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IFB NO. Y19-766-JS **ISSUED: May 24, 2019**

INVITATION FOR BIDS

FOR
ORANGE COUNTY CONVENTION CENTER NORTH/SOUTH BUILDING ACCESS CONTROL SYSTEM REPLACEMENT

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PART H
TECHNICAL SPECIFICATIONS

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PART H
Volume II

Orange County Convention Center
North South Access Control Upgrade

May 2019
100% Construction Documents

SGM ENGINEERING INC
MEP CONSULTING ENGINEERS

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SECTION 011000 - SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Work covered by the Contract Documents.
2. Use of premises.
3. Owner's occupancy requirements.
4. Work restrictions.
5. Specification formats and conventions.

1.3 WORK COVERED BY CONTRACT DOCUMENTS

A. The Work consists of the following:

1. The Work includes providing a complete access control system replacement for the North/South Building Complex.

1.4 TYPE OF CONTRACT

A. Project will be constructed under a single prime contract.

1.5 USE OF PREMISES

A. General: Contractor shall have limited use of premises for construction operations as indicated on Drawings by the Contract limits.

B. Use of Site: Limit use of premises to work in areas indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.

1. Owner Occupancy: Allow for Owner occupancy of Project site and use by the public.
2. Driveways and Entrances: Keep driveways, parking areas, loading areas, and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.

a. Schedule deliveries to minimize use of driveways and entrances.

b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

C. Use of Existing Building: Maintain existing building in a weathertight condition throughout construction period. Repair damage caused by construction operations. Protect building and its occupants during construction period.

D. Protect all existing equipment, finishes, etc. throughout construction phase. Ensure site cleanliness is maintained

1.6 OWNER'S OCCUPANCY REQUIREMENTS

A. Full Owner Occupancy: Owner will occupy site and existing building during entire construction period. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's day-to-day operations. Maintain existing exits, unless otherwise indicated.

1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and authorities having jurisdiction.
2. Provide not less than 72 hours' notice to Owner of activities that will affect Owner's operations.

1.7 WORK RESTRICTIONS

A. On-Site Work Hours: Work shall be generally performed inside the existing building during normal business working hours of 8a.m. to 5 p.m., except otherwise indicated.

1. Weekend Hours: To be coordinated with Owner as needed to keep from obstructing Owners occupancy during change out of equipment or any outage requirements.
2. Hours for Utility Shutdowns: to be coordinated with Owners Representative with a minimum of 72 hours required for shut down.

B. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:

1. Notify Owner not less than 3 days in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without Owner's written permission.

1.8 SPECIFICATION FORMATS AND CONVENTIONS

A. Specification Format: The Specifications are organized into Divisions and Sections using the 50-division format and CSI/CSC's "MasterFormat" numbering system.

1. Section Identification: The Specifications use Section numbers and titles to help cross-referencing in the Contract Documents. Sections in the Project Manual are in numeric sequence; however, the sequence is incomplete because all available Section numbers are

not used. Consult the table of contents at the beginning of the Project Manual to determine numbers and names of Sections in the Contract Documents.

2. Division 01: Sections in Division 01 govern the execution of the Work of all Sections in the Specifications.

B. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

1. Abbreviated Language: Language used in the Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be inferred as the sense requires. Singular words shall be interpreted as plural, and plural words shall be interpreted as singular where applicable as the context of the Contract Documents indicates.
2. Imperative mood and streamlined language are generally used in the Specifications. Requirements expressed in the imperative mood are to be performed by Contractor. Occasionally, the indicative or subjunctive mood may be used in the Section Text for clarity to describe responsibilities that must be fulfilled indirectly by Contractor or by others when so noted.

    a. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.

PART 2 - PRODUCTS (See Drawings)

PART 3 - EXECUTION (See Drawings)

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SECTION 012300 - ALTERNATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for alternates.

1.3 DEFINITIONS

A. Additive: An amount proposed by bidders and stated on the Bid Form for certain work defined in the Bidding Requirements that may be added to or deducted from the Base Bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.

1. The cost or credit for each additive is the net addition to or deduction from the Contract Sum to incorporate additive into the Work. No other adjustments are made to the Contract Sum.

1.4 PROCEDURES

A. Coordination: Modify or adjust affected adjacent work as necessary to completely integrate work of the additive into Project.

1. Include as part of each additive, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of additive.

B. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each additive. Indicate if additives have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated modifications to additives.

C. Execute accepted additives under the same conditions as other work of the Contract.

D. Schedule: A Schedule of Additives is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each additive.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012300

SECTION 013300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

1.3 DEFINITIONS

A. Action Submittals: Written and graphic information that requires Owner's responsive action.

B. Informational Submittals: Written information that does not require Engineer's and Owner's responsive action. Submittals may be rejected for not complying with requirements.

1.4 SUBMITTAL PROCEDURES

A. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.

    a. Owner and Engineer's reserve the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

B. Submittals Schedule: All submittals shall be received by the Owner within 14 days of notice to proceed. Submittals shall be approved prior to commencement of work.

C. Processing Time: Allow enough time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Engineers receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. The Owner will advise Contractor when a submittal being processed must be delayed for coordination.

2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
3. Resubmittal Review: Allow 15 days for review of each resubmittal.
4. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow 21 days for initial review of each submittal.

D. Identification: Place a permanent label or title block on each submittal for identification.

1. Indicate name of firm or entity that prepared each submittal on label or title block.
2. Provide a space approximately 6 by 8 inches (150 by 200 mm) on label or beside title block to record Contractor's review and approval markings and action taken by Engineer.
3. Include the following information on label for processing and recording action taken:

a. Project name.
b. Date.
c. Name and address of Engineer.
d. Name and address of Contractor.
e. Name and address of subcontractor.
f. Name and address of supplier.
g. Name of manufacturer.
h. Submittal number or other unique identifier, including revision identifier.

1) Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 06100.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 06100.01.A).

E. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.

1. Note date and content of previous submittal.
2. Note date and content of revision in label or title block and clearly indicate extent of revision.

F. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

PART 2 - PRODUCTS

2.1 ACTION SUBMITTALS

A. General: Prepare and submit Action Submittals required by individual Specification Sections.

B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.

1. If information must be specially prepared for submittal because standard printed data are not suitable for use, submit as Shop Drawings, not as Product Data.
2. Mark each copy of each submittal to show which products and options are applicable.

3. Include the following information, as applicable:

    a. Manufacturer's written recommendations.
    b. Manufacturer's product specifications.
    c. Manufacturer's installation instructions.
    d. Standard color charts.
    e. Manufacturer's catalog cuts.
    f. Wiring diagrams showing factory-installed wiring.
    g. Printed performance curves.
    h. Operational range diagrams.
    i. Mill reports.
    j. Standard product operation and maintenance manuals.
    k. Compliance with specified referenced standards.
    l. Testing by recognized testing agency.
    m. Application of testing agency labels and seals.
    n. Notation of coordination requirements.

4. Submit Product Data before or concurrent with Samples.
5. Number of Copies: Submit 7 copies of Product Data, unless otherwise indicated. Engineer will return 6 copies. Mark up and retain one returned copy as a Project Record Document.

C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data

1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:

    a. Dimensions.
    b. Identification of products.
    c. Fabrication and installation drawings.
    d. Roughing-in and setting diagrams.
    e. Wiring diagrams showing field-installed wiring, including power, signal, and control wiring.
    f. Shopwork manufacturing instructions.
    g. Templates and patterns.
    h. Schedules.
    i. Design calculations.
    j. Compliance with specified standards.
    k. Notation of coordination requirements.
    l. Notation of dimensions established by field measurement.
    m. Relationship to adjoining construction clearly indicated.
    n. Seal and signature of professional engineer if specified.
    o. Wiring Diagrams: Differentiate between manufacturer-installed and field-installed wiring.

2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches (215 by 280 mm) but no larger than 30 by 40 inches (750 by 1000 mm).

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

A. Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Engineer.

B. Approval Stamp: Stamp each submittal with a uniform, approval stamp.

3.2 ENGINEER'S ACTION

A. General: Engineer will not review submittals that do not bear Contractor's approval stamp and will return them without action.

B. Action Submittals: Engineer will review each submittal, make marks to indicate corrections or modifications required, and return it.

C. Partial submittals are not acceptable, will be considered nonresponsive, and will be returned without review.

D. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

END OF SECTION 013300

SECTION 014000 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for quality assurance and quality control.

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

1. Specific quality-assurance and -control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
3. Requirements for Contractor to provide quality-assurance and -control services required by Engineer or authorities having jurisdiction are not limited by provisions of this Section.

1.3 DEFINITIONS

A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.

B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Engineer.

C. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with industry standards.

D. Source Quality-Control Testing: Tests and inspections that are performed at the source, i.e., plant, mill, factory, or shop.

E. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

F. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

G. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.

1. Using a term such as "carpentry" does not 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 tradespeople of the corresponding generic name.

1.4 CONFLICTING REQUIREMENTS

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

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

1.5 SUBMITTALS

A. Schedule of Tests and Inspections: Prepare in tabular form and include the following:

1. Specification Section number and title.
2. Description of test and inspection.
3. Identification of applicable standards.
4. Identification of test and inspection methods.
5. Number of tests and inspections required.
6. Time schedule or time span for tests and inspections.
7. Entity responsible for performing tests and inspections.
8. Requirements for obtaining samples.
9. Unique characteristics of each quality-control service.

B. Reports: Prepare and submit certified written reports that include the following:

1. Date of issue.
2. Project title and number.
3. Name, address, and telephone number of testing agency.
4. Dates and locations of samples and tests or inspections.

5. Names of individuals making tests and inspections.
6. Description of the Work and test and inspection method.
7. Identification of product and Specification Section.
8. Complete test or inspection data.
9. Test and inspection results and an interpretation of test results.
10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
12. Name and signature of laboratory inspector.
13. Recommendations on retesting and reinspecting.

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

1.6 QUALITY ASSURANCE

A. General: Qualifications paragraphs in this Article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

B. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

C. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

D. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar to those indicated for this Project in material, design, and extent.

F. Specialists: Certain sections of the Specifications require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.

1. Requirement for specialists shall not supersede building codes and regulations governing the Work.

G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according

to ASTM E 548; and with additional qualifications specified in individual Sections; and where required by authorities having jurisdiction, that is acceptable to authorities.

1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.

H. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

I. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:

1. Contractor responsibilities include the following:

a. Provide test specimens representative of proposed products and construction.
b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
c. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
d. Build site-assembled test assemblies and mockups using installers who will perform same tasks for Project.
e. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
f. When testing is complete, remove test specimens, assemblies, mockups, and laboratory mockups; do not reuse products on Project.

1.7 QUALITY CONTROL

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

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

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

1. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.

a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.

2. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
3. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
4. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

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

D. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.

E. Testing Agency Responsibilities: Cooperate with Engineer and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.

1. Notify Engineer and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
6. Do not perform any duties of Contractor.

F. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:

1. Access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
4. Facilities for storage and field curing of test samples.
5. Delivery of samples to testing agencies.
6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
7. Security and protection for samples and for testing and inspecting equipment at Project site.

G. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

1. Schedule times for tests, inspections, obtaining samples, and similar activities.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 REPAIR AND PROTECTION

A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.

1. Provide materials and comply with installation requirements specified in other Specification Sections. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible.

B. Protect construction exposed by or for quality-control service activities.

C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 014000

SECTION 017329 - CUTTING AND PATCHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes procedural requirements for cutting and patching.

1.3 DEFINITIONS

A. Cutting: Removal of in-place construction necessary to permit installation or performance of other Work.

B. Patching: Fitting and repair work required to restore surfaces to original conditions after installation of other Work.

1.4 QUALITY ASSURANCE

A. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio.

B. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.

C. Miscellaneous Elements: Do not cut and patch miscellaneous elements or related components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety

D. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

E. Cutting and Patching Conference: Before proceeding, meet at Project site with 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.

1.5 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during cutting and patching operations, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Comply with requirements specified in other Sections.

B. In-Place Materials: Use materials identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.

1. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.

1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with in-place finishes or primers.
2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Temporary Support: Provide temporary support of Work to be cut.

B. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

D. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to prevent interruption to occupied areas.

3.3 PERFORMANCE

A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
4. Excavating and Backfilling: Comply with requirements in applicable Division 31 Sections where required by cutting and patching operations.
5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
6. Proceed with patching after construction operations requiring cutting are complete.

C. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
2. Exposed Finishes: 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.

    a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
    b. Restore damaged pipe covering to its original condition.

3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.

    a. Where patching occurs in a painted surface, apply primer and intermediate paint coats over the patch and apply final paint coat over entire unbroken surface

containing the patch. Provide additional coats until patch blends with adjacent surfaces.

4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition.

D. Cleaning: Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.

END OF SECTION 017329

SECTION 017823 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
   1. Operation manuals for systems, subsystems, and equipment.
   2. Maintenance manuals for the care and maintenance of products, materials, and finishes systems and equipment.

1.3 DEFINITIONS

A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.

B. Subsystem: A portion of a system with characteristics similar to a system.

1.4 SUBMITTALS

A. Initial Submittal: Submit 2 draft copies of each manual at least 15 days before requesting inspection for Substantial Completion. Include a complete operation and maintenance directory. Engineer will return one copy of draft and mark when general scope and content of manual are acceptable.

B. Final Submittal: Submit 3 copies of each manual in final form.

1.5 COORDINATION

A. Where operation and maintenance documentation includes information on installations by more than one factory-authorized service representative, assemble and coordinate information furnished by representatives and prepare manuals.

PART 2 - PRODUCTS

2.1 MANUALS, GENERAL

A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:

1. Title page.
2. Table of contents.
3. Manual contents.

B. Title Page: Enclose title page in transparent plastic sleeve. Include the following information:

1. Subject matter included in manual.
2. Name and address of Project.
3. Name and address of Owner.
4. Date of submittal.
5. Name, address, and telephone number of Contractor.
6. Name and address of Architect.
7. Cross-reference to related systems in other operation and maintenance manuals.

C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.

1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.

D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.

1. Binders: Heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch (215-by-280-mm) paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.

    a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
    b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents. Indicate volume number for multiple-volume sets.

2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section. Mark each tab to indicate contents. Include typed list of products and major components of

equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.

3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software diskettes for computerized electronic equipment.
4. Supplementary Text: Prepared on 8-1/2-by-11-inch (215-by-280-mm) white bond paper.
5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.

    a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
    b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.
    c. Provide 11x17 control drawings on each control panel corresponding to the controller in it.

2.2 OPERATION MANUALS

A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:

1. System, subsystem, and equipment descriptions.
2. Performance and design criteria if Contractor is delegated design responsibility.
3. Operating standards.
4. Operating procedures.
5. Operating logs.
6. Wiring diagrams.
7. Control diagrams.
8. Piped system diagrams.
9. Precautions against improper use.
10. License requirements including inspection and renewal dates.

B. Descriptions: Include the following:

1. Product name and model number.
2. Manufacturer's name.
3. Equipment identification with serial number of each component.
4. Equipment function.
5. Operating characteristics.
6. Limiting conditions.
7. Performance curves.
8. Engineering data and tests.
9. Complete nomenclature and number of replacement parts.

C. Operating Procedures: Include the following, as applicable:

1. Startup procedures.
2. Equipment or system break-in procedures.
3. Routine and normal operating instructions.
4. Regulation and control procedures.

5. Instructions on stopping.
6. Normal shutdown instructions.
7. Seasonal and weekend operating instructions.
8. Required sequences for electric or electronic systems.
9. Special operating instructions and procedures.

D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.

E. Piped Systems: Diagram piping as installed and identify color-coding where required for identification.

2.3 PRODUCT MAINTENANCE MANUAL

A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.

C. Product Information: Include the following, as applicable:

1. Product name and model number.
2. Manufacturer's name.
3. Color, pattern, and texture.
4. Material and chemical composition.
5. Reordering information for specially manufactured products.

D. Maintenance Procedures: Include manufacturer's written recommendations and the following:

1. Inspection procedures.
2. Types of cleaning agents to be used and methods of cleaning.
3. List of cleaning agents and methods of cleaning detrimental to product.
4. Schedule for routine cleaning and maintenance.
5. Repair instructions.

E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.

2.4 SYSTEMS AND EQUIPMENT MAINTENANCE MANUAL

A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.

B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.

C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:

1. Standard printed maintenance instructions and bulletins.
2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
3. Identification and nomenclature of parts and components.
4. List of items recommended to be stocked as spare parts.

D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:

1. Test and inspection instructions.
2. Troubleshooting guide.
3. Precautions against improper maintenance.
4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
5. Aligning, adjusting, and checking instructions.
6. Demonstration and training videotape, if available.

E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.

1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.

F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.

G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.

H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

A. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

B. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.

1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.

C. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.

1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.

D. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in Record Drawings to ensure correct illustration of completed installation.

1. Do not use original Project Record Documents as part of operation and maintenance manuals.

END OF SECTION 017823

SECTION 017839 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for Project Record Documents, including the following:

1. Record Drawings.
2. Record Product Data.

1.3 SUBMITTALS

A. Record Drawings: Comply with the following:

1. Number of Copies: Submit one set(s) of marked-up Record Prints.
2. Number of Copies: Submit copies of Record Drawings as follows:

a. Initial Submittal: Submit one set(s) of plots from corrected Record CAD Drawings and one set(s) of marked-up Record Prints. Engineer will initial and date each plot and mark whether general scope of changes, additional information recorded, and quality of drafting are acceptable. Engineer will return plots and prints for organizing into sets, printing, binding, and final submittal.
b. Final Submittal: Submit one set(s) of marked-up Record Prints. Print each Drawing, whether or not changes and additional information were recorded.

B. Record Product Data: Submit one copy of each Product Data submittal.

1. Where Record Product Data is required as part of operation and maintenance manuals, submit marked-up Product Data as an insert in manual instead of submittal as Record Product Data.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

A. Record Prints: Maintain one set of blue- or black-line white prints of the Contract Drawings and Shop Drawings.

1. Preparation: Mark Record Prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to prepare the marked-up Record Prints.

    a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
    b. Accurately record information in an understandable drawing technique.
    c. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.

2. Content: Types of items requiring marking include, but are not limited to, the following:

    a. Dimensional changes to Drawings.
    b. Revisions to details shown on Drawings.
    c. Depths of foundations below first floor.
    d. Locations and depths of underground utilities.
    e. Revisions to routing of piping and conduits.
    f. Revisions to electrical circuitry.
    g. Actual equipment locations.
    h. Duct size and routing.
    i. Locations of concealed internal utilities.
    j. Changes made by Change Order.
    k. Changes made following Engineer's written orders.
    l. Details not on the original Contract Drawings.
    m. Field records for variable and concealed conditions.
    n. Record information on the Work that is shown only schematically.

3. Mark the Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. If Shop Drawings are marked, show cross-reference on the Contract Drawings.
4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
5. Mark important additional information that was either shown schematically or omitted from original Drawings.
6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

B. Format: Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.

1. Record Prints: Organize Record Prints into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.

2.2 RECORD PRODUCT DATA

A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.

2.3 MISCELLANEOUS RECORD SUBMITTALS

A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

A. Recording: Maintain one copy of each submittal during the construction period for Project Record Document purposes. Post changes and modifications to Project Record Documents as they occur; do not wait until the end of Project.

B. Maintenance of Record Documents and Samples: Store Record Documents and Samples in the field office apart from the Contract Documents used for construction. Do not use Project Record Documents for construction purposes. Maintain Record Documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to Project Record Documents for Engineer's reference during normal working hours.

END OF SECTION 017839

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SECTION 078400 - PENETRATION FIRESTOPPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes firestop systems for penetrations through fire-resistance-rated constructions, including both empty openings and openings containing penetrating items.

1.3 PERFORMANCE REQUIREMENTS

A. General: For penetrations through fire-resistance-rated constructions, including both empty openings and openings containing penetrating items, provide 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 construction penetrated.

1. Fire-resistance-rated walls including fire walls, fire partitions, fire barriers and smoke barriers.
2. Fire-resistance-rated horizontal assemblies including floors and floor/ceiling assemblies.

B. Rated Systems: Provide firestop systems with the following ratings determined per ASTM E 814 or UL 1479:

1. F-Rated Systems: Provide firestop systems with F-ratings indicated, but not less than that equaling or exceeding fire-resistance rating of constructions penetrated.
2. T-Rated Systems: For the following conditions, provide firestop systems with T-ratings indicated, as well as F-ratings, where systems protect penetrating items exposed to potential contact with adjacent materials in occupiable floor areas:

    a. Penetrations located outside wall cavities.
    b. Penetrations located outside fire-resistance-rated shaft enclosures.

C. For 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.
1. 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.
2. For penetrations involving insulated piping, provide firestop systems not requiring removal of insulation.

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

1.4 SUBMITTALS

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

B. Shop Drawings: For each firestop system, show each type of construction condition penetrated, relationships to adjoining construction, and type of penetrating item. Include firestop design designation of qualified testing and inspecting agency 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 firestop system configuration for construction and penetrating items.
2. Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular firestop condition, submit illustration, with modifications marked, approved by firestop system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.

C. Firestop System Schedule: Indicate locations of each firestop system, along with the following information:

1. Types of penetrating items.
2. Types of constructions penetrated, including fire-resistance ratings and, where applicable, thicknesses of construction penetrated.
3. firestop systems for each location identified by firestop design designation of qualified testing and inspecting agency.

D. Qualification Data: For Installer.

E. Product Certificates: For firestop system products, signed by product manufacturer.

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

G. Field Quality-Control Inspection Reports. For firestops and smokeseals installed by Non-FMG Approved Installer.

H. Other Informational Submittals.

a. Inspection Report(s) for Existing Building(s): Include inspection report(s) of the existing building(s), and instructions for the repair or replacement of any existing firestop and smoke seal systems.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A firm that has been approved by FMG according to FMG 4991, "Approval of Firestop Contractors."

1. As an alternate to utilizing an FMG Approved installer, Contractor may utilize a non-FMG Approved installer under the following conditions:

    a. Field inspection of installed firestop and smokeseal systems is undertaken in accordance with Article titled "Field Quality Control" at Contractor's expense.
    b. Non-FMG Approved Installer Qualifications: A firm experienced in installing firestop and smokeseal systems similar in material, design, and extent to that indicated, whose work has resulted in construction with a record of successful performance. Qualifications include having the necessary experience, staff, and training to install manufacturer's products per specified requirements. Manufacturer's willingness to sell its firestop and smokeseal system products to Contractor or to Installer engaged by Contractor does not in itself confer qualification on buyer.

B. Installation Responsibility: Assign installation of firestop systems and fire-resistive joint systems in Project to a single qualified installer.

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

D. Fire-Test-Response Characteristics: Provide firestop systems that comply with the following requirements and those specified in Part 1 "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. firestop systems are identical to those tested per testing standard referenced in "Part 1 Performance Requirements" Article. Provide rated systems complying with the following requirements:

    a. firestop system products bear classification marking of qualified testing and inspecting agency.
    b. firestop systems correspond to those indicated by reference to firestop system designations listed by the following:

        1) UL in its "Fire Resistance Directory."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver 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 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 firestop systems when ambient or substrate temperatures are outside limits permitted by firestop system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.

B. Ventilate 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 firestop systems are installed according to specified requirements.

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

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

D. Do not cover up firestop system installations that will become concealed behind other construction until each installation has been examined by inspecting agency and building inspector, if required by authorities having jurisdiction.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products: Subject to compliance with requirements, provide one of the firestop systems indicated for each application in the Firestop System Schedule at the end of Part 3. that are produced by one of the following manufacturers:
1. Hilti, Inc.
2. RectorSeal Corporation (The).
3. Specified Technologies Inc.
4. 3M; Fire Protection Products Division.

2.2 FIRESTOPPING, GENERAL

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

B. Identification Labels: Provide permanent, preprinted identification labels for firestop and smokeseal systems as follows:

1. Size: Minimum 2 inch by 3 inch.

2. Materials: One of the following:

   a. Plastic Labels: Self-adhering type with adhesives capable of permanently bonding labels to surfaces on which labels are placed and, in combination with label material, will result in partial destruction of label if removal is attempted.
   b. Metal Labels: Secure with mechanical fasteners.

3. Information: Include the following on identification labels:

   a. System identification, including:

      1) For penetration firestops, the words "Rated Penetration Firestop System - Do Not Disturb".
      2) For joint firestops, the words "Rated Joint Firestop System - Do Not Disturb".
      3) For smokeseals, the words "Smokeseal System - Do Not Disturb".
      4) For all, the additional words "Notify OCCC Maintenance of any damage".
      5) System designation of qualified testing and inspecting agency, and name of qualified testing and inspecting agency.
      6) System manufacturer's name.

   b. Contractor identification, including:

      1) Contractor’s name, address, and phone number.
      2) Installer’s name, address, and phone number.
      3) Date of installation.

C. Accessories: Provide components for each firestop system that are needed to install fill materials and to comply with Part 1 "Performance Requirements" Article. Use only components specified by firestop system manufacturer and approved by qualified testing and inspecting agency for firestop systems indicated. Accessories include, but are not limited to, the following items:

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

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

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

2.3 FILL MATERIALS

A. Ceramic-Fiber Mastic Coatings and Sealants: Single-component formulations of ceramic fibers and inorganic binders.

B. Endothermic Latex Compound Sealants: Single-component, endothermic, latex formulations that after cure do not re-emulsify during exposure to moisture.

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

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

E. Intumescent Polyurethane Foam: Sponge-like polyurethane material, containing no fibers, solvents, or Halogens.

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

G. Intumescent Wrap Strips: Flexible elastomeric strips. Designed for use in conjunction with a restricting collar.

1. Collars: Factory-manufactured metal restricting collars for housing an intumescent insert with a radial extended flange for fastening to substrate.

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 or plastic cases filled with a combination of mineral-fiber, water-insoluble expansion agents, and fire-retardant additives.

J. Silicone Sealants: 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.

K. Firestop Devices: Factory-assembled devices sized to fit specific penetrants.

1. Steel pathway and wall plate lined with intumescent material that adjusts automatically to cable additions or subtractions, allowing for 0 to 100-percent visual fill of conductors.
2. Metallic sleeve lined with an intumescent strip, a radial extended flange on one end of the sleeve for fastening to concrete formwork and casting in-place, and a neoprene gasket.

2.4 MIXING

A. For those products requiring mixing before application, comply with 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 of work.

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

3.2 PREPARATION

A. Surface Cleaning: Clean out openings immediately before installing firestop systems to comply with firestop system manufacturer's written instructions and with the following requirements:

1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of firestop systems.
2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with 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 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 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 FIRESTOP SYSTEM INSTALLATION

A. General: Install firestop systems to comply with Part 1 "Performance Requirements" Article and with 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 and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of firestop systems.

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

1. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.
2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
3. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 CLEANING AND PROTECTING

A. Clean off excess fill materials adjacent to openings as Work progresses by methods and with cleaning materials that are approved in writing by 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 that 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 firestop systems immediately and install new materials to produce systems complying with specified requirements.

3.5 FIRESTOP SYSTEM SCHEDULE

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

B. Firestop Systems for Metallic Pipes, Conduit, or Tubing:

1. UL-Classified Systems:

a. CMU: CAJ1001, CAJ1003, CAJ1011, CAJ1016, CAJ1031, CAJ1032, CAJ1044, CAJ1052, CAJ1079, CAJ1140, CAJ1176, CAJ1205, CAJ1213, CAJ1224, CAJ1226, CAJ1234, CAJ1235, CAJ1242, CAJ1262.
b. GWB: WL1001, WL1015, WL1017, WL1029, WL1030, WL1031, WL1046, WL1049, WL1054, WL1085, WL1089, WL1090, WL1091, WL1095, WL1105, WL1113, WL1115, WL1127.

C. Firestop Systems for Electrical Cables:

1. UL-Classified Systems:
a. CMU: CAJ3003, CAJ3008, CAJ3016, CAJ3030, CAJ3035, CAJ3043, CAJ3083, CAJ3089, CAJ3093, CAJ3095, CAJ3103, CAJ3123, CAJ3124, CAJ3128, CAJ3214, CBJ3003, FA3015, WJ3030, WJ3052, WJ3098.
b. GWB: WL3005, WL3011, WL3025, WL3026, WL3030, WL3032, WL3060, WL3064, WL3065, WL3072, WL3076, WL3106, WL3218, WL3220, WL3223.

3.6 FIELD QUALITY CONTROL

A. Field Testing: Field quality control testing is only required for firestops and smokeseals installed by Non-FMG Approved Installer.

1. Inspecting Agency: Engage a qualified, independent inspecting agency to inspect firestop and smokeseal systems. Independent inspecting agency shall comply with the following requirements, including those related to qualifications, conducting inspections, and preparing test reports.

    a. ASTM E 2174 "Standard Practice for On-Site Inspection of Installed Fire Stops".
    b. ASTM E 2393 "Standard Practice for On-Site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barriers".

2. Inspection Services: Inspecting of completed firestop and smokeseal system installations shall take place in successive stages as installation of firestop and smokeseal systems proceeds. Do not proceed with installation of firestop and smokeseal systems for the next area until inspecting agency determines completed work shows compliance with requirements.

    a. Report results in writing.
    b. Inspecting agency shall state in each report whether inspected firestop and smokeseal systems comply with or deviate from requirements.

3. Remove and replace firestop and smokeseal systems where inspections indicate that they do not comply with specified requirements.
4. Additional inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
5. Proceed with enclosing firestop and smokeseal systems with other construction only after inspection reports are issued and firestop and smokeseal installations comply with requirements.

END OF SECTION 078400

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SECTION 08 11 13 - HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes hollow-metal work.

B. Related Requirements:

1. Section 087100 "Door Hardware" for door hardware for hollow-metal doors.

1.3 DEFINITIONS

A. Minimum Thickness: Minimum thickness of base metal without coatings according to NAAMM-HMMA 803 or SDI A250.8.

1.4 COORDINATION

A. Coordinate anchorage installation for hollow-metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

1.5 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.6 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, core descriptions, fire-resistance ratings, temperature-rise ratings, and finishes.

B. Shop Drawings: Include the following:

1. Elevations of each door type.
2. Details of doors, including vertical- and horizontal-edge details and metal thicknesses.
3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
4. Locations of reinforcement and preparations for hardware.
5. Details of each different wall opening condition.
6. Details of anchorages, joints, field splices, and connections.
7. Details of accessories.
8. Details of moldings, removable stops, and glazing.
9. Details of conduit and preparations for power, signal, and control systems.

C. Samples for Verification:

1. For each type of exposed finish required, prepared on Samples of not less than 3 by 5 inches (75 by 127 mm).

2. For "Doors" and "Frames" subparagraphs below, prepare Samples approximately 12 by 12 inches (305 by 305 mm) to demonstrate compliance with requirements for quality of materials and construction:

    a. Doors: Show vertical-edge, top, and bottom construction; core construction; and hinge and other applied hardware reinforcement. Include separate section showing glazing if applicable.
    b. Frames: Show profile, corner joint, floor and wall anchors, and silencers. Include separate section showing fixed hollow-metal panels and glazing if applicable.

D. Schedule: Provide a schedule of hollow-metal work prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with final Door Hardware Schedule.

1.7 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For each type of hollow-metal door and frame assembly, for tests performed by a qualified testing agency.

1. Exterior Openings: Based on evaluation of comprehensive tests performed by a qualified testing agency, for exterior openings, from the Florida Department of Community Affairs holding a current Florida Product Approval.

B. Oversize Construction Certification: For assemblies required to be fire rated and exceeding limitations of labeled assemblies.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver hollow-metal work palletized, packaged, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.

1. Provide additional protection to prevent damage to factory-finished units.

B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

C. Store hollow-metal work vertically under cover at Project site with head up. Place on minimum 4-inch- (102-mm-) high wood blocking. Provide minimum 1/4-inch (6-mm) space between each stacked door to permit air circulation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Amweld International, LLC.
2. Architectural Openings, Inc.
3. Ceco Door Products; an Assa Abloy Group company.
4. Curries Company; an Assa Abloy Group company.
5. Pioneer Industries, Inc.
6. Quality Engineering Products Co., Inc.
7. Republic Doors and Frames.

8. Steelcraft; an Ingersoll-Rand company.

B. Source Limitations: Obtain hollow-metal work from single source from single manufacturer.

2.2 REGULATORY REQUIREMENTS

A. Fire-Rated Assemblies: Complying with NFPA 80 and listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection ratings and temperature-rise limits indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.

1. Smoke- and Draft-Control Assemblies: Provide an assembly with gaskets listed and labeled for smoke and draft control by a qualified testing agency acceptable to authorities having jurisdiction, based on testing according to UL 1784 and installed in compliance with NFPA 105.

B. Fire-Rated, Borrowed-Light Assemblies: Complying with NFPA 80 and listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction for fire-protection ratings indicated, based on testing according to NFPA 257 or UL 9.

2.3 INTERIOR HOLLOW-METAL DOORS AND FRAMES

A. Construct interior doors and frames to comply with the standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.

B. Heavy-Duty Doors and Frames: SDI A250.8, Level 2.

1. Physical Performance: Level B according to SDI A250.4.
2. Doors:

a. Type: As indicated in the Door and Frame Schedule.
b. Thickness: 1-3/4 inches (44.5 mm).
c. Face: Uncoated, cold-rolled steel sheet, minimum thickness of 0.042 inch (1.0 mm).
d. Edge Construction: Model 1, Full Flush.
e. Core: Manufacturer's standard kraft-paper honeycomb, polystyrene, polyurethane, polyisocyanurate, mineral-board, or vertical steel-stiffener core at manufacturer's discretion.

3. Frames:

a. Materials: Uncoated steel sheet, minimum thickness of 0.053 inch (1.3 mm).
b. Construction: Full profile welded.

4. Exposed Finish: Prime.

2.4 FRAME ANCHORS

A. Jamb Anchors:

1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042 inch (1.0 mm) thick, with corrugated or perforated straps not less than 2 inches (51 mm) wide by 10 inches (254 mm) long; or wire anchors not less than 0.177 inch (4.5 mm) thick.
2. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch (1.0 mm) thick.

B. Floor Anchors: Formed from same material as frames, minimum thickness of 0.042 inch (1.0 mm), and as follows:

1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.

2.5 MATERIALS

A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

B. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

C. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.

D. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B.

E. Frame Anchors: ASTM A 879/A 879M, Commercial Steel (CS), 04Z (12G) coating designation; mill phosphatized.

1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot-dip galvanized according to ASTM A 153/A 153M, Class B.

F. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.

G. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow-metal frames of type indicated.

H. Grout: ASTM C 476, except with a maximum slump of 4 inches (102 mm), as measured according to ASTM C 143/C 143M.

I. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.

J. Bituminous Coating: Cold-applied asphalt mastic, compounded for 15-mil (0.4-mm) dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.6 FABRICATION

A. Fabricate hollow-metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for metal thickness. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.

B. Hollow-Metal Doors:

1. Steel-Stiffened Door Cores: Provide minimum thickness 0.026 inch (0.66 mm), steel vertical stiffeners of same material as face sheets extending full-door height, with vertical webs spaced not more than 6 inches (152 mm) apart. Spot weld to face sheets no more than 5 inches (127 mm) o.c. Fill spaces between stiffeners with glass- or mineral-fiber insulation.

2. Fire Door Cores: As required to provide fire-protection and temperature-rise ratings indicated.
3. Vertical Edges for Single-Acting Doors: Provide beveled or square edges at manufacturer's discretion.
4. Top Edge Closures: Close top edges of doors with inverted closures of same material as face sheets.
5. Bottom Edge Closures: Close bottom edges of doors with end closures or channels of same material as face sheets.
6. Exterior Doors: Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape. Seal joints in top edges of doors against water penetration.
7. Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch (19 mm) beyond edge of door on which astragal is mounted or as required to comply with published listing of qualified testing agency.

C. Hollow-Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.

1. Sidelight and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
3. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.
4. Floor Anchors: Weld anchors to bottoms of jambs with at least four spot welds per anchor; however, for slip-on drywall frames, provide anchor clips or countersunk holes at bottoms of jambs.
5. Jamb Anchors: Provide number and spacing of anchors as follows:

    a. Masonry Type: Locate anchors not more than 16 inches (406 mm) from top and bottom of frame. Space anchors not more than 32 inches (813 mm) o.c., to match coursing, and as follows:

        1) Two anchors per jamb up to 60 inches (1524 mm) high.
        2) Three anchors per jamb from 60 to 90 inches (1524 to 2286 mm) high.
        3) Four anchors per jamb from 90 to 120 inches (2286 to 3048 mm) high.
        4) Four anchors per jamb plus one additional anchor per jamb for each 24 inches (610 mm) or fraction thereof above 120 inches (3048 mm) high.

    b. Stud-Wall Type: Locate anchors not more than 18 inches (457 mm) from top and bottom of frame. Space anchors not more than 32 inches (813 mm) o.c. and as follows:

        1) Three anchors per jamb up to 60 inches (1524 mm) high.
        2) Four anchors per jamb from 60 to 90 inches (1524 to 2286 mm) high.
        3) Five anchors per jamb from 90 to 96 inches (2286 to 2438 mm) high.
        4) Five anchors per jamb plus one additional anchor per jamb for each 24 inches (610 mm) or fraction thereof above 96 inches (2438 mm) high.

    c. Compression Type: Not less than two anchors in each frame.

6. Head Anchors: Two anchors per head for frames more than 42 inches (1067 mm) wide and mounted in metal-stud partitions.
7. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers as follows. Keep holes clear during construction.
    a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
    b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.

D. Fabricate concealed stiffeners and edge channels from either cold- or hot-rolled steel sheet.

E. Hardware Preparation: Factory prepare hollow-metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to SDI A250.6, the Door Hardware Schedule, and templates.
1. Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.
2. Comply with applicable requirements in SDI A250.6 and BHMA A156.115 for preparation of hollow-metal work for hardware.

F. Stops and Moldings: Provide stops and moldings around glazed lites and louvers where indicated. Form corners of stops and moldings with mitered hairline joints.
1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of hollow-metal work.
2. Multiple Glazed Lites: Provide fixed and removable stops and moldings so that each glazed lite is capable of being removed independently.
3. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
4. Provide loose stops and moldings on inside of hollow-metal work.
5. Coordinate rabbet width between fixed and removable stops with glazing and installation types indicated.

2.7 STEEL FINISHES

A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.
1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with SDI A250.10; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

2.8 ACCESSORIES

A. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.

B. Grout Guards: Formed from same material as frames, not less than 0.016 inch (0.4 mm) thick.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.

C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

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

3.2 PREPARATION

A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.

B. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

3.3 INSTALLATION

A. General: Install hollow-metal work plumb, rigid, properly aligned, and securely fastened in place. Comply with Drawings and manufacturer's written instructions.

B. Hollow-Metal Frames: Install hollow-metal frames of size and profile indicated. Comply with SDI A250.11 or NAAMM-HMMA 840 as required by standards specified.

1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.

    a. At fire-rated openings, install frames according to NFPA 80.
    b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
    c. Install frames with removable stops located on secure side of opening.
    d. Install door silencers in frames before grouting.
    e. Remove temporary braces necessary for installation only after frames have been properly set and secured.
    f. Check plumb, square, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
    g. Field apply bituminous coating to backs of frames that will be filled with grout containing antifreezing agents.

2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.

    a. Floor anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.

3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation inside frames.
4. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout.
5. Concrete Walls: Solidly fill space between frames and concrete with mineral-fiber insulation.
6. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
7. In-Place Metal or Wood-Stud Partitions: Secure slip-on drywall frames in place according to manufacturer's written instructions.

8. Installation Tolerances: Adjust hollow-metal door frames for squareness, alignment, twist, and plumb to the following tolerances:
    a. Squareness: Plus or minus 1/16 inch (1.6 mm), measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
    b. Alignment: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a horizontal line parallel to plane of wall.
    c. Twist: Plus or minus 1/16 inch (1.6 mm), measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
    d. Plumbness: Plus or minus 1/16 inch (1.6 mm), measured at jambs at floor.

C. Hollow-Metal Doors: Fit hollow-metal doors accurately in frames, within clearances specified below. Shim as necessary.
    1. Non-Fire-Rated Steel Doors:
        a. Between Door and Frame Jambs and Head: 1/8 inch (3.2 mm) plus or minus 1/32 inch (0.8 mm).
        b. Between Edges of Pairs of Doors: 1/8 inch (3.2 mm) to 1/4 inch (6.3 mm) plus or minus 1/32 inch (0.8 mm).
        c. At Bottom of Door: [3/4 inch (19.1 mm)] [5/8 inch (15.8 mm)] plus or minus 1/32 inch (0.8 mm).
        d. Between Door Face and Stop: 1/16 inch (1.6 mm) to 1/8 inch (3.2 mm) plus or minus 1/32 inch (0.8 mm).
    2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.

D. Glazing: Comply with installation requirements in hollow-metal manufacturer's written instructions.
    1. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches (230 mm) o.c. and not more than 2 inches (51 mm) o.c. from each corner.

3.4 ADJUSTING AND CLEANING

A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow-metal work that is warped, bowed, or otherwise unacceptable.

B. Remove grout and other bonding material from hollow-metal work immediately after installation.

C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

D. Metallic-Coated Surface Touchup: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

E. Touchup Painting: Cleaning and touchup painting of abraded areas of paint are specified in painting Sections.

END OF SECTION 08 1113

SECTION 08 38 00 TRAFFIC DOORS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Ultra Heavy Duty Impact Traffic Doors

1.2 SUBMITTALS

A. Submit under provisions of Section 01300 Submittals.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
1. Preparation instructions and recommendations.
2. Storage and handling requirements and recommendations.
3. Installation methods.
4. Operation and maintenance data.

C. Shop Drawings: Show fabrication and installation details; include door elevations, head, jamb.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

1.4 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.5 WARRANTY

A. Manufacturer's standard two-year warranty that products are free of defects in material and workmanship, guaranteeing to replace (exclusive of freight and labor) parts proven defective within two years after date of shipment to purchaser.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Chase Doors, and Approved Equals.

2.2 ULTRA HEAVY DUTY IMPACT TRAFFIC DOORS

A. Ultra Heavy duty Impact Traffic Doors: 1 7/8 inch Chase “Duralite Industrial door”
   1. Facing: Reinforcing metal plates. (Model SCP-4)
      a. Full Length Panels: 0.25 inch (0.81 mm) rotational molded, polyethylene skins, both sides, also edges with internal steel tube reinforcement.
   2. Window Size: 14 inches wide by 14 inches high.
   3. Window Molding: Black rubber molding.
   4. Glazing: Clear 1/8” polycarbonite.
   5. Option: Rotationally Molded Polyethylene TearDrop Bumpers 38” h.
   6. Hinges: Dbl Acting V-Cam Stainless Steel Hinging system.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. Verify jambs plumb and square.

C. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions.

C. Reinforce hollow metal jambs at hardware locations.

3.4 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION 08 38 00

SECTION 08 71 00 – DOOR HARDWARE

PART 1 – GENERAL

1.2 SUMMARY

A. Section Includes:
1. Standard Builders Hardware
2. Electrified Hardware
3. Hardware for Aluminum Doors
4. Automatic Operators, Low Energy
5. Thresholds and Weatherstripping
6. Smoke Seals
7. Templates
8. Hardware Schedule
9. Keying System

B. Related Sections:
1. Division 26 Electrical Coordination and Requirements
2. Division 27 Systems Low Voltage Coordination and Requirements

1.3 REFERENCES:

A. Reference and Standards: Where cited and except as modified by Project Specifications, applicable standards of the following Organizations apply:
1. American National Standards Institute (ANSI)
2. Builders Hardware Manufacturers Association (BHMA)
3. Door Hardware Institute (DHI)
4. National Fire Protection Association (NFPA)
5. Steel Door Institute (SDI)
6. Underwriters Laboratories (UL)
7. ICC/ANSI Accessibility Standard A117.1-2009
8. Florida Building Code 2010

1.4 SYSTEM DESCRIPTION:

A. Performance Requirements:
1. Provide hardware for fire-rated openings in compliance with NFPA 80, 1999 or current edition.
2. Provide hardware tested and listed by Underwriters Laboratories or other approved testing agency.
3. Provide hardware for fire-rated openings conforming to UL10C positive pressure fire testing.

1.5 SUBMITTALS:

A. Make submittals in accord with specification Section 013300 “Submittal Procedures”.

B. Hardware Schedule: Submit six copies of a typed vertical style hardware schedule on 8-1/2 x 11 sheets. Schedule openings by door number and locations. Indicate door and frame material, dimensions, hand, degree of opening, label condition and special information. Hardware items shall include product description and number, finish, hand, size, keying, template and special requirements. The scheduling sequence and format shall be as recommended by DHI.

C. Samples: Upon Architect's request, submit samples showing function, finish, and design of proposed hardware items. Samples remain suppliers property and will be returned to him prior to project completion.

D. Samples and Templates: Furnish to manufacturer of wood and metal doors and frames as required for proper hardware reinforcement and preparation of their work. If required, furnish physical hardware to the door and frame manufacturer for application.

E. Catalog Cuts: Submit two sets of each type of hardware item used.

F. Elevation Wiring Diagrams:

1. Include with the hardware schedule submittal elevation wiring diagrams of each different electrified hardware application.

2. Schedules submitted without this requirement will be considered incomplete and will not be reviewed.

G. Wiring Diagrams, Point-to-Point:

1. Provide point to point wiring diagrams after hardware schedule submittal has been reviewed and returned and accepted as conforming to contract documents. Provide a complete description of the electrified hardware operation for each different electrified hardware application.

H. Contract Close-Out Submittal:

1. Provide the following material in a 3-ring binder clearly tabbed and organized:
   a. Final hardware schedule
   b. Wiring diagrams including detailed point-to-point wiring and power requirements
   c. Catalog Cuts
   d. Installation Instructions
   e. Operating and adjustment instructions
   f. Illustrated parts list for locks, exit devices, closers
   g. Warrantees

1.6 QUALITY ASSURANCE:

A. Qualifications:

1. Contractor is responsible for:

a. Proper application and fit of door and specialty hardware in locations as indicated on drawings or as specified.
b. Items not specifically mentioned, but necessary to complete work are to be furnished matching in quality and finish of specified items in similar locations.
c. Coordinate dimensions between hardware items.
d. Furnish and install only hardware items listed on approved door hardware submittal.

2. Contractor's selection of hardware supplier:

a. Select recognized builders hardware supplier who has been furnishing hardware in area of project for a period not less than five years.
b. Recognized supplier to have on staff an Architectural Hardware Consultant (AHC) certified by the Door and Hardware Institute. Provide a copy of the AHC certification with submittals.
c. Hardware supplier's AHC to be available at all reasonable times during course of work to meet personally with Owner, Architect or Contractor for hardware consultation.

B. Source Limitations: Obtain each type and variety of door hardware from a single manufacturer, unless otherwise indicated.

C. Electrified Hardware:

1. Unless noted otherwise in Division 26 Electrical. Provide electrified hardware items rated 24 VDC or less.
2. Coordinate electrical hardware requirements, with Division 26 Electrical work for electrical distribution, fire alarm, and security systems.

D. Automatic Operators:

1. Supplier to provide Factory Trained and Certified Technicians to install automatic operators, actuators, provide drawings interfacing electrified hardware and access control systems, provide end user training and be available for continuing support during the warranty period. Provide a copy of certification training with the submittals.

E. Post Installation Inspection: At time of substantial completion direct Door Hardware Supplier to coordinate with Manufacturer's representatives of locks, exit devices, door closers and automatic operators to perform a required complete installation inspection

1. Inspect installation for correct application and operation in accordance with manufacturers written installation instructions.
2. Inspect and verify that provided and recommended screws and fasteners are used.
3. Manufacturer's representatives shall prepare a written report of all installation discrepancies found during this inspection and recommend a repair or replacement solution. Report shall be forwarded to a designated Architect's representative.

1.7 DELIVERY, STORAGE AND HANDLING:

A. Delivery: Deliver items in manufacturer's original package. Each item individually packaged and carefully marked for intended opening and use. Each item complete with necessary screws, bolts, keys, instructions, and where necessary, installation templates.

B. Storage: Protect materials on the job and during installation. Provide a secure, locked, dry storage area or room in the building.
Store off the floor on temporary shelving.

C. Handling: Handle items in a manner to prevent damage. Marred, defaced, damaged, and defective items will be rejected.

1.8 WARRANTY:

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures including excessive deflection, cracking, or breakage.
b. Faulty operation of operators and door hardware.
c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.

2. Warranty Period: One year from date of Substantial Completion, except as Follows:
a. Exit Devices: 3 years from date of Substantial Completion.
b. Manual Closers: 10 years from date of Substantial Completion.
c. Door Closers with Electric Components – 2 years from date of Substantial Completion.

1.9 MAINTENANCE SERVICE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 – PRODUCTS

2.1 MANUFACTURERS:

A. Catalog numbers of Manufacturers listed in Column 1 have been used to establish quality required. Manufacturers listed in Columns 2 & 3 are approved substitutes.

B. It is the intent that approved door hardware be provided for every door on the project. Doors inadvertently omitted from the schedule shall be provided with hardware equal to doors of similar function.

ITEM	1	2	3
Hinges	Hager	Ives	McKinney
Continuous Hinges	Hager	Ives	Markar
Locks	Schlage	No Substitute-User Standard	
Cylinder IC Cores	Best	No Substitute-User Standard	
Exit Devices	Von	No Substitute-User Standard	
Closers	LCN	No Substitute-User Standard	
Automatic Operators	Stanley	No Substitute-User Standard	
Door Position Switches	Schlage	GE	SDC
Pulls, Kick & Armor Plates	Rockwood	Ives	Hager
Overhead Stops	GJ	Rixson	ABH
Stops, Flush Bolts	Ives	Hager	Rockwood
Thresholds	Pemko	Hager	National
Weatherstrip, Smoke Seal	Pemko	DHS	National

C. Designations: Following abbreviations to identify list manufacturers.

ABH	Architectural Builders Hdwe., Elk Grove Village, Il
DHS	Door Hardware Systems, Rochester, NY.
GE	GE-Interlogix, Tualatin, OR.
GJ	Glynn-Johnson Corp., Indianapolis, IN
Hager	C. Hager & Sons, St. Louis, MO
Ives	Ives, Indianapolis, IN
LCN	LCN Closers, Princeton, IL
McKinney	McKinney, Scranton, PA
National	National Guard, Memphis, TN
Pemko	Pemko Mfg., Memphis, TN

Rixson	Rixson Corp., Charlotte, NC
Rockwood	Rockwood Mfg., Rockwood, PA
Schlage	Schlage Lock Co., Colorado Springs, CO
SDC	Security Door Controls, Westlake Village, CA
Stanley	Stanley Access Technologies, Farmington, CT
Von Duprin	Von Duprin, Indianapolis, IN

2.2 MATERIALS:

. A. SCREWS & FASTENERS:

1. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to commercially recognized industry standards for application intended, except aluminum fasteners are not permitted. Provide Phillips flat-head screws with finished heads to match surface of door hardware, unless otherwise indicated.

   a. Steel Machine Screws: For the following fire-rated applications:

      1. Mortise hinges to doors.
      2. Strike plates to frames.
      3. Closers to doors and frames.

   b. Steel thru Bolts: Not allowed.

B. Hinges:

1. Interior door hinges: steel, plated .134 minimum thickness except as noted. Provide heavy weight .180 minimum thickness on doors wider than 3’0. Exterior door hinges: heavy weight .180 minimum thickness. Hinge size 4-1/2 x 4-1/2 unless otherwise noted in this schedule.

2. Electric thru wire hinges: Provide wire leads long enough to reach electrified lock on latch side and a junction box 4’0” above frame with no splices.

3. Provide quantities as follows unless otherwise noted in the schedule:

Door Height:	Number of Hinges
Up to 60”	2 Hinges
Over 60” and not over 90”	3 Hinges
Over 90” and not over 120”	4 Hinges

C. Continuous Hinges, Stainless Steel:

1. 14 gauge, type 304 stainless steel.
2. .25 diameter type 304 stainless steel pin, exterior barrel diameter .438.
3. 2 inch knuckles with split nylon bearings at each separation.
3. Provide EPT cutouts where shown in the hardware sets

4. Provide UL listed at fire labeled openings.
5. Provide models as shown in the hardware sets

D. Continuous Hinges, Aluminum:

1. Heavy duty type 6063-T6 aluminum
2. Provide bearings at 2 9/16" centers
3. Provide bearing at the top to prevent debris from being inserted into the channel.
4. Provide UL listed at fire labeled openings
5. Provide models as shown in the hardware sets.

E. Locks and Latches:

1. Locks and latches: Heavy duty bored type, in accord with ANSI / BHMA standard A-156.2, Series 4000, Grade 1.

2. Where required by applicable codes or the Authority Having Jurisdiction provide knurled levers on doors leading to a hazardous area. Hazardous Area means a space or an area which may be dangerous or cause injury to the public if a person accidentally entered into such an area. Examples include but are not limited to: loading docks, boiler or heater rooms, electrical rooms, telephone equipment rooms or elevator equipment rooms.

3. Provide functions and lever design as shown in the hardware sets

F. Exit Devices:

1. Provide Von Duprin exit devices with features, functions and options as shown in the hardware sets.

2. Exit Devices: Of the push pad design with smooth interior mechanism case. Device shall incorporate a fluid dampener which decelerates the push pad on its return stroke eliminating most noise associated with the device operation. Provide glass bead kits to provide clearance for raised glass trim.

3. Lever trim shall incorporate a break away feature. When locked the rigid lever will break away when more than 35 pounds of torque is applied.

G. Closers:

1. Provide LCN door closers with features, functions and options shown in the hardware sets.
2. Materials and construction: High strength cast iron cylinder with full rack and pinion action. Spring power adjustable to 50%. Provide separate non-critical screw valves for regulation of latch speed, sweep speed, and back check. Hydraulic fluid type requiring no seasonal adjustment for temperatures ranging from 120 degrees F to –30 degrees F.
3. Provide brackets, drop plates, spacer blocks, and accessories required

to insure proper installation.

4. Parallel arms: Extra duty forged steel main arm, forearm and shoe.
5. Provide door closers on fire labeled openings.

H. Automatic Operators:

1. Automatic Operators: Provide Stanley Magic Force, low energy, slow opening type with a maximum opening force of 15 LBF to stop door swing as shown in the hardware sets.
2. Wall Plate Actuators: 6" diameter stainless steel with blue filled engraved handicap logo and script push to open, surface mounted, wireless.

I. Overhead Stops / Holders:

1. Satin stainless steel, ANSI / BHMA Grade 1.

J. Magnetic Wall Holders:

1. Cast aluminum housing, sprayed finish
2. 120 VAC coil, minimum holding force 25 pounds
3. Provide armature extensions as required by job conditions

K. Pulls: 1 inch diameter bar stock. 12 inch center to center.
Fasteners: Decorative spanner head thru bolts.

L. Push Bars

1. Push Bars: 1 inch diameter bar stock. CTC 6 inches less than door width.
Fasteners: Decorative spanner head thru bolts.

M. Kick Plates:

1. 0.050 stainless steel 10 inches high x 2 inches less than door width on singles and 1 inch less on pairs. Fasteners: full threaded, countersunk, undercut, Phillips head, stainless steel, sheet metal screws.

N. Armor Plates:

1. .050 stainless steel 34 inches high x 2 inch less than door width on singles and 1 less on pairs. On doors using edge guard continuous hinges terminate plate 1" from latch edge on singles and ½" on pairs.
2. Fasteners: full threaded, countersunk, undercut, Phillips head, stainless steel, sheet metal screws.
3. Provide UL stamping on fire rated doors.

O. Thresholds:

1. Heavy extruded aluminum with silicone bumper seal
2. Provide with skid resistant abrasive nickel-aluminum composite finish.
3. Provide with stainless steel machine screws and machine screw lead anchors.

2.3 FINISHES:

US SYMBOL	ANSI SYMBOL		DESCRIPTION
Continuous Hinges	US32D	630	Satin Stainless
Steel Hinges, Exterior	US32D	630	Satin Stainless
Steel Hinges, Interior	US26D	626	Satin Chrome
Exit Devices	US26D	626	Satin Chrome
Locks	US26D	626	Satin Chrome Closers
AL		689	Alum. Powder Coat O.H.
Holders	US32D	630	Satin Stainless Steel Stops
Flush Bolts	US26D	626	Satin Chrome
Pulls, Kick & Armor Plates	US32D	630	Satin Stainless Steel

2.4 KEYS AND KEYING:

A. Cylinders: Best, patented, high security, interchangeable core.

B. Provide #1 bitted. User will combine.

PART 3 – EXECUTION

3.1 EXAMINATION:

A. Verify doors and frames are ready to receive work and dimensions are as indicated on shop drawings or as instructed by manufacturers.

B. Verify power supply is available to electrically operated devices. C.

Beginning of installation means acceptance of existing conditions.

3.2 PREPARATION

A. Steel Doors and Frames: Comply with DHI A115 Series.
1. Surface-Applied Door Hardware: Drill and tap doors and frames according to ANSI A250.6.

3.3 INSTALLATION:

A. General:

1. Install each hardware item in accordance with each manufacturer's instructions and recommendations.
2. Install no hardware until substrate finishes are complete.
3. Wherever cutting and fitting is required to install hardware onto or into surfaces, which are later to be painted or otherwise finished, install each item completely then remove and stored during application of finishes; Reinstall upon completion of finishing operations.
4. Set items level, plumb and true to line and location.
5. Adjust and reinforce attachment substrate as necessary for a secure installation.
6. Drill and countersink items not factory prepared for fasteners.
7. Space fasteners and anchors per manufacturer's instructions and in accordance with industry standards.
8. Do not install hardware on doors, which have been improperly prepared.
9. Attach wall mounted hardware to concealed wall blocking. Do not install wall mounted hardware where wall blocking has not been installed and arrange for blocking to be installed before proceeding.

B. Fire-Rated Openings:

1. In addition to previous requirements, conform to NFPA 80 covering installations of fire door assemblies.
2. Refer to instructions from door and frame manufacturer's regarding special hardware installation requirements, including function holes, undercutting and minimum clearances between hardware cutouts.

C. Installation Templates, Instruction Sheets and Schedules: Retain copies of templates, instruction sheets, schedules, installation details and similar data regarding hardware, maintenance and servicing. See Part 1 under Contract Closeout Submittals for assembly and distribution of data.

D. Mounting Heights: Heights given are centerline heights up from finish floor unless stated otherwise: Heights given "Number to Number" indicate one height within limits given. Where heights of items are not listed, install in accordance with recommendations of DHI.

1.	Bottom Hinge	10 to 13 inches from floor
2.	Top Hinge	7-1/2 to 11-3/4 inches from head
3.	Intermediate Hinge	Equally spaced
4.	Lock Lever	38 to 40-5/16 inches
5.	Push Bar	46 to 48 inches
6.	Pull	42 inches

E. Installation Requirements: In addition to mounting heights specified above, install hardware as follows:
1. Hinges:

a. Hang doors within following tolerances: 1/8" maximum

between door and frame, and 1/8" maximum between meeting edges of pairs of doors.

b. Provide under door clearance at fire assemblies per NFPA 80.

c. Where shimming is necessary for proper door / frame installation, use only metal shims.

d. Install electric hinges or pivots as center hinge or second hinge from bottom where doors have 2 pairs of hinges..

2. Locks: Install only curved lip strikes and dust box behind each strike.

3. Exit Devices:
   a. Center exit device cases on door stiles, and equally spaced from each door edge, unless required otherwise by manufacturer's templates or instructions.
   b. Locate power transfers in door and frame centered on exit devices.

4. Closers:
   a. Install closers to permit maximum degree of door swing allowed by job conditions. Follow manufacturer's instructions.

5. Door Stops:
   a. Install stops to permit maximum degree of door swing allowed by job conditions.
   b. Locate floor stops so as not to create a tripping hazard, and to catch door at a point 6 inches in from latch edge, but in no case further than 1/3 door width measured from latch edge.
   c. Wall stops intended for knobs and levers are to be located centered on spindle.

6. Protection plates: (Armor and Kick Plates)
   a. Armor and kick plates: Install on push side of single acting doors.
   b. Unless otherwise indicated install ¼ inch up from door bottom.

7. Threshold:
   a. Scribe and cut to fit profiles of door jambs with mitered corners and precision made joints.
   b. Join units with concealed welds or concealed mechanical devices.
   c. Cut smooth openings for mullions, bolts and similar items.
   d. At exterior doors and elsewhere as indicated, set thresholds in bed of butyl rubber sealant, completely fill voids to exclude moisture.
   e. At exterior doors, install bevel of threshold aligned with exterior face of door, unless indicated otherwise by detail or threshold manufacturer's instructions.
   f. Install thresholds level.

F. Boxed Power Supplies: Locate power supplies as indicated or, if not indicated, above accessible ceilings. Verify location with Architect.

1. Configuration: Provide the least number of power supplies required to adequately serve doors with electrified door hardware.

G. Miscellaneous Hardware:

1. Magnetic Release Door Holders:
   a. Coordinate with electrical.
   b. Refer to manufacturer's graphic chart for mounting locations of both wall and door portions of holders.

H. Doors with Electric Hardware:

1. Doors with Card Reader, Electric Strikes or Electric Locks:
   a. Wire card reader or keypad to operate electric strike or lock.
   b. Electric locks are fail secure and lock when power off.

2. Labeled Doors with Automatic Operators and Exit Devices with Electric Latch Retraction:
   a. Wire exit device so latchbolt is held in retracted position until fire alarm is activated.
   b. Fire alarm to cut power to automatic operator.
   c. Wire relay in operator to release latchbolt or exit device so it engages strike.

3.3 FIELD QUALITY CONTROL:

A. Tests:
1. Electric Closers: Test voltages at each door and note voltage at each. Arrange for and correct power supply where operating voltages are less than 23 volts or greater than 25 volts.
2. Magnetic Release Door Holders: Test each magnetic release after installation and note holding force. Magnetic holders, which do not have a 25-pound minimum holding force are to have voltage checked at each holder, and condition corrected.

B. Manufacturer's Field Service:
1. Closer: After air handling system has been balanced arrange for closer to be finally adjusted by person trained by closer manufacturer or closer manufacturer's representative.
   a. Adjust closer to take 3 seconds minimum for door to swing from a 70 degree position to 3" from latching position.
   b. Adjust closer not to exceed 5 lbs. opening force. Exception: Fire doors as required to close & latch.

3.4 ADJUSTING:

A. Adjusting & Cleaning:

1. Adjust and check each item of hardware and each door to insure proper operation and function of each unit.
2. Lubricate moving parts with graphite-type lubricant unless otherwise recommended by manufacturer.
3. Replace hardware, which cannot be lubricated and adjusted to operate freely and smoothly.
4. Final Adjustment:
   a. Whenever hardware installation is made more than 1 month prior to acceptance of work, make final adjustment and check of hardware during week immediately prior to acceptance, unless otherwise directed by Architect.
   b. Clean and re-lubricate operation items as necessary to restore proper functioning and finish of hardware and doors.
   c. Make final adjustment of locksets and closers to compensate for operation of heating and ventilating systems under supervision of manufacturer's representative.

3.5 PROTECTION AND CLEANING:

A. Installed Hardware: Protect door hardware against damage.

B. Installed Doors:
1. Do not prop doors open using any item wedged between hinge jamb and door.
2. Use only rubber stops, cardboard or rope.
3. Do not use unprotected wood wedges under wood doors.
4. Do not use bare wire or other unprotected means of securing doors in open position, which may mar door or hardware.

C. Job Acceptance: Prior to acceptance of job, clean hardware surfaces on both interior and exterior doors of mortar, plaster, paint caulking and other contaminants. Replace hardware damaged after installation where finish cannot be restored after cleaning.

3.7 HARDWARE SCHEDULE:

A. Hardware set numbers have prefixes to identify the general function of the hardware. Prefix definitions:

1. AC: Electrified with Card Access
2 AR: Electrified with remote release
3. DSM: Door Status Monitor only
4. E: Electrified Hardware
5. H: Mechanical Hardware

B. Provide and install hardware conforming to project specification in sets according to the following attached Schedule of Hardware Sets:

3.8 HARDWARE GROUPS

Hardware Group No. 01

Provide each PR door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
1	EA	RAIN DRIP	142AA	AA	ZER
1	EA	GASKETING	870AA-S	AA	ZER
1	EA	CLOSER BRKT FOR WEATHERSTRIPPING	870SPG	AA	ZER
2	EA	MEETING STILE	8192AA	AA	ZER
2	EA	DOOR SWEEP	8197AA	AA	ZER
1	EA	THRESHOLD	65A-E-223	A	ZER
1			BALANCE OF HARDWARE EXISTING		

Hardware Group No. 02

Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
1	EA	RAIN DRIP	142AA	AA	ZER
1	EA	GASKETING	870AA-S	AA	ZER
1	EA	CLOSER BRKT FOR WEATHERSTRIPPING	870SPG	AA	ZER
1	EA	DOOR SWEEP	8197AA	AA	ZER
1	EA	THRESHOLD	65A-E-223	A	ZER

Hardware Group No. 03

Provide each PR door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
1	EA	POWER TRANSFER	EPT10	689	VON
1	EA	TRIM	E996-L-RV-03-FSE	626	VON
1	EA	INTERCHANGEABLE CORE CYLINDER	AS REQUIRED BY OWNER	626	BST
2	EA	FLOOR STOP	FS18L	BLK	IVE
1	EA	MULTITECH READER	MTK15	BLK	SCE
1			BALANCE OF HARDWARE EXISTING		

Notes: 1) Hardware supplier is responsible to coordinate the correct electric trim with the existing exit device.
2) Security contractor is responsible for power for the electric exit device trim
Functional Description: Authorized credential presented at the card reader will momentarily unlock the outside lever on one door for manual ingress thru opening. Egress is always allowed.

Hardware Group No. 04

Provide each PR door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
1	EA	POWER TRANSFER	EPT10	689	VON
1	EA	TRIM	E996-L-RV-03-FSE	626	VON
1	EA	INTERCHANGEABLE CORE CYLINDER	AS REQUIRED BY OWNER	626	BST
1	EA	MULTITECH READER	MTK15	BLK	SCE
1			BALANCE OF HARDWARE EXISTING		

Notes: 1) Hardware supplier is responsible to coordinate the correct electric trim with the existing exit device.
2) Security contractor is responsible for power for the electric exit device trim
Functional Description: Authorized credential presented at the card reader will momentarily unlock the outside lever on one door for manual ingress thru opening. Egress is always allowed.

Hardware Group No. 05

Provide each PR door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
1	EA	Door Cord	798-12 LESS WIRES	626	SCE
1	EA	TRIM	E996-L-RV-03-FSE	626	VON
1	EA	INTERCHANGEABLE CORE CYLINDER	AS REQUIRED BY OWNER	626	BST
1	EA	MULTITECH READER	MTK15	BLK	SCE
1			BALANCE OF HARDWARE EXISTING		

Notes: 1) Hardware supplier is responsible to coordinate the correct electric trim with the existing exit device.
2) Security contractor is responsible for power for the electric exit device trim
Functional Description: Authorized credential presented at the card reader will momentarily unlock the outside lever on one door for manual ingress thru opening. Egress is always allowed.

Hardware Group No. 06

Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
1	EA	Door Cord	798-12 LESS WIRES	626	SCE
1	EA	TRIM	E996-L-RV-03-FSE	626	VON
1	EA	INTERCHANGEABLE CORE CYLINDER	AS REQUIRED BY OWNER	626	BST
1	EA	MULTITECH READER	MTK15	BLK	SCE
1			BALANCE OF HARDWARE EXISTING		

Notes: 1) Hardware supplier is responsible to coordinate the correct electric trim with the existing exit device.
2) Security contractor is responsible for power for the electric exit device trim
Functional Description: Authorized credential presented at the card reader will momentarily unlock the outside lever on one door for manual ingress thru opening. Egress is always allowed.

Hardware Group No. 07

Provide each PR door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
1	EA	CONT. HINGE	224HD	US28	IVE
1	EA	CONT. HINGE	224HD EPT	US28	IVE
1	EA	POWER TRANSFER	EPT10 CON	689	VON
1	EA	FIRE EXIT HARDWARE	9849-EO-F-SNB	626	VON
1	EA	FIRE EXIT HARDWARE	9849-L-F-E996-03-FSE-LBL-CON	626	VON
1	EA	INTERCHANGEABLE CORE CYLINDER	AS REQUIRED BY OWNER	626	BST
2	EA	SURFACE CLOSER	4040XP CUSH TBSRT	689	LCN
2	EA	KICK PLATE	8400 10" X 1 1/2" LDW B-CS	630	IVE
1	EA	MULTITECH READER	MTK15	BLK	SCE

Note: Security contractor is responsible for power for the electric exit device trim
Functional Description: Authorized credential presented at the card reader will momentarily unlock the outside lever on one door for manual ingress thru opening. Egress is always allowed.

Hardware Group No. 08

Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
1	EA	CONT. HINGE	224HD	US28	IVE
1	EA	STOREROOM LOCK	L9080BD 03A	626	SCH
1	EA	INTERCHANGEABLE CORE CYLINDER	AS REQUIRED BY OWNER	626	BST
1	EA	SURFACE CLOSER	4040XP CUSH TBSRT	689	LCN
1	EA	GASKETING	188SBK PSA	BK	ZER

Hardware Group No. 09

Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
1	EA	CONT. HINGE	224HD	US28	IVE
1	EA	PRIVACY W/DB & IND	L9496BD 03A L583-363	626	SCH
1	EA	INTERCHANGEABLE CORE CYLINDER	AS REQUIRED BY OWNER	626	BST
1	EA	SURFACE CLOSER	4040XP CUSH TBSRT	689	LCN
1	EA	GASKETING	31AA-S	AA	ZER
1	EA	DOOR SWEEP	39A	A	ZER
1	EA	THRESHOLD	65A-E-223	A	ZER

Hardware Group No. 10

Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
1	EA	CONT. HINGE	224HD	US28	IVE
1	EA	STOREROOM LOCK	L9080BD 03A	626	SCH
1	EA	INTERCHANGEABLE CORE CYLINDER	AS REQUIRED BY OWNER	626	BST
1	EA	ELECTRIC STRIKE	6211 FSE CON	630	VON
1	EA	SURFACE CLOSER	4040XP CUSH	689	LCN
1	EA	RAIN DRIP	142AA	AA	ZER
1	EA	GASKETING	870AA-S	AA	ZER
1	EA	CLOSER BRKT FOR WEATHERSTRIPPING	870SPG	AA	ZER
1	EA	DOOR SWEEP	39A	A	ZER
1	EA	THRESHOLD	65A-E-223	A	ZER
1	EA	MULTITECH READER	MTK15	BLK	SCE

Note: Electric strike power is supplied by the security contractor.
Functional Description: Authorized credential presented at the card reader momentarily unlocks the electric strike allowing ingress thru opening. Egress is always available.

Hardware Group No. 11

Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
1	EA	CONT. HINGE	224HD	US28	IVE
1	EA	STOREROOM LOCK	L9080BD 03A	626	SCH
1	EA	INTERCHANGEABLE CORE CYLINDER	AS REQUIRED BY OWNER	626	BST
1	EA	ELECTRIC STRIKE	6211 FSE CON	630	VON
1	EA	SURF. AUTO OPERATOR	9542 DD MS	ANCLR	LCN
2	EA	ACTUATOR, JAMB MOUNT	8310-818	630	LCN
1	EA	RAIN DRIP	142AA	AA	ZER
1	EA	GASKETING	870AA-S	AA	ZER
1	EA	CLOSER BRKT FOR WEATHERSTRIPPING	870SPG	AA	ZER
1	EA	DOOR SWEEP	39A	A	ZER
1	EA	THRESHOLD	65A-E-223	A	ZER
1	EA	MULTITECH READER	MTK15	BLK	SCE

Functional Description: Authorized credential presented at the card reader and depressing the actuator momentarily unlocks the electric strike and initiates the automatic door opener allowing ingress thru opening. Depressing the interior actuator initiates the door operator unless the door operator is electrically turned off. Egress is always available.

Hardware Group No. 12

Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
1	EA	ELECTRIC STRIKE	6211 FSE CON	630	VON
1	EA	RAIN DRIP	142AA	AA	ZER
1	EA	GASKETING	870AA-S	AA	ZER
1	EA	CLOSER BRKT FOR WEATHERSTRIPPING	870SPG	AA	ZER
1	EA	DOOR SWEEP	39A	A	ZER
1	EA	THRESHOLD	65A-E-223	A	ZER
1	EA	MULTITECH READER	MTK15	BLK	SCE
1			BALANCE OF HARDWARE EXISTING		

Note: Electric strike power is supplied by the security contractor.
Functional Description: Authorized credential presented at the card reader momentarily unlocks the electric strike allowing ingress thru opening. Egress is always available.

Hardware Group No. 13

Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
1	EA	STOREROOM LOCK	L9080BD 03A	626	SCH
1	EA	INTERCHANGEABLE CORE CYLINDER	AS REQUIRED BY OWNER	626	BST
1	EA	ELECTRIC STRIKE	6211 FSE CON	630	VON
1	EA	MULTITECH READER	MTK15	BLK	SCE
1			BALANCE OF HARDWARE EXISTING		

Note: Electric strike power is supplied by the security contractor.
Functional Description: Authorized credential presented at the card reader momentarily unlocks the electric strike allowing ingress thru opening. Egress is always available.

Hardware Group No. 14

Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
1	EA	ELECTRIC STRIKE	6211 FSE CON	630	VON
1	EA	MULTITECH READER	MTK15	BLK	SCE
1			BALANCE OF HARDWARE EXISTING		

Note: Electric strike power is supplied by the security contractor.
Functional Description: Authorized credential presented at the card reader momentarily unlocks the electric strike allowing ingress thru opening. Egress is always available.

Hardware Group No. 15

Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
1	EA	ELECTRIC STRIKE	6211 FSE CON	630	VON
1	EA	DOOR SWEEP	39A	A	ZER
1	EA	THRESHOLD	65A-E-223	A	ZER
1	EA	MULTITECH READER	MTK15	BLK	SCE
1			BALANCE OF HARDWARE EXISTING		

Note: Electric strike power is supplied by the security contractor.
Functional Description: Authorized credential presented at the card reader momentarily unlocks the electric strike allowing ingress thru opening. Egress is always available.

Hardware Group No. 16

Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
1	EA	CONT. HINGE	224HD	US28	IVE
1	EA	STOREROOM LOCK	L9080BD 03A	626	SCH
1	EA	INTERCHANGEABLE CORE CYLINDER	AS REQUIRED BY OWNER	626	BST
1	EA	ELECTRIC STRIKE	6211 FSE CON	630	VON
1	EA	SURFACE CLOSER	4040XP REG OR PA AS REQ TBSRT	689	LCN
1	EA	WALL STOP	WS406/407CCV	630	IVE
1	EA	GASKETING	188SBK PSA	BK	ZER
1	EA	MULTITECH READER	MTK15	BLK	SCE
1			BALANCE OF HARDWARE EXISTING		

Note: Electric strike power is supplied by the security contractor.
Functional Description: Authorized credential presented at the card reader momentarily unlocks the electric strike allowing ingress thru opening. Egress is always available.

Hardware Group No. 17

Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
1	EA	CONT. HINGE	224HD	US28	IVE
1	EA	STOREROOM LOCK	L9080BD 03A	626	SCH
1	EA	INTERCHANGEABLE CORE CYLINDER	AS REQUIRED BY OWNER	626	BST
1	EA	ELECTRIC STRIKE	6211 FSE CON	630	VON
1	EA	SURFACE CLOSER	4040XP REG OR PA AS REQ TBSRT	689	LCN
1	EA	FLOOR STOP	FS18L	BLK	IVE

1	EA	RAIN DRIP	142AA	AA	ZER
1	EA	GASKETING	31AA-S	AA	ZER
1	EA	DOOR SWEEP	39A	A	ZER
1	EA	THRESHOLD	65A-E-223	A	ZER
1	EA	MULTITECH READER	MTK15	BLK	SCE

Note: Electric strike power is supplied by the security contractor.
Functional Description: Authorized credential presented at the card reader momentarily unlocks the electric strike allowing ingress thru opening. Egress is always available.

Hardware Group No. 18

Provide each PR door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
1	EA	CONT. HINGE	224HD	US28	IVE
1	EA	CONT. HINGE	224HD EPT	US28	IVE
1	EA	POWER TRANSFER	EPT10 CON	689	VON
1	EA	FIRE EXIT HARDWARE	9849-EO-F	626	VON
1	EA	FIRE EXIT HARDWARE	9849-L-F-E996-03-FSE-24VDC	626	VON
1	EA	INTERCHANGEABLE CORE CYLINDER	AS REQUIRED BY OWNER	626	BST
2	EA	SURFACE CLOSER	4040XP CUSH TBSRT	689	LCN
2	EA	KICK PLATE	8400 10" X 1 1/2" LDW B-CS	630	IVE
1	EA	GASKETING	31AA-S	AA	ZER
1	EA	GASKETING	99A-S	A	ZER
1	EA	WIRE HARNESS	CON-192		SCH
1	EA	WIRE HARNESS	CON-26		SCH
1	EA	WIRE HARNESS	CON-6W		SCH
1	EA	MULTITECH READER	MTK15	BLK	SCE

Functional Description: Authorized credential presented to the card reader momentarily unlocks lever to allow manual ingress thru opening. Egress is always available

Hardware Group No. 19

Provide each PR door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
2	EA	CONT. HINGE	224HD	US28	IVE
1	EA	FIRE EXIT HARDWARE	9849-EO-F-LBL	626	VON
1	EA	FIRE EXIT HARDWARE	9849-L-F-03-LBL	626	VON
1	EA	INTERCHANGEABLE CORE CYLINDER	AS REQUIRED BY OWNER	626	BST
2	EA	SURFACE CLOSER	4040XP CUSH TBSRT	689	LCN
2	EA	ARMOR PLATE	8400 34" X 1 1/2" LDW B-CS	630	IVE
2	EA	FLOOR STOP	FS18L	BLK	IVE
1	EA	GASKETING	31AA-S	AA	ZER
1	EA	GASKETING	99A-S	A	ZER

Hardware Group No. 20

Provide each PR door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
1	EA	CONT. HINGE	224HD	US28	IVE
1	EA	CONT. HINGE	224HD EPT	US28	IVE
1	EA	POWER TRANSFER	EPT10 CON	689	VON
1	EA	PANIC HARDWARE	HH-9849-EO-SNB	626	VON
1	EA	PANIC HARDWARE	HH-9849-L-E996-03-FSE-CON	626	VON
1	EA	INTERCHANGEABLE CORE CYLINDER	AS REQUIRED BY OWNER	626	BST
2	EA	SURFACE CLOSER	4040XP CUSH TBSRT	689	LCN
2	EA	KICK PLATE	8400 10" X 1 1/2" LDW B-CS	630	IVE
2	EA	FLOOR STOP	FS18L	BLK	IVE
1	EA	RAIN DRIP	142AA	AA	ZER
1	EA	GASKETING	870AA-S	AA	ZER
1	EA	GASKETING	99A-S	A	ZER
1	EA	CLOSER BRKT FOR WEATHERSTRIPPING	870SPG	AA	ZER
1	EA	THRESHOLD	65A-E-223	A	ZER
1	EA	WIRE HARNESS	CON-192		SCH
1	EA	WIRE HARNESS	CON-26		SCH
1	EA	MULTITECH READER	MTK15	BLK	SCE

Note: Power for electric exit device trim to be provided by the security contractor.
Functional Description: Authorized credential presented to the card reader momentarily unlocks lever to allow manual ingress thru opening. Egress is always available.

Hardware Group No. 21

Provide each PR door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
2	EA	CONT. HINGE	224HD	US28	IVE
1	EA	FIRE EXIT HARDWARE	HH-9849-EO-F-SNB	626	VON
1	EA	FIRE EXIT HARDWARE	HH-9849-L-F-03-SNB	626	VON
1	EA	INTERCHANGEABLE CORE CYLINDER	AS REQUIRED BY OWNER	626	BST
2	EA	SURFACE CLOSER	4040XP CUSH TBSRT	689	LCN
2	EA	KICK PLATE	8400 10" X 1 1/2" LDW B-CS	630	IVE
2	EA	FLOOR STOP	FS18L	BLK	IVE
1	EA	RAIN DRIP	142AA	AA	ZER
1	EA	GASKETING	870AA-S	AA	ZER
1	EA	GASKETING	99A-S	A	ZER
1	EA	CLOSER BRKT FOR WEATHERSTRIPPING	870SPG	AA	ZER
2	EA	DOOR SWEEP	39A	A	ZER

1	EA	THRESHOLD	65A-E-223	A	ZER

Hardware Group No. 22

Provide each PR door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
2	EA	CONT. HINGE	224HD	US28	IVE
1	EA	Door Cord	798-12 LESS WIRES	626	SCE
1	EA	FIRE EXIT HARDWARE	9849-EO-F	626	VON
1	EA	FIRE EXIT HARDWARE	9849-L-F-E996-03-FSE-SNB-24VDC	626	VON
1	EA	INTERCHANGEABLE CORE CYLINDER	AS REQUIRED BY OWNER	626	BST
2	EA	SURFACE CLOSER	4040XP CUSH TBSRT	689	LCN
2	EA	KICK PLATE	8400 10" X 1 1/2" LDW B-CS	630	IVE
2	EA	FLOOR STOP	FS18L	BLK	IVE
1	EA	RAIN DRIP	142AA	AA	ZER
1	EA	GASKETING	870AA-S	AA	ZER
1	EA	GASKETING	99A-S	A	ZER
1	EA	CLOSER BRKT FOR WEATHERSTRIPPING	870SPG	AA	ZER
2	EA	DOOR SWEEP	39A	A	ZER
1	EA	THRESHOLD	65A-E-223	A	ZER
1	EA	MULTITECH READER	MTK15	BLK	SCE

Functional Description: Authorized credential presented at the card reader momentarily unlocks the exit device trim allowing manual ingress thru the opening. Egress is always allowed. Manual key override.

Hardware Group No. 23

Provide each PR door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
2	EA	CONT. HINGE	224HD	US28	IVE
1	EA	PANIC HARDWARE	HH-9849-EO-SNB	626	VON
1	EA	PANIC HARDWARE	HH-9849-L-03-SNB	626	VON
1	EA	INTERCHANGEABLE CORE CYLINDER	AS REQUIRED BY OWNER	626	BST
2	EA	SURFACE CLOSER	4040XP CUSH TBSRT	689	LCN
2	EA	KICK PLATE	8400 10" X 1 1/2" LDW B-CS	630	IVE
2	EA	FLOOR STOP	FS18L	BLK	IVE
1	EA	RAIN DRIP	142AA	AA	ZER
1	EA	GASKETING	870AA-S	AA	ZER
1	EA	GASKETING	99A-S	A	ZER
1	EA	CLOSER BRKT FOR WEATHERSTRIPPING	870SPG	AA	ZER
2	EA	DOOR SWEEP	39A	A	ZER
1	EA	THRESHOLD	65A-E-223	A	ZER

Hardware Group No. 24

Provide each PR door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
1	EA	CONT. HINGE	224HD	US28	IVE
1	EA	CONT. HINGE	224HD EPT	US28	IVE
1	EA	POWER TRANSFER	EPT10 CON	689	VON
1	SET	AUTO FLUSH BOLT	FB31P	630	IVE
1	EA	STOREROOM LOCK	L9080BD 03A	626	SCH
1	EA	INTERCHANGEABLE CORE CYLINDER	AS REQUIRED BY OWNER	626	BST
1	EA	ELECTRIC STRIKE	6211 FSE CON	630	VON
1	EA	COORDINATOR	COR X FL	628	IVE
2	EA	SURFACE CLOSER	4040XP CUSH TBSRT	689	LCN
2	EA	KICK PLATE	8400 10" X 1 1/2" LDW B-CS	630	IVE
1	EA	WIRE HARNESS	CON-192		SCH
1	EA	WIRE HARNESS	CON-38		SCH
1	EA	MULTITECH READER	MTK15	BLK	SCE

Note: Electric strike power is supplied by the security contractor.
Functional Description: Authorized credential presented at the card reader momentarily unlocks the electric strike allowing ingress thru opening. Egress is always available.

Hardware Group No. 25

Provide each PR door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
2	EA	CONT. HINGE	224HD EPT	US28	IVE
2	EA	POWER TRANSFER	EPT10 CON	689	VON
2	EA	ELEC FIRE EXIT HARDWARE	QEL-9849-L-F-03-LBL-CON	626	VON
2	EA	INTERCHANGEABLE CORE CYLINDER	AS REQUIRED BY OWNER	626	BST
2	EA	SURFACE CLOSER	4040XP CUSH TBSRT	689	LCN
2	EA	KICK PLATE	8400 10" X 1 1/2" LDW B-CS	630	IVE
2	EA	WIRE HARNESS	CON-192		SCH
2	EA	WIRE HARNESS	CON-26		SCH
1	EA	MULTITECH READER	MTK15	BLK	SCE

Notes: 1) Electric latches on the exit devices can be held retracted if connected to fire alarm panel to release when fire alarm is initiated.
2) Power supply to exit devices is provided by the security contractor.
Functional Description: Authorized credential retracts both exit device latches for ingress thru opening. Egress is always available.

Hardware Group No. 26

Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
1	EA	CONT. HINGE	224HD EPT	US28	IVE
1	EA	POWER TRANSFER	EPT10 CON	689	VON
1	EA	FIRE EXIT HARDWARE	98-L-F-E996-03-FSE-CON-SNB-24VDC	626	VON
1	EA	INTERCHANGEABLE CORE CYLINDER	AS REQUIRED BY OWNER	626	BST
1	EA	SURFACE CLOSER	4040XP CUSH TBSRT	689	LCN
1	EA	GASKETING	31AA-S	AA	ZER
1	EA	DOOR SWEEP	39A	A	ZER
1	EA	THRESHOLD	65A-E-223	A	ZER
1	EA	WIRE HARNESS	CON-192		SCH
1	EA	WIRE HARNESS	CON-26		SCH
1	EA	WIRE HARNESS	CON-6W		SCH
1	EA	MULTITECH READER	MTK15	BLK	SCE

Functional Description: Authorized credential presented at the card reader momentarily unlocks the outside trim of the exit device allowing ingress thru opening. Egress is always allowed via the exit device. Manual key override.

Hardware Group No. 27

Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
1	EA	CONT. HINGE	224HD	US28	IVE
1	EA	Door Cord	798-12 LESS WIRES	626	SCE
1	EA	FIRE EXIT HARDWARE	98-L-F-E996-03-FSE-CON-SNB-24VDC	626	VON
1	EA	INTERCHANGEABLE CORE CYLINDER	AS REQUIRED BY OWNER	626	BST
1	EA	SURFACE CLOSER	4040XP CUSH TBSRT	689	LCN
1	EA	GASKETING	31AA-S	AA	ZER
1	EA	DOOR SWEEP	39A	A	ZER
1	EA	THRESHOLD	65A-E-223	A	ZER
1	EA	MULTITECH READER	MTK15	BLK	SCE

Functional Description: Authorized credential presented at the card reader momentarily unlocks the outside trim of the exit device allowing ingress thru opening. Egress is always allowed via the exit device. Manual key override.

Hardware Group No. 28

Provide each PR door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
2	EA	CONT. HINGE	224HD	US28	IVE
2	EA	MANUAL FLUSH BOLT	FB458	626	IVE
1	EA	DUST PROOF STRIKE	DP1	626	IVE
1	EA	STOREROOM LOCK	L9080BD 03A	626	SCH

1	EA	INTERCHANGEABLE CORE CYLINDER	AS REQUIRED BY OWNER	626	BST
2	EA	SURFACE CLOSER	4040XP CUSH TBSRT	689	LCN
1	EA	GASKETING	31AA-S	AA	ZER
2	EA	DOOR SWEEP	39A	A	ZER
1	EA	THRESHOLD	65A-E-223	A	ZER

Note: Astragal by door supplier.

Hardware Group No. 29

Provide each PR door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
2	EA	CONT. HINGE	224HD	US28	IVE
1	SET	AUTO FLUSH BOLT	FB31P	630	IVE
1	EA	DUST PROOF STRIKE	DP1	626	IVE
1	EA	STOREROOM LOCK	L9080BD 03A	626	SCH
1	EA	INTERCHANGEABLE CORE CYLINDER	AS REQUIRED BY OWNER	626	BST
1	EA	COORDINATOR	COR X FL	628	IVE
2	EA	SURFACE CLOSER	4040XP CUSH TBSRT	689	LCN
2	EA	ARMOR PLATE	8400 34" X 1 1/2" LDW B-CS	630	IVE
1	EA	GASKETING	31AA-S	AA	ZER

Note: Astragal by door supplier.

Hardware Group No. 30

Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
1	EA	CONT. HINGE	224HD	US28	IVE
1	EA	STOREROOM LOCK	L9080BD 03A	626	SCH
1	EA	INTERCHANGEABLE CORE CYLINDER	AS REQUIRED BY OWNER	626	BST
1	EA	SURFACE CLOSER	4040XP REG OR PA AS REQ TBSRT	689	LCN
1	EA	WALL STOP	WS406/407CCV	630	IVE
1	EA	GASKETING	31AA-S	AA	ZER
1	EA	THRESHOLD	65A-E-223	A	ZER

Hardware Group No. 31

Provide each RU door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
1	EA	MULTITECH READER	MTK15	BLK	SCE
1			BALANCE OF HARDWARE EXISTING		

Note: Keypad to operate electric operator on overhead door.

Hardware Group No. 32

Provide each PR door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
1	EA	Door Cord	798-12 LESS WIRES	626	SCE
1	EA	ELEC PANIC HARDWARE	QEL-9847-L-03-24VDC	626	VON
1	EA	MULTITECH READER	MTK15	BLK	SCE
1			BALANCE OF HARDWARE EXISTING		

Note: Only the active door receives the new electrified exit device.
Functional Description: Authorized credential presented at the card reader momentarily retracts the exit device latchbolt on the active door only allowing manual ingress thru the opening.

Hardware Group No. 33

Provide each PR door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
1	EA	ELEC PANIC HARDWARE	QEL-9847-L-03-24VDC	626	VON
1	EA	RAIN DRIP	142AA	AA	ZER
1	EA	GASKETING	870AA-S	AA	ZER
1	EA	CLOSER BRKT FOR WEATHERSTRIPPING	870SPG	AA	ZER
2	EA	MEETING STILE	8192AA	AA	ZER
2	EA	DOOR SWEEP	8197AA	AA	ZER
1	EA	THRESHOLD	65A-E-223	A	ZER
1	EA	MULTITECH READER	MTK15	BLK	SCE
1			BALANCE OF HARDWARE EXISTING		

Note: Only the active door receives the new electrified exit device.
Functional Description: Authorized credential presented at the card reader momentarily retracts the exit device latchbolt on the active door only allowing manual ingress thru the opening.

3.9 HARDWARE INDEX

Door #	HW Set #
1-101.13A	07
1-101.19A	31
1-101.19B	10
1-101.2A	28
1-101.35D	16
1-101.8D	18
1-102A	07
1-102B	07
1-103A	07
1-103B	07
1-104A	07
1-104B	07
1-108B	01
1-108C	01
110A	21
110A	04
1-110.1A	28
1-112B	08
1-112C	01
1-112D	01
1-112E	01
1-112F	01
1-112G	01
1-112H	01
1-112I	11
1-112J	01
1-112K	01
1-112L	01
1-112M	01
1-112N	01
1-112O	01
1-112P	01
1-112Q	01
1-112R	01
1-112T	01
1-112U	11
1-112V	02
1-116A	09
1-118.2A	14
1-118A	18
1-119A	13
1-122A	13

Door #	HW Set #
1-122A	13
1-125A	14
1-125C	22
1-125D	22
1-125E	22
1-125F	22
1-125G	22
1-130H	07
1-130I	19
1-130K	18
1-131A	14
1-133.2A	26
1-133.9A	18
1-133C	22
1-133D	22
1-133E	22
1-133F	22
1-133G	22
1-137G	26
1-137M	18
1-137O	18
1-141A	14
1-142B	20
1-144D	21
1-144L	21
1-145A	21
1-145B	21
1-201A	32
1-201B	32
1-201C	32
1-201D	32
1-201E	32
1-201F	32
1-201G	32
1-203A	32
1-203B	32
1-209A	13
1-215.4A	24
1-215A	24
1-217.1C	27
1-217.5B	24
1-220.1A	13

Door #	HW Set #
1-220.A	13
1-227A	13
1-228B	18
1-231A	13
1-236B	13
1-237A	14
1-243A	24
1-244B	15
1-246A	24
1-246B	14
1-248.1A	14
1-253A	28
1-256.1A	13
1-263A	32
1-263B	32
1-265A	33
1-265B	33
1-265C	33
1-303A	13
1-306A	18
1-306C	24
1-333A	13
1-336A	14
1-338A	14
1-339A	13
1-357A	15
1-359A	14
1-360A	13
1-363A	16
1-365A	13
1-366.1A	13
1-370A	14
1-371A	13
1-401C	10
1-402.1A	04
1-402A	07
1-404.1A	07
1-404A	07
2-101A	07
2-101B	07
2-105B	01
2-107A	07

Door #	HW Set #
2-107B	07
2-113B	18
2-114A	24
2-115A	13
2-122A	14
2-123A	27
2-124G	22
2-124J	18
2-125H	06
2-126B	29
2-130A	13
2-201A	32
2-201B	32
2-201C	32
2-201D	32
2-201E	32
2-201F	32
2-201G	32
2-203A	33
2-203B	33
2-203C	01
2-203C	33
2-203D	33
2-208A	13
2-230A	13
2-231D	06
2-232A	25
2-233A	25
2-236A	13
2-238A	14
2-239A	07
2-240.1A	28
2-243A	13
2-313.2A	13
2-314A	14
2-316A	14
2-319A	13
2-336.1A	13
2-336A	14
2-337A	13
2-339A	30
2-341A	13

Door #	HW Set #
2-342A	14
2-344.1A	14
2-402.1A	04
2-402A	04
3-102.1A	14
3-116.1A	14
3-402A	07
3-402B	07
3-403A	07
3-403B	07
4-401A	07
4-401B	07
469	17
503A	20
5-101B	01
5-102A	06
5-105A	13
5-108C	07
5-112A	18
5-112L	18
5-115A	13
5-123.2A	06
5-123C	22
5-123D	22
5-123E	22
5-123F	22
5-123G	22
5-126A	13
5-127B	18
5-127M	18
5-127O	18
5-128A	14
5-130B	02
5-130BB	23
5-130CC	20
5-130E	23
5-130F	01
5-130I	12
5-130K	23
5-130L	02
5-130O	23
5-130Y	23

Door #	HW Set #
5-130Z	23
5-131A	07
5-131B	07
5-132A	07
5-132B	07
5-134C	01
5-137A	28
5-201A	32
5-201B	32
5-201C	32
5-201D	32
5-201E	32
5-201F	32
5-201G	32
5-203A	32
5-203B	32
5-209A	13
5-214.1A	13
5-214.2A	13
5-215.4A	24
5-215A	24
5-216A	28
5-218.5B	24
5-221A	13
5-225A	13
5-231A	13
5-239.1A	14
5-241A	24
5-242B	29
5-258A	32
5-258B	32
5-259A	33
5-259B	33
5-259C	33
5-301A	24
5-301B	24
5-302A	13
5-303A	14
5-305A	13
5-307A	28
5-309A	13
5-311A	08

Door #	HW Set #
5-314A	13
5-315A	14
5-322A	25
5-322C	03
5-336.1A	13
5-337A	14
5-339A	15
5-342A	13
5-357A	14
5-401B	10
5-402.1A	04
5-402A	07
5-404.1A	07
5-404A	07
6-102.2A	06
6-102C	22
6-102D	22
6-102E	22
6-102F	22
6-102G	22
6-104.1	13
6-109A	14
6-109A	13
6-112A	14
6-125A	13
6-129A	07
6-129B	07
6-131A	17
6-133A	14
6-137A	20
6-142A	07
6-142B	07
6-146A	07
6-146B	07
6-201A	32
6-201B	32
6-201C	32
6-201D	32
6-201E	32
6-201F	32
6-201G	32
6-203A	32

Door #	HW Set #
6-203B	32
6-206A	13
6-212.7A	14
6-214A	13
6-215A	28
6-217A	14
6-218A	13
621A	04
6-221A	13
6-238.1A	33
6-238.1B	33
6-238.1B	33
6-238A	33
6-238B	33
6-238C	33
6-239.1A	28
6-239A	29
6-241A	28
6-242A	14
6-243A	13
6-243B	13
6-251A	13
6-305.1A	14
6-310.1A	14
6-310A	13
6-316A	13
6-354A	13
6-355A	15
6-358.1A	13
6-363C	03
6-363D	05
6-371B	05
6-372A	05
6-402.1A	07
6-402A	07

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SECTION 260500 - COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
1. Electrical equipment coordination and installation.
2. Sleeves for raceways and cables.
3. Sleeve seals.
4. Grout.
5. Common electrical installation requirements.
6. Commissioning requirements.

1.3 DEFINITIONS

A. EPDM: Ethylene-propylene-diene terpolymer rubber.

B. NBR: Acrylonitrile-butadiene rubber.

1.4 GENERAL REQUIREMENTS

A. Carefully examine General Conditions, other specification sections, and other drawings (in addition to DIVISION 26), in order to be fully acquainted with their effect on electrical work. Additions to the contract cost will not be allowed due to failure to inspect existing conditions.

B. Do all work in compliance with 2017 Florida Building Code 6th Edition, and the Codes adopted therein, including NFPA 70 (2014 NEC), 2017 Florida Fire Prevention Code 6th Edition and the regulations of the local power utility, cable television and telephone companies. Obtain and pay for any and all required permits, inspections, certificates of inspections and approval, and the like, and deliver such certificates to the Architect/Engineer.

C. Cooperate and coordinate with all other trades. Perform work in such manner and at such times as not to delay work of other trades. Complete all work as soon as the condition of the structure and installations of equipment will permit. Patch, in a satisfactory manner and by the proper craft, any work damaged by electrical workmen.

D. Furnish, perform, or otherwise provide all labor (including, but not limited to, all planning, purchasing, transporting, rigging, hoisting, storing, installing, testing, chasing, channeling, cutting, trenching, excavating and backfilling), coordination, field verification, equipment installation, support, and safety, supplies, and materials necessary for the correct installation of

complete and functional electrical systems (as described or implied by these specifications and the applicable drawings).

E. Coordinate and verify power and telephone company service requirements prior to bid. Bid to include all work required.

F. Circuiting and connection of all items using electric power shall be included under this division of the specifications, including necessary wire, conduit, circuit protection, disconnects and accessories. Secure rough-in drawings and connection information for equipment involved to determine the exact requirements. See all divisions of drawings or specifications for electrically operated equipment. If the connection of an item is not shown on the electrical drawings and it is unclear how to provide for the circuiting and connection, notify the engineer of record in writing prior to bidding project. Submission of a bid indicates that the bidder has included these requirements as part of the scope of work.

G. Protect all existing equipment, finishes, etc. throughout construction phase. Ensure site cleanliness is maintained.

1.5 DRAWINGS:

A. Indicate only diagrammatically the extent, general character, and approximate location of work. Where work is indicated, but with minor details omitted, furnish and install it complete and so as to perform its intended functions.

B. DIVISION 26 work called for under any section of the project specifications, shall be considered as included in this work unless specifically excluded by inclusion in some other branch of the work. This shall include roughing-in for connections and equipment as called for or inferred. Check all drawings and specifications for the project and shall be responsible for the installation of all DIVISION 26 work.

C. Take finish dimensions at the job site in preference to scale dimensions. Do not scale drawings where specific details and dimensions for DIVISION 26 work are not shown on the drawings, take measurements and make layouts as required for the proper installation of the work and coordination with all drawings and coordination with all other work on the project. In case of any discrepancies between the drawings and the specifications that have not been clarified by addendum prior to bidding, it shall be assumed by the signing of the contract that the higher cost (if any difference in costs) is included in the contract price, and perform the work in accordance with the drawings or with the specifications, as determined and approved by the Architect/ Engineer, and no additional costs shall be allowed to the base contract price.

D. Carefully check the drawings and specifications of all trades and divisions before installing any of his work. He shall in all cases consider the work of all other trades, and shall coordinate his work with them so that the best arrangements of all equipment, piping, conduit, ducts, rough-in, etc., can be obtained.

E. Review the specific equipment (such as mechanical, plumbing, kitchen, FFE, etc) minimum circuit ampacity and maximum over current protection requirements of equipment provided by others to confirm it is properly coordinated with the devices being purchased. Notify the AE team immediately upon discovery of discrepancies. This shall be done at the submittal stage

prior to purchasing over current protection or installation of conduit, wire, disconnects, breakers, etc. No cost will be allowed for changes to coordinate.

F. Locations designated for outlets, switches, equipment, etc., are approximate and shall be verified by instruction in these specifications and/or notes on the drawings. Where instructions or notes are insufficient to convey the intent of the design, consult the Architect/Engineer prior to installation.

G. Obtain manufacturer's data on all equipment, the dimensions of which may affect electrical work. Use this data to coordinate proper service characteristics, entry locations, etc., and to ensure minimum clearances are maintained.

1.6 QUALIFICATIONS OF CONTRACTOR:

A. DIVISION 26 Contractor shall have had experience of at least the same size and scope as this project, on at least two other projects within the last five years.

B. Contractor performing any part of this scope of work shall be a State Certified (Type E.C. License) electrical contractor

C. Provide field superintendent who has had a minimum of four (4) years previous successful experience on projects of comparable size and complexity. Superintendent shall be on the site at all times during construction and must have an active Journeyman's Electrical License.

1.7 SITE VISIT/CONDITIONS

A. Visit the site of this contract and thoroughly familiarize with all existing field conditions and the proposed work as described or implied by the contract documents. During the course of his site visit, verify every aspect of the proposed work and the existing field conditions in the areas of construction which might affect his work. No compensation or reimbursement for additional expenses incurred due to failure or neglect to make a thorough investigation of the contract documents and the existing site conditions will be permitted.

B. Install all equipment so that all Code required and Manufacturer recommended servicing clearances are maintained. Coordinate the proper arrangement and installation of all equipment within any designated space. If it is determined that a departure from the Contract Documents is necessary, submit to the A/E, for approval, detailed drawings of the proposed changes with written reasons for the changes. No changes shall be implemented without the issuance of the required drawings, clarifications, and/or change orders.

C. Submission of a proposal will be construed as evidence that such examination has been made and later claims for labor, equipment or materials required because of difficulties encountered will not be recognized.

D. Existing conditions and utilities indicated are taken from existing construction documents, surveys, and field investigations. Unforeseen conditions probably exist and existing conditions shown on drawings may differ from the actual existing installation with the result being that new work may not be field located exactly as shown on the drawings. Field verify dimensions

of all site utilities, conduit routing, boxes, etc., prior to bidding and include any deviations in the contract. Notify A/E if deviations are found.

E. All existing electrical is not shown. Become familiar with all existing conditions prior to bidding, and include in the bid the removal of all electrical equipment, wire, conduit, devices, fixtures, etc. that is not being reused, back to it's originating point.

F. Locate all existing utilities and protect them from damage. Pay for repair or replacement of utilities or other property damaged by operations in conjunction with the completion of this work.

G. Investigate site thoroughly and reroute all conduit and wiring in area of construction in order to maintain continuity of existing circuitry. Existing conduits indicated in Contract Documents indicate approximate locations. Verify and coordinate existing site conduits and pipes prior to any excavation on site. Bids shall include hand digging and all required rerouting in areas of existing conduits or pipes.

H. Work is in connection with existing buildings which must remain in operation while work is being performed. Work shall be in accord with the schedule required by the Contract. Schedule work for a minimum outage to Owner. Notify Owner 72 hours in advance of any shut-down of existing systems. Perform work during non-school operating hours unless otherwise accepted by Owner. Protect existing buildings and equipment during construction.

1.8 COMMISSIONING RESPONSIBILITIES

A. Attend commissioning meetings scheduled by the General Contractor.

B. Schedule work so that required electrical installations are completed, and system verification checks and functional performance test can be carried out on schedule.

C. Inspect, check and confirm in writing the proper installation and performance of all electrical services as required by the system verification and functional performance testing requirements of electrical equipment in the commissioning specifications.

D. Provide qualified personnel to assist and operate electrical system during system verification checks and functional performance testing of HVAC systems as required by the commissioning specifications.

E. Provide instruction and demonstrations for the Owner’s designated operating staff in accordance with the requirements of the commissioning specifications.

1.9 TEMPORARY POWER:

A. Provide temporary power distribution for the connection of all single phase 120V 20A tools, OSHA work lighting, and testing as required for performance of the project. Provide OSHA required work lighting and task lighting for the project.

B. If power to any of the existing facilities will be interrupted, coordinate the outage with the Owner atleast 72 hours in advance. All power outages will occur outside operational hours as determined by the Owner.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION

3.1 COMMON REQUIREMENTS FOR ELECTRICAL INSTALLATION

A. Engineer shall have no responsibility for job site safety and the Contractor shall have full and sole authority for all safety programs and precautions in connection with the Work. Nothing herein shall be interpreted to confer upon the Engineer any duty regarding safety or the prevention of accidents at the jobsite.

B. Comply with NECA 1.

C. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items.

D. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.

E. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electrical equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.

F. Right of Way: Give to piping systems installed at a required slope.

G. All work shall be executed in a workmanship manner and shall present a neat mechanical appearance upon completion.

H. Care shall be exercised that all items are plumb, straight, level.

I. Care shall be exercised so that Code clearance is allowed for all panels, controls. etc., requiring it. Do not allow other trades to infringe on this clearance.

J. Balance load as equally as practicable on all feeders, circuits and panel buses.

K. The electrical circuits, components and controls for all equipment are selected and sized based on the equipment specified. If substitutions are proposed, furnish all materials and data required to prove equivalence. No additional charges shall be allowed if additional materials, labor, connections or equipment are needed for substituted products.

3.2 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Electrical penetrations occur when raceways, cables, wireways, cable trays, or busways penetrate concrete slabs, concrete or masonry walls, or fire-rated floor and wall assemblies.

B. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.

C. Coordinate with roofing scope of work for the installation of electrical items which pierce roof. Roof penetrations shall not void warranty. Pitch pockets are not acceptable.

D. Where work pierces waterproofing, it shall maintain the integrity of the waterproofing. Coordinate roofing materials which pierce roof for compatibility with membrane or other roof types.

E. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.

F. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.

G. Cut sleeves to length for mounting flush with both surfaces of walls.

H. Extend sleeves installed in floors **2 inches** above finished floor level.

I. Size pipe sleeves to provide **1/4-inch** annular clear space between sleeve and raceway or cable, unless indicated otherwise.

J. Seal space outside of sleeves with grout for penetrations of concrete and masonry

K. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint.

L. Fire-Rated-Assembly Penetrations: Firestop penetrations of walls, partitions, ceilings, and floors under Division 07 Section "Firestopping."

M. Roof-Penetration Sleeves: Seal penetration of individual raceways and cables with flexible boot-type flashing units applied in coordination with roofing work. The use of pitch pockets is not acceptable.

END OF SECTION 260500

SECTION 260519 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
1. Building wires and cables rated 600 V and less.
2. Connectors, splices, and terminations rated 600 V and less.
3. Sleeves and sleeve seals for cables.
4. Metal Clad cable, Type MC

1.3 DEFINITIONS

A. EPDM: Ethylene-propylene-diene terpolymer rubber.

B. NBR: Acrylonitrile-butadiene rubber.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated. Provide type and UL listing of each type of conductor, cable, connector and termination to be utilized for the DIVISION 26 scope of work.

B. Field quality-control test reports.

1.5 QUALITY ASSURANCE

A. Listing and Labeling: Provide wires and cables specified in this Section that are listed and labeled as defined in NFPA 70, Article 100.

B. Comply with NFPA 70.

1.6 COORDINATION

A. Coordinate layout and installation of cables with other installations.

B. Revise locations and elevations from those indicated, as required to suit field conditions and as approved by Architect.

PART 2 - PRODUCTS

2.1 CONDUCTORS AND CABLES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. American Insulated Wire Corp.; a Leviton Company.
   2. General Cable Corporation.
   3. Senator Wire & Cable Company.
   4. Southwire Company.

B. Building wires and cables
   1. Conductor Insulation
      a. Comply with NEMA WC 70 for Types THHN-THWN
      b. Service Entrance: Type THHN-THWN CU or XHHW-2 Al, single conductors in raceway.
      c. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspaces: Type THHN-THWN, single conductors in raceway.
      d. Feeders Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN-THWN, single conductors in raceway.
      e. Feeders Installed below Raised Flooring: Type THHN-THWN, single conductors in raceway.
      f. Exposed Branch Circuits, Including in Crawlspaces: Type THHN-THWN, single conductors in raceway.
      g. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN-THWN, single conductors in raceway or Metal-clad cable, Type MC (MC may only be utilized in certain specific installations as described elsewhere in this section).
      h. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN-THWN, single conductors in raceway. Minimum #12.
      i. Branch Circuits Installed below Raised Flooring: Type THHN-THWN, single conductors in raceway. Minimum #12.
      j. Cord Drops and Portable Appliance Connections: Type SO, hard service cord with stainless-steel, wire-mesh, strain relief device at terminations to suit application.
      k. Class 1 Control Circuits: Type THHN-THWN, in raceway.
      l. Class 2 Control Circuits: Type THHN-THWN, in raceway.
   2. Conductor Material:
      a. Copper Conductors: Comply with NEMA WC 70.
      b. All #10 and smaller conductors shall be solid CU. No stranded conductors are permitted for #10 and smaller.
      c. Aluminum conductors may be used for 1/0 and larger panel board feeders if identified as aluminum on the electrical feeder schedule. Aluminum conductors shall be compact stranded aluminum alloy with XHHW-2 insulation, made of an AA-8000 series electrical grade aluminum alloy conductor material.

2.2 CONNECTORS AND SPLICES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. AFC Cable Systems, Inc.
   2. AMP Incorporated
   3. Anderson
   4. O-Z/Gedney; EGS Electrical Group LLC.
   5. 3M; Electrical Products Division.
   6. Burndy

B. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

C. Aluminum connections shall be made with compression type wire barrels factory prefilled with oxide inhibiting compound. Set screw connectors are not acceptable.

2.3 FLEXIBLE METAL CLAD CABLE

A. Comply with:
   1. NFPA 70
   2. ANSI/UL 4/UL 83/UL 1479
   3. Fed. Specification J-C-30B

B. Cable material:
   1. Jacket material:
      a. Galvanized Steel or aluminum , interlocked.
   2. Conductor covering: Paper wrap.
   3. Conductor Material:
      a. Copper, Solid, THHN
      b. Minimum #12 gauge
      c. Maximum #10 gauge
      d. 90 degree C, 600 volt.
      e. Full size insulted grounding conductor, green.
      f. Conductor color coding to match system voltage. Comply with Division 26 Section “Identification”.

C. Fittings:
   1. ANSI/NEMA FB 1
   2. ANSI/UL 514B
   3. Zinc plated Malleable iron, or steel.
      a. Direct flexible conduit bearing set screw type not acceptable.
      b. Install insulated bushings or equivalent protection (i.e. Anti-short) between core conductors and outer jacket.

PART 3 - EXECUTION

3.1 INSTALLATION OF CONDUCTORS AND CABLES IN RACEWAY

A. No cables shall be installed in raceways until the raceway system is complete from end to end.

B. Examine raceways and building finishes to confirm compliance with contract requirements for installation tolerances and other conditions affecting installation of wires and cables. Do not proceed with installation until area is ready and any unsatisfactory conditions have been corrected.

C. Verify that interior of building has been protected from weather.

D. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

E. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.

F. All branch circuit wire shall be sized for a maximum voltage drop of 3%. The contractor shall size all cables to comply with this requirement. Below are some guidelines that may be followed to achieve the correct voltage drop in lieu of providing custom calculations for each case.
   1. Use conductor not smaller than #12 AWG for all 120V 20A branch circuits less than 60’ in length from the source breaker to any device.
   2. All 120V branch circuit conductors where the length is 61’ to 120’ from the source breaker to any device shall utilize #10 minimum throughout the circuit, unless otherwise noted.
   3. All 120V branch circuit conductors where the length is 121’ to 240’ from the source breaker to any device shall utilize # 8 minimum throughout the circuit, unless otherwise noted.
   4. All 120V branch circuit conductors where the length is greater than 241’ from the source breaker to any device shall utilize # 6 minimum throughout the circuit, unless otherwise noted.
   5. Use conductor not smaller than #12 AWG for all 277V 20A branch circuits less than 140’ in length from the source breaker to any device.
   6. All 277V branch circuit conductors where the length is 141’ to 220’ from the source breaker to any device shall utilize #10 minimum throughout the circuit, unless otherwise noted.
   7. All 277V branch circuit conductors where the length is 221’ to 340’ from the source breaker to any device shall utilize # 8 minimum throughout the circuit, unless otherwise noted.
   8. All 277V 20A branch circuit conductors where the length is greater than 341’ from the source breaker to any device shall utilize # 6 minimum throughout the circuit, unless otherwise noted.

G. Provide a dedicated neutral conductor for all dimmer circuits from the load back to the dimmer module or switch.

H. Provide a dedicated neutral conductor for all computer receptacle circuits from the load back to the branch circuit panel board.

I. Neatly train and lace wiring inside boxes, equipment, and panelboards.

J. Conductor sizes indicated on circuit homeruns or in schedules shall be installed over the entire length of the circuit unless noted otherwise on the drawings or in these specifications.

K. Before installing raceways and pulling wire to any mechanical equipment, verify electrical characteristics with final submittal on equipment to assure proper number and AWG of conductors. (As for multiple speed motors, different motor starter arrangements, etc.).

L. Coordinate all wire sizes with lug sizes on equipment, devices, etc. Provide/install lugs as required to match wire size.

3.2 INSTALLATION REQUIREMENTS FOR METAL CLAD CABLES

A. Metal Clad Cables may be used only as specified, where permitted by NEC, and if approved by the Local Inspecting Authority having Jurisdiction.

B. MC Cable shall not be run to the panel board or electrical room. All final runs to the panelbpard shall be in conduit to a point at least 10’ outside the electrical room. No more than 6 current carrying conductors shall be run in any conduit to a junction box outside the electrical room. No junction box shall contain more than 6 current carrying conductors. Wireways are not permitted for the termination of MC cables.

C. MC cable shall not be used for any other building system wiring (except power and lighting).

D. MC cables shall not be used for switch legs.

E. MC cables shall not be used for feeder circuits or for systems.

F. Utilize the same sizing requirements for 20A branch circuit conductors as listed for conductors in raceways.

G. Connectors and supporting components shall be UL Listed for such use. Tie wire is not acceptable for supporting MC cable.

H. Cut cables with UL listed tools intended for such use. Ream smooth and free of sharp and abrasive areas. Install bushing between conductors and outer jacket. The use of slide cutters or dikes to cut cables is not acceptable.

I. Maintain minimum 1/2 inch separation between each cable and support per NEC. The practice of bundling cables is not acceptable.

J. Install cables minimum of 1’-0” from communications cables.

K. Attachment of cables to ceiling system is prohibited.

L. Attachment of cables to, on, or from mechanical (HVAC) equipment, supports, etc., is not permitted.

M. Install cables parallel and perpendicular to building structure.

N. Zigzagging cables through building elements, as method of support is not acceptable.

O. Cable with outer metal sheath damaged by construction elements and/or improper installation shall be replaced at no additional cost to owner.

3.3 CONNECTIONS

A. Where oversized conductors are called for (due to voltage drop, etc.) provide/install lugs as required to match conductors, or provide/install splice box, and splice to reduce conductor size to match lug size.

B. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

C. All aluminum connections shall be made with approved compression connectors before being connected to lugs. Conductors shall be cleaned with a wire brush immediately prior to connecting.

D. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.

E. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches of slack.

F. Power and lighting conductors shall be continuous and unspliced where located within conduit. Splices shall occur within troughs, wireways, outlet boxes, or equipment enclosures where sufficient additional room is provided for all splices. No splices shall be made in in-ground pull boxes (without written acceptance of engineer).

G. Splices in lighting and power outlet boxes, wireway, and troughs shall be kept to a minimum, pull conductors through to equipment, terminal cabinets, and devices.

H. No splices shall be made in junction box, and outlet boxes (wire No. 8 and larger) without written acceptance of Engineer.

I. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B. A calibrated torque wrench shall be used for all bolt tightening.

J. All interior power and lighting taps and splices in No. 8 or smaller shall be fastened together by means of "spring type" connectors. All taps and splices in wire larger than No. 8 shall be made with compression type connectors and taped to provide insulation equal to wire. Utilize weatherproof connectors for all splices in exterior boxes.

K. No splices are permitted in exterior below grade handhole or pull boxes.

3.4 FIELD QUALITY CONTROL

A. After feeders are in place, but before being connected to devices and equipment, test for shorts, opens, and for intentional and unintentional grounds.

B. Cables 600 volts or less in size #1/0 and larger shall be meggered using an industry approved "megger" with 1000 V internal generating voltage. Readings shall be recorded and submitted to the Engineer for acceptance prior to energizing same. If values are less than recommended NETA values notify Engineer. Submit five copies of tabulated megger test values for all cables.

C. Cables 250 volts or less in size #1/0 and larger shall be meggered using an industry approved "megger" with 500 V internal generating voltage. Readings shall be recorded and submitted to the Engineer, for acceptance prior to energizing same. Submit five copies of tabulated megger test values for all cables.

D. Perform Insulation resistance test and turns ratio test. Submit five copies to engineer at substantial completion.

E. Remove and replace malfunctioning units and retest as specified above.

END OF SECTION 260519

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SECTION 260529 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Hangers and supports for electrical equipment and systems.
   2. Construction requirements for concrete bases.

1.3 DEFINITIONS

A. EMT: Electrical metallic tubing.

B. IMC: Intermediate metal conduit.

C. RMC: Rigid metal conduit.

1.4 PERFORMANCE REQUIREMENTS

A. Design supports for multiple raceways capable of supporting combined weight of supported systems and its contents.

B. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

C. Rated Strength: Adequate in tension, shear, and pullout force to resist maximum loads calculated or imposed for this Project, with a minimum structural safety factor of five times the applied force.

D. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

1.5 SUBMITTALS

A. Product Data: For the following:
   1. Unistrut
   2. Straps
   3. Clamps
   4. Rods

5. Hangers
6. Anchors
7. Attachment Devices

B. Shop Drawings: Show fabrication and installation details and include calculations for the following:
1. Trapeze hangers. Include Product Data for components.
2. Steel slotted channel systems. Include Product Data for components.
3. Nonmetallic slotted channel systems. Include Product Data for components.
4. Equipment supports.

1.6 QUALITY ASSURANCE

A. Comply with NFPA 70.

1.7 COORDINATION

A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 03.

B. Coordinate installation of roof curbs, equipment supports, and roof penetrations. These items are specified in Division 07 Section "Roof Accessories."

1.8 ALLOWANCES

A. Provide allowance for j-hook support of existing cabling encountered in renovated space above ceiling.

PART 2 - PRODUCTS

2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

A. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
a. Cooper B-Line, Inc.; a division of Cooper Industries.
b. ERICO International Corporation.
c. Thomas & Betts Corporation.
d. Unistrut; Tyco International, Ltd.
e. Wesanco, Inc.
2. Metallic Coatings: Exterior of the building utilize stainless steel or hot-dip galvanized after fabrication and applied according to MFMA-4. Interior utilize electro-galvanized steel products.
3. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.

4. Channel Dimensions: Selected for applicable load criteria.

B. Nonmetallic Slotted Support Systems: Structural-grade, factory-formed, glass-fiber-resin channels and angles with 9/16-inch diameter holes at a maximum of 8 inches o.c., in at least 1 surface.
   1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. Cooper B-Line, Inc.; a division of Cooper Industries.
      b. Fabco Plastics Wholesale Limited.
      c. T & B/Carlon
      d. Seasafe, Inc.
   2. Fittings and Accessories: Products of channel and angle manufacturer and designed for use with those items.
   3. Fitting and Accessory Materials: Same as channels and angles, except metal items may be stainless steel.
   4. Rated Strength: Selected to suit applicable load criteria.

C. Raceway and Cable Supports: As described in NECA 1 and NECA 101.

D. Conduit and Cable Support Devices: Steel and malleable-iron hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.

E. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for non-armored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be malleable iron.

F. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.

G. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
   1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
      a. 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 Inc.
         2) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
         3) MKT Fastening, LLC.
         4) Simpson Strong-Tie Co., Inc.; Masterset Fastening Systems Unit.
   2. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel, for use in hardened portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.
      a. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
         1) Cooper B-Line, Inc.; a division of Cooper Industries.
         2) Empire Tool and Manufacturing Co., Inc.

3) Hilti Inc.
4) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
5) MKT Fastening, LLC.

3. Concrete Inserts: Steel or malleable-iron, slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58.
4. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
6. Toggle Bolts: All-steel springhead type.
7. Hanger Rods: Threaded steel.

2.2 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

A. Description: Welded or bolted, structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.

B. Materials: Comply with requirements in Division 05 Section "Metal Fabrications" for steel shapes and plates.

PART 3 - EXECUTION

3.1 APPLICATION

A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter.

B. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMT, IMC, and RMC as required by NFPA 70. Minimum rod size shall be 1/4 inch (6 mm) in diameter.

C. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted support system, sized so capacity can be increased by at least 25percent in future without exceeding specified design load limits.

3.2 SUPPORT INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this Article.

B. Raceway Support Methods: In addition to methods described in NECA 1, EMT, IMC, and RMC may be supported by openings through structure members, as permitted in NFPA 70.

C. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb (90 kg).

D. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:
   1. To Wood: Fasten with lag screws or through bolts.
   2. To New Concrete: Bolt to concrete inserts.
   3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
   4. To Existing Concrete: Expansion anchor fasteners.
   5. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inches (100 mm) thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches (100 mm) thick.
   6. To Steel: Welded threaded studs complying with AWS D1.1/D1.1M, with lock washers and nuts, beam clamps (MSS Type 19, 21, 23, 25, or 27) complying with MSS SP-69 or spring-tension clamps.
   7. To Light Steel: Sheet metal screws.
   8. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate by means that meet seismic-restraint strength and anchorage requirements.

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

F. Do not support conduit or raceway with wire, metal banding material, or perforated pipe straps. Remove wire used for temporary supports

G. Do not attach conduit or raceway to ceiling support wires.

H. Conduits or raceways shall not be supported from ceiling grid supports, plumbing pipes, duct systems, heating or air conditioning pipes, or other building systems.

I. Non-bolted conduit clamps, spring type conduit clamps, and tie wire are not acceptable for supports. All conduits must be supported with bolted hangers listed for the specific installed application.

3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

A. Comply with installation requirements in Division 05 Section "Metal Fabrications" for site-fabricated metal supports.

B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.

3.4 CONCRETE BASES

A. Construct concrete bases of dimensions indicated but not less than 4 inches (100 mm) larger in both directions than supported unit, and so anchors will be a minimum of 10 bolt diameters from edge of the base.

B. Use 3000-psi (20.7-MPa), 28-day compressive-strength concrete. Concrete materials, reinforcement, and placement requirements are specified in Division 03 Section "Cast-in-Place Concrete."

C. Anchor equipment to concrete base.
   1. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
   2. Install anchor bolts to elevations required for proper attachment to supported equipment.
   3. Install anchor bolts according to anchor-bolt manufacturer's written instructions.

END OF SECTION 260529

SECTION 260533 - RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

1.3 DEFINITIONS

A. EMT: Electrical metallic tubing.

B. ENT: Electrical nonmetallic tubing.

C. EPDM: Ethylene-propylene-diene terpolymer rubber.

D. FMC: Flexible metal conduit.

E. LFMC: Liquidtight flexible metal conduit.

F. LFNC: Liquidtight flexible nonmetallic conduit.

G. NBR: Acrylonitrile-butadiene rubber.

H. RNC: Rigid nonmetallic conduit.

1.4 SUBMITTALS

A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.

B. Shop Drawings: For the following raceway components. Include plans, elevations, sections, details, and attachments to other work.
   1. Custom enclosures and cabinets.
   2. For handholes and boxes for underground wiring, including the following:
      a. Duct entry provisions, including locations and duct sizes.
      b. Frame and cover design.
      c. Grounding details.
      d. Dimensioned locations of cable rack inserts, and pulling-in and lifting irons.
      e. Joint details.

C. Coordination Drawings: Conduit routing plans, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:
   1. Structural members in the paths of conduit groups with common supports.
   2. HVAC and plumbing items and architectural features in the paths of conduit groups with common supports.

1.5 REFERENCES

A. ANSI C80.1 - Rigid Steel Conduit - Zinc Coated

B. ANSI C80.3 - Electrical Metallic Tubing - Zinc Coated

C. ANSI C80.5 - Aluminum Rigid Conduit (ARC)

D. ANSI/NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing and Cable

E. ANSI/NEMA OS 1 - Sheet-steel Outlet Boxes, Device Boxes, Covers, and Box Supports.

F. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

G. ANSI/NFPA 70 - National Electrical Code

H. NECA Standard Practices for Good Workmanship in Electrical Contracting

I. NEMA RN 1 - Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit.

J. NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Conduit (EPC 40, EPC 80)

K. NEMA TC 3 -Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing

1.6 QUALITY ASSURANCE

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

B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 METAL CONDUIT AND TUBING

A. Minimum Trade Size
   1. All Conduit (except switch legs) - 3/4"c.
   2. Switch legs - 1/2"c.

B. Rigid metallic conduit
   1. Comply with:
      a. ANSI C80.1
      b. UL Spec - No. 6
      c. NEC 344
   2. Conduit material:
      a. Zinc coated or hot dipped galvanized steel.
   3. Fittings:
      a. Threaded.
      b. Insulated bushings shall be used on all rigid steel conduits terminating in panels, boxes, wire gutters, or cabinets, and shall be impact resistant plastic molded in an irregular shape at the top to provide smooth insulating surface at top and inner edge. Material in these bushings must not melt or support flame.
      c. Zinc plated or hot dipped galvanized malleable iron or steel.
   4. Conduit Bodies:
      a. Comply with ANSI/NEMA FB 1.
      b. Threaded hubs.
      c. Zinc plated or hot-dipped galvanized malleable iron.

C. Rigid aluminum conduit
   1. Comply with:
      a. ANSI C80.5
      b. UL 6
      c. NEC 344
   2. Conduit material: Aluminum.
   3. Fittings:
      a. Threaded.
      b. Aluminum.
      c. Insulated bushings on terminations.
   4. Conduit bodies:
      a. Comply with ANSI/NEMA FB 1.
      b. Threaded hubs.
      c. Aluminum.

D. PVC-Coated Steel Conduit: PVC-coated rigid steel conduit.
   1. Comply with:
      a. UL 6
      b. ANSI C80.1
      c. NEC. 344
      d. NEMA RN1
   2. Conduit material: Hot-dipped galvanized rigid steel with external PVC coating, 20 mil. thick.
   3. Fittings:
      a. Threaded.
      b. Insulated bushings on terminations.
      c. Zinc plated or hot-dipped galvanized malleable iron or steel with external PVC coating, 20 mil. thick.
   4. Conduit bodies:
      a. Comply with:
      b. ANSI/NEMA FB 1

c. Threaded hubs
d. Zinc plated or hot-dipped galvanized malleable iron with external PVC coating 20 mil thick.

E. EMT: ANSI C80.3.
1. Comply with:
a. UL 797
b. ANSI C80.3
c. NEC 358
d. ANSI/UL797
2. Conduit material: Galvanized steel tubing.
3. Fittings:
a. ANSI/NEMA FB 1
b. Set screw, Die Cast for Interior Dry locations
c. Compression, Steel for all damp locations

F. FMC: Zinc-coated steel or aluminum.
1. Comply with:
a. NEC 348
b. ANSI/UL 1
2. Conduit material: Steel or aluminum, interlocked.

3. Fittings:
a. ANSI/NEMA FB 1
b. ANSI/UL 514B
c. Die Cast
d. Threaded rigid conduit to flexible conduit coupling.
e. Direct flexible conduit bearing set screw type not acceptable.

G. LFMC: Flexible steel conduit with PVC jacket.
1. Comply with:
a. NEC 350
b. ANSI/UL 360
2. Conduit material:
a. Flexible hot-dipped galvanized steel core, interlocked.
b. Continuous copper ground built into core up to 1-1/4" size.
c. Extruded polyvinyl gray jacket.
3. Fittings:
a. Threaded for rigid conduit connections.
b. Accepted for hazardous locations where so installed.
c. Provide sealing washer in wet/damp locations.
d. Compression type.
e. ANSI/NEMA FB 1.
f. ANSI/UL 5148.
g. Zinc plated malleable iron or steel.

2.2 NONMETALLIC CONDUIT AND TUBING

A. Minimum Trade Size – ¾”

B. RNC: NEMA TC 2, Schedule-40-PVC, unless otherwise indicated.
   1. Comply with:
      a. NEMA TC-2
      b. UL 651
      c. NEC 352
   2. Conduit material:
      a. Shall be high impact PVC - tensile strength 55 PSI, flexural strength 11000 PSI.
   3. Fittings:
      a. Comply with: NEMA TC-3 and UL 514.

2.3 EXPANSION FITTINGS

A. Expansion fittings shall be:
   1. UL Listed, hot dipped galvanized inside and outside providing a 4" expansion chamber - when used with rigid conduit and electrical metallic conduit, or:
   2. Be polyvinyl chloride and shall meet the requirements of and as specified elsewhere for non-metallic conduit and shall provide a 6" expansion chamber.
   3. Hot dipped galvanized expansion fitting shall be provided with an external braided grounding and bonding jumper with accepted clamps, UL Listed for the application.
   4. Expansion fitting, UL Listed for the application and in compliance with the National Electrical Code without the necessity of an external bonding jumper may be considered. Submit fitting with manufacturer's data and UL Listing for acceptance prior to installation.

2.4 METAL WIREWAYS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. Cooper B-Line, Inc.
   2. Hoffman.
   3. Square D; Schneider Electric.

B. Description: Sheet metal sized and shaped as indicated, NEMA 250, Type 1, unless otherwise indicated.

C. Fittings and Accessories: Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.

D. Wireway Covers: Hinged type.

E. Finish: Manufacturer's standard enamel finish.

2.5 SURFACE RACEWAYS

A. Surface Metal Raceways: Galvanized steel with snap-on covers. Manufacturer's standard enamel finish in color selected by Architect.

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. Thomas & Betts Corporation.
   b. Walker Systems, Inc.; Wiremold Company (The).
   c. Wiremold Company (The); Electrical Sales Division.
   d. Mono-Systems, Inc.

2.6 BOXES, ENCLOSURES, AND CABINETS

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

B. Sheet Metal Outlet and Device Boxes: NEMA OS 1.
   1. Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported; include 1/2 inch (13 mm) male fixture studs where required.
   2. Concrete Ceiling Boxes: Concrete type.
   3. Interior flush outlet boxes shall be one piece galvanized steel constructed with stamped knockouts in back and sides, and threaded holes with screws for securing box coverplates or wiring devices.
   4. Ceiling outlet boxes shall be 4" octagonal or 4" square X 1 1/2" deep or larger as required for number and size of conductors and arrangement, size and number of conduits terminating at them.
   5. Switch, wall receptacle, telephone and other recessed wall outlet boxes in drywall shall be a minimum of 4" square X 1 1/2" deep. For recessing in exposed masonry, provide one piece 4" square x 1 1/2" deep wall boxes with appropriate 4" square cut tile wall covers. For recessing in furred-out block walls, provide 4" square box with required extension for block depth and required extension for drywall depth.
   6. Boxes shall be of such form and dimensions as to be adapted to the specific use and location, type of device or fixtures to be used, and number and size of conductors and arrangement, size and number of conduits connecting thereto.
   7. Handy boxes shall not be used for any purpose.
   8. Where a box is used as the sole support for a ceiling paddle fan, the box must be listed for this purpose and the weight of the fan.

C. Cast-Metal Outlet and Device Boxes: NEMA FB 1, Type FD, with gasketed cover.

1. Interior surface outlet boxes and conduit bodies installed from 0" AFF to 90" AFF (including fire alarm device backbox) shall be the heavy cast aluminum or iron with external threaded hubs for power devices and threaded parts for low voltage devices.

2. Trim rings shall also be of one-piece construction.
3. Weatherproof outlet boxes shall be constructed of corrosion-resistant cast metal suited to each application and having threaded conduit hubs, cast metal faceplate with spring-hinged waterproof cap suitable configured, gasket, and corrosion-proof fasteners.
4. Freestanding cast boxes are to be type FSY (with flange). Other cast zinc boxes are not acceptable.

D. Floor Boxes:
1. For all slab on grade areas except wet locations and wooden floors: Cast iron or steel with epoxy paint, fully adjustable before and after the concrete pour. The cover shall provide protection from water, dirt and debris. The cover will be flanged die cast aluminum with brushed aluminum finish that will accept carpet or tile cutouts to match flooring. The box shall be capable of adapting to most power and communications needs. Provide all activations, barriers and brackets required for the particular installation. Design Selection is Wiremold RFB 4 (based on required outlets) or equal.
2. Wood Floors: Cast iron or steel fully adjustable, rectangular, multi-gang box. The cover shall provide protection from water, dirt and debris. The cover will be brass flip lids with appropriate multi gang ring to set flush with wood flooring. The box shall be capable of adapting to most power and communications needs.
3. Poke Thru's for all floor boxes in elevated slabs: Flush style round poke thru with combination power (2 duplex) and data (6 Cat6 outlets). Poke Thru shall be UL scrub water exclusion for tile and carpeted floors. Poke thru shall be maintains UL fire rated for up to 2 hour rated floors. Poke thru shall meet FBC and ADA accessibility guidelines.

E. Sheet Metal Pull and Junction Boxes: NEMA OS 1.
1. Pull and junction boxes (not in-ground type) larger than 25 square inches shall be hinged cover type with flush latches operated with screwdriver.
2. Large Pull Boxes: Boxes larger than 400 cubic inches in volume or 20 inches in any dimension:
   a. Use continuous hinged enclosures with locking handle.
3. Exterior, damp location and wet location pull and junction boxes shall be Nema 4x stainless steel.

F. Cabinets (Control and Systems):
1. NEMA 250, Type 1, galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
2. Hinged door in front cover with flush latch and concealed hinge.
3. Metal barriers to separate wiring of different systems and voltage.
4. Accessory feet where required for freestanding equipment.

PART 3 - EXECUTION

3.1 RACEWAY INSTALLATION

A. Comply with NECA 1 for installation requirements applicable to products specified in Part 2 except where requirements on Drawings or in this Article are stricter.

B. All bending, cutting, and reaming shall be completed with tools specifically designed for the specific use.

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

D. Arrange conduit to maintain headroom and present neat appearance.

E. Provide rigid steel long radius 90 degree sweeps (bend radius of 10 times the conduit trade size diameter) for all changes in direction (vertical and horizontal) for utility conduits. Comply with all installation requirements of the utility to utilize the conduits.

F. Utility conduits shall be buried a minimum of 36” deep to the top of the conduit.

G. Route conduit installed above accessible ceilings or exposed to view parallel or perpendicular to walls. Do not run from point to point.

H. Do not cross conduits in slab.

I. Use conduit hubs to fasten conduit to sheet metal boxes in damp and wet locations and to cast boxes.

J. Keep raceways at least 6 inches (150 mm) away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.

K. Complete raceway installation before starting conductor installation.

L. Support raceways as specified in Division 26 Section "Hangers and Supports for Electrical Systems."

M. Arrange stub-ups so curved portions of bends are not visible above the finished slab.

N. Install no more than equivalent of three 90-degree bends between boxes. Use conduit bodies to make sharp changes in direction, as around beams. Use factory elbows for bends in metal conduit larger than 2 inch (50 mm) size.

O. Provide continuous fiber polyline 1000 lb. minimum tensile strength pull string in each empty conduit except sleeves and nipples. This includes all raceways which do not have conductors furnished under this Division of the specifications. Pull cord must be fastened to prevent accidental removal.

P. Use suitable caps to protect installed conduit against entrance of dirt and moisture.

Q. Rigid steel box connections shall be made with double locknuts and bushings.

R. Spare conduit stubs shall be capped and location and use marked with concrete marker set flush with finish grade. Marker shall be 6" round x 6" deep with appropriate symbol embedded into top to indicate use. Also, tag conduits in panels where originating.

S. Spare conduit stubs shall be capped with a UL listed and accepted cap or plug for the specific intended use and identified with ink markers as to source and labeled "Spare."

T. Conceal conduit and EMT within finished walls, ceilings, and floors, unless otherwise indicated.

U. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.

V. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors, including conductors smaller than No. 4 AWG.

W. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb (90-kg) tensile strength. Leave at least 12 inches (300 mm) of slack at each end of pull wire.

X. Install raceway sealing fittings at suitable, approved, and accessible locations and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings at the following points:
   1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
   2. Where otherwise required by NFPA 70.

Y. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall.

Z. All raceway runs in masonry shall be installed at the same time as the masonry so that no face cutting is required, except to accommodate boxes.

AA. Raceways shall not be routed through stairwells, elevator shafts, elevator machine rooms or fire pump rooms unless the conduit is for use within that space.

BB. Raceways installed in hazardous locations shall be installed in accordance with the appropriate provisions of NEC chapter 5 for that location. Confirm the appropriate space rating with life safety plans.

CC. All raceway runs, whether terminated in boxes or not, shall be capped during the course of construction and until wires are pulled in, and covers are in place. No conductors shall be pulled into raceways until construction work which might damage the raceways has been completed.

DD. Electrical raceways shall be supported independently of all other systems and supports, and shall in every case avoid proximity to other systems which might cause confusion with such systems or might provide a chance of electrolytic actions, contact with live parts or excessive induced heat.

3.2 BOX INSTALLATION

A. Set metal floor boxes level and flush with finished floor surface.

B. Set nonmetallic floor boxes level. Trim after installation to fit flush with finished floor surface.

C. Install electrical boxes as shown on drawings, and as required for splices, taps, wire pulling, equipment connections and compliance with regulatory requirements.

D. Install electrical boxes to maintain headroom and to present neat mechanical appearance.

E. Inaccessible Ceiling Areas: Install outlet and junction boxes no more than 6 inches (150 mm) from ceiling access panel or from removable recessed luminaire.

F. Install boxes to preserve fire resistance rating of partitions and other elements.

G. Align adjacent wall-mounted outlet boxes for switches, thermostats, and similar devices with each other.

H. Use flush mounting outlet boxes in finished areas.

I. Do not install flush mounting boxes back-to-back in walls; provide minimum 6 inch (150 mm) separation. Provide minimum 24 inches (600 mm) separation in acoustic and fire rated walls.

J. Secure flush mounting box to interior wall and partition studs. Accurately position to allow for surface finish thickness.

K. Use stamped steel bridges to fasten flush mounting outlet box between studs.

L. Install flush mounting box without damaging wall insulation or reducing its effectiveness.

M. Support all outlet boxes from structure with minimum of one (1) 3/8" all-thread rod hangers. Boxes larger than 25 square inches shall be supported with two (2) all-thread rod hangers, minimum.

N. Do not fasten boxes to ceiling support wires.

O. Use multi-gang box where more than one device is mounted together. Do not use sectional box.

P. Boxes in exterior walls shall be flush mounted. Use cast outlet box in exterior locations and wet locations where flush mounting is not possible.

Q. Install outlets in the locations shown on the drawings; however, the Owner shall have the right to make, prior to rough-in, slight changes in locations to reflect room furniture layouts.

R. Coordinate work with all divisions so that each electrical box is the type suitable for the wall or ceiling construction provided and suitable fireproofing is inbuilt into fire rated walls.

S. All boxes shall be installed in a flush rigid manner with box lines at perpendicular and parallel angles to finished surfaces. Boxes shall be supported by appropriate hardware selected for the type of surface from which the box shall be supported. For example, provide metal screws for metal, wood screws for wood, and expansion devices for masonry or concrete.

T. For locations exposed to weather or moisture (interior or exterior), provide weatherproof boxes and accessories.

U. As a minimum, provide pull boxes in all raceways over 150 feet long. The pull box shall be located near the midpoint of the raceway length.

V. Provide knockout closures to cap unused knockout holes where blanks have been removed, and plugs for unused threaded hubs.

W. Provide conduit locknuts and bushings of the type and size to suit each respective use and installation.

X. Boxes and conduit bodies shall be located so that all electrical wiring is accessible.

Y. Avoid using round boxes where conduit must enter box through side of box, which would result in a difficult and insecure connection with a locknut or bushing on the rounded surface.

Z. Outlet boxes mounted in metal stud walls, are to be supported to studs with two (2) screws inside of outlet box to a horizontal stud brace between vertical studs or one side of outlet box supported to stud with opposite side mounted to section of stud or device to prevent movement of outlet box after wall finished.

AA. All outlet boxes that do not receive devices in this contract are to have blank plates installed matching wiring device plates.

BB. Height of wall outlets to bottom above finished floors shall be as follows, unless specifically noted otherwise, or unless otherwise required by applicable codes including ADA. Verify with the Architectural plans and shop drawings for installing.

CC. Bottoms of outlets above counter tops or base cabinets shall be minimum 2" above counter top or backsplash, whichever is highest. Outlets may be raised so that bottom rests on top of concrete block course, but all outlets above counters in same area shall be at same height. It is

the responsibility of this Division to secure cabinet drawings and coordinate outlet locations in relation to all cabinets as shown on Architectural plans, prior to rough-in, regardless of height shown on Division 26 drawings.

DD. Height of wall-mounted fixtures shall be as shown on the drawings or as required by Architectural plans and conditions. Fixture outlet boxes shall be equipped with fixture studs when supporting fixtures.

EE. Locate special purpose outlets as indicated on the drawings for the equipment served. Location and type of outlets shall be coordinated with appropriate trades involved. The securing of complete information for proper electrical roughing-in shall be included as work required under this section of specifications. Provide plug for each outlet.

FF. Electrical outlet boxes may be installed in vertical fire resistive assemblies classified as fire/smoke and smoke partitions without affecting the fire classification, provided such openings occur on one side only within a 24" wall space and that openings do not exceed 16 sq. inches. All clearances between such outlet boxes and the gypsum board must be completely filled with joint compound.

GG. Fire-Barrier Penetrations: Firestop penetrations under division 07 Section "Firestopping".

3.3 INSTALLATION OF WIREWAYS

A. Do not install wireways as a substitute for proper coordination and layout of conduit stub ups to panels. Prior authorization from the engineer is required prior to installation of any wireways.

B. Do not make splices in wireways. All wires must be pulled through without splice or termination.

C. Install wireway to maintain headroom and to present neat mechanical appearance.

D. Support wireway independently of conduit.

E. Wireway shall be located so that all electrical wiring is accessible.

END OF SECTION 260533

SECTION 260553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
1. Identification for raceway and metal-clad cable.
2. Identification for conductors and communication and control cable.
3. Underground-line warning tape.
4. Warning labels and signs.
5. Instruction signs.
6. Equipment identification labels.
7. Miscellaneous identification products.

1.3 SUBMITTALS

A. Product Data: For each electrical identification product indicated.

B. Identification Schedule: An index of nomenclature of electrical equipment and system components used in identification signs and labels.

C. Samples: For each type of label and sign to illustrate size, colors, lettering style, mounting provisions, and graphic features of identification products.

1.4 QUALITY ASSURANCE

A. Comply with ANSI A13.1 and ANSI C2.

B. Comply with NFPA 70.

C. Comply with 29 CFR 1910.145.

1.5 COORDINATION

A. Coordinate identification names, abbreviations, colors, and other features with requirements in the Contract Documents, Shop Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual, and with those required by codes, standards, and 29 CFR 1910.145. Use consistent designations throughout Project.

B. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

C. Coordinate installation of identifying devices with location of access panels and doors.

D. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 RACEWAY, BOX AND METAL-CLAD CABLE IDENTIFICATION MATERIALS

A. Snap-Around, Color-Coding Bands: Slit, pretensioned, flexible, solid-colored acrylic sleeves, 2 inches (50 mm) long, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

B. Primed and Painted band 4” in length.

2.2 CONDUCTOR AND COMMUNICATION- AND CONTROL-CABLE IDENTIFICATION MATERIALS

A. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape not less than 3 mils (0.08 mm) thick by 1 to 2 inches (25 to 50 mm) wide.

B. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.

2.3 UNDERGROUND-LINE WARNING TAPE

A. Description: Permanent, bright-colored, continuous-printed, polyethylene tape.
1. Not less than 6 inches (150 mm) wide by 4 mils (0.102 mm) thick.
2. Compounded for permanent direct-burial service.
3. Embedded continuous metallic strip or core.
4. Printed legend shall indicate type of underground line.

2.4 WARNING LABELS AND SIGNS

A. Comply with NFPA 70 and 29 CFR 1910.145.

B. Baked-Enamel Warning Signs: Preprinted aluminum signs, punched or drilled for fasteners, with colors, legend, and size required for application. 1/4-inch (6.4-mm) grommets in corners for mounting. Nominal size, 7 by 10 inches (180 by 250 mm).

C. Metal-Backed, Butyrate Warning Signs: Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs with 0.0396-inch (1-mm) galvanized-steel backing; and with colors, legend, and size required for application. 1/4-inch (6.4-mm) grommets in corners for mounting. Nominal size, 10 by 14 inches (250 by 360 mm).

D. Warning label and sign shall include, but are not limited to, the following legends:
   1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."
   2. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES (915 MM)."

2.5 INSTRUCTION SIGNS

A. Engraved, laminated acrylic or melamine plastic, minimum 1/16 inch (1.6 mm) thick for signs up to 20 sq. in. (129 sq. cm) and 1/8 inch (3.2 mm) thick for larger sizes.
   1. Engraved legend with black letters on white face.
   2. Punched or drilled for mechanical fasteners.
   3. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.

2.6 EQUIPMENT IDENTIFICATION LABELS

A. Safety Signs: Comply with 29 CFR, 1910.145.

B. Nameplates shall be laminated phenolic plastic, chamfer edges.
   1. For 120/208 Volt System:
      a. Black front and back with white core, with lettering etched through the outer covering. White engraved letters on Black background.
   2. For 277/480 Volt System:
      a. Orange front and back with white core with lettering etched through the outer covering. White engraved letters on Orange background.
   3. For Emergency System:
      a. Red front and back with white core with lettering etched through the outer covering. White engraved letters on red background.

2.7 MISCELLANEOUS IDENTIFICATION PRODUCTS

A. Cable Ties: Fungus-inert, self-extinguishing, 1-piece, self-locking, Type 6/6 nylon cable ties.
   1. Minimum Width: 3/16 inch (5 mm).
   2. Tensile Strength: 50 lb (22.6 kg), minimum.
   3. Temperature Range: Minus 40 to plus 185 deg F (Minus 40 to plus 85 deg C).
   4. Color: Black, except where used for color-coding.

B. Paint: Paint materials and application requirements are specified in Division 09 painting Sections.

C. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Identification Materials and Devices: Install at locations for most convenient viewing without interference with operation and maintenance of equipment.

B. Lettering, Colors, and Graphics: Coordinate names, abbreviations, colors, and other designations with corresponding designations in the Contract Documents or with those required by codes and standards. Use consistent designations throughout Project.

C. Sequence of Work: If identification is applied to surfaces that require finish, install identification after completing finish work.

D. Self-Adhesive Identification Products: Clean surfaces before applying.

E. Install painted identification according to manufacturer's written instructions and as follows:
1. Clean surfaces of dust, loose material, and oily films before painting.
2. Prime surfaces using type of primer specified for surface.
3. Apply one intermediate and one finish coat of enamel.

F. Caution Labels for Indoor Boxes and Enclosures for Power and Lighting: Install pressure-sensitive, self-adhesive labels identifying system voltage with black letters on orange background. Install on exterior of door or cover.

G. Circuit Identification Labels on Boxes: Install labels externally.
1. Exposed Boxes: Pressure-sensitive, self-adhesive plastic label on cover.
2. Concealed Boxes: Plasticized card-stock tags.
3. Labeling Legend: Permanent, waterproof listing of panel and circuit number or equivalent.

H. Paths of Underground Electrical Lines: During trench backfilling, for exterior underground power, control, signal, and communication lines, install continuous underground line marker located directly above line at 6 to 8 inches below finished grade. Where width of multiple lines installed in a common trench or concrete envelope does not exceed 16 inches overall, use a single line marker. Install line marker for underground wiring, both direct-buried cables and cables in raceway.

I. Secondary Service, Feeder, and Branch-Circuit Conductors: Color-code throughout the secondary electrical system.
1. Color-code 208/120-V system as follows:
   a. Phase A: Black.
   b. Phase B: Red.
   c. Phase C: Blue.
   d. Neutral: White.
   e. Ground: Green.
   f. Switchlegs(load side of contactor or relay is not considered a switchleg): Purple
2. Color-code 480/277-V system as follows:
   a. Phase A: Brown
   b. Phase B: Orange

c. Phase C: Yellow
d. Neutral: White with a colored stripe or gray.
e. Ground: Green.
f. Switchleg(load side of contactor or relay is not considered a switchleg): Pink

3. Factory apply color the entire length of conductors, except the following field-applied, color-coding methods may be used instead of factory-coded wire for sizes larger than No. 6 AWG:
   a. Colored, pressure-sensitive plastic tape in half-lapped turns for a distance of 6 inches from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Use 1-inch wide tape in colors specified. Adjust tape bands to avoid obscuring cable identification markings.

J. Power-Circuit Identification: Metal tags or aluminum, wraparound marker bands for cables, feeders, and power circuits in vaults, pull and junction boxes, manholes, and switchboard rooms.
   1. Legend: 1/4-inch steel letter and number stamping or embossing with legend corresponding to indicated circuit designations.
   2. Tag Fasteners: Nylon cable ties.
   3. Band Fasteners: Integral ears.

K. Apply identification to conductors as follows:
   1. Conductors to Be Extended in the Future: Indicate source and circuit numbers.
   2. Multiple Power or Lighting Circuits in the Same Enclosure: Identify each conductor with source, voltage, circuit number, and phase. Use color-coding to identify circuits' voltage and phase.
   3. Multiple Control and Communication Circuits in the Same Enclosure: Identify each conductor by its system and circuit designation. Use a consistent system of tags, color-coding, or cable marking tape.

L. Apply warning, caution, and instruction signs as follows:
   1. Warnings, Cautions, and Instructions: Install to ensure safe operation and maintenance of electrical systems and of items to which they connect. Install engraved plastic-laminated instruction signs with approved legend where instructions are needed for system or equipment operation. Install metal-backed butyrate signs for outdoor items.
   2. Emergency Operation: Install engraved laminated signs with white legend on red background with minimum 3/8-inch high lettering for emergency instructions on power transfer, load shedding, and other emergency operations.

M. Equipment Requiring Workspace Clearance According to NFPA 70: Unless otherwise indicated, apply to door or cover of equipment but not on flush panelboards and similar equipment in finished spaces.

N. Instruction Signs:
   1. Operating Instructions: Install instruction signs to facilitate proper operation and maintenance of electrical systems and items to which they connect. Install instruction signs with approved legend where instructions are needed for system or equipment operation.
   2. Emergency Operating Instructions: Install instruction signs with white legend on a red background with minimum 3/8-inch- (10-mm-) high letters for emergency instructions at equipment used for power transfer.

O. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and Operation and Maintenance Manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm systems unless equipment is provided with its own identification.
   1. Labeling Instructions:
      a. Engraved, laminated acrylic or melamine label. Unless otherwise indicated, provide a single line of text with 1/2-inch- (13-mm-) high letters on 1-1/2-inch- (38-mm-) high label; where 2 lines of text are required, use labels 2 inches (50 mm) high.
      b. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.
   2. Equipment to Be Labeled: Include as a minimum the equipment identification (first line ½"): voltage rating and amperage rating (second line 3/8"): where it is fed from (third line 3/8"). (Example :Panel CP1 (Line 1), 208/120V 3ph, 4w, 225A(line 2), fed from swbd MDP-1 (Line 3))
      a. Panelboards, electrical cabinets, and enclosures.
      b. Access doors and panels for concealed electrical items.
      c. Electrical switchgear and switchboards.
      d. Transformers.
      e. Electrical substations.
      f. Emergency system boxes and enclosures.
      g. Motor-control centers.
      h. Disconnect switches.
      i. Enclosed circuit breakers.
      j. Motor starters.
      k. Push-button stations.
      l. Power transfer equipment.
      m. Contactors.
      n. Remote-controlled switches, dimmer modules, and control devices.
      o. Battery inverter units.
      p. Battery racks.
      q. Power-generating units.
      r. Voice and data cable terminal equipment.
      s. Master clock and program equipment.
      t. Intercommunication and call system master and staff stations.
      u. Television/audio components, racks, and controls.
      v. Fire-alarm control panel and annunciators.
      w. Security and intrusion-detection control stations, control panels, terminal cabinets, and racks.
      x. Monitoring and control equipment.
      y. Uninterruptible power supply equipment.
      z. Terminals, racks, and patch panels for voice and data communication and for signal and control functions.

3.2 SWITCHGEAR BREAKERS

A. Provide labels for each breaker to identify the load served.

3.3 CONDUIT/JUNCTION BOX COLOR CODE

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

B. Color Code for Junction Boxes

1.	System Emergency 277/480 volt	Orange/Brown
2.	System Emergency 120/208 volt	Orange/Black
3.	Fire Alarm	Red
4.	Normal Power 277/480 volt	Brown
5.	Normal Power 120/208 volt	Black
6.	Fiber Optics	Purple
7.	Sound System	Yellow
8.	Clock	Light Blue
9.	Intercom	Blue
10.	Computer/Data	Gold
11.	TV	White
12.	Security/CCTV	Beige
13.	Ground	Fluorescent Green
14.	Telephone	Clover Green

C. Conduits (not subject to public view) longer than 20 feet shall be painted with above color paint band 30 ft. on center. Paint band shall be 4" in length. Where conduits are parallel and on conduit racking, the paint bands shall be evenly aligned. Paint shall be neatly applied and uniformed. Paint boxes and raceways prior to installation or tape conduits and surrounding surfaces to avoid overspray. Paint overspray shall be removed.

D. All new and existing junction boxes/cover plates for power, lighting and systems (except those installed in public areas) shall adequately describe it's associated panel and circuit reference number(s) within, (i.e. ELRW-2, 4, 6) or systems within (i.e. fire alarm, intercom. Etc.). Identification shall be by means of black permanent marker. (Paint ½ cover plate with appropriate color as noted in 2.3 above, and mark other ½ with associated panel/circuit or system description as described).

END OF SECTION 260553

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SECTION 262726 - WIRING DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Receptacles, receptacles with integral GFCI, and associated device plates.

1.3 DEFINITIONS

A. EMI: Electromagnetic interference.

B. GFCI: Ground-fault circuit interrupter.

C. Pigtail: Short lead used to connect a device to a branch-circuit conductor.

D. RFI: Radio-frequency interference.

E. TVSS: Transient voltage surge suppressor.

F. UTP: Unshielded twisted pair.

1.4 SUBMITTALS

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

B. Operation and Maintenance Data: For wiring devices to include in all manufacturers' packing label warnings and instruction manuals that include labeling conditions.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain each type of wiring device and associated wall plate through one source from a single manufacturer. Insofar as they are available, obtain all wiring devices and associated wall plates from a single manufacturer and one source.

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

C. Comply with NFPA 70.

D. Comply with NEMA WD 1.

1.6 COORDINATION

A. Receptacles for Owner-Furnished Equipment: Match plug configurations.
   1. Cord and Plug Sets: Match equipment requirements.

1.7 ALLOWANCES

A. Provide for twenty additional receptacles as directed in field. Allowance includes purchase, delivery and installation of box, receptacle cover plate, wire and 100 feet of conduit for each receptacle.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers' Names: Shortened versions (shown in parentheses) of the following manufacturers' names are used in other Part 2 articles:
   1. Hubbell Incorporated; Wiring Device-Kellems (Hubbell).
   2. Leviton Mfg. Company Inc. (Leviton).
   3. Pass & Seymour/Legrand; Wiring Devices & Accessories (Pass & Seymour).

2.2 STRAIGHT BLADE RECEPTACLES

A. Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 configuration 5-20R, and UL 498.
   1. Products: Subject to compliance with requirements, provide one of the following for standard convenience outlets:
      a. Hubbell; HBL5361 (single), HBL5352 (duplex).
      b. Leviton; 5351 (single), 5352 (duplex).
      c. Pass & Seymour; 5361 (single), 5352 (duplex).
   2. Black Computer Power Duplex Receptacle:
      a. Pass & Seymour Model PS5352-Black
      b. Hubbell Model HBL5362-Black
      c. Leviton Model 5362-Black

2.3 WALL PLATES

A. Single and combination types to match corresponding wiring devices.
   1. Plate-Securing Screws: Metal with head color to match plate finish.

2. All wiring devices shall be provided with standard size one-piece cover plates of suitable configuration for the number and type of devices to be covered.
3. Metallic cover plates shall be used in interior spaces, except as noted below, and shall be fabricated of corrosion-resistant #302 stainless steel, having a nominal thickness of .04", and a brushed finish. Screws securing the plates shall have flush (when installed) heads with finish to match plates. Metallic cover plates shall meet all requirements of the National Electrical Code and Federal Specifications.
4. Cover plates for switches located in corrosive atmospheres (where vaporproof is not indicated) shall be equal to Hubbell #17CM81/#17CM82/#17CM83/#17CM84 one piece neoprene with matching presswitch.
5. Cover plate engraving, where required, shall be accomplished by cover plate manufacturer in accordance with instructions given on the drawings. Metallic plates shall be engraved with black fill. Red plates shall be engraved with white fill.
6. Material for Unfinished Spaces: Galvanized steel.

B. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with type 3R weather-resistant, die-cast aluminum with lockable “in use” cover. Cover plates for exterior receptacles shall be gasketed covers with hinge allowing plug and cord to be plugged in and activated with cover closed.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Coordination with Other Trades:
1. Take steps to insure that devices and their boxes are protected. Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against outside of the boxes.
2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
4. Install wiring devices after all wall preparation, including painting, is complete.

B. Install products in accordance with manufacturer's instructions.

C. Install devices plumb and level.

D. Install switches with OFF position down.

E. Provide device coverplates for every device installed. Cover plates shall be installed so that they appear straight with no gaps between plate edges and the wall. Maintain vertical and horizontal to within 1/16 of an inch

F. Wiring devices shall not be installed in exposed masonry until cleaning of masonry with acids has been completed.

G. All receptacles and switches shall be grounded by means of a ground wire from device ground screw to outlet box screw and branch circuit ground conductor. Strap alone will not constitute an acceptable ground.

H. All devices shall be installed so that only one wire is connected to each terminal.

I. Connect wiring devices by wrapping conductor around screw terminal.

J. Install galvanized steel plates on outlet boxes and junction boxes in unfinished areas, above accessible ceilings, and on surface mounted outlets.

K. Install local room area wall switches at door locations on the lock side of the door, approximately four inches from the jamb. Where locations shown on the drawings are in question, provide written request for information to A/E prior to roughin.

L. Conductors:
1. Do not strip insulation from conductors until just before they are spliced or terminated on devices.
2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtails.

M. Device Installation:
1. Replace all devices that have been in temporary use during construction or that show signs that they were installed before building finishing operations were complete.
2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
4. Connect devices to branch circuits using pigtails that are not less than 6 inches (152 mm) in length.
5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, 2/3 to 3/4 of the way around terminal screw.
6. Use a torque screwdriver when a torque is recommended or required by the manufacturer.
7. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.
8. Tighten unused terminal screws on the device.
9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device mounting screws in yokes, allowing metal-to-metal contact.

N. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.

O. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on bottom. Group adjacent switches or receptacles under multigang wall plates. Provide proper NEC barriers in boxes which serve devices for both the Normal and Emergency Systems.

P. Adjust locations of floor service outlets and service poles to suit arrangement of partitions and furnishings.

3.2 CONNECTIONS

A. Connect wiring device grounding terminal to outlet box with bonding jumper.

B. Connect wiring device grounding terminal to branch-circuit equipment grounding conductor.

C. Tighten electrical connectors and terminals according to manufacturers published torque-tightening values. If manufacturers torque values are not indicated, use those specified in UL 486A and UL 486B.

3.3 NEUTRAL CONDUCTOR CONNECTIONS

A. At each receptacle "in" and "out" phase and neutral conductors shall have an additional conductor for connection to device. The practice of "looping" conductors through receptacle boxes shall not be acceptable. (IE: The device shall not be used to complete the circuit. Pigtails shall be used from the device)

3.4 IDENTIFICATION

A. Comply with Division 26 Section "Identification for Electrical Systems."
   1. Receptacles and Switches: Identify panelboard and circuit number from which served. Use permanent marker to identify on the back of plates or tags within outlet boxes.

3.5 FIELD QUALITY CONTROL

A. Inspect each wiring device for defects.

B. Verify that each receptacle device is energized.

C. Test each receptacle device for proper polarity.

3.6 ADJUSTING

A. Adjust devices and wall plates to be flush and level.

END OF SECTION 262726

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SECTION 272626 – DATA COMMUNICATIONS INTEGRATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

B. STANDARDS

1. TIA/EIA-568-B.1 “Commercial Building Telecommunications Cabling Standard”, CSA T529.
2. TIA/EIA-568-B.2-1 "Transmission Performance Specifications for 4-pair 100Ohm Category 6 Cabling".
3. TIA/EIA-569 “Commercial Building Standard for Telecommunications Pathways and Spaces”, CSA T530.
4. TIA/EIA-606 “Administration Standard for Telecommunications Infrastructure of Commercial Buildings”, CSA T528.
5. TIA/EIA-607 “Commercial Building Grounding/Bonding Requirements”.
6. TSB-67 “Transmission Performance Specification for Field Testing of Unshielded Twisted Pair Cabling Systems”.
7. TIA/EIA TSB-72 “Centralized Optical Fiber Cabling Guidelines”.
8. *TIA/EIA PN-3398 TSB-75 “Additional Horizontal Cabling Practices for Open Offices”.
9. ANSI/NFPA 70 National Electrical Code, CSA C22.1.
10. BICSI Telecommunications Distribution Methods Manuals
11. BICSI Telecommunications Installation Manuals
12. County Codes and Regulations.
13. Underwriters Laboratories (UL)
14. FCC -Federal Communications Commission
15. ADA Requirements
16. Occupational Safety and Health Regulations (OSHA)
17. National Fire Protection Association (NFPA)
18. Florida Statutes and Administrative Rules
19. Cabling System Certified Cabling Catalog

1.2 DESCRIPTION

A. General: Furnish and install, complete with all accessories an EIA/TIA 568-B.2-1 Category 6 Premise Distribution System (PDS) with a minimum 25-year, LINK AND CHANNEL WARRANTY for the entire system. This warranty shall provide for guaranteed system performance and the replacement of any defective products or installation. The goal of the project is to provide an enhanced PDS system that shall serve as a vehicle for transport of data, video, and voice telephony signals throughout the building and from building to building from designated demarcation points to outlets located at various desks, workstation and other locations as indicated on the contract drawings and described herein.

B. The intent of the contract documents is to maintain the existing Data system throughout construction. This will include a tie of the old system to the new system. Drawings have been provided to assist with coordinating this effort, but do not necessarily represent the entire scope of the work. Phasing may be modified and altered by contractor with the Owners approval and all such sequencing may require additional temporary connection, conduit, wiring and equipment. The contractor shall include in the bid all cost to maintain the existing and new system functioning harmoniously.

C. Support analog and digital voice applications, data, local area networks (LAN), video and low voltage devices for building controls and management on a common cabling platform. The applications that shall be supported include, but are not limited to:

1. Data Processing - EIA-232-D, EIA-422A, EIA-43-A, RS-485, StarLAN, Fiber Distributed Data Interface (FDDI), Ethernet 10BASE-T (IEEE 802.3i), 10BASE-F (IEEE 802.3j), and TP-PMD. In addition, these links/channels shall be capable of supporting high-end applications such as 100 Base-T (IEEE 802.3u), 1000Base-T (IEEE 802.3z, ab), and 1000 base TX.
2. Voice Over Internet Protocol (VOIP) – Cisco Unified Communications Manager (Call manager).
3. Video – Broadband and base band Analog Video, Digital Video, Video Conferencing.
4. WLAN applications, cabling for Wireless Access points (WAP), shall be compliant with applicable EIA/TIA standards, as well as the IEEE 802.3af standard for providing PoE, (Power over Ethernet) for Data Terminal Equipment (DTE) over Category rated UTP cable.
5. Direct Digital Control (DDC) Building Automatin System (BAS) Central Site.
6. Card Access System inter-controller backbone (Interconnect)
7. Distributed Intercom Controller backbone (Interconnect) (IP Intercom)
8. IP Security cameras
9. Other Applications: ISDN, ATM, ADSL, VoIP.

D. General: The system shall utilize a network of unshielded twisted pair cables (UTP) and fiber optic cables (FO) for horizontal cabling, Backbone cabling, Riser cabling, tie cabling, and patch cords. Cables and terminations shall be provided and located as shown and in the quantities indicated on the drawings. FO Cables shall terminate on rack-mounted Fiber Distribution Centers (FDC's), UTP cables shall terminate on rack-mounted modular patch panels and work area outlets located as shown on the drawings. All cables and terminations shall be identified at all locations according to the EIA/TIA 606 standard. All cables shall be terminated in an alphanumeric sequence at all termination locations.

E. Warranty: Cabling systems shall be required to be covered under a manufacturers warranty program for both LINK and Channel configurations. Including cable, jacks, patch panels, patch cords and include cabling specifically approved for the LINK and Channel configuration as specified in the connectivity manufacturers warranty. The patch cords and workstation cords shall me manufactured by the same manufacturer as the jacks and patch panels. The patch cords shall be 100% factory tested for compliance to the Category 6 standard.

F. All terminations shall comply with, and be tested to the EIA/TIA 568B.2-1 Category 6 requirements at a minimum, and providing at least a 25-year warranty.

1. It should be anticipated by all installers that all horizontal cable supporting data applications must meet at a minimum the Category 6 performance requirements as listed

by EIA/TIA standards for the link and channel. (Field testing for LINK only, 100% factory patch cord testing required)

G. Data Services: Wiring utilized for data communications shall originate at Owner provided hubs and concentrators in vertical free standing equipment racks located at individual IDF'S. Assist Owner by providing port counts for wall outlets, WAP, TV and camera ports.

H. Work Included: Provide wiring, terminations and patch bays between these designated demarcation points and outlet locations designated on the plans shall be considered part of the contact.

I. Utilize the following color code for Category 6 components. Blue jacks for building systems terminations for the ACSP. Each of the following components shall be color matched to allow for system "color coding". Cat. 6 Cable jacket, Patch cords and Cat. 6 jacks.

1.3 QUALIFICATIONS

A. General: The contractor selected for the Project must show current certification as an installer of the manufacturers of the products approved for the project, adhere to the engineering, installation and testing procedures and utilize the authorized manufacturers components and distribution channels in provisioning the Project. The installer shall have a local office within 50 miles of the project site and show proof of at least 5 years prior experience performing a similar scope of work with this company in the same 50 mile area.

B. General: The Contractor directly responsible for this work shall be a "Premise Distribution Wiring Contractor" (PDW) who is, and who has been, regularly engaged in the providing and installation of commercial and industrial telecommunications wiring systems of this type and size for at least the immediate past five years. The Contractor shall be required to hold a valid State of Florida low voltage contractors license. Any sub-Contractor, who will assist the PDW contractor in performance of this work, shall have the same training and certification as the PDW contractor.

C. Certification: The contractor's Project Manager shall possess a current BICSI Registered Communications Distribution Designer (RCDD) certificate. All shop drawings submitted by the contractor shall bear the RCDD's seal. The PM shall have been certified as an RCDD for at least the last 5 years.

D. Experience: The Contractor shall be experienced in all aspects of this work and shall be required to demonstrate direct experience on recent systems of similar type and size. The Contractor shall own and maintain tools and equipment necessary for successful installation and testing of optical fiber and Category 6 copper premise distribution systems and have personnel who are adequately trained in the use of such tools and equipment.

E. Submit contractor qualifications and certifications with bids.

1.4 Not Used

1.5 SUBMITTALS

A. General: Submittals required prior to commencement of work shall include manufactures cut sheets for all proposed equipment including, but not limited to, the following:

1. All wire and cable.
2. All connectors and required tooling.
3. All termination system components for each cable type.
4. All IDF equipment frame types, hardware and LAN equipment if part of this project.
5. All cable suspension j-hooks, cable fasteners, CAT 6 cable suspension components.
6. All grounding and surge suppression system components for the systems portion of the project.
7. AC Grade, Plywood Backboards painted with UL Classified fire retardant paint.
8. Contractor qualifications should be submitted with bids.

B. Adherence to Specifications: Manufacturers and/or products are listed in order of preference. Single manufacturer names means that no other manufacturers' product is accepted without written approval from the Owner and the Engineer. These manufacturers represent major components and are not intended to be comprehensive. Shop drawings and/or samples for all products not listed must be submitted to ICTS for approval. Also, an explanation in detail giving the reason(s) why and how the proposed items will meet the specifications and will not be considered an exception, and submit adequate information to support this claim. ICTS reserves the right to be the sole judge of what is equal or equivalent. These changes, if approved by the OWNER and the ENGINEER, must be issued in a WRITTEN ADDENDUM.

C. Required to be submitted with the bid:
1. Copy of the Contractor's current Certification by the specific connectivity manufacturer.
2. Installer qualifications.

D. Provide EXCEL software spreadsheet that defines the telecommunications outlet number, location, and number of voice, data and special jacks. This database is to also include outlet patch panel connection to the riser/inter-floor cable, equipment, and telephone company demarcation circuit pairs.
1. WLAN applications, cabling for Wireless Access points (WAP), shall be compliant with applicable EIA/TIA standards, as well as the IEEE 802.3af standard for providing PoE, (Power over Ethernet) for Data Terminal Equipment (DTE) over Category rated UTP cable.

1.6 SPECIAL REQUIREMENTS FOR CABLE ROUTING AND INSTALLATION

A. General: Cable routing and Installation practices shall be in accordance with BICSI's Telecommunications Distribution Methods Manual (TDMM) and Telecommunications Installation Manual.

B. Plenum Spaces and cable routing: The majority of PDW wiring in this building will be installed above ceilings. All communications cabling used throughout this project shall comply with the requirements as outlined in the National Electric Code (NEC) article 800. All cabling shall bare

the CMR, MPR OR OFNR (RISER) and or appropriate markings for ducted "air return" applications and for cable run in conduit. Cable shall bare CMP, MPP or OFNP (plenum) markings for all non-ducted return air applications or as required by local and/or State code requirements. Verify with local and State code enforcement officers where plenum and non-plenum cables are required. All cable shall bare the appropriate markings for the environment in which they are installed.

C. Conduit will provide a pathway for all cables concealed within walls, run in exposed ceiling spaces, run in inaccessible ceiling spaces (Drop ceilings above 11’ in height are also considered inaccessible), run exterior of the building, or subject to physical damage.

D. Cable Pathway: In suspended ceiling and raised floor areas where duct, cable trays, or conduits are not available, bundle in bundles of 40 or less, horizontal wiring with cable ties snug, but not deforming the cable geometry. Cable ties in plenum areas shall be plenum rated. The cable bundling shall be supported via "CLIC" fasteners in Telecommunications closets and non-plenum areas and Category 6 compliant J-hooks or basket tray in ceiling spaces. Provide a minimum of two hangers at any corners or 90 degree turns. Attachment shall be to the building structure and framework at a maximum of five (5) foot intervals. Ceiling suspension wire or independent tie wire shall not be allowed in any space for cable support. Where cable is run above the ceiling in areas without walls, all thread rod shall be used (minimum 1/4", however sized to support the intended weight) with the appropriate CAT 6 hanger for cross-room support. Support rods shall be level and plumb after cable installation. Adhere to the manufacturers' requirements for bending radius and pulling tension of all cables.

E. Protection: Sealing of openings through rated fire and smoke walls, existing or created for cable pass through shall be provided under division 7 section “Firestopping”. Create openings as are necessary for cable passage between locations as shown on the drawings or required. Any openings created for this work and left unused shall also be sealed under Division 7 section “Firestopping”.

F. Damage: The contractor shall be responsible for any damage to any surfaces or work disrupted as a result of his work. Repair of surfaces including painting and ceiling tile replacement shall be included as part of this contract.

G. Avoiding EMI: To avoid EMI, all pathways shall provide clearances of at least 4 feet (1.2 meters) from motors or transformers; 1 foot (1’2 inches) from conduit and cables used for electrical-power distribution; and 1 foot (12 inches) from fluorescent lighting. Pathways shall cross perpendicular to fluorescent lighting and electrical power cables and conduits.

1.7 WARRANTY REQUIREMENTS

A. Cabling system warranties are to be supplied by the manufacturer of the connectivity, (jacks, patch panels and patch cords). A Warranty from the cable manufacturer or the contractor shall not be accepted.

B. The warranty program shall include coverage for both Link and Channel configuration as specified in the connectivity manufacturer’s warranty. Warranty Design Standard: Hubbell Premise Wiring, 25 year, Mission Critical System Warranty. (www.hubbell-premise.com)

1.8 WORK EXTERNAL TO THE BUILDING

A. General: the provisions of this specification shall govern any work external to the confines of this building as shown on the drawings.

PART 2 - PRODUCTS

2.1 OUTLETS

A. General: Communications outlets that contain copper services shall be equipped with ANSI/TIA/EIA-568-B.2-1 Category 6, 8-position modular jacks (RJ45 type) utilizing T568B wiring. All outlet cabling shall terminate on appropriate termination blocks at their associated IDF. Outlet jack module arrangement and quantities are shown on the drawings. Outlets shall be certified to operate at 1000 Mbps date speed with twisted pair terminal wiring as verified by ETL or UL. Faceplates shall be able to accommodate up to 6, 8-position modular jacks each.

B. Wall outlets: shall consist of single gang wall plates. Provide blank module inserts for all unused module locations

C. Floor outlets: shall consist of single gang wall plates inside the floor box. Provide blank module inserts for all unused module locations.

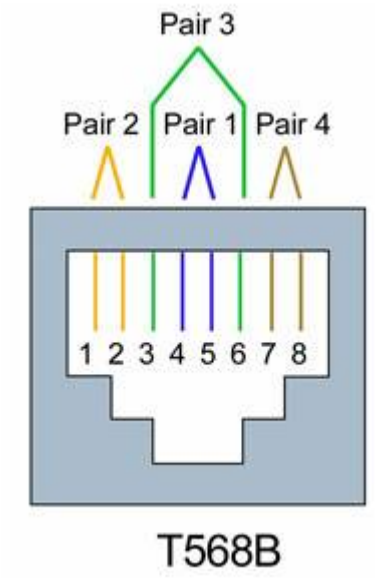
D. Modular furniture outlets: Shall consist of modular furniture faceplate capable of housing up to (4) 8-position modular connectors. Provide blank module inserts for all unused module locations.

E. House wall phone, if indicated, shall consist of SE630 type wall plates with Cat 6 minimum cable to each, terminating in 8-position modular jack.

F. 8-position modular jacks: CAT 6 jacks shall meet or exceed the following electrical and mechanical specifications:

1. Electrical Specifications:
   a. Insulation resistance: 500 MΩ minimum
   b. Dielectric withstand voltage 1,000 VAC RMS, 60 Hz minimum, contact-to-contact and 1,500 VAC RMS, 60 Hz minimum from any contact to exposed conductive surface.
   c. Contact resistance: 20 mΩ maximum
   d. Current rating: 1.5A at 68° F (20°C) per IEC Publication 512-3, Test 5b.
   e. ISO 9001 Certified Manufacturer
   f. U.L. Verified for EIA/TIA electrical performance
   g. Comply with FCC Part 68

2. Mechanical Performance:
   a. Plug Insertion Life: 750 insertions
   b. Contact Force: 3.5 oz (99.2 g) minimum using FCC-Approved modular plug.
   c. Plug Retention Force: 30 lb (133 N) minimum between modular plug and jack.
   d.
3. Temperature Range: -40° to 150°F (-40° to 66°C)



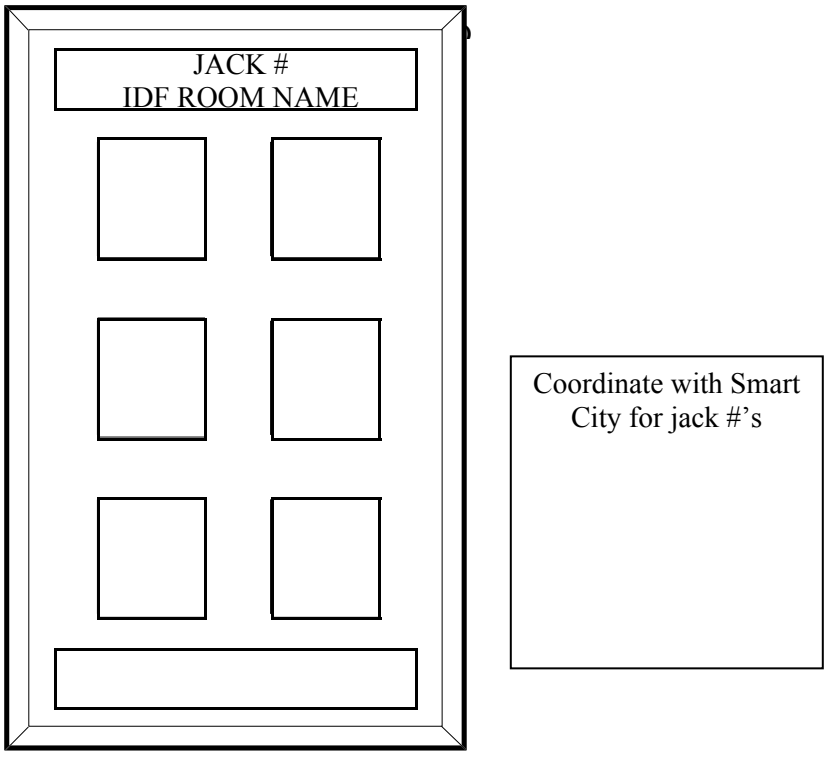
G. Channel Performance: All Enhanced CAT 6 jacks shall be utilized in a channel configuration meeting or exceeding the following specifications at 250 MHz:

H. Category 6 jack component values:
1. NEXT (dB) at 250 MHz - 46.0 dB or exceed
2. Insertion Loss (dB) at 250 MHz - .32 dB or less
3. FEXT (dB) at 250 MHz - 35.1 dB or exceed
4. Return Loss (dB) at 250 MHz – 16.0 dB or exceed

I. Design Selection: Hubbell Premise Wiring Xcelerator, as follows. See drawing details for exact outlet configurations.

1. Wall faceplate (office white): # IFP16OW (6 port)
2. PDS jacks (voice, data, WAPs – coordinate with Smart City for color coding):
3. # HXJ6P or # HXJ6P25 (25 pack)
4. Blanks (office white): #SFB10 (10 pack)
   a. Provide blank module inserts for all unused module locations.

J. Outlet Labeling: Each jack on all outlets shall be identified with permanent machine generated labels, meeting the EIA/TIA 606 requirements, matching the numbering plan indicated on the drawings with the addition of a letter suffix indicating the jack position on the faceplate. All labeling must be permanent. All labeling shall be a minimum 12 pt. in size. All labeling systems shall be submitted to the engineer for approval prior to fabrication



2.2 CATEGORY 6 DATA AND VOICE HORIZONTAL CABLE

A. General: Data pairs shall be extended between the outlet location and its associated IDF. The cable shall consist of 4 pair 23 gauge, solid copper conductors, Certified to the Category 6 standards. ETL or UL Verified for EIA/TIA electrical performance Comply with FCC Part 68. Cables shall be terminated on each of the 8-position modular jacks provided at each outlet. Voice jacks shall also utilize this cable type. Only virgin materials shall be used.

B. General: Cable selection shall be based upon meeting an end-to-end channel performance and shall be shown to have been tested with the proposed component manufacturer's products and warranted as a complete permanent link and channel solution.

C. Cable Insulation and Jacket: Cable jacket shall comply with Article 800 NEC for the environment in which the cable will be installed. All cables shall bear the U.L. and NEC, CMR or MPR markings. (All cable shall be RISER rated unless otherwise specified or required by code.) All PLENUM cables shall bear the UL and National Electrical Code, CMP or MPP markings. Cables utilizing 2x2, 3x1, or other combinations of construction shall not be acceptable.

D. Horizontal Cables drops from IDF or MDF to specified outlets locations are to be without splices.

E. Properties: Electrical Characteristics for horizontal cable tested on 100 m length shall be as follows:

	TIA/EIA CAT 6
Frequency	250MHz
Characteristic Impedance	100Ω ±15%
NEXT (db) Minimum	41.3dB
PSNEXT (dB) Minimum	39.3dB
ELFEXT Minimum	19.8dB
PSELFEXT Minimum	16.8dB
ACR Minimum	8.5dB
PSACR Minimum	6.5dB
Return Loss Minimum	17.3dB
Delay Skew (ns) Maximum	45ns

F. Horizontal Cable Specified: In addition to meeting listed requirements cable is also required to meet a 25 year or greater total PDW warranty. The cable selected must be one of those approved for use in a warranted system from the connectivity manufacturer.

G. Labels: Labeling for copper tie cabling shall be by Room, Outlet, and Jack position number (similar to plate labeling) at the IDF end. Cable shall be identified with IDF # at the outlet box end. Permanent machine type printed (1/8” min letters) vinyl or nylon cloth labels shall be considered acceptable the purpose. Identification shall include be provided at both ends of the cable (in junction box at jack and at IDF patch). Labels shall be by Brady or equal.

2.3 CABLE SUPPORT SYSTEM

A. General – Horizontal cables shall be suspended by pre-manufactured CAT 6 rated J-hooks and by "CLIC" fasteners with cable inserts in closets where J-hooks, ladder tray or rack management is not available. All supports shall be permanently attached to the structure using drop rod suspension, beam clamps, or wall mount to the structural metal or wooden members. The J-hooks shall feature a wide base loop with smooth curves to eliminate snag potential and cable deformation. All cables shall utilize wire basket style cable tray, in accordance with 26 05 36, when running cables down the corridors. J-hooks should only be utilized when running within individual room spaces and should not be utilized for long runs back to the IDF/MDF.

B. Cable ties used in plenum areas are to be plenum rated.

C. J-hooks shall be in accordance with NEC, EIA/TIA requirements for structured cabling systems. All cable supports shall be U.L. listed.

D. Design selection: Erico Caddy, J-Hook, HILTI Inc. J-hangers, CLIC" 32, 40, 50 with insert, or approved equal.

2.4 COPPER TIE CABLING

A. General: Copper tie cabling (12pair or 25pair) shall be provided between IDF's and MDF if indicated on the contract drawings. All voice grade wire and cable place underground shall be solid twisted pair, multi-conductor, ASP-filled core cable. Cable jacket shall be aluminum steel polyethylene (ASP). Conductors shall be dual insulated with foam skin and plastic, and surrounded by filling compound. The cable shall be resistant to mechanical damage, lightning damage or damage from wildlife.

B. The multi-pair copper cables shall meet the following specifications:
   1. Gauge: 24 AWG
   2. DC Resistance: 27.3Ω/1000 ft (8.96Ω/100m), maximum
   3. Mutual Capacitance (at 1khz)
   4. Impedance: 100Ω (25 pair)
   5. Buried/Underground Cable Attenuation (db/1,000 ft [305m]): at 1.0 MHz: 6.4 (25 pair), maximum
   6. Aerial Cable Attenuation (db/1,000 ft [305m]): at 1.0 MHz: 6.7 (25 pair), maximum.

C. Design Selection;
   1. Outside Plant: Mohawk Wire and Cable (OSP, Below grade): REA PE-89 AL Filled or equal by General
   2. Inside Plant: Riser rated feeder cables: Mohawk Wire and Cable

D. Labels: Labeling for copper tie cabling shall be by IDF number. Permanent machine type printed (1/8" min letters) vinyl or nylon cloth labels shall be considered acceptable the purpose. Labels shall also be provided at any exposed cable location 20' on center and at all IDF'S locations. Identification shall include "to" and "from" information. Labels shall be by Brady or equal.

2.5 SITE COPPER CABLE PROTECTION UNITS

A. General: All site copper circuits shall be provided with protection between each building with an entrance cable protector chassis. All building-to-building circuits shall be routed through this protector. Protector shall be connected with a #6 AWG copper bonding conductor between the protector ground lug and the IDF ground point. Each protector chassis shall be provided with 5 pin plug-in protector modules for each pair terminated on the chassis.
   1. Design Selection:
      a. Porta Systems, # 24100-110-M110C w/115SCN-240 modules (Analog phones), or #115SCN-75 (75 volt) modules for (Digital phones)
      b. Or equal by Circa or Systimax

B. VoIP Entrance protection (Cisco or other VoIP phones): All site copper circuits that are intended to distribute voice over IP (VoIP) are to be provided with protection between each

building with data rated primary protectors. All copper data grade building-to-building circuits are to be routed through this protector.

1. Design Selection:
   a. Porta Systems #606-27 (non-PoE circuits)
   b. Porta Systems #606-65 (for circuits providing PoE power)

C. Portable classrooms; Site Cat 6 copper circuits from building or portable (Modular) IDF's to portables (Modular) shall be provided protection on both ends. At the IDF rack, multiport rack mounted protector patch panels shall be used for the outgoing Cat 6 cable. Cable shall be run in conduit to the portables where they will terminate in 3-port and 4-port Wall Plate protector units directly without splice.

1. Design Selection:
   a. Cat 6: Porta Systems

2.6 FIBER OPTIC CABLING

A. General: Multi-mode and/or single mode fiber optic cabling shall be provided between IDF'S and MDF if designated on the contract drawings. Multimode and or singlemode selection depends on future Gigabit requirements and distance constraints. Cables placed below grade shall be certified by the manufacturer for that environment. The following tables are for planning the type of fibers to be selected for a specific run maintains a viable path for future Gigabit transmission speeds. These characteristics shall be used as a standard for type selection criteria.

1. Table 1: (850 nm) Operating Distance

Fiber Type	Modal Bandwidth @ 850 nm	Distance
50μm	700 MHz-km/1GBPS Ethernet	1000 m
50μm	700 MHz-km/10GBPS Ethernet	300 m

2. Table 2: (1300 nm) Operating Distance

Fiber Type	Modal Bandwidth @ 1300 nm	Distance
50μm	500 MHz-km/1 GBPS Ethernet	600 m
50μm SM	500 MHz-km/10 GBPS Ethernet	300 m

B.

C. Multimode Cable Construction (50 Micron):

1. Number of fibers: 12 minimum, or higher as shown on the drawings.
2. Core/Cladding: 50 micron/125 micron.
3. Fiber type: 10G/300 fiber
4. Buffering: 900 micron
5. Attenuation: ≤ 1.5 decibels/kilometer at 850 nanometers, ≤ 1.25 dB decibels/kilometer at 1300 nanometers.
6. Minimum laser bandwidth: 2000 megahertz/kilometer at 850 nanometers, 500 megahertz/kilometer at 1300 nanometers.
7. Sheath construction: Non-metallic

D. Composite cables are approved with compliance of above specifications where applicable.

E. If loose tube 250 micron outside plant cable is installed it is required that all terminations utilize a Fan-out Kit: All kits shall be installed per manufacturer's guidelines to provide fiber protection at each termination point. Kits shall be equal to Siecor SKF-P.

F. Labels: Labeling for fiber cabling shall be by IDF number, plus the color suffix designating which fiber is terminated. Die cut acetate labels or Kroy labels shall be considered acceptable the purpose. Labels shall also be provided at any exposed cable location 20' on center and at all IDF'S locations. Identification shall include to and from information.

a.

2.7 CATEGORY 6 PATCH PANELS

A. General: Equipment racks: shall be equipped with 19" rack mounted, 8-position modular jacks (RJ-45 type), non-keyed, factory configured; patch panels for termination of all copper horizontal cables.

B. Work Area outlet patch panels: Shall be tested to meet the Category 6 standard for component and channel performance and shall be modular-to-110, wired for T568B pin outs for the cables serving the Work Area Outlets

1. Category 6 patch panels component values:

a.	NEXT (dB)	at 250 MHz - 46.0 dB or exceed
b.	Insertion Loss (dB)	at 250 MHz - 32.0 dB or less
c.	FEXT (dB)	at 250 MHz - 35.1 dB or exceed

2. Patch panels shall be provided in 24 and 48 port configurations as shown on the drawings.

a. Design Selection: Hubbell Premise Wiring
   1) 24 port - #P6E24U
   2) 48 port - # P6E48U

C. Voice site patch panels: shall be used for distribution of the voice pairs to the work area patch panels via patch cords. Terminate the site copper tie cables, 25 pair or 50 Pair as shown on the drawings, via the protector units to voice patch panels. These patch panels shall be configured with one voice pair per port (Blue pair) via the 110-connector side of the panel. The panels shall be configured as 8-position modular jack-to-110 termination panels in quantities as indicated on the drawings. These panels shall be patched to another set of work area voice patch panels, which shall be connected to the voice jack of the work area outlets in the field. The panels shall be in 24 and 48 port configurations as shown on the drawings. Punch down all Cat 6 pairs to the work area 110 ports.

a. Design Selection: Hubbell Premise Wiring
   1) 24 port - # P624U
   2) 48 port - # P648U

D. Identification: Designation strips for each port shall be provided on the patch panel. All cables shall be terminated in numerical sequence and each position labeled as to outlet number and jack position as is noted for the outlets.

E. Category 6 Modular Patch Cords and Work-area Cords: Patch cords are provided by the Owner

2.8 FIBER OPTIC TERMINATION

A. Rack Mounted Panels: Fiber optic cabling shall be terminated in fiber distribution cabinets (FDC) where indicated on the contract drawings and described herein. Provide blanking modules in all unused connection ports. FDC's shall be provided in quantities and configurations as shown on the drawings complete with loaded with LC style coupler plates for a minimum of 24 fiber terminations, unless otherwise indicated. All FDC's shall be provided with rack mounting hardware allowing the unit to be placed in a standard EIA 19" rack.

B. General: Provide blank adapter in all unused openings in the FDC. All panels shall include strain relief points where fiber optic cable strength members shall be securely attached.

C. Distribution Units
1. "FDC" Design Selection (SC,SM fiber-optic distribution unit): Unloaded (Holds up to 3 adapter panels)
   a. Design Selection:
      1) Hubbell Premise Wiring #FPR3SP
      2) Equal by Panduit or Wiremold
2. "FDC" Design Selection (SC,SM fiber-optic distribution unit): Unloaded (Holds up to 6 adapter panels)
   a. Design Selection:
      1) Hubbell Premise Wiring #FCR350SP36R
      2) Equal by Panduit or Wiremold
3. Adapter Panels for "FDC", (single-mode) (12 fiber, 6 duplex SC)
   a. Design Selection:
      1) Hubbell Premise Wiring # FSPLCD6
      2) Equals by Panduit or Wiremold
4. Blank Adapter panels for unused adapter openings:
   a. Design Selection: Hubbell Premise Wiring # FSPB
   b. Equal by Panduit or Wiremold.

D. Fiber-Optic Patch cables: Fiber-optic patch cables shall be provided by the Owner

2.9 FIBER OPTIC CONNECTOR

A. Single-mode 8/125µm, SC type connectors shall be field installable. Connectors shall meet or exceed the following transmission and mechanical specifications:

1. 900µm terminations only
2. Mated pair insertion loss per shall be field-installed LC connector pair shall not exceed 0.50dB (0.25dB typical) per ANSI/TIA/EIA-455-34 method. (Multi-mode). Return loss: >26dB (single-mode)
3. Operating temperature 0 degrees C to +60 degrees C
4. Design Selection:
   a. 8/125 (single-mode) applications:
      1) Hubbell Premise Wiring #FCLCSM10 (package of 10 SC connectors)
   b.

2.10 OWNER PROVIDED EQUIPMENT

A. The following equipment will be provided and installed by the Owner
   1. Fiber Optic Patch Cords
   2. Cat 6 Patch cords
   3. Network Data Switches and Routers
   4. Uninterruptible power supplies to support the network switches and routers
   5. Wireless Access points
   6. Student and Staff Computers
   7. Printers
   8. Fax Machines

PART 3 - EXECUTION

3.1 GENERAL

A. Provide port counts to Owner at the beginning of the project to assist with Owner equipment purchase. The count should include all cables terminated in the IDF patch panels such as wall outlets, cameras, TV's and WAPS.

3.2 CAT 6 CABLE INSTALLATION

A. Installation of Category 6 UTP cable shall be in accordance with EIA/TIA guidelines for Category 6. Replace Cable installation and terminations that do not comply.

   1. The maximum pulling tension shall not exceed 25 pounds to avoid stretching the conductors.
   2. The minimum bending radius of the cable shall not be less than 4x the diameter of the Category 6 cabling.
   3. The cable shall be installed without kinks or twists and the application of cable ties shall not deform the cable bundle. Cables are to be loose enough to be rotated easily by hand.
   4. Strip back only as much cable jacket as is required to terminate the cable and the amount of untwisting in a pair as a result of the termination shall not exceed 0.5 in.

3.3 OUTLET PLACEMENT

A. Standard PDS Outlets shall be mounted as close as possible to the power outlet and at the same height.

B. WAP ceiling outlets should be ceiling mounted in the center of the room or as shown.

C. WAP wall mounted outlets should be mounted at 10 – 12 ‘ AFF.

3.4 SERVICE SLACK

A. All cable runs shall contain service slack prior to the termination point. Provide 12-inch service slack in the ceiling above each outlet. Service slack at IDF shall consist of a 10 foot slack section all station cables located and placed neatly in the cable ladder above the equipment rack.

3.5 SUPPORT AND ROUTING OF CABLES

A. Horizontal cables used in this system are to be installed within ceiling spaces. Cables shall be routed through these spaces at right angles to electrical power circuits and supported only from the structure. Tie cables shall be extended between MDF to IDF'S utilizing conduit runs as shown on the drawing

B. Use of ceiling tiles, grid or hanger wires for support of PDW cables shall be prohibited.

C. Install a complete set of supporting J-hooks and other supporting hardware for this system as part of the PDW contract. All supporting hardware shall be submitted to the engineer for approval prior to installation. Hardware shall also be utilized by other systems work. Comply with basic layout indicated on drawing details for cable placement.

D. Do not exceed 80% of the J-hook or cable tray capacity.

3.6 FIRE AND SMOKE PARTITION PENETRATIONS

A. Openings in sleeves and conduits used for the PDW system cables and those that remain (empty) spare shall be sealed under Division 7.

3.7 TRAINING

A. Provide one 2-hour training session to familiarize the owner with the locations of all IDF's, cable and jack labeling and numbering systems, data and voice connections.

3.8 AS-BUILT DOCUMENTATION

A. As-built documentation shall be provided as part of the contract. As-built drawings shall be a complete set of AutoCAD Release 2002 floor plans with all outlets shown and numbered as installed. The original project floor plan disks shall be obtained from the Owner. All cable routings (trunk lines) and elevations of each IDF or MDF indicating outlet, tie, and riser cable terminations shall be required. All addendum information or project revisions resulting in drawing changes that occur during the construction period shall be documented and included in the as-built material. All required as-built documentation is mandatory and shall be required prior to project closeout. A set of prints with all changes shall be submitted to the Engineer for review. Upon completion of the Engineer's review, provide updated disks and a reproducible mylar set of drawings, which include final As-built conditions and the Engineer's review comments, if any.

B. Provide Excel software spreadsheet that defines the telecommunications outlet number, location, and number of voice, data and special jacks. This database shall also provide the outlet patch panel connection to the riser/inter-floor cable, equipment, and telephone company demarcation circuit pairs as part of the as-built documentation.

3.9 TESTING OF WIRING ACCURACY

A. General: Test wiring setting tester for a channel configuration which includes the patch cord, patch panel, UTP Cable, work-area jack and work-area cord.

B. Testing Equipment: Tester shall be as manufactured by Agilent Technologies, Fluke, Microtest or Ideal. Tester shall be 100% Level lll compliant with TIA/EIA 568B.2-1 specifications for testing of CAT 6 cabling. No tester will be approved with out meeting these requirements.

C. Testing guidelines: Each jack in each outlet shall be tested at a minimum to Category 6 compliance. The test shall be done in a LINK configuration to verify the integrity of all conductors and the correctness of the termination sequence. The Contractor and Manufacturer shall provide a minimum 25 year application assurance Warranty for the LINK and CHANNEL.

D. Testing shall be performed between the outlets and the patch panel at the equipment rack, prior to testing UTP runs the tester shall be calibrated per manufacturer's guidelines. The correct cable NVP shall be entered into the tester to assure proper length and attenuation readings.

E. Verify that this testing method is acceptable to the manufacturer that will be providing the LINK AND CHANNEL warranty for this project.

1. 250 MHz sweep tests, Wire map, Attenuation, NEXT, PSNEXT, ELFEXT, PSELFEXT, ACR, PSACR, Return Loss, Delay, Delay Skew, and the installed length for Category 6 cables.
2. Cables not complying with ANSI/TIA/EIA-568-B.1 and B.2-1 Category 6 tests shall be identified to the engineer for corrective action which may include replacement at no additional expense to the Owner.
3. Documentation of cable testing shall be required. Provide the results of all Category 6 cable tests in electronic format as well as two (2) hardbound copies in 3-ring binders. Provide IBM format text files on CD/electronic media. Provide a separate text file for each building in the project. Each test page shall be separated by standard page break (one test per page).

3.10 TESTING OF FIBER OPTIC CABLE

A. General: Each strand in fiber optic cables shall be tested for correctness of termination, overall transmission loss, and defects using an approved Optical Time Domain Reflectometer (OTDR) and a power meter. The Engineer shall be present during all tests. Notify the engineer one week prior to testing.

B. Testing Equipment: Tester shall be as manufactured by Agilent Technologies, Fluke, Microtest, Noyes or Ideal.

C. Testing shall be I.A.W. TIA/EIA-526-14 method B. System loss measurements (both calculated and measured) shall be provided in both directions (1310 and 1550 nanometers for singlemode) for each strand. Per IEEE 802.3z, maximum fiber strand attenuation shall not exceed 2.38 dB @ 850 nm with a modal bandwidth of 160 Mhz-km and 2.35 dB @ 1310 nm with a modal bandwidth of 500 Mhz-km. Test as follows:

1. Measure and record normalized fiber loss at operating wavelength in dB/km.
2. Detect and record point faults or discontinuities.
3. Measure and record overall length of cable.

D. Certification report shall be provided listing both the calculated and measure loss for each fiber optic circuit and submitted with he test results as called for above. Provide test results in IBM text format on CD/electronic media as well as (2) hardbound copies in 3-ring binders. Documentation of testing shall include:

1. Wavelength, fiber type, fiber manufacturer and cable model number, cable manufacturers' attenuation specifications, cable manufacturers' bandwidth specifications, Measurement direction, Test equipment and serial numbers (with date of last calibration), date of each test, reference setup, Name of technician(s) performing testing.
2. OTDR trace(s) shall be submitted with request for substantial completion.

END OF SECTION 272626

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SECTION 281310 – ELECTRONIC ACCESS CONTROL SYSTEM

PART 1 GENERAL

1.1 SUMMARY

a. The Security Management System (SMS) shall be the key central component for managing physical security. The system shall provide a variety of integrated functions including access control.

1.2 REFERENCES

A. Abbreviations

1. ACS: Access Control System
2. AES: Advanced Electronic Encryption
3. API: Application Programming Interface
4. DAS: Direct Attached Storage
5. DHCP: Dynamic Host Configuration Protocol
6. DPS: Door Position Sensor
7. FASC: Federal Agency Smart Credential
8. FASC-N: Federal Agency Smart Credential Number
9. FICAM: Federal Identity, Credential, Access Management
10. FIPS: Federal Information Processing Standard
11. ICM: Input Control Module
12. IP: Internet Protocol
6. ISC: Intelligent System Controller
14. LAN: Local Area Network
15. LDAP: Lightweight Directory Access Protocol
16. NAS: Network Attached Storage
17. NFC: Near Field Communications
18. OCM: Output Control Module
19. ODBC: Open Database Connectivity
20. OPC: OLE for Process Control
21. OSDP: Open Supervised Device Protocol
22. PACS: Physical Access Control System
23. PIV: Personal Identity Verification

24. RAM: Random Access Memory
25. REST: Representational State Transfer
26. REX: Request to Exit
27. RFID: Radio Frequency Identification
28. SAN: Storage Area Network
29. SIA: Security Industry Association
30. SMS: Security Management System
31. SSL: Secure Sockets Layer
32. TCP: Transport Control Protocol
33. TDE: Transparent Data Encryption
34. TWIC: Transportation Worker Identity Card
35. UPS: Uninterruptible Power Supply

B. DEFINITIONS

1. Alarm aggregation: A mechanism of combining several alarms into a single item (group) based on certain criteria.
2. Credential: Data assigned to an entity and used to identify that entity.
3. Designated One Person Control: Requires that a designated cardholder is present before anyone else is allowed to access a certain area.
4. Designated Two Person Control: Requires the presence of two cardholders, designated as special “Team Members”, to restrict individuals from being alone in restricted or highly secure areas as well as restricting the type of personnel allowed in those areas.
5. Devices Global Hard Anti-passback: Once access has been granted via a valid badge presentation, (1) a cardholder cannot present their badge to another entry card reader within the same area without first presenting it to the area's exit card reader, and (2) any attempt to use any card reader in the same area other than exit card reader shall result in access denied and an alarm report.
6. First Card Unlock: Function where a pre-determined time zone activated unlock command is suppressed until a valid credential has been presented and granted access to the portal.
7. Global Soft Anti-passback: As defined in Devices Global Hard Anti-passback with the exception that the cardholder shall be allowed access to a new area for which he is authorized.
8. (Guard) Tour: One or more checkpoints (card readers or alarm inputs) checked during a guard’s predetermined path.
9. Interlock group readers: Configuration for local, but not global, anti-passback whereby only one door may be opened at a time within the area and an alarm is generated for any denied access.

10. Pass-Through: The ability assigned to a person's credential that allows them to access a door even if in lockdown state.
11. Occupancy Limit: Restricts the number of cardholders that shall be present in an area at any given time.
12. Region: A separate instance of the distributed database.
13. Representational State Transfer (REST): A software architecture style consisting of guidelines and best practices for creating scalable web services.
14. RESTful API's (Application Programming Interfaces): Term given to Web services using the REST architecture.
15. Runaway detection: A situation when there are more than a specified number of alarms coming from a given device within a specified time interval.
16. Tailgate Control: Triggered when a person receives an access granted, an output will be fired momentarily for a single person or twice for two people, for a maximum duration of one second.
17. Timed Anti-passback: Configurable wait time between an initial badge swipe and the time at which the same badge will be accepted again at the same card reader.
18. Timezones: Time-based periods, encompassing time of day, day of the week and holidays, which are stored on the ISC and control hardware behavior, cardholder access, online mode of the readers, activation of outputs, masking of inputs, and logging events to the database.
19. Two Person Control: Restricts access to certain areas unless two (2) cardholders are present, where the second badge must be presented within a designated time interval of the first to provide access.

C. REFERENCE STANDARDS

1. Underwriters Laboratories
    a. UL 294 - Standard for Access Control System Units
    b. UL 1076 - Standard for Proprietary Burglar Alarm Units and Systems
    c. UL 1981 - Standard for Central-Station Automation Systems
    d. UL 1610 - Central Station Automation System Software
2. ISO/IEC 14443-3:2011 – Identification Cards
3. ADA – Americans with Disabilities Act
4. National Fire Protection Association
    a. NFPA 70 National Electric Code
    b. NFPA 101 – Life Safety Code
    c. NFPA 731 - Standard for the Installation of Electronic Premises Security Systems
5. Institute of Electrical and Electronic Engineers

a. IEEE 802.3 Ethernet Standards

6. National Institute of Standards and Technology (NIST)
   a. Federal Information Processing Standard Publication 140-2 – Security Requirements for Cryptographic Modules
   b. Federal Information Processing Standard Publication 197 – Advanced Encryption Standard
   c. Federal Information Processing Standard Publication 201 – Personal Identity Verification
   d. SP 800-116 A Recommendation for the Use of PIV Credentials
7. Security Industry Association
   a. Open Supervised Device Protocol (OSDP)

D. SUBMITTALS
1. Informational Submittals
   a. Product Data
   b. Manufacturer product data sheets
   c. Manufacturer product instructions, and installation and operating manuals
   d. Shop Drawings
      1) Complete set of proposed drawings, identifying equipment locations, types of cabling, numbers of conductors, raceway locations, and termination points of each conductor.
      2) Complete listing of proposed devices, indicating interconnection equipment locations and specifying terminal/connecter termination locations.
      3) Operational narrative of each component/system.
2. Closeout Submittals
   a. Warranty Documentation:
      1) Manufacturer warranty statements for all system components and applicable equipment.
3. Record Documentation:
4. Maintenance Material Submissions:
   a. Listing of spare parts required to maintain the system.
5. Closeout Submittals
   a. Final listing of doors, locations, and normal status in MS Excel format.
   b. Complete set of supplier's operating instructions, installation instructions, and troubleshooting guide, to include but not be limited to instructions for:

c. Schematic drawings depicting type and location of interface equipment/components, number of cables and conductors, raceway locations, types of connectors, circuit requirements and type and dimensions of enclosures.

PART 2 PRODUCTS

2.1 MANUFACTURER

A. Lenel

1. 1212 Pittsford-Victor Road, Pittsford, NY 14534-3820

   Phone: +1 585 248-9720

   info@lenel.com

2. Products

   a. Security Management Software: OnGuard version 7.4 or later

2.2 GENERAL DESCRIPTION

A. The Security Management System (“SMS”) shall be the key central component for managing physical security access control,

B. Scalability

1. The SMS shall be capable of processing an unlimited number of credential readers, scalable from single site to multiple sites.

C. Database

1. The SMS shall be based upon one or more independent secure owner provided database instances, one of which has been designated as the system master.

D. The SMS shall provide a variety of integrated core functions to include:

1. Regulation of access and egress
2. Provision of identification credentials
3. Monitoring and managing alarms related to both access control and intrusion

E. Integrations – The SMS shall employ a REST API to enable the integration of select third party products and functions with the core functions of the SMS.

F. User Interface

1. The SMS shall provide access to licensed and installed applications through a common web-based application, supported across all SMS platforms.
2. The SMS shall include a launcher application that can be used from a web browser that will launch various components and modules of the SMS from a single location, with Users able to customize, rearrange, and retain configurations.

G. Communication Security

1. All communication paths within the SMS shall support encrypted communications to provide end-end communication security.

H. Operational Efficiencies

1. The SMS shall offer a web portal for employees to request access and for area owners to approve, hold or deny requested access.
2. Transactions shall be reportable within the SMS.
3. The SMS shall have an expedient means to identify access rights given in violation of corporate policies and to automatically revoke access rights for administered violations.
4. The SMS shall have a web-based analysis tool that collects system data for comprehensive system health monitoring and displays it on a customizable, intuitive dashboard.

2.3 ARCHITECTURE

A. Open Architecture – The SMS shall support an 'open architecture' allowing for additional support of products outside of the vendor proprietary options.

1. SMS shall support hardware that is non-proprietary to the extent where other vendors could offer support for these devices.
2. SMS shall support an REST-based Application Programming Interface (API) that supports the opportunity for 3rd party integration. Access to this API should be managed thru a program to ensure that 'partner' 3rd parties utilize this API appropriately.
3. The SMS shall, when possible, leverage 'open industry standards' for device and system

B. System Topology

1. The owner provided server shall include a central or distributed server component for managing security and any associated integrations.
   a. The SMS server shall function as an application server for connectivity of workstation based or browser-based clients for support of configuration and management.
2. An input or output linkage feature shall allow linking of monitor zone points to output control points within Intelligent System Controllers (ISCs).
3. Tasks shall be accessible from compatible client workstations on the network utilizing any of the following:
   a. Traditional client-server architecture
   b. N-tier architecture where the SMS supports the expansion of the system architecture and allows for user deployment based upon their system architectural needs
   c. Centralized distribution (publishing) of applications using Windows Terminal Server and Citrix® on Windows, UNIX, Linux or Apple Macintosh based systems through any compatible internet browser application and/or by means of a mobile computing platform using a wearable computer, Tablet PC, or PDA device.
4. Redundancy - The owner provided SMS shall support the following means of fault tolerance and SMS redundancy:

a. Hot Standby Servers - A Primary Server shall be the main server that is in use when the SMS is operating under normal conditions, and the SMS shall mirror its database information to a Backup/Secondary Server.

1) Field hardware shall be configured for both the Primary Server and the Backup Server, which shall each recognize the same TCP/IP ISC address on the network.

2) Upon sensing Primary Server failure, the Backup Server shall automatically initiate itself as the Primary Server and shall begin communication with the Field Hardware.

a) Frequency of check for Primary Server failure: 5 seconds

b) Resynchronization time upon Primary Service restoration: 5 minutes maximum

b. Cluster/Warm Standby – A Primary Server shall be the main server that is in use when the SMS is operating under normal conditions.

1) Field hardware shall be configured for both the Primary Server and the Backup Server, which shall each recognize the same TCP/IP ISC address on the network.

2) Upon sensing Primary Server failure, the Backup Server shall bring the necessary services online and shall begin communication with the Field hardware.

3) Shared media devices, either single or dual, shall be employed to house the hard disk used by both servers.

a) Resynchronization time upon Primary Service restoration: 5 minutes maximum

c. Disk Mirroring - This configuration shall allow data to be stored on dual hard disks running simultaneously.

d. RAID Level 10 - The SMS shall offer a Fault Tolerant Redundant Array of Independent Disks Level 10 (RAID Level 10) with a hot standby disk.

1) Redundant components: disk storage, controller channels, high efficiency power supplies

e. Distributed Intelligence - In the event SMS communications is lost or the database server fails, Intelligent System Controllers shall provide complete control, operation and supervision of the system's monitoring and control points.

1) Should the downtime exceed the capacity of the Field Hardware buffer and events are overwritten, an alarm shall appear in the Alarm Monitoring Window notifying the System Operator that events were overwritten.

C. Inter-site Communications

1. The SMS shall support a distributed system (application and database) installation to support geographical or logical separation and management of installations while maintaining a centralized system for reporting.

a. Each distributed system shall support operation of the local clients and hardware, and provide configuration, event, and transactional events to the central system.

b. The SMS shall use a message architecture to transfer necessary incremental credential data from one site to another. This architecture shall provide data queuing, guaranteed delivery, and secure transmission of this data.

D. External Interaction of Data

1. The SMS shall be able to connect to and interface bi-directionally with external data sources utilizing the following methods:

a. ASCII with support for XML formatted text exchange

b. Real-time exchange of data via Active Directory or LDAP

c. Software Application Programming Interface (API)

E. Database - The SMS shall utilize a single supported relational database.

1. Acceptable databases: Microsoft, Oracle (owner provided)

2. Acceptable operating systems: Microsoft Windows Servers or Clients

3. Protection of 'Data at Rest' within the database shall be provided via Transparent data encryption (TDE) and shall be supported to perform real-time I/O encryption and decryption of the database and database log files.

4. The SMS database server shall support an unlimited number of cardholders and visitors limited by the available memory, storage, and processing of the devices. The SMS database server shall support an unlimited number of system events and System Operator transactions in the history file limited only by available hard disk space. The SMS database server shall support an unlimited number of system events and System Operator transactions in the history file limited only by available hard disk space.

5. The SMS shall support bi-directional data interface to external databases in real-time or in a batch mode basis.

a. The SMS shall support a one-step download and distribution process of cardholder and security information from the external database to the SMS database and through the system to Intelligent System Controller (ISC) databases.

b. If a required communication path is broken, the data shall be stored in a temporary queue and shall be automatically downloaded once the communication path is restored.

F. Security

1. Each page in the cardholder record shall be permission protected.

2. Each field in the database shall be permission protected.

3. Communication throughout the SMS shall be AES encrypted.

4. All cardholder PIN codes within the system shall be encrypted.

G. A Network Account Management Module shall integrate SMS cardholders with external user network accounts, allowing System Administrators to perform a set of administrative tasks in

Windows domains from the System Administration Module, and to create a link between physical access control and logical domains.

H. The SMS shall allow, through standard API toolkits, System Administrators to expose specific SMS data and events that are relevant to IT information or other third-party systems or to allow, o System Administrators to accept and process information exposed from the IT information or other third-party systems.

2.4 CORE FUNCTIONALITY

A. Access Control - access granted or denied decisions, define access levels, and set time zones and holidays. The SMS shall support features such as area control (two-man control, hard, soft, and timed anti-passback), database segmentation, and time zone or holiday overrides

1. Configuration

a. Credentials

1) SMS credential management functionality shall allow:

a) enrollment of cardholders via traditional thick client and/or by web-based credential application as well as the storage of cardholder records in the database

b) formatting of cardholder records

c) capturing of images, biometric data, and signatures

d) user-defined fields in the cardholder record

e) issuance/reissuance of traditional plastic badges and/or Mobile Credentials using information in the cardholder record

f) import or export of cardholder data from internal or third-party systems

i. data delimiter: definable

ii. import-export filters: selectable

g) assignment and modification of access rights and levels

h) definition of cardholder escort requirements

i) cardholder use limits

j) user definition of extended individual strike and door held open times

k) deactivation of credential following a period of non-use

l) furnishing and management of digital certificates for smart cards

m) searching for records and images based on any fields in the database

2) The SMS shall support ActivIdentity Server, and ActivIdentity Client.

3) Field types: text, date, numeric, drop-down lists

b. Access Levels shall consist of a combination of card readers and timezones and be assignable to an alphanumeric name.

1) Minimum number of supported access levels: 32,000

2) Card readers shall be assignable to any or all access levels.

3) Each access levels shall have the option for “First Card Unlock”.

4) Temporary access levels – Within the constraint of number of access levels, the SMS shall have provision for access levels with definable start and end dates.

5) Precision access levels – Beyond the constraint of number of access levels, the SMS shall be able to assign access levels with unlimited card reader and timezone combinations.

6) Access Groups – The SMS shall provide for access groups, assignable to an alphanumeric name, containing up to 32 access levels.

7) Timezones – Pre-defined card reader settings shall have the flexibility to be overridden or modified for locking state and required authentication means.

c. Holidays shall be assignable via an embedded calendar with an alphanumeric name and to individual timezones.

1) Minimum number of holiday assignments: 255

2) Number of holiday group types: 8

3) Repeat frequency: annual

4) Daylight Savings Time: definable for automatic time conversion

5) Span: configurable for multiple days

d. Timezones

1) The SMS shall be capable of creating timezones, each with intervals assignable to any day of the week.

a) number of timezones: 255 minimum

b) Intervals: 6 minimum

2) Timezones shall be allowed to belong to any or all access levels so that the time zone only has to be defined once.

e. Scheduling - The SMS shall have a scheduling utility to allow System Administrators to schedule actions to occur on a one-time or a recurring basis and to maintain a log of actions executed.

f. Field Hardware

1) The SMS shall allow for a Windows-based configuration of the following types of field devices which participate in the access control function:

a) Intelligent System Controllers (ISC’s)

b) Input Control Modules (ICM’s)

c) Output Control Modules (OCM’s)

d) Access card readers

2) The SMS shall provide a device discovery utility to aid in configuration.

a) Scope: local subnet or multiple subnets

b) Display categories: brand, discovery service, device status, device type

c) Available functions: ping, reboot, default password check, version discovery, launch device web server, save credentials, update IP address

3) When a field hardware device is configured, the device shall appear in a graphical system overview tree and be available in drop down lists which support operator access.

4) When a field hardware device is configured, the device shall appear in the graphical system overview tree and in appropriate forms.

5) The SMS shall have the ability for bulk add, modify, and delete privileges for ISCs and card readers to allow for the ease of addition and maintenance of themes.

6) The System Administrator shall have the ability to group field devices into monitor zones.

7) System status update frequency shall be configurable.

g. Alarm Masking Groups - System Administrators shall be able to create groups of alarm inputs that enable them to mask or unmask multiple Input Control Module inputs and card reader inputs simultaneously.

1) Alarm Masking Groups shall be able to be masked or modified as a group or as individual points.

2) Alarm masking shall support two-man control.

3) Number of Alarm Masking Groups: maximum 64 per ISC

4) Alarm inputs: maximum 128 per Alarm Masking Group

h. Event Linkage – The SMS shall support a global linkage feature whereby any input or output or event shall be linked to any other input or output or event., with the following additional characteristics:

1) support global I/O function lists, consisting of sequences of up to six actions

2) association with panel areas

i. Graphical Maps - The SMS shall support graphical maps that display device or group status, function lists and video cameras dynamically in real-time, and support the following:

1) configuration to appear on command or when specified alarms are acknowledged

2) graphical map creation software that allows the import of map backgrounds from supported file formats

3) associate various maps with each area to provide for the creation of a map hierarchy

4) user-defined text and icons

5) configuration of map icon shape and color to represent the state of the associated device

2. Badging – SMS badging functionality shall allow for the creation of different badge types based on a database field, the linking of that field to a badge type to automate the process of credential production, and the use of security colors, chromakey, and ghosting, to allow quick identification of personnel access authority.

   a. The SMS shall have the ability to create and maintain badge designs, with tools and support for image import and export, ghosting, signature capture, bar code, and smart card chips.

      1) Image formats: all standard industry image formats

      2) Support image processing and effects with a pre-defined effects gallery.

      3) A badge layout and creation module shall support custom badge designs by the User.

   b. Additional badging related functionality shall include the following:

      1) assignment of access levels and access groups, including bulk assignment, modification or deletion of access levels

      2) custom badge layout

      3) mobile and remote badging

      4) printing: print limits, batch printing, service bureau printing

      5) magnetic stripe encoding using any of three tracks

      6) support for all industry standard bar code formats

   c. Credential images shall be digitized using industry standard JPEG image compression and printed using a high quality and direct card printing process.

   d. The System Operator shall have the following functions available when enrolling cardholders: choose a badge type, select access levels, enter personal identification numbers (PIN), and/or any other user-defined fields.

   e. A badge form shall keep a complete history of every badge that was assigned to the cardholder's record to include cardholder badge ID, issue code, badge type, badge status, activation and deactivation dates and times, PIN numbers, embossed numbers, and anti-passback information.

3. Ingress and Egress

   a. Individual Use

      1) Access Cards

         a) Card types supported:

            i. proximity – 30 mil thickness, ISO compliant

            ii. smart cards – contact and contactless

- MIFARE – 1 kB (8 kb) and 4 kB (32 kb)
- DESfire
- HID iClass
- U.S. Government FIPS 201 and HSPD-12 compliant, including TWIC

iii. PIV standard formats

iv. Mobile Credentials to be installed and used from a smart phone

b) Data formats supported:

i. Magnetic stripe – with card number, facility code, and issue code combinations up to nine-digit card number and two-digit issue code

ii. Wiegand – all industry standard variations

iii. HID Corporate 1000 – 32 bit and 48 bit

iv. 200 bit BCD FASC-N output of FASC-N readers

v. 75-bit Wiegand Binary output of GSA approved FASC-N readers

vi. Custom

c) The SMS shall support the provisioning and usage of Mobile Credentials.

i. Mobile Credentialing shall be configurable from the SMS to include:

- name for the credential service
- URL for issuing credentials
- requirements for certificate based authentication and/or username password to access web portal

ii. Supported mobile credentials:

- Lenel – BlueDiamond
- HID
- Allegion

d) The SMS shall support desktop smart encoding and inline smart encoding for relevant affected reader technologies.

e) The SMS shall support a card reader cipher mode, emulating the presentation of a card credential by manually entering their badge ID.

f) The SMS shall support a configurable denied access attempts counter for each card reader.

g) Extended Held-Open Time – Authorized cardholders shall have the ability on demand to extend the time for which a door is help open after access is granted for up to 30 minutes.

h) An alarm shall be generated upon an attempt to use any badge that is not marked active in the SMS.

2) Biometrics shall provide multi-factor (or alternate) identification through the measurement and comparison of human characteristics including fingerprints, hand geometry, iris imaging, and facial features. The SMS shall have the capability to verify the identity of enrolled individuals using products from approved manufacturer partners.

a) Capture of biometric data (template) shall be accomplished via the biometric device or associated reader.

b) Cardholder biometric data (template) storage means: smart card; in access controller; in the biometric partner database.

3) Request to Exit (REX) - The SMS shall be able to provide an event when a REX is initiated.

4) The SMS provide the ability to alert the System Operator when a cardholder does not present their credential at a required location in a designated period of time.

5) Pre-Alarm - The SMS shall support a card reader pre-alarm feature which sounds a tone prior to a door held open alarm for a configurable period.

a) The SMS shall allow operator response instructions to be specified for each type of alarm and delivered via text and/or audio.

b. Area Control – The SMS shall implement area control implementing functionality affecting more than one person, and have the following elements:

1) Global and Local Hard Anti-passback

2) Global and local Soft Anti-passback

3) Timed Anti-passback

4) Two Person Control

5) Designated One Person Control

6) Designated Two Person Control

7) Tailgate Control

8) Occupancy Limit

9) Interlock group readers

c. Mustering - The SMS shall provide a mustering function to automatic register cardholders that are on site during an incident.

1) Muster Mode shall mean that an incident has occurred and an evacuation is required of one or more a Hazardous Locations.

a) Triggers

i. automatic: occurrence of a designated hardware event

ii. manual: by System Operator

b) Reset: manual by System Operator or Automatic based on Global I/O

2) Hazardous Location (s) shall be defined using entry and exit readers associated with the location.

a) One or more safe locations shall be designated for each a Hazardous Location.

b) Entry and exit card readers shall be provisioned at each portal with the requirement that a badge always be used to enter or exit Hazardous and Safe Locations.

3) Muster Alarm and Reporting

a) When a Hazardous Location is in Muster Mode, all associated Alarm Monitoring Workstations shall be notified with a breakthrough notification and Muster Reporting shall be active.

b) Live Muster Report

i. display the last location of each cardholder based on card swipe.

ii. activation:

- immediately upon entering into Muster Mode
- after a specified time period from Muster Mode activation
- after the number of personnel in the Hazardous Location reaches a given count.

iii. configurable for automatic refresh time and automatic end

c) Muster Status Reporting: individual cardholders in Hazardous Location

d) Live Hazardous Location and Safe Location Reports: cardholder listing and record selection

e) Operator Display

i. Hazardous Locations and Safe Locations shall be placed on graphical maps' System Hardware Status Tree as Area Icons with associated head counts.

4. Guard Tour

a. A tour shall consist of a series of checkpoints that shall include card readers and/or alarm inputs.

b. Each tour shall be assigned to one or more alarm monitoring Workstations indicating from where automatic tours are to be launched.

c. Tour checkpoints shall be assigned minimum and maximum times within which to be reached.

d. The SMS shall handle both scheduled and random tours.

1) Scheduled tours shall have an Alarm Monitoring Window pre-departure notification.

e. Tours will have the option of being linked to live video.

f. Guard tours shall capable of being monitored through a tracking window including tour details and status.

g. The SMS shall support aggregation of tours into tour groups.

5. Elevator - The SMS shall provide elevator control using standard access control field hardware that will permit the restriction of cardholder access to certain floors while also allowing general access to other floors, with the following additional functions:

a. Allow, at the elevator, the use of any card reader and card reader modes used on any other card reader in the SMS

b. Track which floor was selected by an individual cardholder for auditing and reporting purposes

c. Provide an option where the floors of a building are able to be configured into logically divided sections (floor groups) to prevent passenger requests between designated sections.

6. Field Devices

a. Interface

1) The SMS shall be equipped with the access control field hardware required to receive alarms and administer access granted or denied decisions.

2) The SMS shall be capable of interfacing with the following field devices:

a) Intelligent System Controllers (ISC)

b) Intelligent Single Door Controller (ISDC)

c) Intelligent Dual Reader Controller (IDRC)

d) Advanced Dual Reader (ADRC)

e) Input Control Module (ICM)

f) Output Control Module (OCM)

g) Single Reader Interface Module (SRI)

h) Dual Reader Interface Module (DRI)

i) Dual Door Control Module (DCM)

j) Reader Interface Module (RIM)

k) Access Control Network Door Controllers or Network Controller/Readers

l) Power over Ethernet (PoE) Enabled Door Controller

m) Wireless Gateway Interface

n) ISC Display Timer

o) Network Adapters

p) Communication Star Multiplexer

q) RS-485 Interface Module

r) Power supplies

s) Dual Reader Interface (DRI)

t) Intelligent and combination locks

u) Intelligent System Controllers (ISC)

i. LNL-3300

v) Intelligent Dual Reader Controller (IDRC)

i. LNL-2220

w) Schlage Reader MT15

x) Schlage Reader MT11

y) Input Control Module (ICM)

i. LNL-1100-S3

z) Output Control Module (OCM)

i. LNL-1200-S3

aa) Single Reader Interface Module (SRI)

i. LNL-1300-S3

bb) Dual Reader Interface Module (DRI)

i. LNL-1320-S3

cc) Power over Ethernet (PoE) Enabled Door Controller

i. LNL-1300e

dd) Wireless Gateway Interface

i. PIM400-1501-KIT

ee) ISC Display Timer

i. LNL-CCK-1401L

ff) Communication Star Multiplexer

i. LNL-8000

gg) Power supplies

hh) Intelligent and combination locks

3) Migration boards

4) The SMS must be able to retrieve device serial numbers from field hardware, excluding card readers, biometric readers, and keypads.

b. Data download

1) The SMS shall provide for the downloading of data to the ISCs. Downloads shall load SMS information (timezones, access levels, alarm configurations, etc.) into the ISC's first, followed by cardholder information and card reader configurations.

2) Information on cardholder status, badge status, timezones or access levels shall download in real time as they are added, modified, or deleted from the SMS.

c. Permission control - The SMS shall allow System Administrators to set permission control for individual devices within a monitoring zone for command override.

d. Device grouping – The SMS shall support device grouping for uniform command and control of groups of devices within the system.

e. Card readers

1) Options to include:

a) User commands

b) Door strike, REX and DPS functionality

c) Duress actions

d) Alarm masking

e) Logging requirements

f) Selection as "In" or "Out" reader

g) Use limits

2) The SMS shall provide connectivity to, proximity/mobile ready, Smart Card and smart card/mobile ready readers which provide continuous supervision and monitoring of reader processor and wiring integrity by means of a non-proprietary communications protocol standard.

3) The SMS shall support encrypted reader to panel communications using the SIA OSDP protocol.

4) Smart card readers shall have been tested and certified by the Microsoft Windows Hardware Quality Lab.

f. Input Control Modules (ICM's) options to include:

1) Alarm masking

2) Local linkage of inputs and outputs

3) Output activation rules

4) Input configuration for Guard Tour

5) Entry (latched, not latched) and Exit delay modes

g. Intelligent System Controller (ISC) options to include:

1) Administrator functions to group, add, modify or delete ISC's in the system

2) Ability to hardware upgrade an ISC while maintaining complete hardware and data configuration settings

3) a distributed intelligence redundancy mode, whereby the ISC, configured with a UPS battery to maintain the unit for 24 hours, participates with other ISC's to provide complete control, operation and supervision of the system's monitoring and control points in the event of SMS server failure.

a) cardholder capacity: configurable up to 1,000,000

b) event capacity: configurable up to 50,000

h. A system Operator shall have the option to manually control the output points or input points connected to the SMS.

i. The SMS shall support a real-time graphical system status tree or list window that graphically depicts configured field hardware devices.

7. Distributed Access Level Management

a. The SMS shall provide a browser-based interface for the assignment of access rights to individuals or groups of cardholders, using a simple user-interface paradigm suitable to general employee use, and not requiring specialized training on the SMS

b. The SMS administrator shall have the ability to designate which areas a manager has assignment rights for. These rights shall then be reflected in the browser interface accessible by the area manager, such that only areas for which they have authority are available for assignment.

c. The browser-based too for access rights assignment by area managers shall have the ability to search for cardholders and to view cardholder details, constrained by the permissions of the manager

B. Alarm Monitoring - The SMS will provide the ability to monitor system and device Alarms/Events, Field Hardware Command and Control and Status Monitoring and system support functions, for the use of the operators of the system.

1. The SMS shall provide monitoring options thru workstation installed or browser-based clients

2. An Alarm Monitoring window shall provide System Operators information about the time, location, and priority of an alarm and provide the ability to sort pending and new alarms based on event detail.

a. Detail shall include at a minimum: Date/Time, Description, Priority, Controller, Device, Person.

3. Alternate alarm view windows shall be available to support: Alarm or Badge Activity Monitoring, Event Tracing (Live/Historical), and Alarms Pending Response

a. Operators shall be able to acknowledge alarms from any alarm view window.

4. The SMS shall allow a System Operator to:

a. monitor alarms in their assigned monitor zone and to perform field device control actions on specified devices in that zone from either thick client, web client or mobile client platform

b. delete the alarm from the alarm monitoring window without acknowledging the alarm

c. enter and edit an Acknowledgement note detailing the cause of specified alarms and the actions taken

d. activate, deactivate, or pulse outputs configured and associated with a card reader

e. mask or unmask each individual card reader door forced open alarms, door held open alarms, and associated auxiliary alarm inputs

f. display a cardholder record with the stored cardholder's image

g. verify that a person using a credential matches their stored photo

h. open multiple cardholder verification windows to cover multiple readers at the same time

i. initiate several traces of cardholders, assets, and/or field hardware devices while monitoring alarms

j. initiate an historical trace for a device, specifying a date and time range

k. filter alarms from the trace window to include access granted, access denied, system, duress, and area control alarms and by alarm source

l. perform a trace on any ISC, ICM, Alarm Input, Credential, Intrusion Detection Device, Monitor Zone, or card reader

m. manually override card readers, alarm points, and relay outputs

n. combine, enable, or disable alarms for aggregation

o. acknowledge or delete a group of aggregated alarms

p. view runaway devices

5. System Administrators capabilities shall include:

a. set permission control for individual devices within a monitoring zone for command override

b. assign default monitor zones to monitoring workstations

c. option to define monitor zones to include sub devices of an ISC

d. configure how the SMS handles the annunciation of alarms on an individual alarm or event basis

e. set display parameters for unacknowledged alarms

6. Notifications - Upon alarm, the SMS shall allow for:

a. automated sending of texts or e-mail messages

b. forwarding alarms to a Central Station.

7. Annunciation - The System Administrator shall have the ability to configure how the SMS handles the annunciation of alarms on an individual basis.
    a. These attributes and actions shall be assignable on a ‘global’ basis to all devices that share an alarm description.
8. System Administrators shall be able to route and re-route device alarms and events to defined monitoring client workstations on the network, regardless of where the alarm is generated in the field.
9. A real-time graphical system status tree on the screen shall indicate the status of devices to reflect secured, unsecured, in alarm, or offline and provide command and control functions for authorized users.
10. Output control operations shall be available to lock, unlock or pulse control points.
11. An automatic cardholder call-up feature shall allow the quick search and display of images in the database.
12. Logging
    a. All alarms and events in the SMS shall, by default, always be recorded in the database.
        1) System Administrators shall have the ability to select on a time zone basis, the times required for the SMS to log specific events to the database.
        2) System Administrators shall have the option for Alarm or Events to be set to log or not to log particular alarms or events by individual reader or input.
    b. A System Operator journal shall be available to log important daily events.
13. A trace function shall be available for System Operators to locate and track activity on specific cardholders, assets, video cameras, or card readers. An image comparison feature must be provided for use in conjunction with a CCTV interface.
14. The SMS shall support a Test Mode for Alarm Inputs, Door Forced Open, Access Grants to verify that all inputs within the group are operational.

C. Visitor Management System
1. The SMS shall have an integral Visitor Management traditional client or web client to provide the following functionality:
    a. Allow an operator to enroll, schedule, assign to an employee, capture photos, capture signature, assign access levels, sign in or out, and track visitors as they move throughout the facilities
    b. Provide visitor data and image capture / import capability as well as image edits using pre-defined effects, Chroma key, and aspect ratio settings
    c. Allow for re-assignable badges and sticker badges
    d. Provision visitor credentials and maintain visitor data, including credentials and visit history, in the SMS database to minimize re-entry of data.
    e. Search for records and images using any fields in the database relevant to them.

f. Assign visitors to existing valid cardholders with email notification

g. Pre-schedule visits/events

h. Visitor sign-in and sign-out

2. The system shall support the use of a web-based Self-Service portal to create a Visit Event that will include the visitor(s) record creation or modification.

   a. Any cardholder with permissions shall be able to create a visit using a self-service portal to self-enroll visitors, create events, and have an optional manager approval of workflow.

   b. The Host application shall allow any Cardholder with appropriate permissions to use their Directory Account to log in and create the Event/Visit record to include:

      1) Visitor Name, email, phone and other personal information

      2) Purpose

      3) Sign-in location

   c. The web application shall support the use of Evergreen browser.

   d. The system shall provide a workflow where an approving manager may/or must approve the visit event prior to the creation.

3. The Visitor Management System shall provide a visit status user interface to include:

   a. in-progress visits, including overstayed visits

   b. pending visits, including late visitors

   c. completed visits

4. Self-Service app

   a. The Visitor Management System shall have a self-service tablet-based visitor app which allows visitors to

      1) sign themselves into or out of events without assistance from a front desk attendant

      2) sign in/sign out a pre-registered visit or a “walk Up” visit

      3) update personal information (including photo capture)

      4) sign or accept any required documentation (Non-Disclosure Agreements etc.)

      5) print an adhesive sticky badge with latest photo and other pertinent information via supported printer devices

   b. Upon Sign In and Sign Out an email shall be sent to notify host and security personnel of a signed in or signed out visitor.

   c. The Self-Service app shall allow for custom configurations of

      1) App Theme Color, Logos, and custom messages to be defined by customer

      2) Required documents (up to 2) such as a Non-Disclosure Agreement (NDA) or Privacy Agreement and associated acceptance and signature requirements

a) Such documents shall be be available records stored in the database.

D. Third Party Application Programming Interface (API)

1. Software Integrations

a. Software integrations shall be based upon a REST API.

b. Access control integrations shall provide for the following functionality:

1) Full Alarm Management - Send and Receive and Acknowledge alarms

2) Full identity/card management (add/modify/delete) identities, cards, visitors, access permissions, etc.

3) Main command and control operations including – Set Reader modes

4) Add/modify/delete of operator/user permissions of the system

5) Access to device and other security system configuration (e.g. panels, readers, segments, badge types, etc.)

2. Hardware Integrations

a. Hardware integration shall be based upon native API plugs that allow for 3rd parties to map their hardware into the access system to extend the supported device set including but not limited to, Fire, Intrusion, Intercom, Video, Cameras, Readers, etc.

b. Integration shall provide full support for alarms, hardware status, and command and control for integrating third-party devices into the alarm monitoring software

2.5 OPTIONAL CAPABILITIES – The SMS shall allow for the inclusion of additional capabilities.

A. Conversions and Migrations - Manufacturer shall offer the capability to migrate systems from the following manufacturers (equipment)

1. Mercury

2. Honeywell

3. GE Security / Infographics ACU

4. GE Security / CASI - M Series

5. Johnson Controls - Tyco (Software House®)

B. U.S. Federal Government

1. The SMS shall be compliant with US Federal Government Personal Identity Verification Authentication Standards for readers and credentials as defined in FIPS 201-2 to include the following criteria:

a. Included on the FICAM (Federal Identity, Credential, Access Management) Approved Products List.

b. Cryptographic portion of the SMS approved through the NIST FIPS 140-2 cryptographic validation program.

C. Policies

1. The SMS shall have a web-based analysis tool to ensure that the SMS is correctly configured to enforce corporate security policies.
2. A SMS policy manager shall be an application with the following capabilities:
   a. incorporate a flexible policy editor that allows the administrator to define complex security policies without having experience programming the SMS.
   b. allows or disallows exemptions on a per-policy basis
   c. facilitates automatic or manual correction of policy violations.
   d. incorporates auditing and reporting capabilities to meet compliance in regulated industries.
   e. processes multiple violations simultaneously with bulk operations.

D. Web Access and Trending for Comprehensive Health Monitoring

1. The SMS shall provide a self-monitoring tool for SMS system application, database, and communications servers
   a. The monitoring tool shall constantly measure key performance indicators (KPI's) of the system servers, and provide a browser-based portal for viewing, analyzing, and understanding system operations.
      1) An overview screen of SMS server operation shall be available, as shall individual screens for each server
   b. Monitoring shall default to a current-time view, with an option to specify a time window to understand system performance and metrics during the specified time window.
   c. The SMS shall allow thresholds to be set for key performance indicators and for other system measurements and monitors, and for email notifications to be automatically generated when thresholds exceed or fall below configurable limits.

E. Cardholder Self Service browser-based portal

1. The SMS shall allow cardholders to log into a web interface to self-execute common tasks, including:
   a. Enrolling visitors and scheduling visits in the SMS visitor management system
   b. Requesting access either from a list of allowed access levels and readers, or from a log of doors where access was attempted but denied.
   c. Changing their cardholder PIN number for the SMS
2. The Cardholder Self Service tool shall generate email to notify approvers when access has been requested, and cardholders shall be notified automatically of the disposition of an access request.

F. Console for Launching Common Functions

1. The SMS shall include a launcher application that can be used from a web browser and launch various components and modules of the SMS from a common location.

a. The launcher application shall operate on a variety of platforms, including but not limited to Windows, Mac, and IOS, and shall feature a responsive user interface that adapts to the resolution, screen size, and aspect ratio of the device from which it is launched.

b. When invoked from a Windows-based computer, the launcher application shall support both Windows applications and browser-based applications.

c. Common applications shall be prepopulated in the launcher, but it shall be possible to integrate other browser-based applications by URL, to allow additional security application to be easily accessed by the operator.

d. It shall be possible to rearrange the applications in the launcher on a particular device, and have that arrangement remembered automatically for future sessions.

G. Smartphone-based Mobile Credential Support

1. The SMS user screens shall include the ability to issue, modify and revoke smartphone-based mobile credentials. Solutions requiring "dual-enrollment" of mobile credentials in a cloud or web app as well as the SMS are not acceptable.

2. Mobile credentials shall be supplied on a "pool" basis, where specific credentials can be removed and replaced with new credentials at no additional cost.

3. It shall be possible to reissue a credential to a different mobile device for the same user at no additional cost. Solutions that require the purchase of a new credential when a user gets a new phone are not acceptable.

4. The mobile solution shall include the ability to add Bluetooth to existing Wiegand readers via an add-on module.

5. The system shall have the ability to create a custom email template that will be sent to the cardholder

   a. Email shall include link to download the mobile credential application, instructions to install and configure the mobile app, and a one-time password to authenticate the mobile application to the credential server

6. A System Administrator with appropriate user permissions shall have the ability to create a friendly name for each mobile reader, to be displayed in the mobile app

7. The mobile app and credential installed on the cardholders phone shall be compatible with Android and iPhone mobile operating systems

   a. The app shall be available for download from the "App Store" and the "Google Play Store".

      1) The mobile app shall synchronize with the credential server to validate authenticity at least once every 48 hours

      2) Mobile app shall use a Bluetooth signal to establish a connection to the mobile reader

         a) Connections between phone and reader shall be encrypted using at least 128bit AES encryption

            i. The encrypted connection shall protect against and not allow a "record and Playback(BlueSnarfing)" attack as well as protect against other Bluetooth vulnerabilities

ii. The mobile solution shall have annual cyber security risk assessments and penetration testing, performed by at least two independent cybersecurity auditing firms.

b) The mobile application will display to the cardholder readers that are currently within Bluetooth range

i. The mobile app will allow a cardholder to adjust sensitivity which will increase or decrease the range of discoverable readers

ii. The mobile app shall give preference to the readers that are

- Closest in range
- AND most frequently used

iii. The Mobile application shall have the ability to send a notification when a chosen reader is in range, even when the phone is locked

- It shall be possible to unlock the door directly from the notification, with appropriate authentication to the mobile device (pin, face, or fingerprint, depending on device)

iv. The cardholder shall have the option to change the name displayed on their device for each reader

v. The mobile app shall allow for a cardholder to remove specified readers from their view.

H. Third Party Integrations

1. The SMS shall support multiple certified integrated third-party interfaces with hardware and software vendors to include the following functional areas:
   a. command and control
   b. communications
   c. elevator
   d. fire alarm
   e. identity and access management
   f. intercom
   g. intrusion detection and alarm
   h. key management
   i. license plate recognition
   j. monitoring and dispatching
   k. RFID
   l. readers
   m. recording appliances
   n. sensor inputs
   o. time and attendance

2. The SMS shall provide a set of standard REST-based Application Programming Interfaces (API's) and supporting documentation that allows hardware manufacturers and software application developers to interface their products into the SMS.

3. Third party interfaces shall be integrated to provide a single graphical user interface, single source code base, and a single database for configuration, alarm, and event storage.

a. The SMS shall allow alarms and events from the third-party systems to report into the same main Alarm Monitoring window as access control alarms.

b. Third-party hardware alarms and events shall be stored in the SMS database for audit trail and reporting purposes.

4. Data available through these interfaces shall be organized for optimum performance with one application accessing a single bank of data.

5. Any changes to system hardware shall be instantly available across the entire SMS.

I. The SMS shall support OPC, BACnet and SNMP protocols.

1. An industry standard OPC Server utility shall allow the export of SMS alarms and events to industry standard OPC Clients.

2.6 COMMUNICATIONS

A. The SMS shall communicate with the ISCs by the following protocols:

1. TCP/IP (IPv4 and IPv6)

2. RS-485, supporting up to 8 ISC panels on a single line

B. Download communication between the SMS and the ISC shall be fully multi-tasking and shall not interfere with operational functions.

C. Upon loss of communications between the SMS Server and an ISC, an alarm shall be created with a time stamp.

1. Upon re-established communication, the SMS and the ISC shall automatically re-synchronize from the point of communication loss without operator intervention.

2. The SMS shall support Dual Path communications between the SMS Server and the ISC's to allow for a fully functional redundant communication path.

a. During a fail over period, the ISC shall periodically check to see if the primary path has been re-established and will automatically switch back upon a successful connection.

b. Alarms shall be generated upon loss or restoration of communications.

D. Encryption – The SMS shall provide encrypted communication as follows:

1. Credentials to Reader: DESFire EV-1

2. Reader to Downstream Panels: OSDP Secure Channel v2

3. Downstream Panels to ISC: AES-128 bit or AES-256 bit

4. ISC to SMS Server: AES-128 bit or TLS1.2 with AES-256 bit

5. SMS Server to Client: HTTPS

6. Client to Printers and Badge Encoders: Encrypted encoder communications

2.7 SYSTEM MANAGEMENT

A. System Configuration - The SMS shall provide system icons and/or menu selections for each function requiring configuration of SMS options or peripherals including client workstations, field hardware, network functions, communications, and reports.

1. A set-up assistant utility shall be available for the initial system configuration prior to first log in.
2. The SMS shall support configuration setup wizards to guide System Administrators through the configuration of the access control module of the system.

B. In addition to capabilities previously mentioned herein, System Administration capability shall include the following:

1. Customize cardholder, asset, and visitor forms.
2. Import customized map backgrounds and custom icons
3. Bulk delete cardholder records
4. Limit System Operator functions and actions, including searching the database
5. Configure client workstation applications and settings
6. Assign System Operator passwords, log on credentials and permissions and provide operator history

C. The SMS shall provide support for single sign-on capability, whereby System Administrators or System Operators may authenticate into SMS applications using their Windows domain account.

D. System Administrative tasks including defining client workstation and Operator permissions, access groups, time zones, reports, and maps shall be available from any client workstation on the network.

E. Graphical Features

1. The SMS shall display a graphical representation of configured field hardware (including ISCs, fire panels, intrusion detection devices, personal safety devices, intercom systems, and Central Station alarm receivers), digital video hardware, access levels, time zones, access groups, holidays, and card formats.
2. System Administrators shall be able to modify a device that is depicted on the graphical system overview tree or see its properties by double-clicking on the related icon, causing the SMS to bring them to the appropriate form.

F. The SMS shall provide online context-sensitive help files to guide System Administrators and System Operators in configuration and operation.

G. Logging - The SMS shall provide full System Operator activity tracking/logging of critical keyboard functions to include date/time, Operator, activity program, function, and database changes.

1. System Operator functions to log shall include System Operator login and System Operator logout; Additions, Changes, and Deletions to Cardholder Management; New Badge, Print Badge, and Update Badge.

2. Configuration changes to log shall include all functional modules within the SMS.

3. The SMS shall log activity of System Operators performing SMS alarm monitoring including alarms acknowledged, alarms cleared, output control activity, trace, and other functions.

H. Reporting – The SMS shall have a rich reporting function, storing its reports in the database and viewable from any client workstation with permissions.

1. The SMS shall provide an ad hoc customized report generator, allowing the creation of reports using the relational database structure.

2. The SMS shall support an industry standard, off the shelf, custom report writer.

I. Archiving - The SMS shall allow System Administrators to archive offline history files. Offline files shall include access events and System Operator transactions that have been purged from the reportable database.

2.8 HARDWARE REQUIREMENTS

A. The Manufacturer shall publish a summary of recommended server hardware to accommodate the performance requirements of the SMS server software.

B. The SMS server software shall be capable of running in a virtual or cloud environment.

2.9 QUALITY ASSURANCE

A. Contractor qualifications:

1. Company with a minimum of 5 (five) years system design, engineering supervision, and installation experience in the access control industry.

2.10 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Acceptance: Upon delivery to the site, Contractor shall inspect all products and materials for any damage.

2.11 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results.

2.12 MANUFACTURER CAPABILITIES

A. Advanced Services - The SMS Manufacturer shall have an in house Advanced Services group available to contract for:

1. Professional engineering services to include on-site or remote advanced support, enterprise planning and advanced deployments, system design, supporting software tools, database migrations and conversions, emergency service, system assessments.

2. Remote Management and Embedded Services to include project management and coordination, contract management, VAR coordination, and Manufacturer resource coordination

3. Custom applications and reports.

B. Partner Program

1. The SMS Manufacturer shall have a Partner Program that allows other products to develop interfaces to the Security Platform based on a REST API.
    a. Third-party integrations shall have been certified by SMS Manufacturer personnel.
    b. Each new revision or version of the third-party system shall be subject to recertification.
2. Interfaces developed shall be tested and certified by the SMS Manufacturer for each new version of product released.
3. The Partner Program shall have integrations which include, as a minimum, Command and Control, Key Management, Fire Detection, Intrusion, Elevator and Critical Communication products.

C. Global Support Capability

1. The SMS Manufacturer shall have dedicated global support mechanisms in place to provide local support to any installation covered by this specification, regardless of location throughout the world.
2. The SMS Manufacturer shall have multiple independent Value Added Reseller (VAR) options to support customers in each market.
3. The SMS Manufacturer shall have a proven and demonstrable history of deploying Enterprise-scale solutions to Global customers.

2.13 WARRANTY AND SUPPORT

A. Manufacturer shall warrant that the physical disc on which the Software is distributed, if applicable, is free from defects in materials and workmanship and that the Software will function in substantial accordance to the Documentation that accompanies the Software for a period of one (1) year from the date of shipment of the Software to the reseller. This limited warranty is void if failure of the Software results from accident, abuse, modification, misapplication, misuse, abnormal use or a virus.

B. Hardware warranties shall be provided by the original manufacturer of the specific hardware device or component.

C. Manufacturer shall offer a supplemental software support program to include software updates and upgrades.

2.14 LICENSE

A. The SMS shall only require a single license key to be present on the database server for the SMS to operate. Owner shall provide Lenel and SGL single license key. Licenses for each reader to be provided by installer.

1. A license key on the database server shall determine the number of client workstations that shall be able to connect to the SMS and access its functionality.
    a. The license key shall be a software license key.
    b. License keys shall not be required at the client workstations.

2. The SMS shall allow the SMS user the ability to activate, return, or repair the software license key.
3. The software license shall only be used on a physical computer or in a VMware virtual environment.
4. SMS licensing shall support the ability for increasing levels of access to the API's for third party integrations.
    a. The license shall define levels of capacity or specific rates of API calls over a defined time frame.

2.15. LOCALIZATION (LANGUAGE)

A. The SMS (Security Management System) shall provide language support for interface and database by default or by installation of specific localization packages. Support shall be written using Unicode format and have the capability to support both single-byte and double-byte languages, with the list of languages to available. Localized versions of documentation may be available.
    a. Required languages: English

PART 3 EXECUTION

3.1 INSTALLERS
    a. Contractor personnel shall comply with all applicable state and local licensing requirements.
    b. Preparation
    c. The network design and configuration shall be verified for compatibility and performance with the SMS.
    d. The network configuration shall be tested and qualified by the Contractor prior to system installation.
    e. Server performance parameters shall be compared with Manufacturer requirements for the SMS.

3.2 INSTALLATION AND PROGRAMMING
    a. Contractor shall follow manufacturer published installation and configuration instructions and guidelines.
    b. All programming shall be provided to Owner's satisfaction with a complete operational and functional test.

3.3 STORAGE

A. System hardware devices and components shall be stored in an environment where temperature and humidity are in the range specified by the Manufacturer.

Attachment B Graphical Maps

Supported File Formats

The OnGuard system supports the following image formats:

- Adobe Photoshop PSD
- AutoCAD DXF
- CALS Raster CAL
- Encapsulated Post Script EPS
- Fax/Delrina WinFax FAX
- GEM/Ventura IMG
- IBM IOCA (Image Object Container Architecture) (first page supported only) ICA
- JPEG/JIFIF File Interchange Format JPG, JIF
- Kodak Photo CD PCD
- Kodak FlashPix FPX
- Lead CMP
- Macintosh PICT PCT
- Mac Paint MAC
- Microsoft Paint MSP
- Portable Network Graphics PNG
- Targa RAS, TGA
- TIFF (Tagged Image File Format) TIF, MPT
- Windows Bitmap BMP, DIB
- Windows Metafile EMF, WMF
- WordPerfect Graphic WPG

Attachment C - OnGuard Standard Access Control Reports

OnGuard natively has 145 standard reports. All reports are stored in the access control database and are able to be viewed from any client workstation with proper permissions. Our software allows system users to e-mail reports based on system events or on a user-defined schedule. The standard reports that are included with the OnGuard are described below:

1. Access Denials and Grants by Reader Report:

   The Access Denials and Grants by Reader Report shall provide information on all access denials and granted events including time, card reader, badge, and cardholder name, sorted by card reader.

2. Access Denials, Grants, and Other Badge Events Report:

   The Access Denials, Grants, and Other Badge Events report shall provide information on all badge related events including time, reader, badge, and cardholder name.

3. Access Denied Event Report:

   The Access Denied Event Report shall provide information on all access denied events including time, card reader, badge, and cardholder name. It shall also include the following events: Interlock Area Busy, Cannot Open Door: Interlock Area Busy, Exit Request Denied: Interlock Area Busy, and DURESS - Interlock Area Busy.

4. Access Denied Events, by Reader:

   The Access Denied Events, by Reader Report shall provide information on all access denied events including time, card reader, badge, and cardholder name, sorted by card reader. It shall also include the following events: Interlock Area Busy, Cannot Open Door: Interlock Area Busy, Exit Request Denied: Interlock Area Busy, and DURESS - Interlock Area Busy.

5. Access Granted Events Report:

   The Access Granted Events Report shall provide information on all access granted events including time, card reader, badge, and cardholder name.

6. Access Granted Events by Reader Report:

   The Access Granted Events by Reader Report shall provide information on all access granted events including time, card reader, badge, and cardholder name, sorted by card reader.

7. Access Groups Report:

   The Access Groups Report shall provide information on all access groups and the access levels contained in each group.

8. Access Groups with Levels Report:

   The Access Groups with Levels Report shall provide information on all access group definitions including access level details.

9. Access Level Assignments to Cardholders Report:

   The Access Level Assignments to Cardholders Report shall list each access level with a listing of each cardholder that has that access level assigned to them.

10. Access Levels Assignment to Cardholders, By Segment Report:

    The Access Levels Assignment to Cardholders, By Segment Report shall provide information on all cardholders with access levels, sorted by segment. Only personnel with assigned access levels shall be included in the report. This report shall also summarize the total number of badges that will need to be downloaded to each segment. This report only shall only work on a system utilizing database segmentation.

11. Access Levels Report:

    The Access Levels Report shall provide information on all access level definitions.

12. Access Panels Report:

    The Access Panels Report shall provide information on all access panel definitions.

13. Active Visits by Cardholder Name Report:

    The Active Visits by Cardholder Name Report shall provide information on all visits that are currently active (not signed out) grouped by cardholder name.

14. Active Visits by Host Name Report:

    The Active Visits by Host Name Report shall provide information on all visits that are currently active (not signed out) grouped by Host Name.

15. Active Visits by Visitor Name Report:

    The Active Visits by Visitor Name Report shall provide information on all visits that are currently active (not signed out) grouped by Visitor Name.

16. Alarm Acknowledgments Report:

    The Alarm Acknowledgments Report shall provide information on all alarm acknowledgments including the alarm information and acknowledgment notes.

17. Alarm Acknowledgements by Definition Report:

    The Alarm Acknowledgments by Definition Report shall provide information on all alarm acknowledgments including the alarm information and acknowledgment notes, sorted by Definition.

18. Alarm Acknowledgments by System Operator Report:

    The Alarm Acknowledgments by System Operator Report shall provide information on all alarm acknowledgments including the alarm information and acknowledgment notes, sorted by System Operator.

19. Alarm Acknowledgements by Panel Report:

The Alarm Acknowledgments by Panel Report shall provide information on all alarm acknowledgments including the alarm information and acknowledgment notes, sorted by Intelligent System Controller Panel.

20. Alarm Configuration Report:

    The Alarm Configuration Report shall provide alarm configuration summary information.

21. Alarm Input Events Report:

    The Alarm Input Events Report shall provide information on all alarm input events sorted by date.

22. Alarm Panel Inputs Report:

    The Alarm Panel Inputs Report shall provide information on all alarm panel inputs grouped by access panel and alarm panel.

23. Alarm Panel Local Linkage Report:

    The Alarm Panel Local Linkage Report shall provide information of all input and output linkages within an ICM.

24. Alarm Panel Outputs Report:

    The Alarm Panel Outputs Report shall provide information on all alarm panel outputs grouped by access panel and alarm panel.

25. Alarm Panels Report:

    The Alarm Panels Report shall provide information on all alarm panel definitions grouped by access panel.

26. All Cardholders with Logical Access Report:

    The All Cardholders with Logical Access Report shall list all cardholders that have linked accounts through logical access.

27. All Events Over Time Report:

    The All Events Over Time Report shall provide a listing of all event types over time.

28. All Events Over Time with Local Panel Time Report:

    The All Events Over Time with Local Panel Time Report shall provide a listing of all event types over time. This report also shows the time an event occurred in the panel’s time.

29. All Events Over Time with Unique Alarm ID Report:

    The All Events Over Time with Unique Alarm ID Report shall provide a listing of all event types with a unique alarm ID over time.

30. Anti-Passback Events Report:

    The Anti-Passback Events Report shall provide a listing of all anti-passback events over time

31. Area Anti-Passback Configuration Report:

The Area Anti-Passback Configuration Report shall provide a listing of all anti-passback areas, including the reader entrances and exits.

32. Area Configuration Report:

    The Area Configuration Report shall list all areas, including the reader entrances and exits.

33. Area Entrance History Report:

    The Area Entrance History Report shall provide a history of all cardholders enter anti-passback areas, sorted by area and date.

34. Asset Classes Report:

    The Asset Classes Report shall provide information on all asset classes and the asset groups to which they belong.

35. Asset Events Report:

    The Asset Events Reports shall provide information on all asset events.

36. Asset Groups Report:

    The Asset Groups Report shall provide information on all asset groups and the classes they contain.

37. Asset Types Report:

    The Asset Types Report shall provide information on all asset types defined with all associated subtypes.

38. Assets by Scan ID Report:

    The Assets by Scan ID Report shall provide information on all assets grouped by Scan ID.

39. Assets by Type Report:

    The Assets by Type Report shall provide information on all assets grouped by asset type and subtype.

40. Assigned Assets by Cardholder Report:

    The Assigned Assets by Cardholder Report shall provide information on all currently assigned assets grouped by cardholder.

41. Assigned Assets by Scan ID Report:

    The Assigned Assets by Scan ID Report shall provide information on all currently assigned assets grouped by Scan ID.

42. Assigned Assets by Type, Scan ID Report:

    The Assigned Assets by Type, Scan ID Report shall provide information on all currently assigned assets grouped by type and Scan ID.

43. Audio Notifications and Instructions Report:

    The Audio Notifications and Instructions Report shall list all audio notifications and instructions in the database.

44. Badge Type Configuration:

    The Badge Type Report shall provide a listing of all Badge Types.

45. Badges by Deactivation Date Report:

    The Badges by Deactivation Date Report shall list all badges by deactivation date. Shall be used to determine which badges are about to deactivate.

46. Badges Without Access Levels Report:

    The Badges Without Access Levels Report shall provide information on all Badges that do not have any access levels assigned to them. Badges with access levels assigned to them shall not be listed in this report.

47. Card Formats Report:

    The Card Formats Reports shall provide information on definitions of all Magnetic and Wiegand card formats in the SMS.

48. Cardholders Access to Readers Report:

    The Cardholders Access to Readers Report shall provide a listing of each card reader along with which cardholders have access to that card reader. Includes associated access level and timezone.

49. Cardholder Exit or Entry Report:

    The Cardholder Exit or Entry Report shall provide information on all user-defined Exit or Entry information on a per cardholder basis. It shall list the time a cardholder swipes their badge at a designated ‘In’ reader and the time they swiped their badge at the corresponding designated ‘Exit’ reader.

50. Cardholder Photo Gallery Report:

    The Cardholder Photo Gallery Report shall provide cardholder names and photos, sorted by last name.

51. Cardholder Time and Attendance Report:

    The Cardholder Time and Attendance Report shall pair each in-time with an out-time for cardholders gaining entry to time and attendance readers.

52. Cardholders by Badge Type Report:

    The Cardholders by Badge Type Report shall provide information on all cardholders sorted by badge type. No access levels are shown in this report and cardholders that have not been assigned a badge type will not be reported.

53. Cardholders by Last Name Report:

    The Cardholders by Last Name Report shall provide information on all cardholders sorted by last name, with badges but not access levels. Only personnel with badges assigned shall be included in this report.

54. Cardholders Located in Each APB Area by Date Report:

The Cardholders Located in Each APB Area by Date Report shall provide a list of all cardholders located in each anti-passback area, sorted by area and date.

55. Cardholders Located in Each APB Area by Name Report:

    The Cardholders Located in Each APB Area by Name Report shall provide a list of all cardholders located in each anti-passback area, sorted by area and cardholder name.

56. Cardholders with Access, by Badge Type Report:

    The Cardholders with Access, by Badge Type Report shall provide information on all cardholders with access and precision access levels, sorted by badge type. Only personnel with active badges and access levels shall be included in this report.

57. Cardholders with Access by Last Name Report:

    The Cardholders with Access by Last Name Report shall provide information on all cardholders with access and precision access levels, sorted by last name. Only personnel with active badges and access levels shall be included in this report.

58. CCTV Instructions Report:

    The CCTV Instructions Report shall provide summary information on all CCTV instructions in the database.

59. Current Visits Report:

    The Current Visits Report shall provide a list of all currently signed in visits.

60. Destination Assurance Configuration Report:

    The Destination Assurance Configuration Report shall provide a listing of all card readers configured for Destination Assurance with their associated lead times to proceed to the next defined card reader.

61. Destination Assurance Exempt Cardholders Report:

    The Destination Assurance Exempt Cardholders Report shall provide a listing of all cardholders who are exempt from following Destination Assurance procedures.

62. Device Status Events Report:

    The Device Status Events Report shall provide information on all status events for all devices in the SMS.

63. Dialup Events by Panel Report:

    The Dialup Events by Panel Report shall provide information on all dialup related events grouped by Intelligent System Controller.

64. Dialup Last Connect Time Report:

    The Dialup Last Connect Time Report shall provide a list of all online dialup panels and the last time that they were connected to the SMS database server.

65. Elevator Access Denials and Grants Report:

The Elevator Access Denials and Grants Report shall provide information on all elevator related access denied and granted events including floor selected, time, card reader, badge, and cardholder name.

66. Elevator Dispatching Devices and Terminals Report:

    The Elevator Dispatching Devices and Terminals Report shall provide a listing of all elevator dispatching devices with the configured terminals.

67. Elevator Floor Assignments to Cardholders Report:

    The Elevator Floor Assignments to Cardholders Report shall list all cardholders that have access to a particular elevator floor list.

68. Emergency Events Report:

    The Emergency Events Report shall provide a listing of all emergency events over time.

69. Event Codes Report:

    The Event Codes Report shall provide information on all event code templates and event code mapping configurations.

70. Event Count by Panel Report:

    The Event Count by Panel Report shall provide a count of all events grouped by Intelligent System Controller. This report shall include a pie chart breakdown.

71. Fire Device Input or Output Report:

    The Fire Device Input or Output Report shall provide a listing of all fire inputs and outputs grouped by panel and fire device.

72. Global APB or MobileVerify Occupancy by Date Report:

    The Global APB or Mobile Verify Occupancy by Date Report shows the last known area accessed by each cardholder, sorted by date and time.

73. Global APB or MobileVerify Occupancy by Name Report:

    The Global APB or Mobile Verify Occupancy by Name Report shows the last known area accessed by each cardholder, sorted by cardholder.

74. Global I/O Linkages Report:

    The Global I/O Linkages Report shall provide a listing of all global I/O linkages, including the input events and output actions.

75. Guard Tour Configuration Report:

    The Guard Tour Configuration Report shall provide a listing of all configured guard tours, including checkpoints, actions, and messages.

76. Guard Tour History Report:

    The Guard Tour History Report shall provide a listing of all events associated with checkpoints that happened for each guard tour.

77. Hardware Panels Report:

    The Hardware Panels Report shall provide information on all top level hardware panels grouped by category including access panels, fire panels, intercom panels, personal safety panels and central station alarm receivers.

78. Holidays Report:

    The Holidays Report shall provide information on all system holiday definitions.

79. ILS Lock Authorizations by Cardholder Report:

    The ILS Lock Authorizations by Cardholder Report shall list ILS lock authorization levels assigned to cardholder/badge, sorted by cardholder.

80. ILS Lock Authorizations by Level Report:

    The ILS Lock Authorizations by Level Report shall list ILS lock authorization levels assigned to cardholder/badge, sorted by level.

81. ILS Lock Battery Status by Status:

    The ILS Lock Battery Status by Status shall list battery status of ILS locks grouped by battery status (Low to High), wireless gateway, and battery percent.

82. ILS Lock Characteristics Report:

    The ILS Lock Characteristics Report shall list ILS lock configuration details.

83. ILS Lock Communications Report:

    The ILS Lock Communications Report shall list ILS lock wireless diagnostics.

84. ILS Lock Ownership Report:

    The ILS Lock Ownership Report shall list ILS locks owned by a cardholder.

85. Intercom Functions Report:

    The Intercom Functions Report shall provide information on all defined intercom functions.

86. Intercom Stations Report:

    The Intercom Stations Report shall provide information on all intercom stations, grouped by intercom exchange.

87. Intrusion Command Authority – Advanced Report:

    The Intrusion Command Authority – Advanced Report shall list all cardholders that have access level assignments configured to use advanced intrusion command authority.

88. Intrusion Command Authority – Global Report:

    The Intrusion Command Authority – Global Report shall list all cardholders who are assigned access levels with global intrusion command authority.

89. Intrusion Command Events Report:

The Intrusion Command Events Report shall list all events associated with intrusion commands including device, cardholder name, and badge.

90. Intrusion Detection Areas Report:

    The Intrusion Detection Areas Report shall provide a listing of all intrusion areas grouped by panel.

91. Intrusion Detection Devices Report:

    The Intrusion Detection Devices Report shall provide a listing of all intrusion devices grouped by panel.

92. Intrusion Panel User Groups Report:

    The Intrusion Panel User Groups Report shall provide a listing of all intrusion user groups grouped by panel.

93. Last Location of Cardholders Report:

    The Last Location of Cardholders Report shall provide information on the last card reader accessed by each cardholder, sorted by cardholder name.

94. Maps Report:

    The Maps Report shall provide a list of all available maps in the database.

95. Mobile Verify User Transaction Log Report:

    The Mobile Verify User Transaction Log Report shall provide a chronological log of all performed transactions.

96. Mobile Verify User Transaction Log by Operation Report :

    The Mobile Verify User Transaction Log by Operation Report shall provide a chronological log of all performed transactions grouped by operation.

97. Mobile Verify User Transaction Log by User ID Report:

    The Mobile Verify User Transaction Log by User ID Report shall provide a chronological log of all performed transactions grouped by User ID.

98. Module Details Report:

    The Module Details Report shall provide information about module definitions, grouped by parent panel.

99. Module Summary Report:

    The Module Summary Report shall list all modules, grouped by parent panel.

100. Monitor Stations Report:

    The Monitor Stations Report shall provide information on all monitoring stations defined in the SMS including which monitor zones and access panels are assigned to the monitoring station.

101. Monitor Zones Report:

    The Monitor Zones Report shall provide information on all monitor zone definitions.

102. Panels Report:

The Panels Report shall provide information about Panel definitions.

103. Overdue Visits Report:

The Overdue Visits Report shall provide a listing of all scheduled visits that have not signed in.

104. Overstayed Visits Report:

The Overstayed Visits Report shall provide a listing of all visitors logged into the facility, but whose badge or visit has expired.

105. Permission Profiles Report:

The Permission Profiles Report shall provide information on permission profile definitions.

106. Personal Safety Transmitter Assignments Report:

The Personal Safety Transmitter Assignments Report shall provide information on all personal safety transmitters and their assignments to cardholders and assets.

107. Personal Safety Transmitters Report:

The Personal Safety Transmitters Report shall provide information on all personal safety transmitters.

108. Personnel in the Database Report:

The Personnel in the database Report shall provide information on all personnel in the database with basic information.

109. Personnel Without an Active Badge Report:

The Personnel Without an Active Badge Report shall provide information on all personnel in the database that do not have an active badge assigned to them.

110. Personnel with Organizational Details Report:

The Personnel with Organizational Details Report shall provide information on all personnel in the database with organizational details. This report is designed to work with the SMS standard cardholder layout.

111. Personnel with Personal Details Report:

The Personnel with Personal Details Report shall provide information on all personnel in the database with personal details. This report is designed to work with the SMS standard cardholder layout.

112. Point of Sale Registers Report:

The Point of Sale Registers Report shall provide a listing of all Point of Sale Registers configured in the SMS.

113. Precision Access Groups Report:

The Precision Access Groups Report shall provide information on all precision access group definitions.

114. Reader Assignment to Cardholders Report:

    The Reader Assignment to Cardholders Report shall provide a listing of all card readers assigned to a cardholder, sorted by cardholder.

115. Reader Command Programming Configuration Report:

    The Reader Command Programming Configuration Report shall list all command programming readers along with the associated user and instant commands.

116. Reader Status Events Report:

    The Reader Status Events Report shall provide information on card reader status events, grouped by card reader.

117. Reader Timezone Schedules Report:

    The Reader Timezone Schedules Report shall provide information on all card reader timezone scheduling for card reader modes.

118. Readers Report:

    The Readers Report shall provide information on all card reader definitions grouped by access panel.

119. Receiver Account Alarm Activity Report:

    The Receiver Account Alarm Activity Report shall provide information on all alarm activity for receiver accounts including notes and elapsed times.

120. Receiver Account Areas Report:

    The Receivers Account Areas Report shall provide a listing of all receiver account areas, grouped by receiver account.

121. Receiver Account Groups Report:

    The Receivers Account Groups Report shall provide a listing of all receiver account groups and the receiver accounts contained in each group.

122. Receiver Account Zones Report:

    The Receivers Account Zones Report shall provide a listing of all receiver account zones, grouped by receiver account.

123. Receiver Accounts Report:

    The Receiver Accounts Report shall provide a listing of all receiver accounts in the SMS.

124. Receiver Accounts that Failed to Report Report:

    The Receiver Accounts that Failed to Report Report shall provide a listing of receiver accounts that failed to report during their duration.

125. Receiver and Receiver Account Events Report:

    The Receiver and Receiver Account Events Report shall provide a listing of all events that occurred on a receiver or receiver account.

126. Segment Badge Download Summary Report:

    The Segment Badge Download Summary Report shall provide information on each segment by listing the number of badges that must be downloaded to the access panels in that segment. This report shall only work on systems utilizing database segmentation.

127. Segments Report:

    The Segments Reports shall provide a listing of all segments defined in the SMS along with their options.

128. SNMP Agents Report:

    The SNMP Agents Report shall provide a listing of all SNMP Agents configured in the SMS.

129. SNMP Management Information Base Configuration:

    The SNMP Management Information Base Report shall list all MIB data grouped by enterprise.

130. System Servers Report:

    The System Servers Report shall provide a listing of servers defined on the system.

131. Text Instructions Report:

    The Text Instructions Report shall provide information on all text instructions defined in the SMS.

132. Timezones Report:

    The Timezones Report shall provide information on all timezone definitions.

133. User Permissions Report:

    The User Permissions Report shall provide information on all SMS users and their permissions.

134. User Transaction Log Report:

    The User Transaction Log Report shall provide a chronological log of all transactions performed on the SMS by users.

135. User Transaction Log by User ID Report:

    The User Transaction Log by User ID Report shall provide a chronological log of all transactions performed on the SMS by users grouped by User ID.

136. Users with Area Access Levels to Manage Report:

    The Users with Area Access Levels to Manage Report shall list all Area Access Manager users and the access levels that they manage.

137. Visits History Report:

    The Visits History Report shall provide information on all visits enrolled into the SMS.

138. Visitors Report:

    The Visitors Reports shall provide information on all visitors in the SMS.

139. Windows Event Log Errors Report:

The Windows Event Log Errors Report shall provide information on all errors logged by the SMS to the Windows event log.

END OF SECTION 281310

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Orange County, Florida,
Information Technology Standards

04/26/2018

Table of Contents

1.0 Introduction to Orange County IT Standards

This guide provides a framework for documenting policies, business processes, and internal controls used to effectively support the information technology (IT) resources of the government of Orange County, Florida, Board of County Commissioners (County). It explains the role of the County's Information Systems and Services (ISS) personnel in approving, ordering, delivering, and maintaining IT services and products (hardware, software, networks, security, and other IT components) for employees throughout the County. It identifies County-approved products and procedures for acquiring IT systems and services. This guide also establishes County IT standards for use by third-party vendors providing externally hosted systems to various County departments.

The goal of ISS is to build an efficient, effective, and cost-efficient operation with an excellent return on investment by delivering new technologies and a state-of-the-art network server infrastructure. ISS is dedicated to providing prompt problem resolution through the customer service of its Help Desk. ISS seeks to maintain a diverse computing environment designed to meet the requirements of all County departments, while minimizing the risk of data loss or downtime. All computer hardware and software must be approved by ISS prior to purchase.

The ISS Department is comprised of 160+ employees, who are committed to its customer relationship-building attitude. ISS provides a business approach to serving all County agencies, which together form a partnership with ISS personnel to enhance productivity and service to the community.

The following standards apply to any device approved for connection to the County IT network or in use by County employees:

- ISS personnel are responsible for ordering all new computers, software, servers, telephones, and mobile devices for use by County employees. Hardware and software orders arrive at the ISS Warehouse at 3517 Parkway Center Court, Orlando, FL 32808.
- Submit orders by opening a ticket to request the new equipment or software using the Service Center, New Problem/Request email address. Each department authorizes specific individuals, who are responsible for placing new equipment and software orders through ISS. The emails will include pertinent information about the requested item(s). If sufficient details are not included in the initial email request, ISS staff will reach out to gather necessary information for the order. A list of authorized new products for purchase begins on the following page.
- ISS Warehouse personnel are responsible for applying County asset inventory tags to computer components, as necessary, prior to installation of the equipment.
- ISS Support personnel will install all operating systems and software. At the time of installation, ISS Support personnel must receive a copy of all installation software, along with written installation instructions, and licensing documentation. ISS will not install software without proof of licensing.
- All installed computers must, at a minimum, have the following:
    - ISS-installed anti-virus software
    - Computer configuration policy control for group management of devices by Active Directory
    - Remote access only as designated by ISS (ISS prohibits the use of Virtual Network Computing [VNC] and Remote Desktop computing.)
    - ISS-approved remote monitoring and management tools
    - Only ISS personnel shall have administrative rights.
    - Hardware must be a standard supported model
- ISS Enterprise Security is responsible for ISS video service; however, deployment of video equipment on the local government network must be discussed with staff members of the Network Operations Center (NOC) prior to purchase to determine compatibility, bandwidth, network equipment requirements, and installation feasibility.
- Generally, ISS does not support multicast on the County networks, except in specific special cases.

2.0 Authorized Products for New Purchases

This section includes detailed information about products authorized for use with the County's IT Systems.

2.1 Authorized Hardware

Dell Desktop Computer

Dell OptiPlex 7050 Small Form Factor (SFF) (does **not** include monitor or external speakers)

- Intel Core Processor Options:
  - i5 or i7 Processor – SFF with Digital Versatile Disk/Rewritable (DVD+/-RW)
  - i5 Processor – Micro Form Factor without DVD+/-RW (for conference rooms only)
- Windows 10 Professional 64-bit
- 128 GB Solid State Drive (SSD) Hard Drive
- 8 GB Random Access Memory (RAM)
- Universal Serial Bus (USB) Keyboard and Mouse
- Optional built-in aircard
- Display Port to Digital Visual Interface (DVI) Adapter 6' Cable
- 3-Year basic parts warranty

Dell Precision CAD Workstation

Dell Precision T3420 SFF (does **not** include monitor or external speakers)

- Intel Core i7-6700
- Windows 10 Professional 64-bit
- 512 GB SSD Hard Drive
- 16 GB RAM
- NVIDIA Quadro K1200 4 GB, 4x Mini DisplayPort mDP) Low Profile Video Graphics Card
- USB Keyboard and Mouse
- Display Port to DVI Adapter 6' Cable
- 3-Year basic parts warranty

Dell Latitude Laptop

Dell Latitude 7490 Laptop (does **not** include Docking Station or Carrying Case)

- Intel Core i5-7300U
- Windows 10 Professional 64-bit
- 14" HD (1366x768) Non-Touch Anti-Glare LCD with Mic/without Camera
- 128 GB SSD Hard Drive
- 8 GB RAM (16GB Optional)
- **NO** DVD-ROM Drive
- Dell D6000 Docking Station (Optional Accessories. Must be explicitly requested)
- Internal aircard for cellular service built in (Optional)
- Absolute DDS Protection
- 3-Year basic parts warranty

Dell Windows Tablet

Dell Latitude 12 5285 Laptop

- Intel Core i5-7200U
- Windows 10 Professional 64-bit
- 12.3" 3:2 Touch (1920x1280) Screen
- 128 GB SSD Hard Drive
- 8 GB RAM
- AT&T LTE AirCard
- **NO** DVD-ROM Drive
- Absolute DDS Protection
- 3 Year ProSupport
- Travel Keyboard
- Stylus
- Dell D6000 Docking Station and Targus Rugged Case (Optional Accessories)

2.2 Authorized Software for Desktops and Laptops

- Microsoft Windows 10 Pro
- Internet Explorer 11 and Google Chrome (**Note:** Browser customizations are unsupported.)
- Microsoft Office 2016 Pro, Microsoft Office 2013 Pro
- All Microsoft Office applications on the same PC must have matching software versions (i.e., Project, Visio, Word, Power Point, Access, etc.).
- ISS Desktop Support must pre-approve any application requiring the use of Active X controls. At a minimum, the application must meet the following criteria:
  - It must be an .MSI file with silent installation/distribution from the command line.
  - It must install and operate without end-user administrator permissions.
- Java 1.8.25 – Only supported version of Java
- Silverlight – latest version
- The preference is hosted solutions not requiring installation of local software or configuration files.
- Bomgar or WebEx for remote access

2.3 Authorized Network Connectivity

- AT&T Wireless AirCards
- ShewSoft VPN Client
- Hosted applications must be accessible from devices with automatically assigned network settings. (Dynamic Host Configuration Protocol (DHCP) should supply all settings. Fixed addresses are not allowed.)

For all devices joined to our domain (this also applies to "**vendor supported**" devices and applications):

- ISS must install the Operating System and software on the device.
- ISS must receive a copy of all software and installation instructions.
- Hardware must be a standard supported model (see also hardware section, for example Optiplex 9020, 7040, 7050).
- Kace management client and Antivirus software must be installed.
- PGP is required on all laptops.

- The device must receive Windows updates and computer configuration changes via Active Directory policies.
- Only ISS personnel shall have administrative rights.
- VNC and Remote Desktop are not permitted.

2.4 Authorized Client Based Databases

- Oracle (network based database)
- SQL Server (network based database)

2.5 Authorized Mobile Devices

ISS personnel are responsible for placing orders for all new phones and mobile devices. Individual departments may purchase chargers, holsters, rugged cases, and other accessories, along with other office supplies.

Conventional Phones

Legacy phone with data & texting disabled

- Kyocera DuraXE
- Sonim XP5
- LG B470 Flip
- LG B471 Flip (No Camera)

Android Phones

County Android phones must run Android Version 6.0 or above.

- Samsung Galaxy S7
- Samsung Galaxy S7 Active (AT&T only)
- Samsung Galaxy S8
- Samsung Galaxy Tablet S2
- Samsung Galaxy Tablet S3

2.6 Authorized Peripherals and Accessories

Black and White LaserJet Printers

- HP LaserJet Pro 400 Printer M402n (500 to 2,000 pages per month) < 4 users
- HP LaserJet M506dn (5-10 people, 1,500 to 5,000 pages per month + secure printing)
- HP LaserJet M608dn (10-25 people, 5,000 to 16,000 pages/month + secure printing)

Color LaserJet Printers

- HP Color LaserJet Pro M452 (500-1,500 pages per month, small paper tray)
- HP Color Laserjet Enterprise M652dn (2,500 to 17,000 pages/month + secure printing)

HP Multi-Function Devices (MFD) (Print/Scan/Copy)

- HP MFP M426fdn (750 to 4,000 pages per month, B/W)
- HP color MFP M281fdw (1 or 2 people, occasional scanning)
- HP color MFP M477fdn (750 to 4,000 pages per month)
- HP color MFP M577dn (2,000 to 7,500 pages per month)

Scanners (all come with Adobe Acrobat and Automatic Document Feeders [ADF])

- Fujitsu ScanSnap iX500 (25 pages per minute [ppm], 50 sheet ADF, Connected via USB)
- Fujitsu N7100 (25 ppm, 50 sheet ADF, Networked)
- Fujitsu 5530C2 (50 ppm, 100 sheet ADF, Connected via USB)

Note: Printers must use Original Equipment Manufacturer (OEM) toner cartridges only.

Note: ISS must review and approve Desktop, Copier, and combo unit purchases used for printing from the PC. Contact *ServiceCenter@ocfl.net* for more information and assistance.

3.0 Unsupported Products

3.1 Unsupported Hardware

- Pentium dual-core and older desktop systems, Optiplex 755, 960, 990, 9010
- Latitude D-series Laptops, Latitude E6500, E6510, E6520, E6530, E65xx
- Non-Dell PCs
- Wireless keyboards and mice (except conference rooms)
- Desktops and Laptops over 5 years old
- See also *Section 3.4, Peripherals and Accessories*.

3.2 Unsupported Software

- MS Office platforms prior to Office 2013 (including Visio & Project)
- Non MS Windows-based operating systems
- Safari Web Browser
- MS Office plug-ins or VBScripts
- Windows Applications from the Windows App Store
- Freeware
- Windows XP, Windows 8, and Windows 8.1
- Freelance
- SHL Vision & Vision Express, WIN9x/WINNT/UNIX
- Reflections

3.3 Unsupported Client Databases

- No client-based databases are supported (e.g., Microsoft Access, Filemaker Pro)

3.4 Unsupported Peripherals and Accessories

- Inkjet printers
- Printers over 7 years old
- Scanning to multiple folders per device
- Address books in scanners/copiers (users manage their own)
- Personal (non-County) mass storage devices (hard drives, thumb drives, etc.)

4.0 Prohibited Products

4.1 Prohibited Hardware

- Non MS Windows-based PCs, laptops, and tablets
- Recycled, Remanufactured, and non-OEM toner Cartridges
- Refurbished PCs
- Personal (non-County) computing equipment
- Any network (voice or data) device not operated, administered, or expressly approved by ISS
- Any internet access device not operated, administered, or expressly approved by ISS
- Donated and vendor-provided PCs that do not meet County standards

4.2 Prohibited Software

Note: This list is not all inclusive of prohibited software. If you have questions concerning a specific application, please open a ticket or contact the Desktop Support Supervisor.

- Microsoft Internet Explorer version 10 and below
- Server software is not permitted on workstations (SQL server, print servers, web server, file sharing)
- Cloud-based collaborative software (data must be stored within our datacenter).
- Personal Software (purchased for non-commercial use)
- Firefox, Opera, Vivaldi Web Browsers
- Chrome extensions
- Any Alpha, Beta, Shareware, Trialware software not operated, administered or expressly approved by ISS and Purchasing.
- Anti-virus products not operated or administered by ISS
- Personal firewall products
- Network scanning tools
- Remote access software other than that ISS explicitly authorizes
- Desktop sharing, remote control, or remote communications software such as Remote Desktop
- Web page editing tools (without prior approval)
- Software coding tools (without prior approval)
- User installed screen savers
- Games
- Third Party Desktops
- Disk Compression
- Non-Static BITMAP Backgrounds or screen savers
- iTunes or other content sharing applications
- P2P software
- MS Access Run-time Libraries

4.3 Prohibited Network Protocols

- NETBUI
- AppleTalk
- Any network (voice or data) software or service not operated, administered or expressly approved by ISS.
- Any Internet access service not operated, administered, or expressly approved by ISS.

4.4 Prohibited Peripherals and Accessories

- Portable music devices
- Webcams
- Printer sharing through a PC
- Wireless printing

5.0 Standards for In-House Servers and Server Operating Systems

The following server standards apply to all servers on the Orange County network maintained by County ISS personnel:

- Only ISS personnel shall have administrative rights to server-class devices.
- All servers shall operate in a VMWare-based virtual environment. The ISS Infrastructure Manager must approve in writing any exceptions to this rule prior to project implementation.
- Any device that cannot run in a VMWare-based virtual environment ("stand-alone") must have hardware and software approved by ISS Infrastructure Manager prior to its connection to the County network.
- All servers will comply with ISS standard resource configurations. The ISS Infrastructure Manager must pre-approve any deviation from this standard and may incur additional costs.
- No server shall be configured as a 'file share'. File storage shall be NAS based.
- In addition to the requirements listed above, all stand-alone devices must, at a minimum, meet the following requirements:
    - Be installed at the County Data Center (RCC)
    - Be rack-mountable
    - Only run server-class operating systems
    - Be configured for out-of-band management and have remote monitoring software installed
    - Meet ISS minimum hardware requirements including, but not limited to:
        - Dual power supplies
        - Dual NIC's
        - Dual processors
        - Dual HBA's
        - Dual hard drives, redundant array of independent disks (RAID) configurable for boot drive
        - Use storage area network (SAN) for attached storage devices

The following lists the default standards used for specific server operating systems:

5.1 Microsoft Windows-Based Server Requirements

In no case shall an operating system be installed that is not under current manufacturer support (typically this is N-2 for Microsoft operating systems).

- The Boot partition "C Drive" shall be 40 GB (Thin Provisioned).
- The Data partition shall be 40GB to 100 GB (Thin Provisioned).
- 8 GB RAM
- The C: drive will contain only the operating systems. Databases must reside on separate servers from that of application or Web servers.
- Application, service, or vendor accounts will not be members of the domain administrator's group.
- Application, service, or vendor accounts will not be in the local administrator's group for any server.
- Applications must run as a service. ISS prohibits applications that require a user account to remain logged in.

5.2 Linux-Based Server Requirements

- RHEL 7 or greater, kernel 3.0 or greater, 64 bit architecture
- 40 GB Boot partition
- 4 GB memory
- Applications will **not**:
  - Have a web interface that allows users to access the system as a privileged account.
  - Run root processes.
  - Be installed in any file system that is part of root.
  - Write log files to any file system that is part of root.
  - Update root system's files during installation.
- Applications will be installed using a unique user ID and unique group ID.
- Purge application and system logs, as needed.
- Disable Telnet and the "r" commands on all UNIX servers.
- .rhost file is not available.

5.3 Oracle-Based Server Requirements

- County-supported Oracle versions are Oracle Enterprise Edition 10g or higher.
- County-supported environment for Oracle databases is Oracle Linux on an Oracle Exadata shared environment.
- Database setup shall be compliant with Oracle's Optimal Flexible Architecture (OFA) file naming conventions
- Applications must be installed under separate schema not requiring Database Administrator (DBA) privileges or DBA type privileges. Applications will not require or use the Linix Oracle account.
- Applications will provide a security module to manage user IDs and permissions.
- Application vendors shall provide all database creation scripts and any other required scripts to build, maintain, and support the database environment.
- Application vendors shall provide all documentation related to all database creation scripts and any other required scripts to build, maintain, and support the database environment.
- ISS personnel shall install databases using vendor provided scripts, initialization parameters, and any special performance related parameters.
- Oracle's Administrator (SYSADM) account must not be required for software to operate.
  NOTE: If SYSADM privileges are required for installation, a County Database Administrator shall perform the installation vendor supplied scripts under the application vendor's direction.

5.4 Microsoft SQL-Based Server Requirements

- Microsoft SQL Server versions are Server SQL 2012 Enterprise or higher.
- Database installations must be on a separate server from the application executables and support files. Database installations cannot be installed to the C: drive of the Windows Server. Applications will allow the ISS Database Administrator to specify the drives and directories where the database files will reside.
- MSDE, SQL Server Express, or MS Access based software are prohibited. Applications must support SQL Servers Integrated Security model.
- Applications must contain a security module to manage user ID's and permissions, with no blank or hard-coded passwords allowed.
- Server Administrator privileges are not permitted.

NOTE: If Server Administrator privileges are required for installation, an ISS Database Administrator shall perform the installation.

- ISS prohibits use of applications that create, update, or delete of any files on the database server outside the constructs of the database engine.
- ISS prohibits use of applications that create new databases or persistent database objects as part of its operation.
- Applications shall support application database backups/restores using the County's Enterprise Backup Tool. Currently, the County standard is CommVault's Galaxy iData-Agent for SQL Server.
- Applications must provide an audit mechanism to record the date, time, and user id that last modified a given row in an application table.
- Applications must utilize database referential integrity.

6.0 Network Systems Requirements

6.1 Protocol Node Names and Addresses

- The ONLY protocol allowed on the County Data Network is the Internet Protocol referred to as Internet Protocol (IP) or Transmission Control Protocol/Internet Protocol (TCP/IP) Version 4.
- There can be only one unique address for each node on the network. Node naming and addressing conventions will conform to the guidelines established here.
- The NOC assigns all addresses for all devices connecting to the County Network. All IP addresses must conform to R.F.C. 1918:

  10.0.0.0 - 10.255.255.255/8

  172.16.0.0 - 172.31.255.255/12

  192.168.0.0 - 192.168.255.255/16

- The NOC maintains an addressing plan and uses the plan to assign addresses. The Internet Addressing Authority, a private entity, assigned a block of addresses for the County. The NOC will maintain and assign these addresses, as needed.
- Use of Registered Internet addresses on the County network is not allowed.
- All network numbers for "special function" TCP/IP networks will be assigned by the NOC.
- No INTERNET connections are allowed from any node, modem, or communications device on the network without NOC and Enterprise Security approval.
- A network-wide, shared-use Internet connection is available to all entities.
- TCP/IP DOMAIN NAME SERVERS (DNS) are an alternative to local administration and maintenance of a "hosts" file. Any Divisions, Elected Officials, or agencies wishing to use the DNS may send a list of IP addresses to be included in the DNS to the ISS Service Center, (407-836-2929 or 6-2929), which will be routed to the NOC staff.
- Entities who have dedicated network staff and wish to be assigned their own IP address space will request the assignment from the NOC through the ISS Service Center, (407-836-2929 or 6-2929). These entities will provision their own DNS and be responsible for administration of their own IP address spaces (as assigned by the NOC for the agency to administer).
- Only routed networks with at least 254 IP nodes are eligible for this option. DHCP is provided by the NOC.
- No shared device (printer, server) may use a DHCP address. Static IP addresses are available in limited amounts on request.

6.2 Bridges, Routers, and Gateways

- Routers are required at points in the network where traffic control and/or broadcast domain segmentation needs exist.
- Routers are required on all Wide Area Network connections.
- Protocol conversion is not supported on this network, as one common protocol (TCP/IP) is standard for all nodes.

6.3 Network Security

- All default accounts on all processors connected to the network will either be disabled or have the default password changed. No accounts are allowed without passwords.
- The default "privileged password" on all network electronics will be changed.
- All dial-up access must be provided through secure access servers. No direct access via dial-up lines is allowed on any type of device, processor, terminal, server, or PC connected to the network.
- The NOC provides and maintains a secure access server for Dial-up use. Contact the ISS Service Center (407-836-2929 or 6-2929) for remote access authorization by the Enterprise Security Team.
- The requesting department will provide the hardware & software for the employee's home use, unless the employee provides their own.
- Vendor field service will have remote access through NOC provided access servers. VPN access is available for use.
- No entity on the network shall make any connection to the Internet, dial-up service, wireless provider, or wireless access-point without written permission from the ISS Enterprise Security Team and Network Operations.
- An Internet gateway is provided for all entities on the network to use.
- Any entity that directly connects their network to the Internet may not remain connected to the County network, due to security risks. If the Internet connected entity supplies, at their own expense, an acceptable Firewall between their networks and the County networks, the County network connection can resume via the Firewall provided.

Wireless Local Area Network (LAN) (Ethernet) Security

- All 802.11x wireless LANs must use a DOT1X supplicant for network admission control.
- All 802.11x clients must use VPN triple Data Encryption Standard (DES) or Advanced Encryption Standard (AES) encryption. Client authentication via RADIUS server is required. The RADIUS server is provided and administered by ISS Enterprise Security.
- All access points attached to the County network must be Lightweight Access Point (LWAP). (No stand-alone access points are permitted)

Wireless Wide Area Network (WAN) Security

- The County maintains a contract with a wireless provider. A gateway is available for connecting to the contracted wireless provider. The County prohibits access to the network using any other wireless provider.

6.4 Network Components

Transmission Media

- Fiber-optic, Category 5, 5e, and 6, and Category 3 Unshielded Twisted Pair (UTP), Shielded Twisted Pair (STP), and radio (802.11x) are all permitted for IP data communications in the network.

Transmission Methods

- Optical, metallic cable, leased data circuits (analog, digital), private (analog, digital), and wireless (802.11x) are all permitted for IP data communications in the network.

Supported LAN Types

- ETHERNET, 802.3, 10 BASE T, 100 BASE TX, 100 BASE FX, 1000 BASE xx (Gigabit), 802.11x (wireless Ethernet), 10 GIGABIT.
- Etherchannel: The only Etherchannel protocol supported by the County is 802.3ad Link Aggregation Control Protocol (LACP).

6.5 Network Circuits

- The NOC will design all WAN networks and, if required, procure leased data communications circuits from the Carrier.
- The NOC will act as the central point of contact between all entities using WAN circuits.
- The NOC will be notified by the affected entity and/or the ISS Service Center of service affecting WAN outages.
- The ISS Service Center (407-836-2929 or 6-2929) and the NOC will be responsible for coordinating successful repair of WAN circuits.
- The NOC will be responsible for ordering the disconnection and termination of leased data circuits upon notification by the customer.
- Critical LANs and/or WANs may be designed with duplicate, automatic, redundant circuits and electronics to provide automatic recovery of data communications.
- Circuits leased by any entity (other than the County) will be managed by that entity's technical staff.
- A Remote Site is available for recovery of certain critical applications and County networks in the event of a formally declared disaster. This site is located in Tallahassee at the Northwest Regional Data Center. (NWRDC). The NWRDC is permanently connected to the County networks, and is available and operational 24 x 7 x 365.

6.6 Network Installation

- In situations where installation of network equipment by one entity may affect customers from other entities, the installation will be jointly coordinated by representatives of the NOC and the other entities.
- The NOC will design and install all LAN and WAN networks, except in special circumstance.

6.7 Network Trouble Reporting

- Customers exclusively confined to applications delivered by networks supplied by the NOC will call or e-mail the ISS Service Center (407-836-2929 or 6-2929) to report trouble, request service, and get technical advice. The ISS Service Center will screen all calls, resolve any problems it is able to resolve with ISS Service Center staff, and refer unresolved network problems to the NOC.
- Customers exclusively confined to applications on networks supplied by other entities will call that entity's network staff to report trouble, request service, and get technical advice.
- Customers on a mix of processors and networks supplied by the NOC and other entity's processors and networks will call the ISS Service Center (407-836-2929 or 6-2929) to report trouble, request service, and get technical advice.
- The NOC employs a variety of network management and troubleshooting tools and systems. These network management systems are used by the NOC staff to test, troubleshoot, and diagnose all devices attached to the network.
- All LAN equipment attached to the network must support Simple Network Management Protocol (SNMP) and/or SNMP-2. Remote Monitoring (RMON) is also allowed, but not instead of SNMP. RMON is in addition to SNMP. Older equipment not supporting these standards will be phased out. The NOC is the only organization permitted to run SNMP on network equipment.
- Network problems that can be repaired by the NOC will be scheduled in a repair queue. Repair priority is based on the severity of the problem and quantity of customers affected.

- All devices attached to the network must have at least a minimum SNMP profile entered, consisting of the entity's name, address, and technical support staff phones number(s). This will assist NOC staff in locating the network on which the equipment is located, when troubleshooting.

6.8 Network Performance Management

- The NOC is responsible for monitoring all LAN and WAN performance. This includes all SNMP and RMON.
- Only NOC staff members are allowed to run SNMP/RMON on network devices.
- The NOC will redesign networks, which sustain traffic loads that adversely affect customer interactive response times and/or reliability.
- The NOC will assist other entities with managing the performance of their networks as requested.

6.9 Network Documentation

- Each entity on the network will provide the NOC with a current diagram of network topology, equipment location, and configuration (including building address and floor location).
- The NOC will provide a diagram of the network as well as tables and listings of all physical and logical components to any approved requesting entity.
- Each entity on the network will provide on-going, updated information to the NOC reflecting components, circuits, and logical changes.
- The NOC will add this information to its diagram and database, and will provide the revised network documents to all requesting entities.

7.0 IP Telephony Standards

- The definition of IP telephony is telephones and a Private Branch Exchange (PBX) with an integral Ethernet Network Information Card (NIC) using the Internet Protocol to communicate.
- All telecom related applications must be certified under the Avaya DevConnect program and compatible with the County's current level of Avaya Communications Manager for the appropriate site.
- The Telecom Unit must approve all peripheral applications, or software, prior to purchase.
- IP phones must derive their electrical power from the CAT-5e Ethernet cable. (POE type-1, 802.af standard)
- Ethernet switches in the closets will be used to provide in-line DC power through the CAT-5e patch panels.
- All Ethernet electronics used in this configuration will have a UPS attached.
- If the IP phone has a provision to connect the desktop PC into the same Ethernet as the phone, then the IP phone must use Ethernet switch technology. Use of a hub/repeater is not allowed.
- IP phones must operate in a separate subnet from the attached PC.
- IP phone packets will be given the highest priority of all IP communications traffic on the LAN. Other non-telephony applications will have their "IP Precedence" bit modified at the Ethernet switch to conform to this standard.
- IP phone access to the network through the internet provider will use the ISS provided VPN services.
- Direct access to internal devices is prohibited.

8.0 Externally-Hosted System Standards

This information is for all vendors, networks, systems, and applications that will transmit, process, store, or handle electronic data provided by County.

8.1 Data Input and Processing

- Any use of Social Security Number information shall adhere to and abide by Florida Statutes, specifically F.S. 119.071, which provides detailed guidelines on usage of Social Security Numbers.
- The hosted application shall not have access to Social Security information.
- The hosted application shall not have access to data containing bank information.
- The hosted application shall not have nor be granted direct or indirect access to the County's Active Directory user names.
- The hosted application shall not have access to the County's internal or DMZ networks.

8.2 Data Storage and Handling

- The provider shall encrypt any data accessible from the hosted application meeting the following criteria at rest and in transit:
  - Names
  - Addresses
  - Phone numbers
  - Email addresses
  - Birth dates
  - Federal/state/local documents numbers
  - Account numbers
  - Race or religious information
  - User names
  - Passwords
  - Employee identification numbers
  - All Health Insurance Portability and Accountability Act (HIPAA) information
  - All Purchase Card Industry Data Security Standards (PCI DSS) information
- Any data, accessible from the hosted application or directly accessible from it, should be encrypted.

8.3 Transmission of Data

An encrypted tunnel must be used to transmit any data referenced above.

8.4 Disposal of Data

When no longer needed, or when data must be removed from the system, it shall be sanitized and disposed of using one of the methods listed below:

- **Sanitization** – Overwriting data previously stored on a disk or drive with a random pattern of meaningless information
- **Destruction** – Physically damaging a medium, so that it is not usable by any device that may normally be used to read information on the media, such as a computer, tape reader, audio or video player
- **Purging Data** – Using a strong magnetic device, such as a degausser, to render data unrecoverable

8.5 External Audits

- The vendor must ensure that the web hosting environment and application is secure using IT security best practices.
- The external service, system, and application must pass a yearly penetration test performed by ISS personnel.

9.0 Data Center Standards

In addition to standards outlined in *5.0, Standards for In-House Servers and Server Operating Systems*, the following requirements apply to hardware installed in an Orange County Data Center, such as, network switches, appliances, servers, storage arrays, etc. These requirements apply to orders placed by Orange County personnel, vendor special orders, and orders placed by RCC tenants:

- Standard rack configuration is 42U
- PDU orders need network monitoring (smart PDU) for rack
- Mounting hardware for racks should be included in order
- Dual power supplies for all equipment
- Dual NIC cards for any hardware needing to connect to network

10.0 Acronyms

ADF	Automatic Document Feeder
County	Government of Orange County, Florida, Board of County Commissioners
DHCP	Dynamic Host Configuration Protocol
DNS	Domain Name Server
DVI	Digital Visual Interface
DVD+/-RW	Digital Versatile Disk-Rewritable
GB	gigabyte
ISS	Orange County Information Systems and Services
IP	Internet Protocol
IT	Information Technology
NOC	Network Operations Center
OEM	Original Equipment Manufacturer
ppm	Pages per minute
RAM	Random Access Memory
RMON	Remote Monitoring
SAN	Storage area network
SNMP	Simple Network Management Protocol
SSD	Solid State Drive
SFF	Small Form Factor
TCP/IP	Transmission Control Protocol/Internet Protocol
USB	Universal Serial Bus
WAN	Wide Area Network
VNC	Virtual Network Computing
VPN	Virtual Private Network

Attachment 1

Enterprise Security – Electronic Security

Standards and Guidelines for *Door Access Control*

Purpose:

The purpose of this document is to establish policies and standards to protect physical access to secured locations and facilities for Orange County Government Board of County Commissioners (OCGBCC) through Door Access Control systems across the OCGBCC Enterprise.

Scope:

The standards in this document apply to all Physical Security Systems located within OCGBCC information systems and networks. The Information Systems and Services, Enterprise Security Department, is responsible to oversee all aspects of Electronic Security Control across the OCGBCC Enterprise. These systems are 24x7x365 production environments which are designed to increase safety, efficiency and limit liability to OCGBCC and its citizens.

Definition:

"Door Access Control" refers to access control using badges and/or PIN numbers and/or biometrics to access doors throughout Orange County.

Policy:

Any new access control platforms solicited for new buildings or replacement for existing buildings shall adhere to these standards. Any and all Access Control installations, removals or modifications shall require the direct involvement of the Electronic Security Unit and documented approval by the Orange County Security Committee.

Standards:

There is one standard Door Access Control system used by OCGBCC , *Lenel OnGuard*. This system integrates disparate hardware and software components providing reliable management interfaces across the enterprise network. For all new implementations or modifications, all hardware components shall be compliant with the Mercury Open Architecture.

The different hardware components that work directly and/or integrate with Lenel are:

- Intelligent System Controller, IP based
- Reader Interface module
- Input and output control modules
- ADA compatible standard multi-technology contactless reader
- Multi-technology Readers- Allegion aptiQ
- Electronic door strike
- Door position switch
- Motion sensor
- Request to exit button
- ADA compatible crash bar
- Panic button
- Biometric readers
- Schlage AD-Series Wireless Lock

Lenel was selected by OCGBCC's Facilities Management in 2002 after an extensive evaluation of all industry standards. A consultant company was engaged to provide an analysis of each of the solutions and it was determined that Lenel was the best fit for OCGBCC. A steering committee was formed to evaluate and approve this system. The members of the committee were Facilities Management, Capital Projects, Purchasing, Administrative Services and Information Systems and Services. This solution was also approved by the Board of County Commissioners.

There are several advantages that this product was able to provide that the competitors were not. Some examples of this include: This is an enterprise solution and in 2002 there was no competitors that had an enterprise solution. Lenel was a national company with enterprise support agreements that no other vendor had in place. Lenel had a proven record to install in an enterprise environment that included 100's of buildings and 1000's of readers over a 1000 square mile area that the other vendors did not have.

The maintenance for Lenel is very reasonable in comparison to other vendors. Lenel does not provide direct support; we must go through an integrator company that is licensed and certified in Lenel to get support. The training program for these integrators and Orange County staff is extensive and comprehensive. All training classes are certified by Lenel. Support services are very minimal as the platform is a very stable environment. All hardware is readily available and integrated with many different suppliers to reduce any downtime that may arise.

List of Integrators from Lenel.com:

- Stanley Security Solutions, Inc.
- Integrated Systems of Florida, Inc.
- Convergint Technologies
- Security 101
- Diebold Inc.
- Kratos Public Safety & Security
- Smart Watch Security and Sound LLC
- Lockheed Martin T&S Solutions
- Intelligent Access Systems of NC LLC
- VT Group
- Future Computer Systems Dba Fire Central Solutions
- WW.GAY Fire & Integrated Systems, Inc.
- Integrated Fire & Security Solutions Inc.
- Triad Security Group Inc
- Ip Vision, Inc
- Integrated Security Systems
- Split Pine Technologies, LLC

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