ORANGE COUNTY MEDICAL CENTER
FIRE ALARM REPLACEMENT
BID DOCUMENTS

FOR
ORANGE COUNTY
CAPITAL PROJECTS
IOC II, 400 E. SOUTH STREET
ORLANDO, FLORIDA 32801

BY
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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. Performance of all tasks specified in the contract documents shall be the responsibility of the contractor unless specified otherwise. See scope of work.

1.03 SCOPE OF WORK

A. The work consists of the removal of the existing fire alarm and evacuation system. Furnish and install a new addressable fire alarm and evacuation system with all new conduit and wiring as required. See plans and specifications for more information and specifically see the project scope of work on Sheet E-0.1.

1. The Contractor shall furnish and install a complete 24 VDC, closed circuit, fully addressable, electrically supervised, zone annunciated fire alarm system with voice evacuation to replace an existing fire alarm system. The new system shall include but not be limited to all control panels, power supplies, signal initiating devices, audible and visual alarm devices, conduit and wiring, and all accessories required to provide a complete operating system.
2. All devices, appliances, panels, conduit and wiring shall be new.
3. All control/power equipment shall have surge protection installed per NFPA-72 (latest edition) and NEC articles 280 and 800 (latest edition).
4. All wiring entering or leaving a building shall have surge protection installed per NFPA-70 (latest edition).
5. The main Fire Alarm Control Panel (FACP) is located in the Main Electrical Room. The Contractor shall begin the work in this section of the building.
6. It is the design intent that the new fire alarm system shall be constructed while the existing fire alarm system remains functional and operational to serve the facility. As each phase of the project is completed the existing fire alarm system serving that phase of the project shall be removed and taken off of the existing main fire alarm control panel.
7. It is anticipated that until final switchover to the new fire alarm system the facility shall be served by both the existing fire alarm system and the new fire alarm system at the same time.
8. The nature of this contract involves the remodeling of existing facilities. The contractor shall review the contract drawings and specifications and it is highly recommended that the contractor visit the job site to ascertain all existing building conditions including conduit runs, interfacing, interferences, conflicts, discrepancies, etc. The drawings are generally diagrammatic and do not show all existing conditions and/or every accessory to be removed and/or replaced. Drawings are not to be scaled, and site conditions shall govern exact location of all electrical equipment, devices, wiring, conduit, etc.

9. All existing duct mounted smoke detectors and relays shall be replaced with new as part of this project.

B. Other conditions:

1. The contractor shall have all submittals approved by the Engineer and accepted by the Owner prior to the start of active construction.
2. The contractor shall have all equipment and material onsite prior to the start of active construction.
3. The contractor shall submit to the Owner prior to the project pre-construction meeting the following:

   - Schedule of Values
   - Construction Schedule
   - Submittal Schedule
   - Emergency Telephone List including subcontractors and suppliers

5. The contractor shall field verify existing conditions of construction prior to start of active construction.
6. The contractor is responsible for moving furniture and or equipment if necessary to perform the work included in the contract. The contractor is responsible for placing the furniture and or equipment back in its original location. The contractor is responsible for any damages to furniture, equipment, etc., which occur during construction. The contractor shall provide protection for floors, walls, furniture, equipment and any other items that may be subject to damage during the construction periods.
7. The contractor shall coordinate with the Owner on the operation of the security alarm system prior to the start of active construction. The contractor shall submit an action plan for operation of the security alarm system during construction to the Owner for acceptance prior to start of active construction. This active plan shall be in place prior to the start of active construction. Any false security alarms that occur during construction and deemed by the Owner to be the fault of the contractor, the contractor shall pay all cost incurred from the local police and or sheriff department for responding to a false alarm.
8. The contractor shall take digital photos or video of pre-existing conditions of the interior and exterior of the building prior to the start of active construction. Failure to provide digital photos prior to start of construction, places the responsibility on the Contractor to complete the necessary replacement, repairs, and or cleaning as determined by the Owner at no additional cost to the Owner. One CD of photos of the site existing conditions shall be submitted to the Owner.
9. The contractor shall at all times maintain daily cleanup of construction areas. Work areas that are not cleaned by the contractor, and cleaned by the Owner, those costs shall be charged back to the contractor via change order.
10. The contractor shall provide a construction schedule to the Owner's Project Manager prior to the pre-construction meeting. The contractor shall update the construction schedule weekly and submit it to the Owner's Project Manager for review.
11. Use of building restrooms will be allowed only on the floors that the Contractor is doing work. The Contractor shall be required to maintain the

cleanliness of those restrooms. Otherwise, the Contractor shall be responsible for maintaining an outdoor portable toilet that will be locked and secured each workday.

13. The Contractor shall be prohibited from using any of the break rooms/lunch rooms during the construction duration.

1.04 WORK SEQUENCE

A. The facility will remain fully occupied while work is in progress. All outdoor work shall be performed during normal business hours. Normal business hours are defined as 8am to 5pm. Material and equipment deliveries will be during normal business hours. All indoor work shall be performed after hours, unless authorized by the Owner for daytime work.

B. The contractor may work on the weekends at his or her discretion. Weekend work shall not be an additional cost to the Owner. The contractor will coordinate with the Owner for access to the building on weekends and after hours work.

1.05 BUILDING/SITE SECURITY

A. The building shall be secured from unwarranted entry at the end of each workday.

B. Criminal background checks shall be the expense of the Contractor. Criminal background checks shall be completed prior to the start of the construction. The Contractor shall run a criminal background check through the Florida Department of Law Enforcement (FDLE) website of all contractor personnel and subcontractors that will be onsite during the construction duration of the project. The Contractor will submit the results of the background checks electronically to the Orange County Facilities Management Security Section for review. Orange County Facilities Management Security Section will determine who passed their background check. Those who passed will be allowed to receive an Orange County pictured I.D.

1.06 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.

4. Where appropriate, maintain the existing building in a watertight condition throughout the construction period. Repair damage caused by construction operations. Take all precautions necessary to protect the building and it's occupants during the construction period.
5. Confine construction operations to the areas permitted by the contract documents and other Owner directives.
6. Provide protection and safekeeping of material and equipment stored on premises.
7. Contractor will move any stored material and equipment, which interfere with operations of the Owner or other contractors.
8. Comply with Owners' requirements for ingress and egress procedures, prohibitions against firearms, procedures for transportation of workers, safety and fire prevention requirements and pollution control requirements.
9. Contractor to require all employees and subcontractors to wear non-objectionable clothing; prohibit revealing clothing and articles of clothing with offensive writings displayed. The contractor shall require offending personnel to leave the premises until such clothing is changed.
10. Contractor employees and subcontractors will not fraternize with County employees or the general public during the entire construction period.
11. Use of sound equipment (such as boom boxes, stereos, radios, etc.) during day times of construction is not allowed.
12. Smoking is not allowed inside the building.
13. Conduct that is disrespectful, abusive or otherwise objectionable to the Owners' employees or general public will not be allowed at any time during the construction period. Repetitive complaints and violations of the requirements listed above will be cause for dismissal and or permanent removal of offending personnel from the project.
14. Contractor to coordinate with the Owner the site location for storage of equipment, machinery, materials, tools and a construction waste dumpster.
15. Contractor shall at all times keep the premises free of all waste or surplus materials, rubbish and debris, which is caused by contractor employees or subcontractors resulting from their work.
16. Contractor shall maintain a safe work environment to all building occupants during the construction period.

C. Use of the existing building: Where appropriate, maintain the existing building in a weather tight condition throughout the construction period. Repair damage caused by construction operations. Take all precautions necessary to protect the building and it's adjacent occupants during the construction period.

1.07 DISTRIBUTION OF RELATED DOCUMENTS

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

1.08 CONTRACT DOCUMENT FILE

A. Copies of the Contract Documents, Plans, Specifications, Addenda, Change Orders, Architects Supplemental Instructions, approved Shop Drawings, Substitution

Acceptances, etc. shall be placed and maintained at the project site by the Contractor throughout the entire contract period. These documents shall be filed in a manner that allows for ease of retrieval. Documents shall be made available to the Architect/Engineer and the County's representatives throughout this same period.

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. 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

SECTION 01027
APPLICATION 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 01300 – "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.

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 Engineer
c. Project Number
d. Contractor's name and address
e. Date of submittal

2. Arrange the Schedule of Values in a tabular form with separate columns to indicate the following for each item listed:

a. Generic name
b. Related Specification Section
c. Change Orders (numbers) that have affected value
d. Dollar Value
e. Percentage of Contract Sum to the nearest one-hundredth percent, adjusted to total 100 percent

3. Provide a 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. Electrical: Typically shown per specification section, labor and material, per floor.
    g. Logical grouping of specification subsections are permitted.

4. Round amounts off the nearest whole dollar, the total shall equal the Contract Sum.

5. For each part of the Work where an Application for Payment may include materials or equipment, purchased or fabricated and stored, but not yet installed, provide separate line items on the Schedule of Values for initial cost of the materials, for each subsequent stage of completion, and for total installed value of that part of the Work.

6. Margins of Cost: Show line items for indirect costs, and margins on actual costs, only to the extent that such items will be listed individually in Applications for Payment. Each item in the Schedule of Values and Applications for Payment shall be complete including its total cost and proportionate share of general overhead and profit margin.

    a. At the Contractor's option, temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown as separate line items in the Schedule of Values or distributed as general overhead expense.

7. Schedule Updating: Update and resubmit the Schedule of Values when Change Orders or Construction Change Directives result in a change in the contract sum.

1.04 APPLICATIONS FOR PAYMENT

A. Each Application for Payment shall be consistent with previous applications and payments as reviewed by the Owner's representative and paid for by the Owner.

    1. The initial Application for Payment, the Application for Payment at time of

Substantial Completion, and the Final Application for Payment involve additional requirements. See items G, I, J and K of this section.

B. Payment Application Times: The period of construction work covered by each Application of Payment is the period indicated in the Agreement.

C. Payment Application Forms: Use the County's most updated form as the form for Application for Payment. Form given at the Preconstruction Conference.

D. Application Preparation: Complete every entry on the form, including notarization and execution by person authorized to sign legal documents on behalf of the Owner. Incomplete applications will be returned without action.

1. Entries shall match data on the Schedule of Values and Contractor's Construction Schedule. Use updated schedules if revisions have been made.

2. Include amounts of Change Orders and Construction Change Directives issued prior to the last day of the construction period covered by the application.

E. Transmittal: Submit six (6) original executed copies of each Application for Payment to the Project Manager by means ensuring receipt within 24 hours; one copy shall be complete, including waivers of lien and similar attachments, when required.

1. Transmit each copy with a transmittal form listing attachments, and recording appropriate information related to the application in a manner acceptable to the Project Manager.

F. Waivers of Mechanics Lien: With each Application for Payment submit waivers of mechanics liens from subcontractors of sub-subcontractors and suppliers for the construction period covered by the previous application.

1. Submit partial waivers on each item for the amount requested, prior to deduction for retainage, on each item.
2. When an application shows completion of an item, submit final or full waivers.
3. The Owner reserves the right to designate which entities involved in the work must submit waivers.
4. List all Subcontractor's start and finish dates to substantiate any Notice to Owner received by the Project Manager.

G. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of the first Application for Payment include the following:

1. List of principal subcontractors
2. List of principal suppliers and fabricators
3. Schedule of Values
4. Approved Contractor's Construction Schedule (preliminary if not final)
5. Schedule of principal products
6. Schedule of unit prices (if applicable)
7. Submittal schedule (preliminary if not final)
8. List of Contractor's staff assignments

9. List of Contractor's principal consultants
10. Copies of building permits for trades requiring separate permits
11. Copies of authorizations and licenses from governing authorities for performance of the Work
12. Initial progress report
13. Report of Pre-construction Meeting
14. Initial settlement survey and damage report, (if required)
15. Listing of all long lead procurement items monthly applications for payment will be accompanied with updated schedule and review of as-built drawings

H. Interim Application for Payment: Payment will be processed once a month. No applications will be processed without receipt of previous months waiver of lien described in subsection F above. Payment for item will be based on percentage completed as determined and approved by the County Project Manager or invoice for stored materials. Retainage (10%) will be held for all interim applications.

I. Application for Payment at Substantial Completion: Following issuance of the Certificate of Substantial Completion, submit an Application for Payment; this application shall reflect any Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work. Application shall also include all items listed in Part H. above.

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

1. Occupancy permits and similar approvals
2. Warranties (guarantees) and maintenance agreements
3. Test/adjust/balance records
4. Maintenance instructions
5. Start-up performance reports

6. Change-over information related to Owner's occupancy, use, operation and maintenance
7. Final cleaning
8. Application for reduction of retainage, and consent of surety
9. List of incomplete Work, recognized as exceptions to Project Manager's Certificate of Substantial Completion

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

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

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION (Not Applicable)

END OF SECTION 01027

SECTION 01035
MODIFICATION PROCEDURES

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 handling and processing Contract modifications.

B. Related Sections: The following sections contain requirements that relate to this section:

1. Division 1 Section 01300 Submittals for requirements for the Contractor's Construction Schedule.
2. Division 1 Section 01027 Application for Payment for administrative procedures governing applications for payment.
3. Division 1 Section 01631 Product Substitutions for administrative procedures for handling requests for substitutions made after award of the Contract.

1.03 MINOR CHANGES IN THE WORK

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

1.04 CHANGE ORDER PROPOSAL REQUESTS

A. Owner-Initiated Proposal Requests: Proposed changes in the work that will require adjustment to the Contract Sum or Contract Time will be issued by the Project Manager, with a detailed description of the proposed change and supplemental or revised Drawings and Specifications, if necessary.

1. Proposal requests issued by the Project Manager are for information only. Do not consider them instruction either to stop work in progress, or to execute the proposed change.

2. Unless otherwise indicated in the proposal request, within 7 days of receipt of the proposal request, submit to the Project Manager from the Owner's review, an estimate of cost necessary to execute the proposed change.

a. Include a list of quantities of products to be purchased and unit costs, along with the total amount of purchases to be made. Where requested, furnish survey data to substantiate quantities.
b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.

c. Include a statement indicating the effect the proposed change in the work will have on the Contract Time.
d. Contractor and subcontractors will provide a complete detailed labor and material breakdown to justify change order request amount.

B. Contractor-Initiated Change Order Proposal Requests: When latent or other unforeseen conditions in mutual accord with the Owner Representatives findings require modifications to the Contract, the Contractor may propose changes by submitting a request for a change to the Engineer.

1. Include a statement outlining the reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and Contract Time.

2. Include a list of quantities of products to be purchased and unit costs along with the total amount of purchases to be made. Where requested, furnish survey data to substantiate quantities.

3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.

4. Comply with requirements in Section 01631 “Product Substitutions” - if the proposed change in the work requires that substitution of one product or system for a product or system not specified.

5. Contractor and subcontractors will provide a complete detailed labor and material breakdown to justify change order request amounts.

C. Proposal Request Form: Project Manager will transfer the information to the appropriate forms for approval. Use AIA Document G 709 for Change Order Proposal Requests.

D. Proposal Request Form: Use forms provided by the Owner for Change Order Proposals.

1.05 CONSTRUCTION CHANGE DIRECTIVE

A. Construction Change Directive: When the Owner and Contractor are not in total agreement on the terms of a Change Order Proposal Request, the Project Manager may issue a Construction Change Directive instructing the Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.

1. The Construction Change Directive will contain a complete description of the change in the Work and designate the method to be followed to determine change in the Contract Sum or Contract Time.

B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.

1. After completion of the change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

1.06 CHANGE ORDER PROCEDURES

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

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION (Not Applicable)

END OF SECTION 01035

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 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 Engineer/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-15 and 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 Engineer to proceed with cutting and patching does not waive the Engineer's right to later require complete removal and replacement of a part of the Work found to be unsatisfactory.

1.04 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 Divisions 15 and 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 Engineer's opinion, reduce the building's aesthetic qualities, or result in visual evidence of cutting and patching. Remove and replace work cut and patched in a visually unsatisfactory manner.

1. If possible retain the original installer or fabricator to cut and patch the following categories of exposed work, or if it is not possible to engage the original installer or fabricator, engage another recognized experienced and specialized firm:

a. Processed concrete finishes
b. Preformed metal panels
c. Window wall system
d. Stucco and ornamental plaster
e. Acoustical ceilings
f. Carpeting
g. Wall covering
h. HVAC enclosures, cabinets or covers
I. Roofing systems

PART 2 PRODUCTS

2.01 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 Engineer/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 a Carborundum saw or diamond core drill.

4. Comply with requirements of applicable Sections of Division-2 where cutting and patching required excavating and backfilling.

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 a smooth painted surfaces, extend final coat over entire unbroken surfaces containing the patch, after the patched area has received primer and second coat.

3.04 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

SECTION 01095
REFERENCE STANDARDS AND DEFINITIONS

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 DEFINITIONS

A. General: Basic Contract definitions are included in the Conditions of the Contract.

B. Indicated: The term *indicated* refers to graphic representations, notes or schedules on the Drawings, or other Paragraphs or Schedules in the Specifications, and similar requirements in the Contract Documents. Where terms such as shown, noted, scheduled and specified are used, it is to help the reader locate the reference; no limitation on location is intended.

C. Directed: Terms such as directed, requested, authorized, selected, accepted, required, and permitted mean directed by the Project Manager, requested by the Engineer/Project Manager and similar phrases.

D. Approved: This term approved means accepted, where used in conjunction with the Engineer's action on the Contractor's submittals, applications, and requests, is limited to the Engineer's duties and responsibilities as stated in the Conditions of the Contract.

E. Regulations: The term Regulations includes laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the construction industry that control performance of the Work.

F. Furnish: The term furnish is used to mean supply and deliver to the Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

G. Install: The term install is used to describe operations at project site including the actual unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.

H. Provide: The term provide means to furnish and install, complete and ready for the intended use.

I. Installer: An Installer is the Contractor or an entity engaged by the Contractor, either as an employee, subcontractor, or contractor of lower tier for performance of a particular construction activity, including installation, erection, application, and similar operations. Installers are required to be experienced in the operations they are engaged to perform.

1. The term experienced, when used with the term Installer, means having a minimum of five previous projects similar in size and scope to this Project, being familiar with the special requirements indicated, and having complied

with requirements of the authority having jurisdiction.

2. Trades: Use of titles such as carpentry is not intended to imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as carpenter. It also does not imply that requirements specified apply exclusively to trades persons of the corresponding generic name.

J. Project Site is the space available to the Contractor for performance of construction activities, either exclusively or in conjunction with others performing other work as part of the Project. The extent of the Project Site is shown on the Drawings and may or may not be identical with the description of the land on which the Project is to be built.

K. Testing Laboratories: A testing laboratory is an independent entity engaged to perform specific inspections or tests, either at the Project sites or elsewhere, and to report on and, if required, to interpret results of those inspections or tests.

1.03 SPECIFICATION FORMAT AND CONTENT EXPLANATION

A. Specification Format: These Specifications are organized into Divisions and Sections based on the Construction Specifications Institute's 16 Division format and MASTER FORMAT numbering system.

B. Specification Content: This Specification uses certain conventions in the use of language and the intended meaning of certain terms, words, and phrases when used in particular situations or circumstances. These conventions are explained as follows:

1. Abbreviated Language: Language used in Specifications and other Contract Documents is the abbreviated type. Words and meaning shall be interpreted as appropriate. Words that are implied, but not stated shall be interpolated as the sense required. Singular words will be interpreted as plural and plural words interpreted as singular where applicable and the context of the Contract Documents so indicates.

2. Imperative and streamlined language is used generally in the Specifications. Requirements expressed in the imperative mood are to be performed by the Contractor. At certain locations in the text, for clarity, subjective language is used to describe responsibilities that must be fulfilled indirectly by the Contractor, or by others when so noted.

a. The words, shall be shall be included by inference wherever a colon (:) is used within a sentence or phrase.

1.04 INDUSTRY STANDARDS

A. Applicability of Standards: Except where the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copies directly into the Contract Documents to the extend reference. Such standards are made part of the Contract Documents by

reference.

B. Publication Dates: Comply with the standard in effect as of the date of the Contract Documents.

C. Conflicting Requirements: Where compliances with two or more standards are specified, and the standards may establish different or conflicting requirements for minimum quantities or quality levels. Refer requirements that are different, but apparently equal, and uncertainties to the Engineer for a decision before proceeding.

1. Minimum Quantity or Quality Levels: The quantity of 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. In complying with these requirements, indicated numeric values are minimum or maximum, as appropriate for the context of the requirements. Refer uncertainties to the Engineer/Owner for a decision before proceeding.

D. Copies of Standards: Each entity engaged in construction on the Project is required to be familiar with industry standards applicable to that entity's construction activity. Copies of applicable standards are not bound with the Contract Documents.

1. Where copies of standards are needed for performance of a required construction activity. The Contractor shall obtain copies directly from the publication source or any other authorized source.

E. Abbreviations and Names: Trade association names and titles of general standards are frequently abbreviated. Where such acronyms or abbreviations are used in the Specifications or other Contract Documents, they mean the recognized name of the trade association, standards generating organization, authority having jurisdiction, or other entity applicable to the context of the text provision. See Trade Reference List at the end of this Section refer to the Encyclopedia of Associations, published by Gale Research Co., available in most libraries.

1.05 GOVERNING REGULATIONS/AUTHORITIES

A. The Engineer has contacted authorities having jurisdiction where necessary to obtain information necessary the preparation of Contract Documents. Contact authorities having jurisdiction directly for information and decisions having a bearing on the work.

1.06 SUBMITTALS

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

1.07 TRADE REFERENCES

Acronyms for abbreviations used in the Specifications or other Contract Documents mean the

recognized name of the trade association, standards generating organization, authority that have jurisdiction or other entity applicable to the context of the text provision.

AA	Aluminum Association
AABC	Associated Air Balance Council
AAMA	American Engineerural Manufacturer's Association
AAN	American Association of Nurserymen
AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
ACIL	American Council of Independent Laboratories
ACPA	American Concrete Pipe Association
ADC	Air Diffusion Council
AGA	American Gas Association
AHA	American Hardboard Association
AI	Asphalt Institute
AIHA	American Industrial Hygiene Association
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AMCA	Air Movement and Control Association
ANSI	American National Standards Institute
APA	American Plywood Association
ARI	Air Conditioning and Refrigeration Institute
ASA	Acoustical Society of America
ASC	Adhesive and Sealant Council
ASHRAE	American Society of Heating, Refrigerating, and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASPE	American Society of Plumbing Engineers
ASSE	American Society of Sanitary Engineers

ASTM	American Society of Testing of Materials
AWI	Engineerural Woodwork Institute
AWPB	American Wood Preservers Bureau
AWS	American Welding Society
AWWA	American Water Works Association
BHMA	Builders Hardware Manufacturers Association
CISPI	Cast Iron Soil Pipe Institute
CRSI	Concrete Reinforcing Steel Institute
DHI	Door and Hardware Institute
DLPA	Decorative Laminate Products Association
EIMA	Exterior Insulation Manufacturers Association
FGMA	Flat Glass Marketing Association
FM	Factory Mutual Engineering and Research
GA	Gypsum Association
ICBO	International Conference of Building Officials
IEEE	Institute of Electrical and Electronic Engineers
IESNA	Illuminating Engineering Society of North America
MBMA	Metal Building Manufacturer’s Association
ML/SFA	Metal Lath/Steel Framing Association
MSS	Manufacturers Standardization Society of the Valve and Fittings Industry
NAAMM	National Association of Engineerural Metal Mfgs.
NAPA	National Asphalt Pavement Association
NAPF	National Association of Plastic Fabricators (Now DLPA)
NBHA	National Builder's Hardware Association (Now DHI)
NCMA	National Concrete Masonry Association
NEC	National Electric Code

NECA	National Electric Contractors Association
NEII	National Elevator Industry, Inc.
NFPA	National Fire Protection Association
NHLA	National Hardwood Lumber Association
NPA	National Particle board Association
NPCA	National Paint and Coatings Association
NRCA	National Roofing Contractors Association
NSF	National Sanitation Foundation
NWMA	National Woodwork Manufacturers Association (Now NWWDA)
NWWDA	National Wood Window and Door Association (Formerly NWMA)
PDI	Plumbing and Drainage Institute
RFCI	Resilient Floor Covering Institute
RMA	Rubber Manufacturers Association
SDI	Steel Deck Institute
S.D.I.	Steel Door Institute
SGCC	Safety Glazing Certification Council
SHLMA	Southern Hardwood Lumber Manufacturers Association (Now HMA)
SIGMA	Sealed Insulating Glass Manufacturers Association
SMACNA	Sheet Metal and Air Conditioning Contractor’s National Association
SJI	Steel Joist Institute
SPRI	Single Ply Roofing Institute
SSPC	Steel Structures Painting Council
SWI	Steel Window Institute
TCA	Tile Council of America
UL	Underwriters’ Laboratories
WCMA	Wall Covering Manufacturers Association

WRI Wire Reinforcement Institute

WSFI Wood and Synthetic Flooring Institute

1.08 FEDERAL GOVERNMENT AGENCIES

A. Names and titles of federal government standard or Specification producing agencies are frequently abbreviated. The following acronyms or abbreviations referenced in the Contract Documents indicate names of standard of Specification producing agencies of the federal government. Names and addresses are subject to change but are believed to be, but are not assured to be, accurate and up-to-date as of the date of the Contract Documents.

CE Corps of Engineers
(US Department of the Army)
Chief of Engineers - Referral
Washington, DC 20314 (202) 272-0660

CFR Code of Federal Regulations
Available from the Government Printing Office
North Capitol St. Between G and H Street, NW
Washington, DC 20402 (202) 783-3238

(MATERIAL IS USUALLY FIRST PUBLISHED IN THE FEDERAL REGISTER)

CPSC Consumer Product Safety Commission
5401 Westbard Avenue
Washington, DC 20816 (800) 638-2772

CS Commercial Standard
(US Department of Commerce)
Government Printing Office
Washington, DC 20402 (202) 377-2000

DOC Department of Commerce
14th Street and Constitution Ave., NW
Washington, DC 20230 (202) 377-2000

DOT Department of Transportation
400 Seventh St., SW
Washington, DC 20590 (202) 426-4000

EPA Environmental Protection Agency
401 M. St., SW
Washington, DC 20460 (202) 382-2090

FAA Federal Aviation Administration
(U.S. Department of Transportation)
800 Independence Avenue SW
Washington, DC 20590 (202) 366-4000

FCC	Federal Communications Commission 1919 M. Street NW Washington, DC 20554	(202) 632-7000
NBS	National Bureau of Standards (U.S. Department of Commerce) Gaithersburg, MD 20899	(301) 921-1000
OSHA	Occupational Safety and Health Administration (U.S. Department of Labor) Government Printing Office Washington, DC 20402	(202) 523-7001
PS	Product Standard of NBS (U.S. Department of Commerce) Government Printing Office Washington, DC 20402	(202) 783-3238
USDA	U.S. Department of Agriculture Independence Avenue Between 12th and 14 Street, SW Washington, DC 20250	(202) 447-8732

PART 2 PRODUCTS

(Not Applicable)

PART 3 EXECUTION

(Not Applicable)

END OF SECTION 01095

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

B. Construction schedules are specified in Section 01300 Submittals.

1.03 PRE-CONSTRUCTION CONFERENCE

A. Schedule a pre-construction conference and organizational meeting at the project site or other convenient location no later than 20 days after execution of the agreement and prior to commencement of construction activities. Conduct the meeting to review responsibilities and personnel assignments.

B. Attends: The OWNERS, Representative, the Contractor and its superintendent, major subcontractors, manufacturers, suppliers and other concerned parties shall each be represented at the conference by persons familiar with and authorized to conclude matters relating to the work.

C. Agenda: Discuss items of significance that could affect progress including such topics as:

1. Tentative construction schedule
2. Critical Work sequencing and/coordinating
3. Designation of responsible personnel
4. Procedures for processing field decisions and Change Orders
5. Procedures for processing Applications for Payment
6. Distribution of Contract Documents
7. Submittal of Shop Drawings, Product Data and Samples
8. Preparation of record documents
9. Use of the Premises
10. Office, Work and storage areas
11. Equipment deliveries and priorities
12. Safety procedures
13. First aid
14. Security

15. Housekeeping
16. Working hours

D. Contractor must submit at the time of the meeting at least the following items:

1. Schedule of Values
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 Engineer.

3. Do not proceed if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of Work and reconvene the conference at the earliest feasible date.

1.05 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 Engineer, each subcontractor, supplier or other entity concerned with current progress of involved in planning, coordination or performance of future activities with the project and authorized to conclude matters relating to progress.

C. Agenda: Review and correct or approve minutes of the previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to the current status of the Project.

1. Contractor’s Construction Schedule: Review progress since the last meeting. Determine where each activity is in relation to the Contractor’s Construction Schedule, whether on time, ahead, or behind schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.

2. Review the present and future needs of each entity present, including such items as:

a. Interface requirements
b. Time
c. Sequences
d. Deliveries

e. Off-site fabrication problems
f. Access
g. Site utilization
h. Temporary facilities and services
I. Hours of work
j. Hazards and risks
k. Housekeeping
l. Quality and work standards
m. Change Orders
n. Documentation of information for payment requests.

D. Reporting: No later than 3 days after each progress meeting date, distribute copies of minutes of the meeting to each party present and to other parties who should have been present. Include a brief summary, in narrative form, or progress since the previous meeting and report.

PART 2 PRODUCTS

(Not Applicable)

PART 3 EXECUTION

(Not Applicable)

END OF SECTION 01200

SECTION 01300
SUBMITTALS

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 submittals required for performance of the Work, including:

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

B. Administrative Submittals: Refer to other Division-1 Sections and other Contract Documents for requirements for administrative submittals. Such submittals include, but are not limited to:

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

C. The Schedule of Values submittal is included in Section 01027 "Applications for Payment".

1.03 SUBMITTAL PROCEDURES

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

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals and related activities that require sequential activity.

2. Coordinate transmittal of different types of submittals for related elements of the Work so processing will not be delayed by the need to review submittals concurrently for coordination.

a. The Project Manager reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

3. Processing: Allow sufficient review time so that installation will not be delayed as a result of the time required to process submittals, including time for resubmittals.

a. Allow two weeks for initial review. Allow additional time if processing must be delayed to permit coordination with subsequent submittals. The Project Manager will promptly advise the Contractor when a submittal being processed must be delayed for coordination.
b. If an intermediate submittal is necessary, process the same as the initial submittal.
c. Allow two weeks for reprocessing each submittal.
d. No extension of Contract Time will be authorized because of failure to transmit submittals to the Engineer sufficiently in advance of the Work to permit processing.

B. Submittal Preparation: Place a permanent label or title block on each submittal for identification. Indicate the name of the entity that prepared each submittal on the label or title block.

1. Provide a space approximately 4" x 5" on the label or beside the title block on Shop Drawings to record the Contractor's review and approval markings and the action taken.

2. Include the following information on the label for processing and recording action taken.
a. Project name
b. Date
c. Name and address of Engineer
d. Name and address of Contractor
e. Name and address of subcontractor
f. Name and address of supplier
g. Name of manufacturer
h. Number and title of appropriate Specification Section
I. Drawing number and detail references, as appropriate.

C. Submittal Transmittal: Package each submittal appropriately for transmittal and handling. Transmit each submittal from Contractor to Project Manager using transmittal form as provided by the Project Manager. Submittals received from sources other than the Contractor will be returned without action.

1. On the transmittal record relevant information and requests for data. On the form, or separate sheet, record deviations from Contract Document requirements, including minor variations and limitation. Include Contractor certification that information complies with Contract Document requirements.

2. Transmittal Form: As provide by the Project Manager

D. Contractor shall be responsible for cost of re-review of rejected submittals, shop drawing, etc. Costs for re-review shall be reimbursed to the County by deducting the cost from the Contractors monthly progress payments. Costs to be determined by applying the consultants standard billing rates, plus 10% handling by the County.

1.04 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Critical Path Method (CPM) Schedule: Prepare a fully developed, horizontal bar-chart type Contractor's construction schedule. Submit in accordance with Section 01200 Project Meetings.

1. Provide a separate time bar for each significant construction activity. Provide a continuous vertical line to identify the first working day of each week. Use the same breakdown of units of the work as indicated in the Schedule of Values.

2. Within each time bar, indicate estimated completion percentage in 10 percent increments. As work progresses, place a contrasting mark in each bar to indicate Actual Completion.

3. Prepare the schedule on a sheet, series of sheets, stable transparency, or other reproducible media, of sufficient width to show data for the entire construction period.

4. Secure time commitments for performing critical elements of the work from parties involved. Coordinate each element on the schedule with other construction activities; include minor elements involved in the sequence of the work. Show each activity in proper sequence. Indicate graphically sequences necessary for completion of related portions of the work.

5. Coordinate the Contractor's construction schedule with the schedule of values, list of subcontracts, submittal schedule, progress reports, payment request and other schedules.

6. Indicate completion in advance of the date established for Substantial Completion. Indicate Substantial Completion on the schedule to allow time for the Engineer's procedures necessary for certification of Substantial Completion.

B. Phasing: Provide notations on the schedule to show how the sequence of the work is affected by requirements for phased completion to permit work by separate Contractors and partial occupancy by the Owner prior to Substantial Completion.

C. Work Stages: Indicate important stages of construction for each major portion of the work, including testing and installation.

D. Area Separations: Provide a separate time bar to identify each major construction area for each major portion of the work. Indicate where each element in an area

must be sequenced or integrated with other activities.

E. Cost Correlation: At the head of the schedule, provide a two item cost correlation line, indicating precalculated and actual costs. On the line show dollar-volume of work performed as the dates used for preparation of payment requests.

1. Refer to Section Applications for Payment for cost reporting and payment procedures.

F. Distribution: Following response to the initial submittal, print and distribute copies to the Engineer, Owner, subcontractors, and other parties required to comply with scheduled dates. Post copies in the project meeting room and temporary field office.

1. When revision are made distribute to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in construction activities.

G. Schedule Updating: Revise the schedule monthly or activity, where revisions have been recognized or made. Issue the updated schedule concurrently monthly pay request.

1.05 SUBMITTAL LOG

A. After development and acceptance of the Contractor's construction schedule, prepare a complete log of submittals.

1. Coordinate submittals log with the list of subcontracts, schedule of values and the list of products as well as the Contractor's construction schedule.

2. Prepare the log in chronological order; include all submittals required. Provide the following information:

a. Scheduled date for the first submittal
b. Related Section number
c. Submittal category
d. Name of subcontractor
e. Description of the part of the work covered
f. Scheduled date for resubmittal
g. Scheduled date the Engineer's final release or approval.

3. All submittals must be received within the first 25% of contract time.

B. Distribution: Following response to initial submittal, print and distribute copies to the Project Manager, subcontractors, and other parties required to comply with submittal dates indicated. Post copies in the project meeting room and field office.

1. When revision are made, distribute to the same parties and post in

the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in construction activities.

C. Log Updating: Revise the log after each meeting or activity, where revisions have been recognized or made. Issue the updated schedule concurrently with report of each meeting.

1.06 DAILY CONSTRUCTION REPORTS

A. Prepare a daily construction report, recording the following information concerning events at the site; and submit duplicate copies to the Project Manager at weekly intervals:

1. List of subcontractors at the site
2. Approximate count of personnel at the site
3. High and low temperatures, general weather conditions
4. Accidents and unusual events
5. Meetings and significant decisions
6. Stoppages, delays, shortages, losses
7. Meter readings and similar recordings
8. Emergency procedures
9. Orders and requests of governing authorities
10. Change Orders received, implemented
11. Services connected, disconnected
12. Equipment or system tests and start-ups
13. Partial completions, occupancies
14. Substantial Completions authorized

1.07 SHOP DRAWINGS

A. Submit newly prepared information, drawn to accurate scale. Highlight, encircle, or otherwise indicate deviations from the Contract Documents. Do not reproduce Contract Documents or copy standard information as the basis of Shop Drawings. Standard information prepared without specific reference to the Project is not considered a Shop Drawings and will be rejected.

B. Shop Drawings include fabrication and installation drawings, setting diagrams, schedules, patterns, templates and similar drawings. Include the following information:

1. All required dimensions
2. Identification of products and materials included
3. Compliance with specified standards
4. Notation of coordination requirements
5. Notation of dimensions established by field measurement
6. Sheet Size: Except for templates, patterns and similar full-size Drawings on sheets at least 8" x 11" but no larger than 24" x 36".
7. Initial Submittal: Submit one correctable translucent reproducible print and one blue-or black-line print for the Project Manager ☐s review; the reproducible print will be returned.
8. Initial Submittal: Submit 2 blue-or black-line prints for the Engineer's

review; one will be returned.

9. Final Submittal: Submit 5 blue-or black-line prints; submit 7 prints where required for maintenance manuals. 3 prints will be retained; the remainder will be returned.
10. Final Submittal: Submit 3 blue-or black-line prints; submit 5 prints where required for maintenance manuals. 2 prints will be retained; the remainder will be returned.
    a. One of the prints returned shall be marked-up and maintained as a Record Documents.
11. Do not use Shop Drawings without an appropriate final stamp indicating action taken in connections with construction.

C. Coordination drawings are a special type of Shop Drawing that show the relationship and integration of different construction elements that require careful coordination during fabrication or installation to fit in the space provided or function as intended.

1. Preparation of coordination Drawings is specified in section Project Coordination and may include components previously shown in detail on Shop Drawings or Product Data.

2. Submit coordination Drawings for integration of different construction elements. Show sequence and relationships of separate components to avoid any conflict including conflicts in use of space.

3. Contractor is not entitled to additional payments due to lack of compliance with this Section.

1.08 PRODUCT DATA

A. Collect Product Data into a single submittal for each element of construction or system. Product Data includes printed information such as manufacturer's installation instructions, catalog cuts, standard color charts, roughing-in diagrams and templates, standard wiring diagrams and performance curves. Where Product Data must be specially prepared because standard printed data is not suitable for use, submit as "Shop Drawing".

1. Mark each copy to show applicable choices and options. Where printed Product Data includes information on several products, some of which are not required, mark copies to indicate the applicable information. Include the following information:

    a. Manufacturer's printed recommendations
    b. Compliance with recognized trade association standards
    c. Compliance with recognized testing agency standards
    d. Application of testing agency labels and seals
    e. Notation of dimensions verified by field measurement
    f. Notation of coordination requirements
    g. Manufacturers local representative and phone number.

2. Do not submit Product Data until compliance with requirements of the Contract Documents has been confirmed.

3. Preliminary Submittal: Submit a preliminary single-copy of Product Data where selection of options is required.

4. Submittals: Submit six (6) copies of each required submittal. The Project Manager will return two (2) sets to the Contractor marked with action taken and corrections or modifications required.

    a. Unless noncompliance with Contract Document provisions is observed, the submittal may serve as the final submittal.

5. Distribution: Furnish copies of final submittal to installers, subcontractors, suppliers, manufacturers, fabricators, and others required for performance of construction activities. Show distribution on transmittal forms.

    a. Do not proceed with installation until an applicable copy of Product Data applicable is in the Installer's possession.
    b. Do not permit use of unmarked copies of Product Data in connection with construction.

1.09 ENGINEER'S ACTION

A. Except for submittals for record, information or similar purposes, where action and return is required or requested, the Engineer/Project Manager will review each submittal, mark to indicate action taken, and return promptly.

    1. Compliance with specified characteristics is the Contractor's responsibility.

B. Action Stamp: The Engineer/Project Manager will stamp each submittal with a uniform, self-explanatory action stamp. The stamp will be appropriately marked, similarly as follows, to indicate the action taken:

    1. Final Unrestricted Release: Where submittals are marked "No Exceptions Taken", that part of the work covered by the submittal may proceed provided it complies with requirements of the Contract Documents; final acceptance will depend upon that compliance.

    2. Final-But-Restricted Release: When submittals are marked "Made Corrections Noted" that part of the Work covered by the submittal may proceed provided it complies with notations or corrections on the submittal and requirements of the Contract Documents; final acceptance will depend on that compliance.

    3. Returned for Resubmittal: When submittal is marked "Revise and Resubmit", do not proceed with that part of the Work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Revise or prepare a new submittal in accordance with the notations; resubmit without delay. Repeat if necessary to obtain a different action mark.

        a. Do not permit submittals marked "Revise and Resubmit" to be used at the Project site, or elsewhere where work is in progress.

4. Rejected: Submittal does not comply with requirements of the Contract Documents. Submittal must be discarded and entirely new submittal shall be forward to the Project Manager without delay.

PART 2 PRODUCTS

(Not Applicable)

PART 3 Execution

(Not Applicable)

END OF SECTION 01300

SECTION 01400
QUALITY CONTROL SERVICES

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 quality control services.

B. Quality control services include inspections and tests and related actions including reports, performed by independent agencies, governing authorities, and the Contractor. They do not include Contract enforcement activities performed by the Engineer.

C. Inspection and testing services are required to verify compliance with requirements specified or indicated. These services do not relieve the Contractor of responsibility for compliance with Contract Document requirements.

D. Requirements of this Section relate to customized fabrication and installation procedures, not production of standard products.

1. Specific quality control requirements for individual construction activities are specified in the Sections that specify those activities. Those requirements, including inspections and test, cover production of standard products as well as customized fabrication and installation procedures.

2. Inspection, test and related actions specified are not intended to limit the Contractor's quality control procedures that facilitates compliance with Contract Document requirements.

3. Requirements for the Contractor to provide quality control services required by the Engineer, Owner, or authorities having jurisdiction are not limited by provisions of this Section.

1.03 GENERAL QUALITY CONTROL

A. The Contractor shall be responsible for maintaining and ensuring quality control over subcontractors, suppliers, manufacturers, materials, equipment, products, services, site conditions and workmanship to product work of specified quality. The completed work shall be of high quality throughout.

1.04 WORKMANSHIP

A. Comply with well-known standards recognized be each trade except when more

restrictive tolerances or specified requirements indicate more rigid standards or more precise workmanship.

B. Perform work by persons qualified to produce workmanship of specified quality. Said qualifications shall be determined by well-known standards recognized by the trade for each respective portion of contract work.

C. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration and racking.

1.05 MANUFACTURER'S INSTRUCTIONS

A. Comply with instructions in full detail, including each step in sequence. Should instructions conflict with Contract Documents, request clarification from Engineer before proceeding.

1.06 MANUFACTURER'S CERTIFICATES

A. When required by individual Specifications Section, submit manufacturer's certificate and supporting documentation, in duplicate, that products meet or exceed specified requirements.

B. ASBESTOS FREE MATERIALS - Manufacturer and/or supplier shall provide a written and notarized statement on manufacturer's company letterhead to certify and warrant that product (s) utilized on project are asbestos free.

1.07 MANUFACTURERS FIELD SERVICES

A. When specified in respective Specification Sections, require supplier and/or manufacturer to provide qualified personnel to observe field conditions, conditions of surfaces and installation, quality of workmanship, test, adjust and balance of equipment as applicable and to make appropriate recommendations.

B. Representative shall submit written report to Owner listing observations, recommendations, and certifying full conformance and compliance with manufacturer's standards or requirements.

1.08 RESPONSIBILITIES

A. The Owner shall provide inspections, tests and similar quality control services, specified in individual Specification Sections and these services include those specified to be performed by an independent agency and not by the Contractor.

B. The Contractor shall cover all costs of tests or inspections to evaluate means and methods of installation performed as a substitution and not as originally specified.

1. Retesting: The Contractor is responsible for retesting where results of required inspections, test or similar services prove unsatisfactory and do not indicate compliance with Contract Documents requirements, regardless of whether the original test was the Contractor's responsibility.

a. Cost of retesting construction revised or replaced by the Contractor

is the Contractor's responsibility, where required tests were performed on original construction.

2. Associated Services: The Contractor shall cooperate with agencies performing required inspections, tests and similar services and provide reasonable auxiliary services as requested. Notify the agency sufficiently in advance of operations to permit assignment of personnel. Auxiliary services required include, but are not limited to:
   a. Providing access to the work and furnishing incidental labor and facilities necessary to facilitate inspections and tests.
   b. Taking adequate quantities of representatives samples of materials that require testing or assisting the agency in taking samples.
   c. Providing facilities for storage and curing the test samples.
   d. Providing the agency with a preliminary design mix proposed for use for materials mixes that require control by the testing agency.
   e. Security and protection of samples and test equipment at the Project site.

C. Duties of the Testing Agency: The independent testing agency engages to perform inspections, sampling and testing of materials and construction specified in individual Specification Sections shall cooperate with Engineer and Contractor in performance of its duties, and shall provide qualified personnel to perform required inspections and tests.

1. The agency shall notify the Engineer and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.

2. The agency is not authorized to release, revoke, alter or enlarge requirements of the Contract Documents, or approve or accept any portion of the Work.

3. The agency shall not perform any duties of the Contractor.

D. Coordination: The Contractor and each agency engaged to perform inspection, tests and similar services shall coordinate the sequence of activities to accommodate required services with a minimum of delay. In addition, the Contractor and each agency shall coordinate activities to avoid the necessity of removing and replacing construction to accommodate inspections and tests.

1. The Contractor is responsible for scheduling times for inspections, tests, taking samples and similar activities.

1.09 SUBMITTALS

A. Qualification for Service Agencies: Engage inspection and testing service agencies, including independent testing laboratories, which are prequalified as complying with "Recommended Requirements for Independent Laboratory qualification" by the American Council of Independent Laboratories, and which specialize in the types of inspections and tests to be performed.

1. Each independent inspection and testing agency engages on the Project

shall be authorized by authorities having jurisdiction to operate in the State in which the Project is located.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION

3.01 REPAIR AND PROTECTION

A. General: Upon completion of inspection, testing, sample-taking and similar services, repair damaged construction and restore substrates and finished to eliminate deficiencies, including deficiencies in visual qualities of exposed finishes. Comply with Contract Document requirements for “Cutting and Patching”.

B. Protect construction exposed by or for quality control service activities, and protect and repaired construction.

C. Repair and protection in the Contractor’s responsibility regardless of the assignment of responsibility for inspection, testing or similar services.

END OF SECTION 01400

SECTION 01600
MATERIALS AND EQUIPMENT

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 governing the Contractor's selection of products for use in the Project.

B. The Contractor's Construction Schedule and the Schedule of Submittals are included under Section 01300 -Submittals.

C. Standards: Refer to Section “Definitions and Standards” for applicability of industry standards to products specified.

D. Administrative procedures for handling requests for substitutions made after award of the Contract are included under Section 01300 “Product Substitution”.

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 term “material”, “equipment”, “system” and terms of similar intent.

    a. “Named Products” are items identified by manufacturer’s product name, including make or model designation, indicated 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 of the United States and its possessions; or produced or supplied by entities substantially owned (more than 50 percent) by persons who are not citizens nor living within the United States and its possessions.

2. “Materials” are products that are 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 SUBMITTALS

A. Product List Schedule: Prepare a schedule showing products specified in a tabular form acceptable to the Project Manager. Include generic names of products required. Include the manufacturer’s name and proprietary product names for each item listed.

1. Coordinate the product list schedule with the Contractor’s Construction Schedule and the Schedule of Submittals.
   a. Related Specification Section Number
   b. Generic name used in Contract Documents
   c. Proprietary name, model number and similar designations.
   d. Manufacturers name and address
   e. Suppliers name and address
   f. Installers name and address
   g. Projected delivery date, or time span of delivery period.

2. Initial Submittal: Within 30 days after date of commencement of the work, submit 3 copies of an initial product list schedule. Provide a written explanation for omissions of data, and for known variations from Contract requirements.

   a. At the Contractor’s option, the initial submittal may be limited to product selections and designations that must be established early in the Contract period.

3. Complete Scheduled: Within 45 days after date of commencement of the Work, submit 3 copies of the completed product list schedule. Provide a written explanation for omissions of data, and for known variations from Contract requirements.

4. Engineers Action: The Engineer will respond in writing to the Contractor within 2 weeks of receipt of the completed product list schedule. No response within this time period constitutes no objection to listed manufacturers on products, but does not constitute a waiver of the requirement that products comply with Contract Documents. The Engineer’s response will include the following:

   a. A list of unacceptable product selections, containing a brief explanation of reasons for this action.

1.05 QUALITY ASSURANCE

A. Source Limitations: To the fullest extent possible, provide products of the same kind, from a single source.

B. Compatibility of Options: When the Contractor is given the option of selecting

between two 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. Nameplates: Except for required labels and operating data, do not attach or imprint manufacturers or producer's nameplates or trademarks on exposed surfaces of products which will be exposed to view in occupied spaces or on the exterior.

1. Labels: Locate required product labels and stamps on a concealed surface or, where required for observation after installation, on accessible surface that is 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 which 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
f. Additional pertinent information

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver, store and handle products in accordance with the manufacturer's recommendations, using means and methods that will prevent damage, deteriorating 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 ensure 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 the manufacturer's original sealed container of 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 weather tight enclosure, with ventilation adequate in 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, unused at the time of installation.

1. Provide products complete with all accessories, trim, finish, safety guards and other devices and details needed for a complete installation and for the intended use and effect.

2. Standard Products: Where available, provide standard products of types that have been produced and used successfully in similar situation on other projects.

B. Product Selection Procedures: Product selection is governed by the Contract Documents and governing regulations, not by previous project experience. Procedures governing product selection include the following:

1. Proprietary Specification Requirements: Where only a single product or manufacturer is named, provide the product indicated. No substitutions will be permitted.

a. Where products or manufacturers are specified by name, accompanied by the term "or equal" or "or approved equal" comply with the Contractor Document provisions concerning "substitutions" to obtain approval for use of an unnamed product.

2. Non-Proprietary Specifications: When the Specifications list products or manufacturers that are available and may be incorporated in the Work, but do not restrict the Contractor to use of those products only, the Contractor may propose any available product that complies with Contract requirements. Comply with Contract Document provisions concerning "substitutions" to obtain approval for use of an unnamed product.

3. Descriptive Specification Requirements: Where Specifications describe a product or assembly, listing exact characteristics required, with or without use of a brand or trade name, provide a product or assembly that provides the characteristics and otherwise complies with Contract requirements.

4. Performance Specification Requirements: Where Specifications require compliance with performance requirements, provide products that comply with these requirements, and are recommended by the manufacturer for the application indicated.

a. Manufacturer's recommendations may be contained in published product literature, or by the manufacturer's certification of performance.

5. Compliance with Standards, Codes and Regulations: Where the Specifications only require compliance with an imposed code, standard or regulation, select a product that complies with the standards, codes or regulations specified.

6. Visual Matching: Where Specifications require matching an established Sample, the Engineer's decision will be final on whether a proposed product matches satisfactorily.

a. Where no product available within the specified category matches satisfactorily and also complies with other specified requirements, comply with provisions of the Contract Documents concerning "substitutions" for selection of a matching product in another product category, or for noncompliance with specified requirements.

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

8. Asbestos free materials: No products containing asbestos shall be used for any part of the work for this product. Provide verification.

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 project 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

SECTION 01631
PRODUCTS SUBSTITUTIONS

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 handling request for substitutions made during bidding and after award of the Contract.

B. The Contractor's Installation Schedule and the Schedule of Submittals are included under Section "Submittals".

C. Standards: Refer to Section "Definitions and Standards" for applicability of industry standards to products specified.

D. Procedural requirements governing the Contractor's selection of products and product options are included under Section "Materials and Equipment".

1.03 DEFINITIONS

A. Definitions used in this Article are not intended to change or modify the meaning of other terms used in the Contract Documents.

B. Substitutions: The Contract will be awarded based on the design, methods, materials and/or equipment as addressed in the Contract Drawings and/or described in the Contract Specifications, without any consideration for substitution or "or-equal" replacement. Addressing, describing or naming an item is intended to establish the type, function, characteristics and quality required in order to establish a base for bidding.

a. Within thirty (30) days after Contract award, the Contractor may submit for approval substitutes for any equipment and/or material. In addition to the product documents, a written certification shall accompany the documentation indicating that the proposed substitute will have the same characteristics, will perform in accordance with the design requirements and that complies with all the requirements set for in the Contract. Any additional information required by the Owner or County Representative shall be provided by the Contractor. Rejection of any proposed substitute will be considered final and the Contractor shall not get into any agreement with manufacturers or providers until the submittal has been finally approved.

b. The submission of this documentation shall follow the requirements set quality required in order to establish a base for bidding.

1.04 SUBMITTALS

A. Substitution Request Submittal: Request for substitution will be considered if received within thirty (30) days after commencement of the Work. As long as this time allowance will not impact the construction schedule.

1. Submit three (3) copies of each request for substitution for consideration. Submit requests in the form and in accordance with procedures required for Change Order proposals.

2. Identify the product, or the fabrication or installation method to be replaced in each request. Include related Specification Section and Drawing numbers. Provide complete documentation showing compliance with the requirements for substitution, and the following information, as appropriate:
   a. Product Data, including Drawings, and descriptions of products, fabrication and installation procedures.
   b. Samples, where applicable or requested.
   c. A detailed comparison of significant qualities of the proposed substitution with those of the Work specified. Significant qualities may include elements such as size, weight, durability, performance and visual effect.
   d. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by the Owner and separate Contractors that will become necessary to accommodate the proposed substitution.
   e. A statement indicating the substitution's effect on the Contractor's construction schedule compared to the schedule without approval of the substitution. Indicate the effect of the proposed substitution on overall Contract Time.
   f. Cost information, including a proposal of the net change, if any in the Contract Sum.
   g. Certification by the Contractor that the Substitution proposed is equal-to or better in every significant respect to that required by the Contract Documents, and that it will perform adequately in the application indicated. Include the contractor's waiver of rights to additional payment or time that may subsequently become necessary because of the failure of the substitution to perform adequately.

3. Engineer's Action: Within two weeks of receipt of the request for substitution, the Engineer will request additional information or documentation necessary for evaluation of the request if needed. Within two (2) weeks of receipt of the request, or one week of receipt of the additional information or documentation, which ever is later, the Engineer will notify the Contractor of acceptance or rejection of the proposed substitution. If a decision on use of a proposed substitute cannot be made or obtained within the time allocated, use the project specified by name. Decision on the use of a product substitution or its rejection by the Engineer is

considered final. Acceptance will be in the form of a Change Order.

PART 2 PRODUCTS

2.01 SUBSTITUTIONS

A. Conditions: The Contractor's substitution request will be received and considered by the Engineer when one or more of the following conditions are satisfied, as determined by the Engineer; otherwise request will be returned without action except to record noncompliance with these requirements.

1. Extensive revisions to Contract Documents are not required.

2. Proposed changes are in keeping with the general intent of Contract Documents.

3. The request is timely, fully documented and properly submitted.

4. The specified product or method of construction cannot be provided within the Contract Time. The request will not be considered if the product or method cannot be provided as a result of failure to pursue the work promptly or coordinate activities properly.

5. The specified product or method of construction cannot receive necessary approval by a governing authority, and the requested substitution can be approved.

6. A substantial advantage is offered to the Owner, in terms of cost, time, energy conservation or other considerations of merit, after deducting offsetting responsibilities the Owner may be required to bear. Additional responsibilities for the Owner may include additional compensation to the Engineer for redesign and evaluation services, increased cost of other construction by the Owner or separate Contractors, and similar consideration.

7. The specified product or method of construction cannot be provided in a manner that is compatible with other materials, and where the Contractor certifies that the substitution will overcome the incompatibility.

8. The specified product or method of construction cannot be coordinated with other materials, and where the Contractor certifies that the proposed substitution can be coordinated.

9. The specified product or method of construction cannot provide a warranty required by the Contract Documents and where the Contractor certifies that the proposed substitution provide the required warranty.

B. The Contractor's submittal and Project Manager's acceptance of Shop Drawings, Product Data or Samples that relate to construction activities not complying with the Contract Documents does not constitute an acceptable or valid request for substitution, nor does it constitute approval.

C. Substitution request constitutes a representation that the Contractor:

1. Has investigated proposed product and determined that it meets or exceeds, in all respects, specified product.

2. Will provide the same warranty for substitution as for specified product.

3. Will coordinate installation and make other changes which may be required for work to be complete in all respects.

4. Waives claims for additional costs which may subsequently become apparent. All costs associated with the substitution will be paid by the Contractor regardless of approvals given, and regardless of subsequent difficulties experienced as a result of substitutions.

END OF SECTION 01631

SECTION 01700
PROJECT CLOSE-OUT

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.

1.01 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 Division 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 in 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 Engineer/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 Engineer or Owner’s final inspection list of items to be completed or corrected, stating that each item has been completed or otherwise resolved for acceptance, and the list has been endorsed and dated by the Project Manager.

4. Submit final meter readings for utilities, a measured record of stored fuel and similar data as of the date of Substantial Completion, or when the Owner took possession of the responsibility for corresponding elements of the Work.

5. Submit consent of surety to final payment.

6. Submit a final liquidated damages settlement statement

7. Submit evidence of final, continuing insurance coverage complying with insurance requirements.

B. Reinspection Procedure: The Engineer will reinspect the work upon receipt of notice that the work, including inspection list items from earlier inspections, has been completed, except items whose completion has been delayed because of

circumstances acceptable to the Engineer.

1. Upon completion of reinspection, the Engineer will prepare a certification of final acceptance, or advise the contractor of work that is incomplete or of obligations that have not been fulfilled but are required for final acceptance.

1.05 RECORD DOCUMENT SUBMITTALS

A. General: Do not use record documents for construction purposed; protect from deterioration and loss in a secure, fire-resistive location; provide access to record documents for the Engineer's reference during normal working hours.

B. Record Drawings: Maintain a clean, undamaged set of blue or black line white-prints of Contract Drawings and Shop Drawings. Mark the set to show the actual installation; where the installation varies substantially from the work as originally shown. Mark whichever drawing is most capable of showing conditions fully and accurately; where Shop Drawings are used, record a cross-reference at the corresponding location on the 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-Builts 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 Engineer for the Owner's records.

D. Record Project Data: Maintain one copy of each Product Data submittal. Mark these documents to show significant variation in actual work performed in comparison with information submitted. Include variations in products delivered to the site, and from the manufacturer's installation instructions and

recommendations. Give particular attention to concealed products and portions of the Work which cannot otherwise be readily discerned later by direct observation. Note related Change Orders and mark-up of record drawings and Specifications.

1. Upon completion of mark-up, submit complete set of record Product Data in the three ring binder (indexed) to the Engineer for the Owner's records.

E. Record Sample Submitted: Immediately prior to the date or dates of substantial completion, the Contractor will meet at the site with the Engineer and the Owners 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 Owners 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 manufacturers representatives. All items to be provided or competed prior to Certificate of Substantial Completion being issued by the Owner. Include a detailed review of the following items:

1. Maintenance manuals
2. Record documents
3. Spare parts and materials
4. Tools
5. Lubricants

6. Fuels
7. Identification systems
8. Control sequences
9. Hazards
10. Cleaning
11. Warranties and bonds
12. Maintenance agreements and similar continuing commitments
13. On site instructions to County maintenance personnel on major systems operations such as HVAC as per technical specifications.

B. As part of instruction for operating equipment, demonstrate the following procedures, prior to the Owner issuing Certificate of Substantial Completion:

1. Start-up
2. Shutdown
3. Emergency operations
4. Noise and vibration adjustments
5. Safety procedures
6. Economy and efficiency adjustments

2.02 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.

3.02 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. Pest Control: Engage an experienced exterminator to make a final inspection, and rid the Project of rodents, insects and other pests.

D. Removal of Protection: Remove temporary protection and facilities installed for protection of the work during construction.

E. 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

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 manufacturers standard warranties on products and special warranties.

1. Refer to the General Conditions for terms of the Contractor's special warranty of workmanship and materials.

2. General close-out requirements are included in Section "Project Close-Out".

3. Specific requirements for warranties for the work and products and installations that are specified to be warranted, are included in the individual Sections of Division 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 Engineer's representative, at the beginning of the tenth month of the warranty period, in conducting an on site review and evaluation of all items of equipment, materials and workmanship covered by the warranties and guarantees. Contractor shall act promptly and without cost to the County to correct all defects, problems, or deficiencies determined as such by the Engineer/Owner during on the site review.

B. All warranties and guarantees shall commence on the date of Substantial Completion except for items which are determined by the County to be incomplete or a non-comply status at the time of Substantial Completion. The coverage commencement date for warranties and guarantees of such work shall be the date of the County's acceptance of that work.

C. Warranty period shall be manufacturer's standard for product specified except where specific warranty periods are specified in individual sections. But in no case less than one year.

1.05 SUBMITTALS

A. Submit written warranties to the Owner prior to the date certified for Substantial Completion. If the Engineer's Certificate of substantial Completion designates a commencement date for warranties other than the date of Substantial Completion for the Work, or a designated portion of the work, submit written warranties upon request of the Project Manager.

1. When a designated portion of the work is completed and occupied or used by the Owner, by separate agreement with the Contractor during the construction period, submit properly executed warranties to the Project Manager within fifteen days of completion of that designated portion of the work.

B. When a special warranty is required to be executed by the Contractor, or the Contractor and a subcontractor, supplier or manufacturer, prepared a written document that contains appropriate terms and identification, ready for executing by the required parties. Submit a draft to the Engineer for approval prior to final execution.

1. Refer to individual Sections of Division 2 through 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 1/2“ by 11" paper.

1. Provide heavy paper dividers with Celluloid covered tabs for each separate warranty. Mark the tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product, and the name, address and telephone number of the installer.

2. Identify each binder on the front and the spine with the typed or printed title “WARRANTIES AND BONDS’, the Project title or name, and the name of the Contractor.

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

SECTION 02070
DEMOLITION AND ALTERATIONS

PART 1 - GENERAL

1.1 SCOPE OF SECTION

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

1.2 REFERENCE STANDARDS

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

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

1. ASTM E 84 Surface Burning Characteristics of Building Materials

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

2. NFPA 241 Safeguarding Construction, Alteration and Demolition Operations

B. Unknown Conditions: Work shall not include Contractor's identification, detection, abatement, encapsulation or removal of asbestos or similar hazardous substance(s). In the course of performing this work, if such material/product is encountered, discontinue work and remove workers from the project until such material/product and hazards connected therewith are abated, encapsulated or removed, or it is determined that no hazard exists. An extension of time will be granted for delay resulting form such condition and correction.

C. Structural Members: Do not cut any building structure without written authorization of the Engineer. Any structural members intentionally cut without proper authorization or accidentally cut shall be restored to their original integrity and condition.

1. Do not cut or drill existing concrete pre cast slabs. Use existing chases and openings at floor slabs.

1.3 PROTECTION

A. Safety: Before commencing any work, provide warning signs, lights, barricades, fences, rails and other safety devices. Exercise caution when working adjacent to spaces occupied by Owner's personnel.

B. Temporary Work: Do not commence demolition until temporary shoring, bracing,

partitions, exits and other support and protective measures have been properly installed.

C. Temporary Partitions and Closures: Where new existing openings are created and where work is in occupied spaces or existing equipment, provide physical separation and protect from dust and moisture with partitions and closures. Maintain partitions in place until new work has been completed and provide protection from the weather and dust. Before and during removal, clean all surfaces with a vacuum cleaner (to avoid dispersion of dust).

D. Portable Coverings: For minor interior alterations, where acceptable to Engineer, flame-proofed drop cloths may be used. Plastic sheet or film shall not be used for any purpose for interior work.

E. Air filters: During Demolition provide portable air filters as part of dust control.

F. Wet mop concrete floors slab to control dust.

G. Vacuum space every day at the completion of the work.

1.4 SECURITY

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

1.5 HOUSEKEEPING

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

1.6 OCCUPIED SPACES

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

PART 2 - MATERIALS

2.1 LUMBER

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

2.2 TAPE

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

2.3 TEMPORARY CLOSURES

A. In addition to the requirements of Division 0, flame-proofed drop cloths (not flammable plastic), UL labeled, flame spread maximum fifteen (15). Where daylight would be beneficial for workmanship and reduce need of artificial illumination, translucent polyvinyl chloride film reinforced in diamond pattern with 33 nylon threads per foot. Acceptable: "Griffolyn" T-55-FR, Reed Industries, Box 248, Houston, Texas 77233, phone 800/231-6074.

PART 3 - EXECUTION

3.1 RELOCATION AND REMOVAL

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

3.2 PORTABLE COVERINGS

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

3.3 DEMOLITION

A. Plan of Operations: Establish procedures for safe removal of parts by methods that will not transmit excessive vibrations to or eccentric loads on building structure, create a nuisance, damage existing work that will remain, nor endanger either workmen, public, occupants nor adjacent work.

B. Supervision: Cut and demolish under supervision of a competent foreman, capable of identifying hazardous conditions and authorized to promptly take corrective action to eliminate them.

C. Precaution: Exercise care to avoid unnecessary damage to work that shall remain or stored for reinstallation.

D. Hole Cutting: Neatly cut holes where necessary. Keep area and debris covered to minimize creation of dust. Use care and adjust hole locations as required to minimize necessary cutting.

E. Finishes and Exposed Work: Cut to true and straight lines to permit satisfactory refinishing or connection to new work. Remove items to nearest full piece that is to remain.

3.4 OWNERSHIP OF MATERIALS

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

3.5 SALVAGE OPERATIONS

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

3.6 REMOVAL

A. Remove materials/products/equipment which are not to be reused in the work in an orderly and careful manner so as not to endanger or damage adjacent work which is to remain. When removing nails by claw hammer, place a small piece of wood under the hammer head to keep claws at right angle to the nail and prevent damage to the surface.

3.7 DISPOSAL

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

3.8 CLEANING

A. Clean surfaces as described in specifications.

3.9 CONCRETE

A. Exercise due caution in cutting and patching, chipping or general concreting so as not to deface that portion of the existing structure which is to remain. Should any such impairment occur, immediately clean or restore to original condition at no cost to Owner.

B. Do not cut or core existing, concrete slabs, columns, joist and beams.

C. Patch all existing slab penetrations caused by demolition of mechanical and plumbing with rated and UL listed seal assembly.

3.10 UTILITIES AND RELATED EQUIPMENT, PLUMBING, AND ELECTRICAL WORK

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

3.11 DRYWALL

A. Within the limits of the work, should any portion of existing drywall surfaces be deemed broken, scratched or unfastened, spackle with drywall compound, refasten or other wise repairs. Where indicated on the drawings for drywall to be removed remove the covering, base, drywall board, vapor barrier, insulation, metal furring and all fasteners.

B. Within the limits of the work make repairs to drywall partitions. Match adjacent surfaces or as indicated on the drawing.

C. Within the limits of tile work remove drywall ceiling and ceiling suspension system and supports, fasteners complete.

3.12 PATCHING

A. Where removals leave holes and damaged surfaces exposed in the finished work, patch and repair these holes and damaged surfaces to match adjacent finished surfaces. Where new work is to be applied to existing surfaces, perform removals and patching in a manner to produce surfaces suitable for receiving new work. Finished surfaces of patched area shall flush with the adjacent existing surface and shall match the existing adjacent surface as closely as possible as to texture and finish.

B. Where patching occurs on rated partition or fireproofed structure repair to match existing UL rated system to match code required hourly rating for assembly.

3.13 FIRESTOPPING AND DRAFT STOPPING

A. Fire stop existing holes at all masonry walls, floor slab & GWB Partitions.

B. Fire stop existing open ends of conduits:

C. Fire stop all existing plumbing penetrations at existing rated walls and floors.

D. Draft stop all penetrations into cavity of walls, ceilings, and attics. They include all penetrations created by new work or penetrations left by removal of existing proposed for replacement.

3.14. ACOUSTICAL LAY-IN CEILING

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

END OF SECTION 02070

SECTION 07841
THROUGH-PENETRATION FIRESTOP SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes through-penetration firestop systems for penetrations through the fire-resistance-rated assemblies, including both new and existing empty openings and new and existing openings containing penetrating items.

B. Firestopping shall be designed and constructed in accordance with the Florida Building Code, Florida Fire Code and Uniform Fire Safety Standards as adopted by the State Fire Marshall and latest addendums

1.3 PERFORMANCE REQUIREMENTS

A. General: For the following constructions, provide through-penetration firestop systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of assembly penetrated.

1. Fire-resistance-rated load-bearing walls, including partitions, with fire-protection-rated openings.
2. Fire-resistance-rated non-load-bearing walls, including partitions, with fire-protection-rated openings.
3. Fire-resistance-rated roof assemblies.

4. F-Rated Systems: Provide through-penetration firestop systems with F-ratings indicated, as determined per ASTM E 814, but not less than that equaling or exceeding fire-resistance rating of constructions penetrated.

5. T-Rated Systems: For the following conditions, provide through-penetration firestop systems with T-ratings indicated, as well as F-ratings, as determined per ASTM E 814, where systems protect penetrating items exposed to potential contact with adjacent materials in occupiable floor areas:

Penetrations located outside wall cavities.
Penetrations located outside fire-resistive shaft enclosures.

Penetrations located in construction containing fire-protection-rated openings.
Penetrating items larger than 4-inch (100-mm-) diameter nominal pipe or 16 sq. in. (100 sq. cm) in overall cross-sectional area.

6. For through-penetration firestop systems exposed to view, traffic, moisture, and physical damage, provide products that after curing do not deteriorate when exposed to these conditions both during and after construction.

7. For piping penetrations for plumbing and wet-pipe sprinkler systems, provide moisture-resistant through-penetration firestop systems.
8. For floor penetrations with annular spaces exceeding 4 inches (100 mm) in width and exposed to possible loading and traffic, provide firestop systems capable of supporting floor loads involved either by installing floor plates or by other means.
9. For penetrations involving insulated piping, provide through-penetration firestop systems not requiring removal of insulation.

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

1.4 SUBMITTALS

A. Product Data: For each type of through-penetration firestop system product indicated.

B. Shop Drawings: For each through-penetration firestop system, show each kind of construction condition penetrated, relationships to adjoining construction, and kind of penetrating item. Include firestop design designation of testing and inspecting agency acceptable to authorities having jurisdiction that evidences compliance with requirements for each condition indicated.

1. Submit documentation, including illustrations, from a qualified testing and inspecting agency that is applicable to each through-penetration firestop system configuration for construction and penetrating items.
2. Where Project conditions require modification of qualified testing and inspecting agency's illustration to suit a particular through-penetration firestop condition, submit illustration, with modifications marked, approved by through-penetration firestop system manufacturer's fire-protection engineer.

C. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of Engineers and owners, and other information specified.

D. Product Certificates: Signed by manufacturers of through-penetration firestop system products certifying that products furnished comply with requirements.

E. Product Test Reports: From a qualified testing agency indicating through-penetration firestop system complies with requirements, based on comprehensive testing of current products

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed through-penetration firestop systems similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

B. Installer Qualifications: An experienced installer who is qualified by having the necessary experience, staff, and training to install manufacturer's products per specified requirements. A manufacturer's willingness to sell its through-penetration firestop system products to Contractor or to an installer engaged by Contractor does not in itself confer qualification on buyer.

C. Source Limitations: Obtain through-penetration firestop systems, for each kind of penetration and construction condition indicated, from a single manufacturer.

D. Fire-Test-Response Characteristics: Provide through-penetration firestop systems that comply with the following requirements and those specified in "Performance Requirements" Article:

1. Firestopping tests are performed by a qualified testing and inspecting agency. A qualified testing and inspecting agency is UL, or another agency performing testing and follow-up inspection services for firestop systems acceptable to authorities having jurisdiction.

2. Through-penetration firestop systems are identical to those tested per ASTM E 814. Provide rated systems complying with the following requirements:

a. Through-penetration firestop system products bear classification marking of qualified testing and inspecting agency.

b. Through-penetration firestop systems correspond to those indicated by reference to through-penetration firestop system designations listed by the following:

UL in "Fire Resistance Directory."

E. Preinstallation Conference: Conduct conference at Project site.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver through-penetration firestop system products to Project site in original, unopened containers or packages with intact and legible manufacturers' labels identifying product and manufacturer; date of manufacture; lot number; shelf life, if applicable; qualified testing and inspecting agency's classification marking applicable to Project; curing time; and mixing instructions for multicomponent materials.

B. Store and handle materials for through-penetration firestop systems to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not install through-penetration firestop systems when ambient or substrate temperatures are outside limits permitted by through-penetration firestop system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.

B. Ventilate through-penetration firestop systems per manufacturer's written instructions by natural means or, where this is inadequate, forced-air circulation.

1.8 COORDINATION

A. Coordinate construction of openings and penetrating items to ensure that through-penetration firestop systems are installed according to specified requirements.

B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate through-penetration firestop systems.

C. Notify Owner's inspecting agency at least seven days in advance of through-penetration firestop system installations; confirm dates and times on days preceding each series of installations.

D. Do not cover up through-penetration firestop system installations that will become concealed behind other construction until Owner's inspecting agency and building inspector, if required by authorities having jurisdiction, have examined each installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Hilti Construction Chemicals, Inc.
2. Nelson Firestop Products.
3. 3M Fire Protection Products.
4. Or approved equivalent

2.2 FIRESTOPPING

A. General: Where UL-classified systems are indicated, they refer to the alpha-alpha-numeric designations listed in UL's "Fire Resistance Directory" under product Category XHEZ.

B. Compatibility: Provide through-penetration firestop systems that are compatible with one another, with the substrates forming openings, and with the items, if any, penetrating through-penetration firestop systems, under conditions of service and application, as demonstrated by through-penetration firestop system manufacturer based on testing and field experience.

C. Accessories: Provide components for each through-penetration firestop system that are needed to install fill materials and to comply with "Performance Requirements" Article. Use only components specified by through-penetration firestop system manufacturer and approved by the qualified testing and inspecting agency for firestop systems indicated. Accessories include, but are not limited to, the following items:

1. Permanent forming/damming/backing materials, including the following:

   Slag-/rock-wool-fiber insulation.
   Sealants used in combination with other forming/damming/backing materials to prevent leakage of fill materials in liquid state.
   Fire-rated form board.
   Fillers for sealants.

2. Temporary forming materials.
3. Substrate primers.
4. Collars.
5. Steel sleeves.

2.3 FILL MATERIALS

A. General: Fill materials are those referred to in directories of the referenced testing and inspecting agencies as fill, void, or cavity materials.

B. Cast-in-Place Firestop Devices: Factory-assembled devices for use in cast-in-place concrete floors and consisting of an outer metallic sleeve lined with an intumescent strip, a radial extended flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.

C. Latex Sealants: Single-component latex formulations that after cure do not re-emulsify during exposure to moisture.

D. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.

E. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced elastomeric sheet bonded to galvanized steel sheet.

F. Intumescent Putties: Nonhardening dielectric, water-resistant putties containing no solvents, inorganic fibers, or silicone compounds.

G. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.

H. Mortars: Prepackaged, dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers, and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogeneous mortar.

I. Pillows/Bags: Reusable, heat-expanding pillows/bags consisting of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents and fire-retardant additives.

J. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

K Silicone Sealants: Moisture-curing, single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below:

1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces and nonsag formulation for openings in vertical and other surfaces requiring a nonslumping, gunnable sealant, unless indicated firestop system limits use to nonsag grade for both opening conditions.
2. Grade for Horizontal Surfaces: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces.
3. Grade for Vertical Surfaces: Nonsag formulation for openings in vertical and other surfaces.

2.4 MIXING

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

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning: Clean out openings immediately before installing through-penetration firestop systems to comply with written recommendations of firestop system manufacturer and the following requirements:

1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of through-penetration firestop systems.
2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with through-penetration firestop systems. Remove loose particles remaining from cleaning operation.
3. Remove laitance and form-release agents from concrete.

B. Priming: Prime substrates where recommended in writing by through-penetration firestop system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

C. Masking Tape: Use masking tape to prevent through-penetration firestop systems from contacting adjoining surfaces that will remain exposed on completion of Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from firestop system materials. Remove tape as soon as possible without disturbing firestop system's seal with substrates.

3.3 THROUGH-PENETRATION FIRESTOP SYSTEM INSTALLATION

A. General: Install through-penetration firestop systems to comply with "Performance Requirements" Article and firestop system manufacturer's written installation instructions and published drawings for products and applications indicated.

B. Install forming/damming/backing materials and other accessories of types required to support fill materials during their application and in the position

needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.

1. After installing fill materials, remove combustible forming materials and other accessories not indicated as permanent components of firestop systems.

2. Install fill materials for firestop systems by proven techniques to produce the following results:

3. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.

4. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
5. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 FIELD QUALITY CONTROL

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

B. Inspecting agency will state in each report whether inspected through-penetration firestop systems comply with or deviate from requirements.

C. Proceed with enclosing through-penetration firestop systems with other construction only after inspection reports are issued.

D. Where deficiencies are found, repair or replace through-penetration firestop systems so they comply with requirements.

3.5 IDENTIFICATION

A. Identify through-penetration firestop systems with pressure-sensitive, self-adhesive, preprinted vinyl labels. Attach labels permanently to surfaces of penetrated construction on both sides of each firestop system installation where labels will be visible to anyone seeking to remove penetrating items or firestop systems. Labels shall be installed above ceilings and in concealed spaces. Include the following information on labels:

1. The words: "FIRE AND SMOKE BARRIER PROTECT ALL OPENINGS". Contractor's name, address, and phone number.

Through-penetration firestop system designation of applicable testing and inspecting agency.
Date of installation.
Through-penetration firestop system manufacturer's name.
Installer's name.

3.6 CLEANING AND PROTECTION

A. Clean off excess fill materials adjacent to openings as Work progresses by methods and with cleaning materials that are approved in writing by through-penetration firestop system manufacturers and that do not damage materials in which openings occur.

B. Provide final protection and maintain conditions during and after installation that ensure through-penetration firestop systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated through-penetration firestop systems immediately and install new materials to produce through-penetration firestop systems complying with specified requirements.

END OF SECTION 07841

SECTION 09510
ACOUSTICAL CEILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary conditions and Division 1 Specification sections apply to work of this section.

1.2 SCOPE

A. Selectively remove existing acoustical ceiling tile and suspension system as required by the Fire Alarm work and store for reinstallation. Provide new acoustical ceiling tile and suspension system as required to replace all damaged ceiling tile and suspension system which cannot be reused and reinstalled.

B. Replace components as required or if damaged by the work.

1.3 SUBMITTALS

A. Product Data: Provide 6 copies of manufacturer's product specifications and installation instructions for each acoustical ceiling material required, and for each suspension system, including certified laboratory test reports and other data as required to show compliance with these specifications.

PART 2 - PRODUCTS

2.1 CEILING UNITS

A. Acoustical Panels:

1. General: Provide lay-in panels with fissured textured to match existing ceiling tile. Material Fiber Acoustical Panels:

2. Products/Manufacturer: To match existing.

2.2 CEILING SUSPENSION MATERIALS

A. General:

1. Comply with ASTM C-635 for dimensional tolerances, coatings and finishes, as applicable to type of suspension system required for type of ceiling units indicated. Coordinate with other work supported by or penetrating through ceilings, including light fixtures, HVAC equipment, soffits, fans and partition system (if any).

2. Structural Class: Intermediate-duty system. Individual component deflection shall not exceed 1/360 of the span.

3. Hanger Wires: Galvanized carbon steel, ASTM A-641, soft temper, prestretched, yield-stress load of at least 3 times design load, but not less than 9-gauge. install wire hangar at each corner of grid at light fixtures.

4. Type of System: Indirect-hung suspension system. Provide under the work of this Section, supplemental framing as required for proper spacing of hanger wires and other items suspended such as fans, and electric fixtures.

B. System Manufacturer:

1. To match existing.

C. Edge Moldings: Manufacturer's standard channel molding for edges and penetrations of ceiling, with single flange of molding exposed, white baked enamel finish unless otherwise indicated.

D. Exposed Suspension System: Manufacturer's standard exposed runners, cross-runners and accessories, of types and profiles indicated, with exposed cross runners coped to lay flush with main runners.

E. Finish of Exposed Members: Provide uniform factory-applied finish on exposed surfaces of ceiling suspension system, including moldings, trim, and accessories. Finish to match existing.

F. Finish: Provide hot-dipped galvanized finish (G-30 minimum on all ceiling suspension components. Exposed surfaces of suspension system component will receive a white baked on enamel paint. Color to match existing.

PART 3 - EXECUTION

3.1 PREPARATION

A. Measure each ceiling area and establish layout of acoustical units to balance border widths at opposite edges of each ceiling. Avoid use of less-than-half width units at borders, and comply with reflected ceiling plans wherever possible.
B. When removing the system exercise care so as not to damage system.
C. Coordinate with Owner’s representative for an interior air-conditioned space for storage of all removed components.

3.2 INSTALLATION

A. General

1. Install materials in accordance with manufacturer's printed instructions, and comply with governing regulations, fire resistance rating requirements as indicated, and industry standards applicable to work.

2. Arrange acoustical units and orient directionally-patterned units (if any) in manner shown by reflected ceiling plans.

3. Install tile with pattern running in one direction.

4. Install suspension systems to comply with ASTM C-636, with hangers supported only from building structural members or supplemental framing supported by building structural members. Locate hangers near each end and spaced 4'-0" along each carrying channel or direct-hung runner, unless otherwise indicated, leveling to tolerance of 1/8" in 12'-0".

5. Secure wire hangers by looping and wire-tying, either directly to structures or supplemental framing.

6. Install edge moldings to type indicated at perimeter of acoustical ceiling area and at locations where necessary to conceal edges of acoustical units.

7. Screw-attach moldings to substrate at intervals not over 16" o.c. and not more than 3" from ends, leveling with ceiling suspension system to tolerance of 1/8" in 12'-0". Miter corners accurately and connect securely.

8. Install acoustical panels in coordination with suspension system instructions, with edges concealed by support of suspension members.

9. Scribe and cut panels to fit accurately at borders and at penetrations.

10. Do not use or install pop rivets in tracks.

11. Do not staple tracks to wall.

12. Install four support hangers at each corner of light fixtures and HVAC grille and diffusers.

13. Store material in HVAC space to acclimate following the manufacturer’s instruction for temperature and humidity.

3.2 ADJUST AND CLEAN

A. Clean exposed surfaces of acoustical ceilings including trim, edge moldings, and suspension members; comply with manufacturer's instructions for cleaning and touch-up of minor finish damage. Remove and replace work which cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

B. Replace damaged tiles or suspension system to match existing.

END SECTION - 09510

SECTION 16010
GENERAL PROVISIONS

PART 1 - GENERAL

1.01 WORK INCLUDED:

A. The work covered under this Division of the Specifications is intended to include the furnishing of all materials, equipment and labor necessary for or reasonably incidental to, the installation of a complete and fully operative electrical system as indicated on the drawings and specified in this section.

1. The work shall consist generally of, but is not limited to, the following major items:

a. Fire Alarm System.
b. Conduit and Wiring.

B. Work Not Included:

The following work is not included in this Section:

1. Temperature controls and related wiring.

C. Fees and Permits:

1. Obtain all permits required for his/her work and include the cost of same in his/her bid.
2. The contractor shall also include in his/her bid the cost for the power company service.

D. Certificate of Inspection:

The Contractor shall, at his/her expense, have a final inspection made of the complete electrical installation and shall deliver a certificate of approval of the complete work to the Owner before receiving his/her final payment.

1.02 SUBMITTALS

A. Submit properly identified manufacturer's literature and technical data to the form defined in Section 01300, before commencing work.

B. Shop Drawings:

1. Submit copies of manufacturer's drawing of conduit, wire, wiring devices, fire alarm and voice evacuation system and any other special electrical equipment to be installed, and shall receive the Project Engineer's acceptance before ordering the same for installation.

2. All shop drawings shall be submitted in 3-ring binders with each specification section indicated with tabs.

3. If shop drawings are submitted intermittingly and not in 3-ring binders, they will not be reviewed and will be returned to contractor for proper submittal.

4. Substitutions – refer to Specification Section 01631 Accepted Equivalent:

1.03 QUALITY ASSURANCE

A. Qualifications of manufacturers, materials and equipment:

1. Material and equipment, except as herein otherwise noted, shall be new and conform to standards specified herein defined to include conduits, cable, wiring materials and devices, panelboards, and the like.

2. Materials and equipment shall be of an approved design.

a. Similar materials shall be of one manufacturer wherever possible.

3. Equipment offered under these Specifications shall be limited to products regularly produced and recommended for service ratings in accordance with manufacturer's catalogs, engineering data, or other comprehensive literature made available to the public and in effect at the time of opening of bids.

4. Install equipment in strict accordance with manufacturer's instruction for type, capacity and suitability of each piece of equipment used.

a. Obtain these instructions which shall be considered a part of these Specifications.

B. Qualifications of supervisor, workmanship and installers:

1. The Contractor shall have a Master Electrician constantly supervising the work covered by these Specifications, and so far as possible shall keep the same foreman on the job from start to finish.

a. The workmanship of the entire job shall be first class in every way and only experienced and competent workers shall be employed for the work.

1.04 CODES AND REGULATIONS

A. Work shall be installed in accordance with the regulations and requirements of the National Electrical Code NFPA No. 70; Life Safety Code NFPA No. 101, Standard Building Code as well as all rules, state and local codes regulations and requirements of the telephone and power companies.

B. Where conduits and/or cables penetrate fire rated walls, ceilings or floors, the penetrations shall be fire stopped in accordance with chapter 10, section 1001 of the standard building code.

1. The above shall be ascertained and fully coordinated before the installation of any material, equipment, and the like, and any discrepancy shall be immediately brought to the attention of the Project Engineer in writing, and the Contractor shall receive a disposition of same before proceeding with the work.

2. Furnish, without additional charge, any additional materials and labor that may be required for compliance with these codes, law, rules, regulations or requirements even though the work is not mentioned in these Specifications or shown on the Drawings.

C. Material and equipment shall bear the label of approval of the National Board of Fire Underwriters Laboratory.

1.05 INSPECTIONS

A. All work and materials covered by these Specifications and shown on the Drawings shall be subject to inspection at any and all times by representatives of the Project Engineer or Owner.

B. If the Project Engineer or Owner's inspectors find that any material does not conform with these Specifications, the Contractor shall within three days after being notified by the Project Engineer or Owner, remove the material from the premises, and if said material has been installed, the entire expense of removing and replacing same, including any cutting and patching that may be necessary, shall be borne by the Contractor.

C. Tests:

The Owner reserves the right to inspect and test any portion of the equipment during the progress of this work.

1. The Contractor shall test the entire system in the presence of the Owner or the Owner's representative when the work is completed to insure that all portions are free from short circuits and grounds.

2. All equipment, material and labor necessary to conduct the above tests shall be furnished at the Electrical Contractor's expense.

1.06 PRODUCT HANDLING

A. Protection of Equipment, Material and Work:The Contractor shall effectively protect, at his/her own expense, much of his/her work, materials or equipment, as is liable to injury during the construction period.

1. Openings into any part of the conduit system as well as associated fixtures, equipment, and the like, both before and after being set in place, shall be securely covered or otherwise protected to prevent obstruction of the conduit, or injury due to carelessness or maliciously dropped tools or materials, grit, dirt, or any foreign matter.

a. The Contractor will be held responsible for all damage done until his/her work is fully and finally accepted.

2. Cover conduit ends with capped bushings.

B. Repair of damage: In the event of damage, repair shall be made immediately, to the Project Engineer's satisfaction and at no additional cost to the Owner.

C. Special Handling: Special care, storage and handling of new and existing lighting fixtures shall be taken to minimize breakage of lenses and lamps shipped with fixtures.

1. Immediately replace any breakage with the exact lens or lamp. Used material is not an acceptable replacement.

1.07 JOB CONDITIONS

A. Accuracy of Data: The data given herein and on the Drawings are as exact as could be secured.

1. The Specifications and Drawings are for the assistance and guidance of the Contractor.

2. Exact locations, distances, levels, and the like, will be governed by the building field conditions and the Contractor shall use the data contained herein with this understanding.

B. Drawings:

1. The electrical drawings are diagrammatic, but shall be followed as closely as actual construction and work of other Contractors will permit.

2. Deviations from drawings required to make the work of the Contractor conform to the building as constructed, and to the work of other contractors, shall be made by the Contractor at his/her expense.

3. The branch circuit wiring and arrangements of home runs have been worked out for maximum economy consistent with adequate sizing for voltage drop, and the like. Maximum number of branch circuits per home-run conduit shall be (3) three.

4. Install the wiring circuits arranged exactly as shown on the drawings.

5. It is not the intention of the drawings or specifications to indicate each piece of conduit, fittings, and the like, required for the satisfactory operation of the installation and whereby one is indicated, but not specified, or specified but not indicated on the drawings, it shall be considered to be both specified and indicated.

C. Measurements:

1. Contractor shall thoroughly review the Contract Drawings and the Specifications to gain a complete understanding of the project requirements. It is highly recommended that the Contractor visit the job site to ascertain all existing building conditions, project access and proposed lay down areas, conduit runs, interfacing, interferences, conflicts, discrepancies, etc., and shall report the same to the Engineer for clarification ten days prior to submittal of the bid.

2. The Contractor shall make all measurements necessary for his/her work and shall assume responsibility for their accuracy.

3. Install necessary pull boxes, manholes and junction boxes as may be required to accomplish the distribution system indicated on the riser diagram.

D. Structural difficulties: Should any structural difficulties prevent the setting of cabinets, running conductors, and the like, at points indicated on the drawings, the necessary deviation therefrom, as determined by the Project Engineer will be permitted and shall be made without additional cost.

E. Cooperation with Other Contractors

1. The Contractor shall arrange all parts of his/her work in proper relation to the work of other contractors.

2. Where interferences occur, the Contractor shall, before installing the work involved, consult with the Project Engineer as to exact location and level of his/her work.

3. The Project Engineer's decision will be final.

4. The Contractor shall be responsible for arrangement of his/her work and equipment and maintenance of proper headroom under this work.

5. Should work installed by him/her require any modifications to avoid interference with the other work, such changes shall be made without additional cost.

6. The Engineer's decision as to determination or allocation or responsibility where conditions require changing of work, shall be final.

7. If any work of the Contractor is dependent for its proper execution on contiguous work, examine such work and report in writing any defect thereon or conditions rendering it unsuitable.

8. The beginning of work, without making such report, shall constitute an acceptance of such work, and any defects in his/her own work consequently shall be his/her responsibility.

1.08 CLEANING

A. Keep the premises free of debris and unusable materials resulting from the work, and immediately upon completion of the work remove such debris and material from the

site and leave floors broom clean in areas affected by the work.

1.09 GUARANTEE

A. Leave the electrical installation in proper working order and without charge, replace any work or materials which develop defects within one year from date of final inspection and acceptance by the Owner.

1.10 DEFINITIONS

A. In this Division "provide" is used as a term contraction meaning "to furnish, install and connect up completely in the specified or in an approved manner for the item and/or material described".

PART 2 - PRODUCTS Not Used

PART 3 - EXECUTION Not Used

END OF SECTION

SECTION 16060
MINOR ELECTRICAL DEMOLITION FOR REMODELING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Electrical demolition.

PART 2 - PRODUCTS

2.01 MATERIALS AND EQUIPMENT

B. Materials and equipment for patching and extending work: As specified in individual Sections.

PART 3 - EXECUTION

3.01 EXAMINATION

C. Verify field measurements and circuiting arrangements are as shown on Drawings.

D. Verify that abandoned wiring and equipment serve only abandoned facilities.

C. Demolition Drawings are based on casual field observation and existing record documents. Report discrepancies to Owner or Owner's Representative before disturbing existing installation.

D. Beginning of demolition means installer accepts existing conditions.

3.02 PREPARATION

A. 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.

B. Existing Fire Alarm System: Maintain existing system in service until new system is accepted. Disable system only to make switchovers and connections. Notify Owner Engineer and local fire service at least 24 hours before partially or completely disabling system. Minimize outage duration. Make temporary connections to maintain service in areas adjacent to work area.

3.03 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 and remove electrical devices and equipment serving utilization equipment that has been removed.

E. Repair adjacent construction and finishes damaged during demolition and extension work.

F. Maintain access to existing electrical installations which remain active. Modify installation or provide access panel as appropriate.

G. Extend existing installations using materials and methods compatible with existing electrical installations, or as specified.

3.04 CLEANING AND REPAIR

A. Clean and repair existing materials and equipment which remain or are to be reused.

B. 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.

3.05 INSTALLATION

i. Install relocated materials and equipment under the provisions found in other sections of the specifications.

END OF SECTION

SECTION 16110
RACEWAYS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.

B. This section is a Division 16 Basic Electrical Materials and Methods section, and is part of each Division 16 section making reference to electrical raceways specified herein.

1.02 DESCRIPTION OF WORK:

A. Extent of raceway work is indicated by drawings and schedules.

B. Types of raceway specified in this section include the following:

1. Rigid metal conduit.
2. Intermediate metal conduit.
3. PVC coated metal conduit.
4. Flexible metal conduit.
5. Liquid tight flexible metal conduit.
6. Electrical metallic tubing (EMT).
7. Rigid nonmetallic conduit (PVC).
8. Surface Metal Raceway

C. Electrical nonmetallic tubing (ENT) is not acceptable.

1.03 QUALITY ASSURANCE:

A. Manufacturers: Firms regularly engaged in manufacture of raceway systems of types and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.

B. Installer's Qualifications: Installer shall have at least 3 years of successful installation experience on projects with electrical raceway work similar to that required for this project.

1.04 CODES AND STANDARDS:

A. NEMA Compliance: Comply with applicable requirements of NEMA Standards Publications pertaining to raceways.

B. UL Compliance and Labeling: Comply with applicable requirements of UL safety standards pertaining to electrical raceway systems. Provide raceway products and components which have been UL listed and labeled.

C. NEC Compliance: Comply with applicable requirements of NFPA-70 pertaining to

construction and installation of raceway systems.

1.05 SUBMITTALS:

A. Product Data: Submit manufacturer's technical product data, including specifications and installation instructions for each type of raceway system required. Include data substantiating that materials comply with requirements.

PART 2 - PRODUCTS

2.01 GENERAL:

A. Provide raceways and fittings, of types, sizes, and weights (wall thickness) for each installation indicated. Where types are not indicated, provide proper selection determined by installer to fulfill installation requirements and comply with applicable portions of NFPA-70 for raceways.

B. All conduits and fittings shall bear the U.L. label or seal.

C. Minimum trade size raceway shall be 1/2".

D. Where conduit size is not indicated on plan, size conduit in accordance with NFPA-70, except no conduit smaller than 3/4" shall be embedded in concrete or masonry or installed below grade.

2.02 RIGID METAL CONDUIT

A. Provide zinc coated or hot-dipped galvanized type rigid steel conduit conforming to Federal Specification WW-C-581, ANSI C80 and U.L.6.

B. Provide threaded type zinc plated or hot-dipped galvanized malleable iron or steel fittings conforming to Federal Specification W-F-408.

1. Use Type 1 fittings for rain tight connections.
2. Use Type 2 fittings for concrete tight connections.
3. Use Type 3 fittings for other miscellaneous conditions.

C. Provide insulated bushings on all rigid steel conduits terminating in panels, boxes, wire gutters, or cabinets.

D. Provide zinc plated or hot-dipped galvanized, malleable iron conduit bodies with removable cover, corrosion resistant screws, threaded hubs and complying with ANSI/NEMA FB1.

2.03 INTERMEDIATE METAL CONDUIT:

A. Provide zinc coated or hot-dipped galvanized type intermediate steel conduit conforming to Federal Specification WW-C-581 and U.L. 1242.

B. Provide threaded type zinc plated or hot-dipped galvanized, malleable iron or steel fittings.

C. Provide insulated bushings on all intermediate steel conduits terminating in panels, boxes, wire gutters, or cabinets.

D. Provide zinc plated or hot-dipped galvanized malleable iron conduit bodies with removable cover, corrosion resistant screws, threaded hubs and complying with ANSI/NEMA FB1.

2.04 PVC COATED METAL CONDUIT

A. Provide hot-dipped galvanized type rigid steel conduit with external PVC coating (20 mil. thick) conforming to Federal Specification WW-C-581, ANSI C80.1, U.L. 6, and NEMA RN1.

B. Provide threaded type zinc plated or hot-dipped galvanized, malleable iron or steel fittings with external PVC coating (20 mil. thick).

C. Provide insulated bushings on all PVC coated metal conduits terminating in panels, boxes, wire gutters, or cabinets.

D. Provide zinc plated or hot-dipped galvanized, malleable iron conduit bodies with removable cover, corrosion resistant screws, threaded hubs and complying with ANSI/NEMA FB1.

2.05 FLEXIBLE METAL CONDUIT

A. Provide flexible steel conduit formed from continuous length of spirally wound, interlocked zinc coated strip steel and conforming to Federal Specification WW-C-56 and U.L. 1.

B. Provide threadless hinged clamp type fittings for use with flexible steel conduit.

1. Straight Terminal Connectors: One piece body, female end with clamp and deep slotted machine screw for securing conduit, male threaded end provided with locknut, and insulated throat connections for terminations.
2. 45 deg. Or 90 deg. Angle Terminal Connectors: Two piece body construction with removable upper section, female end with clamp and deep slotted machine screw for securing conduit, male threaded end provided with locknut, and insulated throat connections for terminations.

2.06 LIQUID TIGHT FLEXIBLE METAL CONDUIT

A. Provide liquid tight flexible metal conduit constructed from a continuous, flexible, interlocked, single strip and double wrapped steel, galvanized inside and outside, coated with liquid tight jacket of flexible polyvinyl chloride (PVC), and conforming to U.L. 360.

B. Provide compression type cadmium plated, malleable iron fittings with neoprene gasket sealing rings, and complying with ANSI/NEMA FB1 and U.L. 5148.

C. Provide insulated throat connectors for terminations.

2.07 ELECTRICAL METALLIC TUBING

A. Provide galvanized steel tubing conforming to Federal Specification WW-C-563, ANSI C80.3, and U.L. 797.

B. Provide set screw or compression type zinc plated or hot-dipped galvanized, malleable iron or steel fittings conforming to Federal Specification W-F-408.

1. Use Type 1 fittings for rain tight connections.
2. Use Type 2 fittings for concrete tight connections.
3. Use Type 3 fittings for miscellaneous connections.

C. Provide insulated throat connectors for terminations.

D. Provide zinc plated or hot-dipped galvanized, malleable iron conduit bodies with removable cover, corrosion resistant screws, threaded hubs and complying with ANSI/NEMA FB1.

2.08 RIGID NONMETALLIC CONDUIT:

A. Provide rigid nonmetallic conduit conforming to Federal Specification WC1094A, NEMA TC-2 and U.L. 651.

1. Heavy Wall Conduit: Schedule 40, 90C, U.L. rated, constructed of polyvinyl chloride, for direct burial or normal above ground use.
2. Extra Heavy Wall Conduit: Schedule 80, U.L. rated, constructed of polyvinyl chloride, for direct burial or above ground use.

B. Provide fittings which mate and match to conduit type and material and comply with NEMA TC-3 and U.L. 514.

C. Provide threaded terminal adapters on all rigid nonmetallic conduits terminating in panels, boxes, wire gutters, or cabinets. Adapters to have male threads on one end, socket end on other.

D. Provide zinc plated or hot-dipped galvanized, malleable iron conduit bodies with removable cover, corrosion resistant screws, threaded hubs and complying with ANSI/NEMA FB1.

2.09 EXPANSION FITTINGS:

A. Expansion fittings shall be:

1. U.L. Listed, hot-dipped galvanized inside and outside, providing a 4" expansion chamber, external braided grounding and bonding jumper with approved clamps and U.L. listed for the application.
2. U.L. Listed, polyvinyl chloride, providing a 6" expansion chamber, and meet requirements for rigid nonmetallic conduit.

2.10 Available Conduit Bodies Manufacturers: Subject to compliance with requirements, manufacturers offering conduit bodies which may be incorporated in the work include, but are not limited to the following:

A. Appleton Electric; Div. of Emerson Electric Co.
B. Arrow Hart Div.; Crouse Hinds Co.
C. Bell Electric Div.; Square D Co.
D. Killark Electric Mfg. Co.
E. O-Z/Gedney Div.; General Signal Co.
F. Spring City Electrical Mfg. Co.

2.11 SURFACE METAL RACEWAY

A. Provide one-piece steel surface raceway which bears U.L. label or seal, size as required for each application, and finish as indicated on drawings or as directed by Engineer.

B. Manufacturers:

1. Wiremold System 500 or 700 as required.
2. Or approved equal.

C. Provide insulating bushings on all surface metal raceways terminating in panels, boxes, wire gutters, or cabinets.

D. Provide fittings and boxes from manufacturers standard accessories which mate and match for a complete system installation. Minimum box depth shall be 1-3/4".

PART 3 - EXECUTION

3.01 INSTALLATION:

A. General: Install raceways as indicated; in accordance with manufacturer's written installation instructions, and in compliance with NFPA-70, and NECA's "Standards of Installation".

B. Coordinate with other work including wires/cables, boxes and panel work, as necessary to interface installation of electrical raceways and components with other work.

C. Install conduits concealed in either wall, slabs, or above hung ceilings. Where conduits cannot be concealed, route conduits exposed on wall or ceiling.

D. Mechanically fasten together metal conduits, enclosures and raceways for conductors to form continuous electrical conductor. Connect to electrical boxes, fittings and cabinets to provide electrical continuity and firm mechanical assembly.

E. Avoid use of dissimilar metals throughout system to eliminate possibility of electrolysis. Where dissimilar metals are in contact, coat surfaces with corrosion inhibiting compound before assembling.

F. Install miscellaneous fittings such as reducers, chase nipples, 3 piece unions, split couplings, and plugs that have been specifically designed and manufactured for their particular application. Install expansion fittings in raceways every 200' linear run or wherever structural expansion joints are crossed.

G. Use roughing-in dimensions of electrically operated unit furnished by supplier. Set conduit and boxes for connection to units only after receiving review of dimensions and after checking location with other trades.

H. Provide nylon pull cord in all empty conduits. Test conduits required to be installed, but left empty, test with ball mandrel. Clear any conduit which rejects ball mandrel. Pay costs involved for restoration of conduit and surrounding surfaces to original condition.

3.02 CONDUIT INSTALLATION:

A. Use electrical metal tubing conduit in mechanical equipment rooms, electrical equipment rooms and for main feeder circuits.

B. Use EMT in offices, corridors and toilets for branch circuits.

C. Use flexible metal conduit in movable partitions and from outlet boxes to recessed lighting fixtures, and final 24" of connections to motors, or control items subject to movement or vibration and in cells of precast concrete panels.

D. Use liquid tight flexible metal conduit where subject to one or more of the following conditions:

1. Exterior location.
2. Moist or humid atmosphere where condensate can be expected to accumulate.
3. Corrosive atmosphere.
4. Subjected to water spray or dripping oil, water or grease.

E. Cut conduits straight, properly ream, and cut threads for heavy wall conduit deep and clean.

F. Field bend conduit with benders designed for purpose so as not to distort nor vary internal diameter.

G. Size conduits to meet NFPA-70, except no conduit smaller than 3/4" shall be embedded in concrete or masonry or install below grade.

H. Where penetrating grade or floor in an exposed location from underground or in slab, a black mastic coated or PVC coated galvanized rigid steel conduit shall be used.

I. Provide rigid 90 degree elbows when turning conduit up in slab or turning conduit up above grade.

J. Fasten conduit terminations in sheet metal enclosures by 2 metal locknuts, and terminate with bushing. Install locknuts inside and outside enclosure.

K. Conduits are not to cross pipe shafts, or ventilating duct openings.

L. Keep conduits a minimum distance of 6" from parallel runs of flues, hot water pipes, or other sources of heat. Wherever possible, install horizontal raceway runs above water and steam piping.

M Support riser conduit at each floor level with clamp hangers.

N. Use of running threads at conduit joints and terminations is prohibited. Where required, use 3 piece union or split coupling.

O. Complete installation of electrical raceways before starting installation of cables/wires within raceway.

3.03 CONCEALED CONDUITS:

A. Raceways installed underground or in floors, or outside shall be PVC Schedule 40.

B. For floors-on-grade, install conduits under concrete slabs.

C. Install underground conduits minimum of 24" below finished grade.

D. Where penetrating a floor in a location concealed in a block wall and acceptable by applicable codes, PVC Schedule 40 rigid non-metallic raceways may be used up to the first outlet box, provided outlet height above finished floor does not exceed 48".

3.04 CONDUITS IN CONCRETE SLAB:

A. Place conduits between bottom reinforcing steel and top reinforcing steel.

B. Place conduits either parallel, or at 90 deg. to main reinforcing steel.

C. Separate conduits by not less than diameter of largest conduit to ensure proper concrete bond.

D. Conduits crossing in slab must be reviewed for proper cover by Engineer.

E. Embedded conduit diameter is not to exceed 1/3 of slab thickness.

F. Install conduits as not to damage or run through structural members. Avoid horizontal or cross runs in building partitions or side walls.

3.05 EXPOSED CONDUITS:

A. Install exposed conduits and extensions from concealed conduit systems neatly, parallel with, or at right angles to walls of building.

B. Install exposed conduit work as not to interfere with ceiling insets, lights, or ventilation ducts or outlets.

C. Support exposed conduits by use of hangers or clamps. Support conduits on each side of bends and on spacing not to exceed following: up to 1": 6'-0"; 1-1/4" and over: 8'-0".

D. Exposed conduits shall be painted to match the color of walls, ceilings, canopies, etc., as indicated on drawings, or as directed by the Engineer.

3.06 NON-METALLIC CONDUITS:

A. Make solvent cemented joints in accordance with recommendations of manufacturer.

B. Install PVC conduits in accordance with NFPA-70 and in compliance with local utility practices.

3.07 CONDUIT FITTINGS:

A. Construct locknuts for securing conduit to metal enclosure with sharp edge for digging into metal, and ridged outside circumference for proper fastening.

B. Insulated bushing for terminating conduits smaller than 1-1/4" are to have flared bottom and ribbed sides, with smooth upper edges to prevent injury to cable insulation.

C. Insulated bushings for terminating conduits 1-1/4" and larger are to have flared bottom and ribbed sides. Upper edge to have phenolic insulating ring molded into bushing.

D. Bushing of insulated type to have screw type grounding terminal.

E. Miscellaneous fittings such as reducers, chase nipples, 3 piece unions, split couplings, and plugs to be specifically designed for their particular application.

END OF SECTION

SECTION 16120
WIRES AND CABLES

PART 1 - GENERAL:

1.01 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specifications sections, apply to work of this section.

B. This section is a Division 16 Basic Electrical Materials and Methods section and is part of Division 16 section making reference to electrical wires and cables specified herein.

1.02 DESCRIPTION OF WORK:

A. Extent of electrical wires and cable work is indicated by drawings and schedules.

B. Types of electrical wire, cable, and connectors specified in this section include the following:

1. Copper conductors.
2. Service entrance cable.
3. Split-bolt connectors.
4. Wirenut connectors.

C. Applications of electrical wire, cable, and connectors required for project are as follows:

1. For power distribution circuits.
2. For appliance and equipment circuits.
3. For motor branch circuits.

1.03 QUALITY ASSURANCE:

A. Manufacturers: Firms regularly engaged in the manufacture of electrical wire and cable products of types, sizes, and ratings required, whose products have been in satisfactory use in similar service for not less than 5 years.

B. Installer's Qualifications: Firm with at least 3 years of successful installation experience with projects similar to that required for this project.

C. NFPA-70 Compliance: Comply with NFPA-70 requirements as applicable to construction, installation and color coding of electrical wires and cables.

D. UL Compliance: Comply with applicable requirements of UL Std. 83, "Thermoplastic Insulated Wires and Cables" and Std. 486A, "Wire Connectors and Soldering for Use With Copper Conductors".

E. UL Compliance: Provide wiring/cabling and connector products which are UL listed and labeled.

F. NEMA/ICEA Compliance: Comply with NEMA/ICEA Std. Pub/No's WC5, Thermoplastic Insulated Wires and Cable for the "Transmission and Distribution of Electrical Energy", and WC30, "Color Coding of Wires and Cables", pertaining to electrical power type wires and cables.

G. IEEE Compliance: Comply with applicable requirements of IEEE Stds. 82, "Test Procedures for Impulse Voltage Tests on Insulated Conductors", and Std. 241, "IEEE Recommended Practice for Electric Power Systems in Commercial Buildings" pertaining to wiring.

H. ASTM Compliance: Comply with applicable requirements of ASTM B1, 2, 3, 8, and D-573. Provide copper conductors with conductivity of not less than 98% at 20 degrees C. (68 deg.F.).

I. FOIST Compliance: Comply with Federal Specifications J-C-30, "Electrical Cable and Wire (Power, Fixed, Installation)", and W-S-610, "Splice Conductor".

1.04 SUBMITTALS:

A. Product Data: Submit manufacturer's data on electrical wires, cables, and conductors.

B. DELIVERY, STORAGE, AND HANDLING:

1. Deliver wire and cable properly packaged in factory fabricated type containers, or wound on NEMA specified type wire and cable reels.
2. Store wire and cable in clean dry space in original containers. Protect products from weather, damaging fumes, construction debris and traffic.
3. Handle wire and cable carefully to avoid abrasing, puncturing, and tearing wire and cable insulation and sheathing. Ensure that dielectric resistance integrity of wires/cables is maintained.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS:

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to the following:

1. Wire and Cable:

a. Apex Wire and Cable Corp.
b. American Insulated Wire Corp.
c. American Wire and Cable Co.
d. Anaconda-Ericson Inc., Wire and Cable Div.
e. Beldon Div.; Cooper Industries.
f. Brand-Rex Div.; Pyle National Co.
g. Cerro Wire and Cable Corp.
h. Cleveland Insulated Wire Co.
j. Phelps Dodge Cable and Wire Co.
k. Rome Cable Corp.

l. Southwire Corp.
m. Triangle PWC, Inc.

2. Connectors;

a. AMP, Inc.
b. Appleton Electric Co.; Emerson Electric Co.
c. Burndy Corporation.
d. Brand-Rex Div.; Pyle National Co.
e. Electrical Products Div.; Midland Ross Corp.
f. General Electric Co.
g. Ideal Industries, Inc.
h. Leviton Mfg. Company.
i. 3M Company.
j. O-Z/Gedney Co.
k. Southport Industries Inc.
l. Square D Company.
m. Thomas and Betts Corp.

2.02 WIRES, CABLES, AND CONNECTORS:

A. General: Provide electrical wires, cables, and connectors of manufacturer's standard materials, as indicated by published product information; designed and constructed as recommended by manufacturer, for a complete installation, and for application indicated. Except as otherwise indicated, provide copper conductors with conductivity of not less than 98% at 20 degrees C (68 degrees F.).

B. Building Materials: Provide factory-fabricated wires of sizes, ampacity ratings, and materials for applications and services indicated. Where not indicated, provide proper wire selection as determined by installer to comply with project's installation requirements, NFPA-70 and NEMA standards. Select from the following UL types, those wires with construction features which fulfill project requirements.

1. Type THWN: For dry or wet locations; max. operating temperature 75 deg.C. (167 deg.F.). Insulation, flame retardant, moisture and heat resistant, thermoplastic; outer covering, nylon jacket; conductor, annealed copper.
2. Type THHN: For dry and damp locations; max. operating temperature 90 deg.C. (194 deg.F.). Insulation, flame retardant, heat resistant thermoplastic conductor, annealed copper.

2.03 CONNECTORS:

A. General: Provide UL type factory fabricated, metal connectors of sizes, ampacity ratings, materials, types and classes for applications and for services indicated. Where not indicated, provide proper selection as determined by Installer to comply with project's installation requirements, NFPA-70 and NEMA standards. Select from the following, those types, classes, kinds and styles of connectors to fulfill project requirements:

1. Type: Pressure.
2. Type: Crimp.

3. Type: Threaded.
4. Class: Insulated.
5. Kind: Copper (for CU to CU connection).
6. Style: Butt connection.
7. Style: Elbow connection.
8. Style: Combined "T" and straight connection.
9. Style: "T" connection.
10. Style: Split-bolt parallel connection.
11. Style: Tap connection.
12. Style: Pigtail connection.
13. Style: Wirenut connection.

PART 3 - EXECUTION

3.01 INSTALLATION OF WIRES AND CABLES:

A. General: Install electrical cables, wire and wiring connectors as indicated, in compliance with applicable requirements of NFPA-70, NEMA, UL, and NECA's "Standard of Installation" and in accordance with recognized industry practices.

B. Coordinate wire/cable installation work including electrical raceway and equipment installation work, as necessary to properly interface installation of wires/cables with other work.

C. Install UL type wiring in conduit, for feeders and branch circuits.

D. Pull conductors simultaneously where more than one is being installed in same raceway.

E. Use pulling compound or lubricant, where necessary; compound used must not deteriorate conductor or insulator.

F. Use pulling means including, fish tape, cable, rope and basket weave wire/cable grips which will not damage cables or raceways.

G. Keep conductor splices to a minimum.

H. Install splices and tapes which possess equivalent or better mechanical strength and insulation ratings than conductors being spliced.

I. Use splice and tap connectors which are compatible with conductor material.

J. Tighten electrical connectors and terminals, including screws and bolts, in accordance with manufacturer's published torque tightening values. Where manufacturer's torquing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL Std 486A and B.

3.02 FIELD QUALITY CONTROL:

A. Prior to energization of circuitry, check installed wires and cables with megohm meter to determine insulation resistance levels to ensure requirements are fulfilled.

B. Prior to energization, test wires and cables for electrical continuity and for short circuits.

C. Subsequent to wire and cable hook-ups, energize circuitry and demonstrate functioning in accordance with requirements. Where necessary, correct malfunctioning units, and then retest to demonstrate compliance.

END OF SECTION

EDSECTION 16135
ELECTRICAL BOXES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.

B. This section is a Division 16 Basic Electrical Materials and Methods section, and is a part of each Division 16 making reference to electrical wiring boxes specified herein.

1.02 DESCRIPTION OF WORK:

A. Extent of electrical box work is indicated by drawings and schedules.

B. Types of electrical boxes specified in this section include the following:

1. Outlet boxes.
2. Junction boxes.
3. Pull boxes.
4. In-ground hand hole.

1.03 QUALITY ASSURANCE:

A. Manufacturers: Firms regularly engaged in manufacture of electrical boxes, of types, sizes, and capacities required, whose products have been in satisfactory use in similar service for not less than 3 years.

B. Installer's Qualifications: Firms with at least 3 years of successful installation experience on projects utilizing electrical boxes similar to those required for this project.

C. NFPA-70 Compliance: Comply with NFPA-70 as applicable to construction and installation of electrical wiring boxes.

D. UL Compliance: Comply with applicable requirements of UL 50, UL 514 Series, and UL 886 pertaining to electrical boxes which are UL listed and labeled.

E. NEMA Compliance: Comply with applicable requirements of NEMA Std. Pub.No.'s OS1, OS2, and Pub.250 pertaining to outlets and device boxes, covers and box supports.

1.04 SUBMITTALS:

A. Product Data: Submit manufacturer's data on electrical boxes and fittings.

PART 2 - PRODUCTS

2.01 FABRICATED MATERIALS:

A. Outlet Boxes: Provide galvanized coated flat rolled sheet steel outlet wiring boxes, of shapes, cubic inch capacities, and sizes, including box depths as indicated, suitable for installation at respective locations. Construct outlet boxes with mounting holes, and with cable and conduit size knockout openings in bottom and sides. Provide boxes with threaded screw holes, with corrosion resistant cover and grounding screws for fastening surface and device type box covers, and for equipment type grounding.

1. Outlet Box Accessories: Provide outlet box accessories as required for each installation, including box supports, mounting ears and brackets, wallboard hangers, box extension rings, fixture studs, cable clamps, and metal straps for supporting outlet boxes, which are compatible with outlet boxes being used to fulfill installation requirements for individual wiring situations. Choice of accessories is Installer's code compliance option.

B. Device Boxes: Provide galvanized coated flat rolled sheet steel gangable or non-gangable device boxes, of shapes, cubic inch capacities, and sizes, including box depths as indicated, suitable for installation at respective locations. Construct device boxes for flush mounting with mounting holes, and with cable size knockout openings in bottom and ends, and with threaded screw holes in end plates for fastening devices. Provide cable clamps, and for equipment type grounding.

1. Device Box Accessories: Provide device box accessories as required for each installation, including mounting brackets, device box extensions, switch box supports, plaster ears, and plaster board expandable grip fasteners, which are compatible with device boxes being utilized to fulfill installation requirements for individual wiring situations. Choice of accessories is installer's code compliance option.
2. Manufacturers: Subject to compliance with requirements, provide interior outlet boxes of one of the following:

a. Adalet-PLM Div., Scott Fetzer Co.
b. Appleton Electric; Emerson Electric Co.
c. Bell Electric; Square D Company.
d. Midland-Ross Corp.
e. OZ/Gedney; General Signal Co.
f. Pass and Seymor, Inc.
g. RACO Div; Harvey Hubbell Inc.
h. Thomas and Betts Co.

C. Rain tight Outlet Boxes: Provide corrosion resistant cast metal rain tight outlet wiring boxes, of types, shapes and sizes, including depth of boxes, with threaded conduit holes for fastening electrical conduit, cast metal face plates with spring-hinged watertight caps suitably configurated for each application, including face plate gaskets and corrosion resistant plugs and fasteners.

1. Manufacturers: Subject to compliance with requirements, provide rain tight outlet boxes of one of the following:

a. Appleton Electric; Emerson Electric Co.

b. Arrow Hart Div.; Crouse-Hinds Co.
c. Bell Electric; Square D Co.
d. Harvey Hubbell, Inc.
e. OZ/Gedney; General Signal Co.
f. Pass and Seymor, Inc.

D. Junction and Pull Boxes: Provide galvanized code-gage sheet steel junction and pull boxes, with screw-on covers; of types, shapes, and sizes to suit each respective location and installation; with welded seams and equipped with stainless steel nuts, bolts, screws and washers.

1. Manufacturers: Subject to compliance with requirements, provide junction and pull boxes of one of the following:

a. Adalet-PLM Div.; Scott Fetzer Co.
b. Appleton Electric; Emerson Electric Co.
c. Arrow Hart Div.; Crouse Hinds-Co.
d. Bell Electric; Square D Company.
e. OZ/Gedney Co.; General Signal Co.
f. Spring City Electrical Mfg. Co.

E. Knockout Closures: Provide corrosion resistant box knockout closures of types and sizes, to suit respective installation requirements and applications.

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

a. Adalet-PLM Div.; Scott Fetzer Co.
b. AMP, Inc.
c. Arrow Hart Div.; Crouse-Hinds Co.
d. Appleton Electric Co.; Emerson Electric Co.
e. Bell Electric; Square D Co.
f. Midland Ross Corp.
g. Midwest Electric; Cooper Industries, Inc.
h. OZ/Gedney Co.; General Signal Co.
i. RACO Div.; Harvey Hubbell, Inc.
j. Thomas and Betts Co. Inc.

6. In-ground Hand Hole: Provide concrete hand hole with knockouts, sump, pull eyes, ground rod hole, and cast iron ring with cover. Cover shall read “Electric”. Refer to drawings for size.

1. Manufacturers: Subject to compliance with requirements, provide in-ground hand hole of one of the following:

a. Brooks Products.
b. or approved equal.

PART 3 - EXECUTION

3.01 INSTALLATION OF ELECTRICAL BOXES AND FITTINGS:

A. General: Install electrical boxes and fittings as indicated, in accordance with manufacturer's written instructions, applicable requirements of NFPA-70 and NECA's "Standard of Installation", and in accordance with recognized industry practices to fulfill project requirements.

B. Coordinate installation of electrical boxes and fittings with wire/cable, wiring devices, and raceway installation work.

C. Provide weather tight outlets for interior and exterior locations exposed to weather or moisture.

D. Provide knockout closures to cap unused knockout holes where blanks have been removed.

E. Install electrical boxes in those locations which ensure ready accessibility to enclosed electrical wiring.

F. Avoid installing boxes back-to-back in walls. Provide not less than 6" (150mm) separation.

G. Avoid installing aluminum products in concrete.

H. Position recessed outlet boxes accurately to allow for surface finish thickness.

I. Fasten electrical boxes firmly and rigidly to substrates, or structural surfaces to which attached, or solidly embed electrical boxes in concrete or masonry.

J. Provide electrical connections for installed boxes.

K. Subsequent to installation of boxes, protect boxes from construction debris and damage.

L. Install in-ground hand hole on 6" gravel base. Provide 3/4" x 10'-0" long ground rod in box and connect to counterpoise. Connect cover to ground rod with 96" long #4 AWG minimum. Install cover flush with finished grade.

3.02 GROUNDING:

A. Upon completion of installation work, properly ground electrical boxes and demonstrate compliance with requirements.

END OF SECTION

SECTION 16142
ELECTRICAL CONNECTIONS FOR EQUIPMENT

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specifications sections, apply to work of this section.

B. This section is a Division 16 Basic Electrical Materials and Methods section, and is part of each Division 16 sections making reference to electrical connections for equipment specified herein.

1.02 DESCRIPTION OF WORK

A. Extent of electrical connections for equipment is indicated by drawings and schedules. Electrical connections are hereby defined to include connections used for providing electrical power to equipment.

B. Applications of electrical power connections specified in this section include the following, but not limited:

1. From electrical source to motor starters.
2. From motor starters to motors.

C. Electrical connections for equipment, not furnished as integral part of equipment, are specified in Division 16 sections, and are work of this section.

D. Junction boxes and disconnect switches required for connecting motors and other electrical units of equipment are specified in applicable Division 16 sections, and are work of this section.

E. Raceways and wires/cables required for connecting motors and other electrical units of equipment are specified in applicable Division 16 sections, and are work of this section.

F. Refer to sections of other Divisions for specific individual equipment power requirements, not work of this section.

1.03 QUALITY ASSURANCE

A. Manufacturers: Firms regularly engaged in manufacture of electrical connectors and terminals, of types and rating required, and ancillary connection materials, including electrical insulating tape, soldering fluxes, and cable ties, whose products have been in satisfactory use in similar service for not less than 5 years.

B. Installer's Qualifications: Installer shall have at least 3 years of successful installation experience with projects utilizing electrical connections for equipment similar to that required for this project.

C. NFPA-70 Compliance: Comply with applicable requirements of NFPA-70 as to type products used and installation of electrical power connections (terminals and splices), for junction boxes, motor starters and disconnect switches.

D. IEEE Compliance: Comply with Std. 241, "IEEE Recommended Practice for Electric Power Systems in Commercial Buildings" pertaining to connections and terminations.

E. ANSI Compliance: Comply with applicable requirement of ANSI/NEMA and ANSI/EIA standards pertaining to products and installation of electrical connections for equipment.

F. UL Compliance: Comply with UL Std.486A, "Wire Connectors and Soldering Lugs for Use with Copper Conductors" including, but not limited to, tightening of electrical connectors to torque values indicated. Provide electrical connection products and materials which are UL listed and labeled.

1.04 SUBMITTALS

A. Product Data: Submit manufacturer's data on electrical connections for equipment products and materials.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products of one of the following (for each type of product):

1. Adalet-PLM Div., Scott and Fetzer Co.
2. Allen-Stevens Conduit Fittings Corp.
3. AMP Incorporated.
4. Appleton Electric Co.
5. Arrow Hart Div., Crouse Hinds Co.
6. Burndy Corp.
7. General Electric Co.
8. Harvey Hubbell Inc.
9. Ideal Industries, Inc.
10. Pyle National Co.
11. Reliable Electric Co.
12. Square D Company.
13. Thomas and Betts Corp.

2.02 MATERIALS AND COMPONENTS

A. General: For each electrical connection indicated, provide complete assembly of materials, including but not necessarily limited to, pressure connectors, terminals (lugs), electrical insulating tape, heat-shrinkable insulating tubing, cables ties, solderless wire-nuts, and other items and accessories as needed to complete splices and terminations of types indicated.

2.03 METAL CONDUIT, TUBING AND FITTINGS

A. General: Provide metal conduit, tubing, and fittings of types, grades, sizes, and weights (wall thickness) indicated for each type service. Where types and grades are not indicated, provide proper selection to fulfill wiring requirements, and comply with NFPA-70 requirements for raceways. Provide products complying with Division 16 basic electrical materials and methods section "Raceways" and in accordance with the following listing of metal conduit, tubing and fittings.

1. Rigid metal conduit.
2. Rigid metal conduit fittings.
3. Electrical metallic tubing (EMT).
4. EMT fittings.
5. Flexible metal conduit.
6. Flexible metal conduit fittings.
7. Liquid tight flexible metal conduit.
8. Liquid tight flexible metal conduit fittings.
9. PVC coated metal conduit.
10. PVC coated metal conduit fittings.

2.04 WIRES, CABLES AND CONNECTORS

A. General: Provide wires, cables, and connectors complying with Division 16 basic electrical materials and methods section "Wires and Cables".

B. Wires/Cables: Unless otherwise indicated, provide wires/cables (conductors) for electrical connections which match, including sizes and ratings, of wires/cables which are supplying electrical power. Provide copper conductors with conductivity of not less than 98% at 20 deg. C. (68 deg. F.)

C. Connectors and Terminals: Provide electrical connectors and terminals which mate and match, including sizes and ratings, with equipment terminals and are recommended by equipment manufacturer for intended applications.

D. Electrical Connection Accessories: Provide electrical insulating tape, heat-shrinkable insulating tubing and boots, wirenuts and cable ties as recommended for use by accessories manufacturers for type services indicated.

PART 3 - EXECUTION

3.01 INSPECTION

A. Inspect area and conditions under which electrical connections for equipment are to be installed and notify Contractor in writing of conditions detrimental to proper completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to Installer.

3.02 INSTALLATION OF ELECTRICAL CONNECTIONS

A. Install electrical connections as indicated; in accordance with equipment manufacturer's written instructions and with recognized industry practices, and complying with applicable requirements of UL, NFPA-70, and NECA's "Standard of Installation" to ensure that products fulfill requirements.

B. Coordinate with other work, including wires/cables, raceways and equipment installation, as necessary to properly interface installment of electrical connections for equipment with other work.

C. Connect electrical power supply conductors to equipment conductors in accordance with equipment manufacturer's written instructions and wiring diagrams. Mate and match conductors of electrical connections for proper interface between electrical power supplies and installed equipment.

D. Cover splices with electrical insulating material equivalent to, or of greater insulation resistivity ratings, than electrical insulation rating of those conductors being spliced.

E. Prepare cables and wires, by cutting and stripping covering armor, jacket, and insulation properly to ensure uniform and neat appearance where cables and wires are terminated. Exercise care to avoid cutting through tapes which will remain on conductors. Also avoid "ringing" copper conductors while skinning wire.

F. Trim cables and wires as short as practicable and arrange routing to facilitate inspection, testing and maintenance.

G. Tighten connectors and terminals, including screws and bolts, in accordance with equipment manufacturers published torque tightening values for equipment connectors. Accomplish tightening by utilizing proper torquing tools, including torque screwdriver, bean-type torque wrench, and ratchet wrench with adjustable torque settings. Where manufacturer's torquing requirements are not available, tighten connectors and terminals to comply with torquing values contained in UL's 486A.

H. Provide flexible conduit for motor connections, and other electrical equipment connections, where subject to movement and vibration.

I. Provide liquid tight flexible conduit for connections of motors and other electrical equipment where subject to movement and vibration, and also where connections are subjected to one or more of the following conditions:

1. Exterior location.
2. Moist or humid atmosphere where condensate can be expected to accumulate.
3. Corrosive atmosphere.
4. Subject to water spray or dripping oil, grease, or water.

J. Fasten identification markers to each electrical power supply wire/cable conductor which indicates their voltage, phase and feeder number in accordance with Division 16 section "Electrical Identification". Affix markers on each terminal conductor, as close as possible to the point of connection.

3.03 FIELD QUALITY CONTROL

A. Upon completion of installation of electrical connections, and after circuitry has been energized with rated power source, test connections to demonstrate capability and compliance with requirements. Ensure that direction of rotation of each motor fulfills requirement. Correct malfunctioning units at site, then retest to demonstrate compliance.

END OF SECTION

SECTION 16180
OVERCURRENT PROTECTIVE DEVICES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.

B. This section is a Division 16 Basic Materials and Methods section, and is part of each Division 16 section making reference to overcurrent protective devices specified herein.

1.02 DESCRIPTION OF WORK

A. Extent of overcurrent protective device work is indicated by drawings and schedules.

B. Types of overcurrent protective devices in this section include the following:

1. Circuit Breakers:

a. Molded case.

C. Refer to other Division 16 sections for cable/wire and connector work required in conjunction with overcurrent protective devices; not work of this section.

1.03 QUALITY ASSURANCE

A. Manufacturers: Firms regularly engaged in manufacture of overcurrent protective devices, of types, sizes, and ratings required, whose products have been in satisfactory use in similar services for not less than 5 years.

B. Installer: Qualified with at least 5 years of successful installation experience on projects with electrical installation work similar to that required for projects.

C. NFPA-70 Compliance: Comply with NFPA-70 requirements as applicable to construction and installation of overcurrent protective devices.

D. UL Compliance: Comply with applicable requirements of UL 489, "Molded Case Circuit Breakers and Circuit Breaker Enclosures. Provide overcurrent protective devices, which are UL, listed and labeled.

E. NEMA Compliance: Comply with applicable requirements of NEMA Std. Pub. Nos. AB 1, AB 2, and SG 3 pertaining to molded case and low voltage power type circuit breakers.

1.04 SUBMITTALS

A. Product Data: Submit manufacturer's data on overcurrent protective devices, including: amperes, voltages, and current ratings, interrupting ratings, current

limitations, internal inductive and non-inductive loads, time current trip characteristic curves, and mounting requirements.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products of one of the following (for each type and rating of overcurrent protective device).

1. Circuit Breakers:

a. To match existing.

2.02 CIRCUIT BREAKERS

A. General: Except as otherwise indicated, provide circuit breakers and ancillary components, of types, sizes, ratings and electrical characteristics indicated, which comply with manufacturer's standard design, materials, components, and construction in accordance with published product information and as required for a complete installation.

B. Molded Case Circuit Breakers: Provide factory assembled, molded case circuit breakers of frame size indicated. Provide breakers with permanent thermal and instantaneous magnetic trips in each pole, and with fault current limiting protection, ampere rating as indicated. Construct with over center, trip free, toggle type operating mechanisms with quick-make, quick-break action and positive handle trip indication. Provide push-to-trip button on cover for mechanical tripping circuit breakers. Construct breakers for mounting and operating in any physical position and operating in an ambient temperature of 40 deg. C. Provide breakers with mechanical screw type removable connector lugs, AL/CU rated.

C. Coordinate the required size of all circuit breakers feeding equipment, (i.e. motors, HVAC, kitchen equipment, special purpose outlets, elevators, owner furnished equipment, etc.) with approved equipment shop drawings and owner representatives prior to ordering circuit breakers. Breakers shall be sized per NFPA-70, the equipment nameplate, and per manufacturer’s recommendations.

PART 3 - EXECUTION

3.01 INSTALLATION OF OVERCURRENT PROTECTIVE DEVICES

A. Install overcurrent protective devices as indicated, in accordance with manufacturer's written instructions and with recognized industry practices to ensure that protective devices comply with requirements. The arrangements of overcurrent protective devices have been worked out for phase balancing and the like and shall be followed as closely as actual construction will permit. Comply with NFPA-70 and NEMA standards for installation of overcurrent protective devices.

B. Coordinate with other work, including electrical wiring work, as necessary to interface installation of overcurrent protective devices with other work.

C. Fasten circuit breakers without causing mechanical stresses, twisting or misalignment being exerted by clamps, supports, or cabling.

D. Set field adjustable circuit breakers for trip settings as indicated, subsequent to installation of units.

3.02 ADJUST AND CLEAN

A. Inspect circuit breakers operating mechanisms for malfunctioning and, where necessary, adjust units for free mechanical movement.

3.03 FIELD QUALITY CONTROL

A. Prior to energization of overcurrent protective devices, test devices for continuity of circuitry and for short circuits. Correct malfunction units, and then demonstrate compliance with requirements.

END OF SECTION

SECTION 16190
SUPPORTING DEVICES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions, and Division 1 Specification sections, apply to work of this section.

B. This section is a Division 16 Basic Electrical Materials and Methods section, and is a part of each Division 16 section making reference to electrical supporting devices specified herein.

1.02 DESCRIPTION OF WORK:

A. Extent of supports, anchors, sleeves and seals is indicated by drawings and schedules and/or specified in other Division 16 sections.

B. Types of supports, anchors, sleeves and seals specified in this section include the following:
1. C-clamps.
2. I-Beam clamps.
3. One-hole conduit straps.
4. Two-hole conduit straps.
5. Round steel rods.
6. Lead expansion anchors.
7. Toggle bolts.
8. Wall and floor seals.
9. Bridle Rings.

3. Conduit supporting devices of the spring or tension type, such as conduit clips manufactured by Caddy Corporation, are <u>not</u> acceptable.

1.03 QUALITY ASSURANCE:

A. Manufacturers: Firms regularly engaged in manufacture of supporting devices, of types, sizes, and ratings required whose products have been in satisfactory use in similar service for not less than 3 years.

B. Installers Qualifications: Installer with at least 3 years of successful installation experience with projects utilizing electrical supporting device work similar to that required for this project.

C. NFPA-70 Compliance: Comply with NFPA-70 requirements as applicable to construction and installation of electrical supporting devices.

D. NECA Compliance: Comply with National Electrical Contractors Association's "Standard of Installation" pertaining to anchors, fasteners, hangers, supports, and equipment mounting.

E. UL Compliance: Provide electrical components which are UL listed and labeled.

1.04 SUBMITTALS:

A. Product Data: Submit manufacturer's data on supporting devices including catalog cuts, specifications, and installation instructions, for each type of support, anchor, sleeve and seal.

PART 2 - PRODUCTS

2.01 MANUFACTURED SUPPORTING DEVICES:

A. General: Provide supporting devices which comply with manufacturer's standard materials, design, and construction in accordance with published product information, and as required for complete installation; and as herein specified. Where more than one type of supporting device meets indicated requirement, selection is Installer's option.

B. Supports: Provide supporting devices of types, sizes and materials indicated; and having the following construction features:

1. C-Clamps: Black malleable iron; 1/2" rod size; approximately 70 pounds per 100 units.
2. I-Beam Clamps: Black steel, 1-1/4" x 3/16" stock; 3/8" cross bolt; flange width 2"; approximately 52 pounds per 100 units.
3. One-Hole Conduit Straps: For supporting 3/4" rigid metal conduit; galvanized steel; approximately 7 pounds per 100 units.
4. Two-Hole Conduit Straps: For supporting 3/4" rigid metal conduit, galvanized steel; 3/4" strap width; and 2-1/8" between center of screw holes.
5. Hexagon Nuts: For 1/2" rod size; galvanized steel; approximately 4 pounds per 100 units.
6. Round Steel Rod: Black steel; 1/2" dia.; approximately 67 pounds per 100 feet.
7. Offset Conduit Clamps: For supporting 2" rigid metal conduit; black steel; approximately 200 pounds per 100 units.

C. Anchors: Provide anchors of types, sizes, and materials indicated, with the following construction features:

1. Lead Expansion Anchors: 1/2"; approximately 38 pounds per 100 units.
2. Toggle Bolts: Springhead; 3/16" x 4"; approximately 5 pounds per 100 units.
3. Manufacturers: Subject to compliance with requirements, provide anchors of one of the following:

    a. Ideal Industries, Inc.
    b. Joslyn Mfg. and Supply Co.
    c. McGraw Edison Co.
    d. Star Expansion Co.
    e. U.S. Expansion Bolt Co.

D. Sleeves and Seals: Provide sleeves and seals of types, sizes and materials indicated, with the following construction features:

1. Wall and Floor Seals: Provide factory assembled watertight wall and floor seals, of types, and sizes indicated; suitable for sealing around conduit, pipe, or tubing passing through concrete floors and wall. Construct seals with steel sleeves, malleable iron body, neoprene sealing grommets and rings, metal pressure rings, pressure clamps, and cap screws.
2. U-Channel Strut Systems: Provide U-channel strut system for supporting electrical equipment, 12 gage hot dip galvanized steel, of types and sizes indicated; construct with 9/16" dia. holes, 8" o.c. on top surface, with standard green finish, and with the following fittings which mate and match with U-channel.

    a. Fixture hangers.
    b. Channel hangers.
    c. End caps.
    d. Beam clamps.
    e. Wiring studs.
    f. Thinwall conduit clamps.
    g. Rigid conduit clamps.
    h. Conduit hangers.
    i. U-bolts.

3. Manufacturers: Subject to compliance with requirements, provide channel systems of one of the following:

    a. Allied Tube and Conduit Corp.
    b. B-Line Systems, Inc.
    c. Greenfield Mfg. Co., Inc.
    d. Midland Ross Corp.
    e. OZ/Gedney Div.; General Signal Corp.
    f. Power Strut Div.; Van Huffel Tube Corp.
    g. Unistrut Div.; GTE Products Corp.

2.02 FABRICATED SUPPORTING DEVICES:

A. Pipe Sleeves: Provide pipe sleeves of one of the following:

1. Sheet Metal: Fabricate from galvanized sheet metal; round tube closed with snap lock joint, welded spiral seam, or welded longitudinal joint. Fabricate sleeves from the following gage metal: 3" and smaller, 20 gage; 4" to 6", 16 gage; over 6", 14 gage.
2. Steel Pipe: Fabricate from Schedule 40 galvanized steel pipe; remove burrs.
3. Iron Pipe: Fabricate from cast-iron or ductile iron pipe; remove burrs.

PART 3 - EXECUTION

3.01 INSTALLATION OF SUPPORTING DEVICES:

A. Install hangers, anchors, sleeves and seals as indicated, in accordance with manufacturer's written instructions and with recognized industry practices to insure supporting devices comply with requirements. Comply with requirements of NECA and NFPA-70 for installation of supporting devices.

B. Coordinate with other electrical work, including raceway and wiring work, as

necessary to interface installation of supporting devices with other work.

C. Install hangers, supports, clamps, and attachments to support piping properly from building structure. Arrange for grouping of parallel runs of horizontal conduits to be supported together on trapeze type hangers where possible. Install supports with spacing indicated and in compliance with NFPA-70 requirements.

D Torque sleeve seal nuts, complying with manufacturer's recommended values. Ensure that sealing grommets expand to form watertight seal.

END OF SECTION

SECTION 16450
GROUNDING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.

B. Division 16 Basic Materials and Methods sections apply to work of this section.

1.02 DESCRIPTION OF WORK

A. Extent of grounding work is indicated by drawings and schedules.

B. Types of grounding specified in this section include the following:

1. Solid Grounding.

C. Applications of grounding work in this section include the following:

1. Underground metal water piping.
2. Grounding electrodes.
3. Grounding rods.
4. Service equipment.
5. Enclosures.
6. Equipment.
7. Ground Test Well.

1.03 QUALITY ASSURANCE

A. Manufacturers: Firms regularly engaged in manufacture of electrical connectors, terminals and fittings, of types and ratings required, and ancillary grounding materials, including stranded cables, copper brain and bus, ground rods and plate electrodes, whose products have been in satisfactory use in similar service for not less than 3 years.

B. Installer: Qualified with at least 3 years of successful installation experience on projects with electrical grounding work similar to that required for project.

C. NFPA-70 Compliance: Comply with NFPA-70 requirements as applicable to materials and installation of electrical grounding systems, associated equipment and wiring. Provide grounding products which are UL listed and labeled.

D. UL Compliance: Comply with applicable requirements of UL Standards Nos.467 and 869 pertaining to electrical grounding and bonding.

E. IEEE Compliance: Comply with applicable requirements of IEEE Standard 142 and 241 pertaining to electrical grounding.

1.04 SUBMITTAL

A. Product Data: Submit manufacturer's data on grounding systems and accessories.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS:

A. Manufacturers: Subject to compliance with requirements, provide grounding products of one of the following:

1. B-Line Systems, Inc.
2. Burndy Corp.
3. Crouse-Hinds Co.
4. Electrical Components Div.; Grould, Inc.
5. General Electric Supply Co.
6. Ideal Industries, Inc.
7. Thomas and Betts Corp.
8. Western Electric Co.

2.02 GROUNDING SYSTEMS

A. Materials and Components:

1. General: Except as otherwise indicated, provide electrical grounding systems indicated; with assembly of materials, including, but not limited to, cables/wires, connectors, terminals (solderless lugs), grounding rods/electrodes, and plate electrodes, bonding jumper braid, surge arrestors, and additional accessories needed for complete installation. Where more than one type unit meets indicated requirements, selection is Installer's option. Where materials or components are not indicated, provide products complying with NFPA-70, UL, IEEE, and established industry standards for applications indicated.
2. Provide raceways, and electrical boxes and fittings complying with Division 16 Basic Materials and Methods sections "Raceways" and "Electrical Boxes and Fittings", in accordance with the following listing:
   a. Rigid steel conduit.
   b. Electrical metallic tubing.
   c. Flexible metal conduit, Type 2.
   d. Liquid-tight flexible metal conduit.
   e. Rigid metal conduit fittings.
   f. EMT Fittings, Type 1.
   g. Flexible metal conduit fittings.
   h. Liquid-tight flexible metal conduit fittings.

B. Conductors: Unless otherwise indicated, provide electrical grounding conductors for grounding connections matching power supply wiring materials and sized according to NFPA-70.

C. Bonding Jumper Braid: Copper braided tape, constructed of 30-gage bare copper wires and properly sized for indicated applications.

D. Flexible Jumper Strap: Flexible flat conductor, 480 strands of 30-gage bare copper wire; 3/4" wide, 9-1/2" long; 48,250 cm. Protect braid with copper bolthole ends with holes sized for 3/8" dia. bolts.

E. Ground Rods: Steel with copper welded exterior. Each ground rod shall consist of a

40 ft. ground rod, 5/8” driven vertically. Top of ground rod shall be at least one (1) foot deep below grade.

F. Electrical Grounding Connection Accessories: Provide electrical insulating tape, heat-shrinkable insulating tubing, welding materials, bonding straps, as recommended by accessories manufacturers for type services indicated.

G. Ground Test Well: Plastic 10" diameter x 10" high body with two pipe slots; plastic snap-lock cover with lifting holes and shall read “Ground”. Provide test well at each ground rod location. Cover shall be flush with grade.

H. Grounding Bars: Ground bars shall be copper of the size and description as shown on the drawings, or shall be 1/4" x 2" bus grade copper, spaced from wall on insulating 1" high supports, of 6" or greater O.A. length, allowing 2" length per lug connected thereto.

PART 3 - EXECUTION

3.01 GENERAL

A. Grounding conductors shall be provided with every circuit.

B. Grounding conductors shall; be so installed as to permit shortest and most direct path from equipment to ground; be installed in metal conduit with both conductor and conduit bonded at each end; have connections accessible for inspection and made with approved solderless connectors brazed (or bolted) to the equipment or structure to be grounded. The main grounding electrode conductor shall be exothermically welded to ground rods and water pipe.

C. All contact surfaces shall be thoroughly cleaned before connections are made to insure good metal-to-metal contact.

D. All exterior grade mounted equipment shall have their enclosures grounded directly to a separate driven ground at the equipment in addition to the building ground connection.

3.02 BONDING

A. Where available on the premises, bond the following items together:

1. Metal water pipe.
2. Building metal frame.

B. A main ground, bare copper conductor, NEC sized but in no case less than #2/0, shall be run in conduit from the Main Switchgear of <u>each</u> building to the building steel in respective building. This ground conductor shall also be run individually and be bonded to the main water service ahead of any union in pipe and must be metal pipe of length as acceptable by authorities having jurisdiction. Provide properly sized bonding shunt around water meter and/or dielectric unions in the water pipe. Also required is the same size ground wire to minimum 5/8" x 20 ft. copperweld driven ground rod.

C. Install ground bushings on all conduits entering enclosures where the continuity of grounding is broken between the conduit and enclosure (i.e. conduit stub-up into a

motor control center enclosure). Provide an appropriately sized bond jumper from the ground bushing to the equipment ground bus.

3.03 INSTALLATION AND METHODS - 120 THROUGH 480 VOLT SYSTEMS

A. Except as otherwise indicated, each feeder raceway on the load side of the service entrance shall contain a ground conductor sized as indicated and where not shown shall be sized in accordance with Table 250-95 of the NEC. Conductor shall be connected to the equipment grounding bus in switchboards and panelboards, to lighting fixtures, motors and other types of equipment and outlets. The ground shall be in addition to the metallic raceway and shall be properly connected thereto, using a lug device located within each item enclosure at the point of electric power connections to permit convenient inspection.

B. Each feeder metallic conduit shall be bonded at all discontinuities, including at switchboards and all sub-distribution and branch circuit panels with conductors in accordance with Table 250-95 of NEC for parallel return with respective interior grounding conductor.

C. Provide green insulated ground wire for all grounding type receptacles and for equipment of all voltages. In addition to grounding strap connection to metallic outlet boxes, a supplemental grounding wire and screw equal to Raco No. 983 shall be provided to connect receptacle ground terminal to the box.

D. All plug strips and metallic surface raceway shall contain a green insulation ground conductor from supply panel ground bus connected to grounding screw on each receptacle in strip and to strip channel. Conductor shall be continuous.

3.04 MISCELLANEOUS GROUNDING CONNECTIONS

A. Required connections to building steel shall be with approved terminals and bolted in accessible locations.

B. Where reinforced concrete is utilized for building grounding system (UFER ground), proper reinforced bonding shall be provided to secure low resistance to earth with "thermite" type devices, and #10AWG wire ties shall be provided to not less than ten (10) full length rebars which contact the connected rebar (by Division 16 contractor).

C. All surfaces to which grounding connections are made shall be thoroughly cleaned to maximum conductive condition immediately before connections are made thereto. Exposed bare metal at the termination point shall be painted.

D. Welded or Brazed Connections: Joints in ground conductors shall be welded or brazed. The welding or brazing processes shall be an exothermic type.

3.05 MAIN ELECTRICAL SERVICE GROUNDING AND BONDING (AS APPLICABLE)

A. Ground in accordance with Article 250 of the NEC. Artificial grounding electrodes shall be provided for the main service grounding in sufficient number and configuration to secure grounding resistance specified. Grounding system shall also be extended to the cold water entrance pipe and be grounded to the line side of any metering.

B. Provide counterpoise at service entrance of minimum of three driven ground rods of adequate length spaced 20 feet apart in a triangle, or as detailed. Conductor size between ground rods shall be in compliance with N.E.C. Connections to ground rods shall be thermowelded. Top of ground rods and conductors shall be minimum 24 inches below grade. Connect to building lightning protective counterpoise with #2/0 cable.

3.06 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 NEC specified limits.

B. Ground resistance measurements shall be made on each grounding system utilized in the project. The ground resistance measurements shall include building structural steel, driven grounding system, and other approved systems as may be applicable. Ground resistance measurements shall be made in normally dry weather, not less than 24 hours after rainfall, and with the ground under test isolated from other grounds. 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 in writing on Contractor's letterhead to the Engineer/Engineer.

3.07 GROUND RESISTANCE

A. Grounding resistance measure at main service shall not exceed 10 ohms.

B. Resistance to ground of all non-current carrying metal parts shall not exceed 25 ohms, measured at motors, panels, grounding busses, cabinets, etc.

END OF SECTION

SECTION 16721
FIRE ALARM SYSTEM

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS:

A. Applicable provisions of "General Conditions", "Supplementary General Conditions" and "General Requirements", Division One, govern work under this Section.

1.02 DESCRIPTION:

A. Work Included: The Contractor shall furnish and install a complete 24 VDC, closed circuit, fully addressable, electrically supervised zone annunciated fire alarm system as specified herein and indicated on drawings. The system shall include but not be limited to all control panels, power supplies, signal initiating devices, audible and visual alarm devices, wire fittings and all accessories required to provide a complete operating system. The system shall operate as a:

1. Non-coded, continuous ringing system which will sound all audible devices until it is manually silenced.
2. The system shall be wired as a Class B system for all circuits.
3. The installing company shall furnish the Owner with a second year maintenance agreement.
4. The fire alarm system components shall be labeled with the same manufacturer's name and logo to insure the integrity of the complete system.

B. Conduit and boxes to be installed by electrical contractor.

1.03 QUALITY ASSURANCE AND SUBMITTALS:

A. The system shall be provided by a firm regularly engaged in this type of work and shall submit proof that said firm has similar installations that are operating to the satisfaction of the systems owners. The said firm shall submit evidence that it has maintained personnel who will be available for repair and maintenance within 24 hours after notification of service requirement by Owner.

1.04 ACCEPTABLE MANUFACTURERS:

A. Silent Knight
B. Gamewell
C. Notifier

PART 2 - PRODUCTS

2.01 CONTROL PANEL:

A. The fire alarm control panel shall be of dead front construction and be modular in design. The control panel shall be capable of future expansion and shall provide a minimum of zones indicated on drawings.

B. The control panel shall use state-of-the-art electronics and shall use light emitting diodes (LED) throughout. Each signal initiating circuit shall be represented with a yellow LED and a red LED to indicate trouble and alarm. Each circuit shall include individual supervisory and alarm relays and/or circuitry so that a fault condition in any circuit will not prevent the proper operation of any other circuit. These circuits shall be identified by a lettered nameplate showing the zone designation or function. The nameplate shall be a standard product of the manufacturer designed to enhance the appearance of the face-plate. It shall not be lettered with embossed tape. All signal initiating circuits will automatically lock in until the detection device has been restored to normal and the control panel has been manually reset.

C. The following common equipment shall operate in the described manner. A green pilot LED shall indicate that the system is operating from main power. The common trouble LED shall light for any trouble condition in any part of the system and shall remain on until the trouble condition has been corrected. A common alarm LED shall flash to indicate an unacknowledged alarm in the system and the individual zone LED shall indicate the particular zone. The common alarm LED shall revert to a steady condition upon silencing of the alarm condition. The control panel will provide resound for subsequent alarms and the common alarm LED shall commence to flash with each new alarm if the previous alarm has been silenced. Individual supervisory LEDs will be mounted to the common board as a standard feature. They shall consist of the following:

Voltage Monitor	To supervise external auxiliary power source.
Charger	Supervision of charge voltage being supplied to the battery.
Battery	Low battery/no battery.
Ground Fault	Both positive and negative.
Alarm Loop 1	Common audible output #1.
Alarm Loop 2	Common audible output #2.
Automatic Dialer	Central Station Supervision

D. Individual fuses shall be used on the following common points, and shall cause individual trouble conditions should any of the fuses become subjected to an overload condition.

Alarm Loop 1	Common audible output #1.
Alarm Loop 2	Common audible output #2.
Battery	Overload protection.
Smoke Detector	Used on (4) wire detectors Power
Auxiliary System	Constant output Voltage

E. The common control shall include five switches which shall test all LEDs, reset the system after an alarm condition, shall silence the trouble buzzer and/or the audible devices, shall not disconnect the central station from the control panel, and a fire drill switch to test the audible devices without tripping the central station alarm. A reverse polarity transmitter and a local energy circuit shall be available.

F. An internal diagnostic test plug shall be provided for field testing of system power checks to assist in trouble shooting by maintenance personnel. This diagnostic feature allows for reading actual power to the following points: common positive, common alarm, lamp test, reset, common trouble pulsed alarm, power supply common, silence bus, card supervision sensing and logic supply voltage.

G. Plug-in connectors shall be used to inter-connect mother boards. All mother boards shall be identical and shall be capable of accepting all modules introduced to its assembly.

H. All modules shall be supervised for placement and removal of any module shall cause a trouble condition in the panel. The control panel shall have a power supply with sufficient power output to operate the system. Auxiliary power packs shall be supervised.

I. The battery pack shall provide operating and supervisory power for:

1. 24 hrs. as per ANSI/NFPA Standard 72.
2. Provide low-maintenance gel cell type batteries with sufficient ampere-hour rating to meet the above NFPA Standard and to operate all alarm signals for a duration of 5 minutes at the end of the required period of time.

2.02 MANUAL STATION:

A. Manual Fire Alarm Stations shall be non-coded, non-break glass type equipment with a key operated test-reset lock in order that they may be tested, and so designed that after actual Emergency Operation, they cannot be restored to normal except by use of a key. An operated station shall automatically condition itself so as to be visually detected, as operated, at a minimum distance of one hundred feet, front or side. Manual Stations shall be constructed of die-formed satin-finished aluminum, with operating directions provided on the cover in depressed red letters. The word FIRE shall appear on each side of the stations in depressed letters, one-half inch in size or larger. Manual Stations shall be Underwriters' Laboratories Listed.

2.03 PHOTOELECTRIC SMOKE DETECTOR:

A. The contractor shall furnish and install where indicated on the plans, photoelectric smoke detectors. The combination detector head and twist-lock base shall be UL Listed compatible with a UL Listed fire alarm panel.

B. The base shall be directly interchangeable with an ionization detector.

C. The smoke detector shall have a flashing, status indicated LED for visual supervision. When the detector is actuated, the flashing LED will latch on steady and at full brilliance. The detector may be reset by actuating the control panel reset switch.

D. It shall be possible to perform functional test of the detector without the need of generating smoke. The test method must simulate effects of products of combustion in the chamber to ensure testing of all detector circuits.

E. To facilitate installation, the detector shall be non-polarized. By using a furnished wire jumper, it shall be possible to check circuit loop continuity prior to installing the detector head.

F. Voltage and RF transient suppression techniques shall be employed to minimize false alarm potential. A gated alarm output shall be used for additional detector stability.

G. Auxiliary SPDT relays and/or remote LED alarm indicators shall be installed where indicated.

2.04 PHOTOELECTRIC DUCT SMOKE DETECTORS

A. The duct detector shall be furnished and wired by this contractor and installed on duct by the mechanical contractor. The detector and housing shall be UL listed.

B. Air sampling shall be accomplished via sampling tubes which extend into air ducts.

C. The housing shall have a transparent inspection port allowing viewing of the smoke detector status.

D. Each detector shall have a remote test station with an alarm LED and test switch.

2.05 WATERFLOW DETECTOR

A. Waterflow switch to be supplied and installed by the mechanical contractor and wired in to Fire Alarm System by this contractor.

2.06 SPRINKLER SUPERVISORY SWITCHES

A. Supervisory switch to be supplied and installed by mechanical contractor and wired in to fire alarm system by this contractor.

2.07 AUDIO/VISUAL ALARM DEVICES:

A. Visual Fire Alarms shall be installed at each location designated on the drawings and/or as specified herein. Visual alarms shall be of the flashing type using a Xenon Flashtube designed for operation on 24 VDC. Visual alarms shall be semi-flush mounted. Series SL and shall incorporate an alarm horn operating at 24 VDC.

B. Horns shall be UL Listed and shall be Standard finish fire alarm gloss red enamel with the word FIRE imprinted on the white translucent lens.

2.08 REMOTE ANNUNCIATOR:

A. A remote annunciator shall be furnished and installed as shown on the drawings. The annunciator shall be of the lamp type and duplicate all zone alarm lamps of Main Fire Alarm Control Panel. It shall also include Main Power Lamp, Common Trouble Buzzer and Buzzer Silence features. Annunciator shall have a stainless steel face plate and be arranged for flush mounting.

Zone Identification shall be by:

1. Full English lettering per area.
2. Lamp test shall be activated by a pushbutton switch which electrically tests all visual and audible annunciation.
3. Supervision: Wiring and lamps shall be electrically supervised from control panel. Burned out lamps and open wiring shall cause an audible and visual trouble signal to occur.

4. Audible trouble indication shall be contained within annunciator.

2.09 AIR HANDLING SHUTDOWN: Relay

A. Fire alarm system installer shall provide and install a relay at each air handling unit for shutdown on any alarm from system. The unit shall be normally closed with a coil to match voltage of Fire Alarm Control Panel. This unit shall open on alarm from Fire Alarm Control Panel and interrupt starting circuit of air handler unit fan.

PART 3 - EXECUTION

3.01 INSTALLATION:

A. Shall be done in a neat workmanlike fashion by a firm regularly engaged in fire alarm installation and service.

3.02 WIRING:

A. Shall be No.14 THWN or THHN.

3.03 INSTRUCTIONS:

A. Shall be given in all phases of the operation to operating persons selected by the Engineer.

3.04 DRAWINGS:

A. As built drawings shall be given to operating persons at time of instructions, in addition to those to be supplied as general requirements of the job.

END OF SECTION