TRINITY
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W I.S.D ACCESS CONTROL SYSTEM DESIGN

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SECTION 01090
ALTERATIONS

PART 1 GENERAL

1.1 SUMMARY

A. The procedures and administrative requirements of this Section apply to all of the following Sections of the specifications which are involved in alterations to the existing building.

1.2 EXTENT NOTES

A. Cut into or partially remove portions of the existing building as necessary to make way for new construction. Include such work as:
   1. Cutting, moving, or removal of items shown to be cut, moved or removed.
   2. Cutting, moving, or removal of items not shown to be cut, move or removed, but which must be cut, moved or removed to allow new work to proceed. Work or items which are to remain in the finished work shall be patched or reinstalled after their cutting, moving or removal, and their joints and finishes made to match adjacent or similar work.
   3. Removal of existing surface finishes as needed to install new work and finishes.
   4. Removal of abandoned items and removal of items serving no useful purpose, such as abandoned piping or wiring.
   5. Repair or removal of dangerous or unsanitary conditions.
   6. Removal of unsuitable or extraneous materials not marked for salvage, such as abandoned furnishings, debris, and rotted wood.

1.3 SCHEDULING AND ACCESS

A. OUTAGES: Utility and service outages shall be kept to a minimum, and will be permitted only with permission from Owner.

B. SECURITY: When keys for locked areas are need to perform work, obtain from Owner. Return keys at end of each day's work.

C. ACCESS BY OWNER: The Owner shall have access to the building at all times during adjacent work.

PART 2 PRODUCTS – Not Used

PART 3 EXECUTION

3.1 ALTERATIONS, CUTTING AND PROTECTION

A. EXTENT: Cutting and removal work shall be performed so as not to damage adjacent work.

B. RESPONSIBILITY AND ASSIGNMENT TO TRADES: Contractor shall assign the work of moving, removal, cutting, patching and repair to trades under his supervision so as to cause the least damage to each type of work encountered, and so as to return the building as much as possible to the appearance of new work.

   1. Patching of finish materials shall be assigned to mechanics skilled in the work of the finish trade involved.

C. PROTECTION: Protect remaining finishes, equipment, and adjacent work from damage caused

by cutting, moving, removal and patching operations. Protect surfaces which will remain a part of the finished work.

D. DISCOVERIES: Construction, furnishings, and articles of a historic or private nature, which are encountered during cutting, removal and new construction, shall be turned over to the Owner, or if the Owner desires for the disposition shall be sought and followed.

E. SALVAGE:
   1. Salvage sufficient quantities of cut or removed material to replace damaged work or path new work, where the material cannot be readily obtained in today's market.
   2. In addition to items specified above or indicated on the drawings to be salvaged, items marked or listed for salvage shall remain the property of the Owner and shall be carefully removed and store in a dry, secure place.
   3. Do not incorporate salvaged or used materials in new construction, except for small quantities of finish material which are difficult to match.

F. DEBRIS: Remove debris promptly from the site each day. Removed material becomes the property of the Contractor. Load removed material directly onto trucks for removal from site. Dispose of removed material legally. Do not burn material on site and do not allow debris to enter sewers.

3.2 PATCHING, EXTENDING, AND MATCHING:

A. SKILL: Patch and extend existing work using skilled mechanics who are capable of matching the existing quality of workmanship. The quality of patched work or extended work shall not be less than specified in Sections of the product and execution Specifications which follow these General Requirements.

B. PATCHING:
   1. In areas where any portion of an existing finished surface is damaged, lifted, stained or other wise made imperfect by work of this contract, patch or replace the imperfect portion of the surface with matching material.
   2. Provide adequate support or substrate for patching of finishes.
   3. If the imperfect surface was a painted or coated one, repaint or recoat the patched portion in such a way that uniform color and texture over the entire surface results.
   4. If the surrounding surface cannot be matched, repaint or recoat the entire surface.

3.3 QUALITY

A. In the Sections of the product and execution specifications which follow these General Requirements, no concerted attempt has been made to describe each of the various existing products that must be used to patch, match, extend or replace existing work. Obtain all such products in time to complete the Work on Schedule. Such products shall be provided in quality which is in no way inferior to the existing products.

B. The quality of the products that exist in the building, as apparent during pre-bid site visits, shall serve as the Specifications requirement for strength, appearance, and other characteristics.

3.4 TRANSITIONS

A. Where new work abuts or finishes flush with existing work, make the transition as smooth and workmanlike as possible. Patched work shall match existing adjacent work in texture and appearance as to make the patch or transition invisible to the eye at a distance of 3 ft.

B. Where masonry, tile, plaster, metal or other finished surface is cut in such a way that a smooth

transition with new work is not possible, terminate the existing surface in a neat fashion along a straight line at a natural line of division and provide trim appropriate to the finished surface.

3.5 MATCHING

A. Restore existing work that is damaged during construction to a condition equal to its condition at the time of the start of the Work.

B. At location in existing areas where partitions are removed, patch the floors, walls, and ceiling with finish materials to match adjacent finishes.

3.6 OVERALL REQUIREMENTS THAT THE WORK BE COMPLETED

A. Where a product or type of construction occurs in the existing building, and it is not specified as a part of the new work, provide such products or types of construction as needed to patch, extend or match the existing work.

B. These Specifications will generally not describe existing products or standards of execution, nor will they enumerate products which are not a part of the new construction. The existing product is its own Specification.

C. The presence of any product or type of construction in the old work shall cause its patching, extending, or matching to be performed, as necessary to make the work complete and consistent, to identical standards of quality.

3.7 REPAIR

A. Replace work damaged in the course of alterations, except at areas approved for repair.

B. Where full removal of extensive amounts of almost-suitable work would be needed to replace damaged portions, then filling, spackling, straightening, and similar repair techniques, followed by full painting or other finishing, will be permitted.

C. Examples of work that will frequently be approved for repair rather than replacement: pitting and concealed concrete surfaces, slightly bent ceiling runners, hairline cracks in plaster.

D. If the repaired work is not brought up to standard of new work, it shall be cut out and replaced with new work.

3.8 CLEANING:

A. EACH SUCCESSIVE TRADE: As each trade finishes its work on each part of the alteration work and related new work, it shall clean up its work area and make work surfaces ready for work of the succeeding trades.

B. Spillage, overspray, collections of dust or debris, and damage to Owner occupied spaces shall be cleaned or remedied immediately be the responsible trade.

C. EACH AREA AS IT IS COMPLETED: Clean up all surfaces, remove equipment, salvage and debris, and return in condition suitable for use by the Owner as quickly as possible.

END OF SECTION

SECTION 01740
WARRANTIES AND BONDS

PART 1 GENERAL

1.1 SUMMARY

A. This section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
   1. Warranties
   2. Bonds

B. Standard Products Warranties are reprinted written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the Owner.

C. Special Warranties are written warranties required by or incorporated in Contract Documents, to extend time limits provided by standard warranties or to provide greater rights for the Owner.

PART 2 PRODUCTS

2.1 WARRANTY DOCUMENTS

A. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.
   1. Bind warranties and bonds in heavy-duty, 3 ring, vinyl covered, loose leaf binders, thickness as necessary to accommodate contents. Provide typed tabs for each separate item.
   2. Copies of each warranty to be included in the Operation and Maintenance Manuals.

PART 3 EXECUTION

3.1 DISCLAIMERS AND LIMITATIONS:

A. Manufacturer's disclaimers and limitation on product warranties do not relieve the Contractor of the warranty on the Work that incorporates the products, nor does it relieve suppliers, manufacturers, and Subcontractor required to countersign warranties with the Contractor.

3.2 RELATED DAMAGES AND LOSSES:

A. When correcting warranted Work that has failed, remove and replace other Work that has been damaged as a result of such failure or that must be removed and replaced to provide access for correction of warranted Work.

3.3 REINSTATEMENT OF WARRANTY:

A. When Work covered by a warranty has failed and been corrected, reinstate the warranty by written endorsement. The reinstated warranty shall be equal with an equitable adjustment for depreciation.

3.4 REPLACEMENT COSTS:

A. On determination that Work covered by a warranty has failed, replace or rebuild the Work to an acceptable condition complying with requirements of Contract Documents. The Contractor is responsible for the cost of replacing or rebuilding defective Work regardless of whether the

Owner has benefited from the use of the Work through part of its useful service life.

B. Submit written warranties to the Engineer prior to the date certified for Substantial Completion. If the Engineer Certificate of Substantial Completion designates a commencement date for warranties other than the date of Substantial Completion, submit written warranties on the Engineer's request.

3.5 CONTRACTOR'S GUARANTEE:

A. The Contractor does hereby guarantee all equipment, apparatus and parts against defects in design workmanship, or material where not otherwise specified for a period of not less than **(2) TWO** years after completion of Contract. Any parts found to be defective shall be replaced at the Contractor's expense. In the event that one or more of the defects mentioned above shall appear within the specified period, the Owner shall have the right to continue to use or operate the defective part of the apparatus until the Contractor is able to make repairs or replacements, or until such time as it can be taken out of service without loss or inconvenience to the Owner. In case of defective minor parts, the Owner may, at his own expense, do the work of installing replaced defective parts, provided he finds it is to his interest to do so.

1. Refer to mechanical drawings and specifications for warranties on compressors and mechanical equipment that might be different from above.

3.6 MANUFACTURERS GUARANTEE: **Sample: 20 years N.D.L. for roofs, typical**.

END OF SECTION

SECTION 01700
PROJECT CLOSEOUT

PART 1 – GENERAL

1.1 SUMMARY

A. This section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
   1. Inspection procedures
   2. Record Drawings
   3. Record Specifications
   4. Record Product Data
   5. Final Cleaning

1.2 SUBSTANTIAL COMPLETION

A. Preliminary Procedures: Before requesting inspection for certification of Substantial Completion, complete the following. List items below that are incomplete in request.
   1. Prepare a list of items to be completed and corrected (punch list), the value ot items on the list, and reasons why the Work is not complete.
   2. Advise Owner of pending insurance changeover requirements.
   3. In the Application for Payment that coincides with the date Substantial Complete is claimed, show 100 percent completion for the portion of the work claimed substantially complete.
   4. Submit specific warranties, workmanship bonds, maintenance agreements, final certifications and similar documents.
   5. Obtain and submit releases permitting Owner unrestricted use of Work and access to services and utilities. Include occupancy permits, operating certificates and similar releases.
   6. Submit record drawings, operation and maintenance manuals, final completion project photographs, damage or settlement survey, property survey, and similar record information.
   7. Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable.
   8. Change-over permanent locks and transmit keys to the Owner.
   9. Completion start-up testing of systems, and instruction of the Owner's personnel.
   10. Remove temporary facilities from the site, along with construction tools, mock- ups, and similar elements.
   11. Complete final clean-up, including touch-up painting. Touch-up and repair and restore marred exposed finishes.

B. Inspection Procedures: On receipt of a request for inspection, the Engineer will proceed or advise the Contractor of unfilled requirements. The Engineer will prepare the Certificate of Substantial Completion following inspection, or advise the Contractor of construction that must be completed or corrected before the Certificate will be issued.
   1. The Engineer will repeat inspection when requested and assured that the Work has been substantially completed.
   2. Results of the completed inspection will form the basis of requirements for final acceptance.

1.3 FINAL ACCEPTANCE

A. Before requesting inspection for certification of final acceptance and final payment,

complete the following:

1. Submit the final payment request with releases.
2. Submit a final statement, accounting for changes to the Contract Sum.
3. Submit an officially notarized copy of the Engineer's final punch-list of itemized work to be completed or corrected, stating that each item has been completed or otherwise resolved for acceptance and has been endorsed and dated by the Engineer.
4. Submit final meter readings for utilities, a record of stored fuel, and similar data as of Substantial Completion.
5. Submit consent of surety to final payment.
6. Submit evidence of continuing insurance coverage complying with insurance requirements.
7. Submit pest-control final inspection report and warranty

B. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, Engineer will either proceed with inspection or notify Contractor of unfulfilled requirements. Engineer will prepare a final Certificate for Payment after inspection or will notify Contractors of construction that must be completed or corrected before certificate will be issued.

C. Re-inspection Procedure: The Engineer will reinspect the Work upon receipt of the contractor's notice that the work, including punch-list items resulting from earlier inspections, has been completed, except for those items whose completion has been delayed because of circumstances that are acceptable to the Engineer.

1. Upon completion of reinspection, the Engineer will either prepare a certificate of final acceptance, or will advise the Contractor of work that is incomplete or of obligations that have not been fulfilled, but are required for final acceptance.
2. If necessary, the reinspection procedure will be repeated.

PART 2 PRODUCTS

2.1 RECORD DOCUMENT SUBMITTAL

A. Do not use Record Documents for construction purposes; protect from loss in a secure location; provide access to Record Documents for the Engineer's reference.

2.2 RECORD DRAWINGS

A. Maintain a clean, undamaged set of prints of Contract Drawings and Shop Drawings.

1. Mark-up these drawings to show the actual installation. Mark whichever drawing is most capable of showing conditions accurately.
   a. Give particular attention to concealed elements that would be difficult to measure at a later date.
   b. Organize record sheets into manageable sets, bind with durable paper cover sheets, and print suitable titles, dates and other identification on the cover.
   c. Accurately record information in an understandable drawing technique.
   d. 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 foundation 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 or Construction Change Directive
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 important additional information that was either shown schematically or omitted from original Drawings.
5. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

2.3 RECORD SPECIFICATIONS

A. Maintain one copy of the Project Manual, including addenda. Mark to show variations in actual Work performed in comparison with the Specifications and modifications.
   1. Give particular attention to substitutions, selection of options and similar information on elements that are concealed or cannot be readily discerned later by direct observation.
   2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
   3. Record the name of manufacturer, supplier, installer, and other information necessary to provide a record of selections made.
   4. For each principal product, indicate whether Record Product Data has been submitted in operation and maintenance manuals instead of submitted as Record Product Data.
   5. Note related record drawing information and Product Data.

B. Upon completion of the Work, submit record Specifications to the Engineer for the owner's record.

2.4 MAINTENANCE MANUALS

A. Organize maintenance data into sets of manageable size. Bind in individual heavy-duty ring vinyl-covered binders, with pocket folders for folded sheet information. Mark identification on front and spine of each binder. Include the following information:
   1. Emergency instructions.
   2. Spare parts list.
   3. Copies of warranties.
   4. Wiring diagrams.
   5. Recommended "turn around" cycles.
   6. Inspection procedures.
   7. Shop Drawings and Product Data.

2.5 OPERATING AND MAINTENANCE INSTRUCTIONS

A. Arrange for the installer of equipment that requires regular maintenance to meet with the Owner's personnel to provide instruction in proper operation and maintenance. Include a detailed review of the following:
   1. Maintenance manuals.
   2. Spare parts and materials.
   3. Tools.
   4. Lubricants.
   5. Control sequences.

6. Hazards.
7. Warranties and Bonds.
8. Maintenance agreements and similar continuing commitments.

B. As part of instruction for operating equipment, demonstrate the following procedures:
   1. Noise and vibration adjustments.
   2. Safety procedures.

PART 3 - EXECUTION

3.1 FINAL CLEANING

A. General: Provide final cleaning. Employ experienced workers for final cleaning. Clean each surface to the condition expected in a commercial building cleaning maintenance program.

B. Cleaning agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

   1. Complete the following before inspection for certification of Substantial Completion:
      a. Remove labels that are not permanent labels.
      b. Clean transparent materials. Remove glazing compound. Replace chipped or broken glass.
      c. Clean exposed hard-surface finishes to a dust-free condition, free of stains, films and similar foreign substances. Restore reflective surfaces to their original reflective condition. Leave concrete floors broom clean. Vacuum carpeted surfaces.
      d. Clean the site of rubbish, litter and other foreign substances. Sweep paved areas; remove stains, spills and other foreign deposits. Rake grounds that are neither paved nor planted, to a smooth even-textured surface.
      e. Clean surfaces of mechanical and electrical equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and

      other foreign substances.
      g. Leave Project clean and ready for occupancy.

3.2 REMOVAL OF PROTECTION

A. Remove temporary protection and facilities.

3.3 COMPLIANCE

A. Comply with regulations of authorities having jurisdiction and safety standards for cleaning. Remove waste materials from the site and dispose of in a lawful manner.

END OF SECTION

SECTION 01340
SHOP DRAWINGS AND DATA AND SAMPLES

PART 1 GENERAL

1.1 SUMMARY:

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

B. Submit to Engineer, Shop Drawings, Product Data and Samples required by Specification Section.

C. Prepare and submit, with Construction Schedule, a separate schedule listing dates for submission and review of Shop Drawings. Products Data and Samples will be needed for each product.

1.2 SHOP DRAWINGS:

A. Original drawings, prepared by Contractor, Subcontractor, supplier or Distributor, which illustrate some portion of the work; showing fabrication, layout, setting or erection details. No portion of the Contract Documents shall be reproduced for use as a part of the Shop Drawings.

B. Shop drawings shall be prepared be a qualified detailer.

1.3 SUBMISSION REQUIREMENTS:

A. Schedule submissions at least two weeks before reviewed submittals will be needed.

B. Shop Drawings: Submit number of copies or Product Data which contractor requires for distribution plus two (2) copies which will be retained by Engineer.

C. Product Data: Submit number of copies or Product Data which Contractor requires for distribution plus three (3) copies which will be retained by Engineer.

D. Samples: Submit number of samples specified in each Specification Section.

E. Accompany submittals with transmittal letter in duplicate, containing:
   1. For work designed by consultants, make submission directly to consultant and simultaneously submit duplicate of transmittal letter to Engineer.

F. Submittals shall include:
   1. Date and Revision Dates
   2. Project Title and Number
   3. The Names of: a. Engineer b. Contractor
      c. Subcontractor d. Supplier
      e. Manufacturer f. Separate detailer when pertinent
   4. Contractor's stamp, initialed or signed, certifying review of submittal verification of field measurements and compliance with Contract Documents.
   5. Identification of product materials
   6. Field dimension, clearly identified as such
   7. Applicable standards, such as ASTM or Fed. specification
   8. Identification of deviations

H. If shop drawings which have been previously submitted for review are resubmitted, they shall clearly note any changes or additions that have been made to the previous submittal.

1.4 RESUBMISSION REQUIREMENTS:

A. Shop Drawings:
   a. Revise initial drawings as required and resubmit as specified for initial submittal.
   b. Indicate on drawings any changes which have been made other than those requested by the Engineer.

B. Product data and Samples: Submit new data and samples as required for initial submittal.

PART 2 PRODUCTS

2.1 PRODUCT DATA: Collect information into a single submittal for each element of construction and type of product or equipment

A. Manufacturer's Standard Schematic Drawings:
   1. Modify drawings to delete information not applicable to project.

B. Manufacturer's Catalog Sheets, Brochures, Diagrams, Schedules, Performance Charts, Illustrations and other descriptive data.
   1. Clearly mark each copy to identify pertinent materials, products or models.
   2. Manufacturer’s written recommendations
   3. Manufacturer’s product specifications
   4. Manufacturer’s installation instructions
   5. Standard color charts
   6. Manufacturer’s catalog cuts
   7. Standard product operation and maintenance manuals
   8. Wiring diagrams showing factory installed wiring
   9. Testing by recognized testing agency
   10. Application of testing agency labels and seals
   11. Show dimensions and clearances required.
   12. Show performance characteristics and capacities.

C. Submit Product Data before or concurrent with Samples.

D. Number of Copies: Submit three copies of Product Data, unless otherwise indicated.

2.2 SAMPLES: Submit Physical examples to illustrate materials, equipment or workmanship, and to establish standards by which completed work is judged.

A. Office Samples: Of sufficient size and quantity to clearly illustrate:
   1. Functional characteristics of product or material.
   2. Full range of color samples.

B. Field Samples and Mock-Ups:
   1. Erect at Project Site at location acceptable to Engineer.
   2. Construct each complete, including work of all trades required in finish work. PART

PART 3 EXECUTION

3.1 CONTRACTOR REVIEW

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

3.2 CONTRACTORS RESPONSIBILITIES:

A. Review and Approve Shop Drawings, Product Data and Samples prior to submission and so indicate over his signature.

B. Verify: 1. Field measurements
   2. Catalog numbers and similar data.

3. Field construction criteria
4. A. D. A. (American w/ Disabilities Act) requirements

C. Coordinate submittals with requirements of work and Contract Documents.

D. Contractor's responsibility for errors and omissions in submittals is not relieved by Engineer's review of submittal.

E. Contractor's responsibility for deviations in submittals from requirements of the Contract Documents is not relieved by Engineer's review of submittals.

F. Notify Engineer, in writing at time of submission, of deviations in submittals from requirements of Contract Documents.

G. Begin no work which requires submittals until return of submittals with Engineer's stamp and initials or signature indicating review.

H. After Engineer's review, distribute copies.

3.3 ENGINEER DUTIES

A. General: Review submittals with reasonable promptness.

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

C. Review for
1. Design Concept
2. Information given in contract documents

D. Review of separate item does not constitute review of an assembly in which item functions.

E. Affix stamp initials or signature certifying review of submittal

F. Return submittals to contractor for distribution.

END OF SECTION

SECTION 08710
FINISH HARDWARE

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. Work under this section comprises of furnishing and installing hardware specified herein and noted on drawings for a complete and operational system, including any electrified hardware components, systems, controls and hardware for aluminum entrance doors. Any door shown on the drawing and not specifically referenced in the hardware sets shall be provided with identical hardware as specified on other similar openings and shall be included in the General Contractor and finish hardware suppliers bid. All fire rated door shall be provided with fire rated hardware as required by local code Authority as part of the General Contractors and hardware supplier's base bid. The General Contractor and hardware supplier shall verify all cylinder types specified for locking devices supplied as part of the door system with the door manufacturer and/or door supplies.

B. The Contractor and the Hardware Supplier shall notify the Engineer in writing of any discrepancies (five (10) days prior to bid date) that could and/or would result in hardware being supplied that is none functional, hardware specified and/or hardware that has not been specified that will result in any code violations and any door that is not covered in this specification. Failure of the Contractor and hardware supplier to address any such issue shall be considered acceptance of the hardware specified and all discrepancies shall be corrected at the Contractor and hardware supplier's expense and considered a part of their base bid. Change orders shall not be issued if deemed by the Engineer and/or the Weslaco ISD Representative to, fall under and/or be covered as a part of the General Contractors or hardware supplier's base bid, due to failure to comply with this instruction notification.

C. Items include but are not limited to the following: Refer to all "D" and "G" sheets.
1. Hinges
2. Flush Bolts
3. Exit Devices
4. Locksets and Cylinders
5. Push Plates - Pulls
6. Closers
7. Kick, and Protection Plates
8. Electrified Hold Open Devices
9. Thresholds, Seals and Door Bottoms
10. Miscellaneous Trim and Accessories

1.2 RELATED DOCUMENTS, drawings and general provisions of contract, including General and Supplementary Conditions, and Division 1 Specification sections, apply to this section.

1.3 RELATED WORK specified elsewhere that should be examined for its effect upon this specification section:

A. Section within 08411 – Aluminum Entrances, Storefront and Window Framing
B. Division 16 – Electrical
C. Division 13 – Access Control

1.4 REFERENCES SPECIFIED in this section subject to compliance as directed:

A. NFPA-80 - Standard for Fire Doors and Windows
B. NFPA-101 - Life Safety Code
C. ADA - The Americans with Disabilities Act - Title III - Public Accommodations

D. ANSI-A 117.1 - American National Standards Institute - Accessible and Usable Buildings and Facilities
E. ANSI-A 156.5 - American National Standards institute -Auxiliary Locks and Associated Products
F. UFAS - Uniform Federal Accessibility Standards
G. UL - Underwriter's Laboratories
H. WHI - Warnock Hersey International, Testing Services
I. State and Local Codes including Authority Having Jurisdiction
J. UL10C - Positive Pressure
K. IBC-2009/2012 – International Building Code
L. NFPA-70 – International Electrical Code

1.5 SUBMITTALS

A. HARDWARE SCHEDULES submit copies of schedule in accordance with Division 1, General Requirements. Schedule to be in vertical format, listing each door opening, including: handing of opening, all hardware scheduled for opening or otherwise required to allow for proper function of door opening as intended, and finish of hardware. At doors with door closers or door controls include degree of door opening. Supply the schedules all Finish Hardware within two (2) weeks from date purchase order is received by the hardware supplier.

B. Submit manufacturer's cut/catalog sheets on all hardware items and any required special mounting instructions with the hardware schedule.

C. Certification of Compliance:
   1. Submit any information necessary to indicate compliance to all of these specifications as required.

   2. Submit a statement from the manufacturer that electronic hardware and systems being supplied comply with the operational descriptions exactly as specified.

D. Submit any samples necessary as required by the Engineer/Owner.

E. Templates for finish hardware items to be sent to related door and frame suppliers within three (3) working days of receipt of approved hardware schedule.

F. Doors and Frames used in positive pressure opening assemblies shall meet UL10C in areas where this specification includes Seals for smoke door.

1.6 QUALITY ASSURANCE

A. Hardware supplier to be a qualified, Factory Authorized, direct distributor of the products to be furnished. In addition, the supplier to have in their regular employment an AHC or AHC /CDC and/or a person of equivalent experience (minimum fifteen (15) years in the industry) who will be made available at reasonable times to consult with the Engineer/Contractor and/or Weslaco ISD Representative regarding any matters affecting the finish hardware on this project.

B. All hardware used in labeled fire or smoke rated openings to be listed for those types of openings and bear the identifying label or mark indicating UL. (Underwriter's Laboratories) approved for fire. Exit devices in non-labeled openings to be listed for panic.

1.7 DELIVERY, HANDLING AND PACKAGING

A. Furnish all hardware with each unit clearly marked and numbered in accordance with the hardware schedule. Include door and item number for each.

B. Pack each item of hardware completes with all necessary parts and fasteners.

C. Properly wrap and cushion each item to prevent scratches and dents during delivery and storage.

1.8 SEQUENCING AND SCHEDULING

Any part of the finish hardware required by the frame or door manufacturers or other suppliers that is needed in order to produce doors or frames is to be sent to those suppliers in a timely manner, so as not to interrupt job progress.

1.9 WARRANTY

All finish hardware shall be supplied with a Two- (2) year warranty against defects in materials and workmanship, commencing with substantial completion of the project except as follows:

1. All Closers are to have a thirty- (30) year written warranty.
2. All Exit Devices are to have a three- (3) year written warranty.
3. All Grades 1 Locksets are to have a ten- (10) year written warranty.
4. All Continuous Hinges are to have a ten- (10) year written warranty.

PART 2 – PRODUCTS

2.1 FASTENERS

A. Furnish with finish hardware all necessary screws, bolts and other fasteners of suitable size and type to anchor the hardware in position for a long life under hard use.

B. Design of all fastenings shall harmonize with the hardware as to material and finish.

C. All hardware shall be installed with the Manufacturers standard screws as provided. The use of any other type of fasteners shall not be permitted. The general contractor shall provide wood blocking in all stud walls specified and/or scheduled to receive wall stops, No Exception.

2.2 ENVIRONMENTAL CONCERN FOR PACKAGING

All hardware shipped to the project job site shall be packaged in biodegradable packs such as paper or cardboard boxes and wrapping.

2.3 HINGES

A. All hinges to be of one manufacturer as hereafter listed for continuity and consideration of warranty. Provide one of the following manufacturers Ives, Hager or Stanley.

B. Unless otherwise specified provide five-knuckle, heavy-duty, button tip, full mortise template type hinges with non-rising loose pins. Provide non-removable pins for out swinging doors at secured areas or as called for in this specification (Refer to 3.02 Hardware Sets).

C. Exterior Door Hinges
Provide barrel continuous hinge type of stainless steel.

C. Continuous hinges shall be Ives as specified or equal products manufactured by Select Products and ABH shall be acceptable.

2.4 LOCK AND LOCK TRIM

A. Refer to all “D” Sheets for each campus requirements.

2.5 CYLINDERS AND KEYING

A. Refer to all “D” Sheets for each campus requirements.

B. Factory stamp all keys “Do not duplicate” and with key symbol as directed by WISD.

2.6 EXIT DEVICES

A. Refer to all “D” sheets for each campus requirements.
All exit devices and trim, including electrified items, to be of one manufacturer as hereafter listed and in the hardware sets for continuity of design and consideration of warranty; electrified devices and trim to be the same series and design as mechanical devices and trim. All exit devices shall meet and/or exceed ANSI A156.3, Grade 1 test requirements.

B. Exit Devices to be “UL” listed for life safety. All exit devices for labeled doors shall have “UL” label for “Fire Exit Hardware”. All exit devise shall be listed by UL for accident and hazard and shall comply with applicable requirements of NFPA 80 and NFPA 101.

C. All exit devices to be of a heavy duty, chassis mounted design, with one-piece removable covers, eliminating necessity of removing the device from the door for standard maintenance and keying requirements.

D. All trims to be through-bolted to the lock stile case. Lever design to be the same as specified with the lock sets specified. Furnish filler plates and shim kits as needed for flush mounting of devices on doors. End cap be constructed of cast or forged material and shall not overlap the mechanism case. Devices to have no exposed rivets or screws on back of device that would be visible through a glass light.

E. Exit Devices to be the modern push rail design. All exit devices shall be mounted with sex bolts. Furnish stainless steel touch pad on all exit devices. Touch pad and Touch pad end caps to overlap the mechanism case with two point attachment to the door. Provide touch pads with return stroke fluid dampers and rubber bottoming dampers.

F. Furnish roller strikes for all rim and surface vertical rod exit devices. Internal springs shall be coil compression type. Furnish security dead latching for all active latch bolts.

G. All devices shall carry a three- (3) year warranty against manufacturing defects and workmanship. Exit devices shall be certified by an independent testing lab for a minimum of 1,000,000 cycles.

H. Exit Devices shall be Von Duprin “99” series as specified or acceptable products manufactured by Falcon.

2.7 SURFACE MOUNTED DOOR CLOSERS

A. Refer to all “D” sheets for each campus requirements. All closers for this project shall be the products of a single manufacturer for continuity of design and consideration of

warranty. All door closers shall be mounted as to achieve the maximum degree of opening (trim permitting).

C. All closers to be heavy duty, surface-mounted, fully hydraulic, rack and pinion action with high strength cylinder to provide control throughout the entire door opening cycle.

C. Size all closers in accordance with the manufacturer's recommendations at the factory.

D. All closers to have adjustable spring power sizes 1 or 2 through 4 or 6 and separate tamper resistant, brass, non-critical regulating screw valves for closing speed, latching speed and back-check control as a standard feature unless specified otherwise.

E. All closer covers to be rectangular, full cover type of non-ferrous, non-corrosive material painted to match closer. Provide closer covers only if provided as a standard part of the door closer package.

F. Closers shall have heavy-duty arms. All closer arms shall be of sufficient length to accommodate the reveal depth and to insure proper installation. The hardware supplier shall provide any and all required brackets, spacers or filler plates as required by the manufacture for a proper and functional installation as part of their base bid.

G. Supply appropriate arm assembly for each closer so that closer body and arm are mounted on non-public side of door opening and on the interior side of exterior openings, except where required otherwise in the hardware sets.
   1. All parallel arm mounted closers to be factory indexed to insure proper installation.
   2. Furnish heavy-duty cold forged parallel arms for all parallel arm mounted closers.

H. Provide closers with special application and heavy-duty arms as specified in the hardware sets or as otherwise called for to insure a proper operating, long lasting opening. Drop plates and any additional brackets required for the proper installation of the door closer shall be included in the hardware supplier's base bid.

I. Finish: Sprayed enamel finish shall match other hardware.

J. Provide and mount all door closers with sex bolts as provided by the manufacturer.

2.9 MISCELANEOUS

A. Refer to all "D" sheets for additional equipment to be provided, Cylinder rim housing, key systems, cylinders, keys, cores, mortise housing, removable mullion. Contractor shall include all cost in bid for a complete installation of the additional equipment.

2.10 PUSH PLATES, DOOR PULLS, AND KICKPLATES

A. All push plates, door pull, kick plates and other miscellaneous hardware as listed in hardware sets. Equivalent products as manufactured by Ives, Rockwood, Hager and Trimco are acceptable.

B. Kick plates to be 10 inches high and Mop plates to be 6 inches high, both by 1-1/2 inches or 1 inch less than door width (LDW) as specified. They are to be of 16 gauge thick stainless steel. For door with louvers or narrow bottom rails, kick plate height to be 1 inch less dimension shown from the bottom of the door to the bottom of the louver or glass.

C. Where required armor plates, edge guards and other protective hardware shall be supplied in sizes as scheduled in the hardware sets.

D. Finish: Same as other hardware where available.

2.11 FLUSH BOLTS AND COORDINATORS

A. Provide Flush bolts with Dust Proof Strikes as indicated in the individual hardware sets by Ives, Rockwood, Hager and Trimco are acceptable. Finish shall match the adjacent hardware.

2.12 THRESHOLDS AND SEALS

A. Provide materials and finishes as listed in hardware sets and manufactured by Zero. Equivalent product by National Guard Products and Reese are acceptable. All thresholds must be in accordance with the requirements of the ADA and ANSI A117.1.

B. Provide thresholds with wood screws and plastic anchors. Supply all necessary anchoring devices for weather strip and sound seal.

C. Seals shall comply with requirements of UL10C. All thresholds, door bottoms and weather strip inserts shall be a silicone based product as specified in 3.02 Hardware Sets.

D. Seals shall comply with the requirements of the Wood Door Manufacturer's certification requirements.

E. Provide all Threshold with factory applied none slip coating (SIA) as specified.

2.13 FINISHES

A. Finishes for all hardware are as required in this specification and the hardware sets.

B. Special care is to be taken to make uniform the finish of all various manufactured items.

2.14 PROPRIETARY PRODUCTS

A. References to specific products are used to establish quality standards of utility and performance. Unless otherwise approved provide only the specified product.

B. All other materials, not specifically described, but required for a complete and proper finish hardware installation, are to be selected by the Contractor, subject to the approval of Weslaco ISD Representative.

PART 3 - EXECUTION

3.1 INSTALLATION AND SERVICE ITEMS OF FINISH HARDWARE

A. All finish hardware shall be installed by an experienced finish hardware installer with at least ten (10) years of experience after a pre-installation meeting between the contractor, hardware Manufacturers representative, the hardware supplier, the hollow metal supplier and the wood door supplier. The finish hardware installer shall be responsible for the proper installation and function of all doors and hardware.

B. The hardware supplier's office and/or warehouse shall be located within a one hundred twenty five (125) mile radius of the project site as to better service the general contractor and the Weslaco ISD Representative during the course of this project.

C. Check hardware against the reviewed hardware schedule upon delivery. Store the hardware in a dry and secure location to protect against loss and damage.

D. Install finish hardware in accordance with approved hardware schedule and manufacturers' printed instructions. Pre-fit hardware before finish is applied to door; remove and reinstall after finish is complete and dry. Install and adjust hardware so that parts operate smoothly, close tightly, and do not rattle.

E. Mortise and cutting to be done neatly, and evidence of cutting to be concealed in the finished work. Protect all Finish hardware from scratching or other damage.

F. The hardware supplier, general contractor, hardware installer, representatives of the lock, exit device and closer manufacturers shall after three (3) months of Weslaco ISD acceptance of the facility perform an onsite survey of the finish hardware. Any item of finish hardware found to be defective or out of adjustment shall be replaced or adjusted for the proper function and operation of the door assembly at the contractor's, supplier's and/or installer's expense. The hardware supplier shall provide a written report of any and all affected items to the Engineer and Weslaco ISD (No Exceptions). The scheduled inspection date for the onsite inspection and adjustment of finish hardware shall be provided to the Owner as a part of the general contractor and hardware supplies close-out documentation for this project.

END OF SECTION

SECTION 08411
ALUMINUM STOREFRONTS & ENTRANCES

PART 1 GENERAL

1.1 SUMMARY

A. Related Documents: Conditions of the Contract, Division 1 - General Requirements, and Drawings apply to Work of this Section.

B. Section Includes:
1. Storefront system and Entrances complete with reinforcing, fasteners, anchors, and attachment devices.
2. Accessories necessary to complete work.

C. Products Furnished But Not Installed Under This Section:
1. Anchoring devices that are built into masonry.
2. Anchoring devices that are cast in concrete.

D. Related Sections:
1. Section 08710 - Door Hardware.

1.2 REFERENCES

A. Aluminum Association (AA):

1.	DAF-45	Designation System for Aluminum Finishes.

B. American Architectural Manufacturers Association (AAMA):

1.	501	Methods of Test for Exterior Walls.
2.	501.2	Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls, and Sloped Glazing Systems.
3.	611	Voluntary Specification for Anodized Architectural Aluminum.
5.	701	Voluntary Specifications for Pile Weatherstripping and Replaceable Fenestration Weatherseals.
6.	1503	Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors, and Glazed Wall Sections.
7.	1801	Voluntary Specification for the Acoustical Rating of Windows, Doors, and Glazed Wall Sections.
8.	CW-10	Care and Handling of Architectural Aluminum From Shop to Site.
9.	SFM1	Aluminum Storefront and Entrance Manual.

C. American Society for Testing and Materials (ASTM):

1.	A36	Structural Steel.
2.	A123	Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
3.	B209	Aluminum and Aluminum - Alloy Sheet and Plate.
4.	B221	Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes.
5.	E283	Test Method for Rate of Air Leakage Through Exterior Windows, Curtain Walls and Doors.
6.	E330	Test Method for Structural Performance of Exterior Windows, Curtain Walls and Doors by Uniform Static Air Pressure Difference.
7.	E331	Test Method for Water Penetration of Exterior Windows, Curtain Walls and Doors by Uniform Static Air Pressure Difference.

D. Glass Association of North America (GANA): Glazing Manual

E. Federal Specifications (FS):

1. TT-P-641G(1) Primer Coating, Zinc Dust-Zinc Oxide (For Galvanized Surfaces).
2. TT-P-645A Primer, Paint, Zinc Chromate, Alkyd Type.

F. Steel Structures Painting Council (SSPC): Cold-Applied Asphalt Mastic (Extra Thick Film).

1.3 SYSTEM REQUIREMENTS

A. Design Requirements:
1. Drawings are diagrammatic and do not purport to identify nor solve problems of thermal or structural movement, glazing, anchorage, or moisture disposal.
2. Requirements shown by details are intended to establish basic dimension of units, sight lines and profiles of members.
3. Provide concealed fastening.
4. Provide entrance and storefront systems, including necessary modifications, to meet specified requirements and maintaining visual design concepts.
5. Attachment considerations are to take into account site peculiarities and expansion and contraction movements so there is no possibility of loosening, weakening or fracturing connection between units and building structure or between units themselves.
6. Anchors, fasteners and braces shall be structurally stressed not more than 50% of allowable stress when maximum loads are applied.
7. Provide for expansion and contraction due to structural movement without detriment to appearance or performance.
8. Framing systems shall accommodate expansion and contraction movement due to surface temperature differentials of 180 degrees F without causing buckling, stress on glass, failure of joint seals, excessive stress on structural elements, reduction of performance, or other detrimental effects.

B. Performance Requirements:
1. Wind loads: Provide framing system capable of withstanding wind load design pressures of 40 psf acting inward and 40 psf acting outward. The design pressures are based on the International Building Code; 2006 Edition.
2. Air infiltration: Air leakage through fixed light areas of storefront shall not exceed 0.06 cfm per square foot of surface area when tested in accordance with ASTM E283 at differential static pressure of 6.24 psf.
3. Water infiltration: No uncontrolled leakage when tested in accordance with ASTM E331 at test pressure of 10 psf as defined in AAMA 501.
4. Deflection: Maximum calculated deflection of any framing member in direction normal to plane of wall when subjected to specified design pressures for spans up to and including 13'-6" shall be limited to [1/175] of its clear span and for spans greater than 13'-6" deflection shall be limited to [1/240] of its clear span + 1/4", except that maximum deflection of members supporting plaster surfaces shall not exceed 1/360 of its span.
5. Thermal Transmittance (U-factor): When tested to AAMA Specification 1503, the thermal transmittance (U-factor) shall not be more than:
    a. Glass to Exterior – 0.54 (clear)
    b. Glass to Center – 0.63 (clear)
    c. Glass to Interior – 0.51 (clear)
6. Condensation Resistance (CRF): When tested to AAMA Specification 1503, the condensation resistance factor shall not be less than:
    a. Glass to Exterior – 69 frame and 60glass (clear)
    b. Glass to Center – 58 frame and 61glass (clear)
    c. Glass to Interior – 57 frame and 57glass (clear)

C. Testing Requirements: Provide components that have been previously tested by an independent testing laboratory.

1.4 SUBMITTALS

A. General: Submit in accordance with Section 01340.

B. Product Data:
   1. Submit manufacturer's descriptive literature and product specifications.
   2. Include information for factory finishes, hardware, accessories, and other required components.

C. Shop Drawings:
   1. Submit shop drawings covering fabrication, installation and finish of specified systems.
   2. Include following:
      a. Fully dimensioned plans and elevations with detail coordination keys.
      b. Locations of exposed fasteners and joints.
   3. Provide detailed drawings of:
      a. Composite members.
      b. Joint connections for framing systems and for entrance doors.
      c. Anchorage.
      d. System reinforcements.
      e. System expansion and contraction provisions.
      f. Glazing methods and accessories.
      g. Internal sealant requirements.
      h. Thermal improvements.
   4. Schedule of finishes.

D. Samples:
   1. Submit manufacturer's standard samples indicating quality of finish.
   2. Where normal texture or color variations are expected, include additional samples illustrating range of variation.

E. Test Reports:
   1. Standard Systems: Submit certified copies of previous test reports substantiating performance of system in lieu of retesting. Include other supportive data as necessary.

F. Qualification Data:
   1. Submit installer qualifications verifying years of experience. Manufacturer's Instructions: Submit manufacturer's printed installation instructions.

1.05 QUALITY ASSURANCE

A. Single Source Responsibility: To ensure quality of appearance and performance, obtain materials for systems from either a single manufacturer or from manufacturer approved by systems manufacturer.

B. Installer Qualifications: Certified in writing by system manufacturer as qualified for installation of specified systems.

C. Perform Work in accordance with AAMA SFM1 and manufacturer's written instructions.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of Sections 01010 and 01040.

B. Protect finished surfaces as necessary to prevent damage.

C. Do not use adhesive papers or sprayed coatings that become firmly bonded when exposed to sun.

D. Do not leave coating residue on any surfaces.

E. Replace damaged units.

1.7 WARRANTY

A. Provide warranties in accordance with Section 01740.

B. Provide written warranty in form acceptable to Owner jointly signed by manufacturer, installer and Contractor warranting work to be watertight, free from deflective materials, defective workmanship, glass breakage due to defective design, and agreeing to replace components which fail within 1 year from date of Substantial Completion.

C. Warranty shall cover following:
1. Complete watertight and airtight system installation within specified tolerances.
2. System is structurally sound and free from distortion.

PART 2 PRODUCTS

2.1 MANUFACTURERS AND PRODUCTS

A. Subject to compliance with requirements indicated, provide products by one of the following or approved equal: Refer to all “D” and “G” sheets.
1. Oldcastle BuildingEnvelope™ (Vistawall), Terrell, TX.

B. Equal products of other manufacturers with Engineer's/Owner approval prior to bidding. Refer to specifications section 01010, Items 1.18 and 1.29 for substitutions

C. Acceptable Storefront Framing System: Series 3000 Thermal MultiPlane, glass set to the center, back, thermally broken, exterior loaded 2" x 4-1/2" mullion profile. This system uses a poured-in-place polyurethane thermal pocket to create its thermal break. This system accommodates 1" glass thickness.
Acceptable Entrance System: Series 500 Rugged Wide Stile Doors with FG-3000 Rugged Frames (.188" Wall Thickness) or Reliance Sub-frames as required.

2.2 FRAMING MATERIALS AND ACCESSORIES

A. Aluminum: ASTM B221, alloy 6063-T5 for extrusions; ASTM B209, alloy 5005-H16 for sheets; or other alloys and temper recommended by manufacturer appropriate for specified finish.

B. Internal Reinforcing:
1. ASTM A36 for carbon steel.
2. Shapes and sizes to suit installation.
3. Steel components factory coated with alkyd type zinc chromate primer complying with FS TT-P-645.

C. Anchorage Devices:
1. Manufacturer's standard formed or fabricated steel or aluminum assemblies of shapes, plates, bars or tubes.
2. Hot-dip galvanized steel assemblies after fabrication; comply with ASTM A123, 2.0 ounce minimum coating.

D. Fasteners:
1. Aluminum, non-magnetic stainless steel or other non-corrosive materials compatible with items being fastened.
2. Provide concealed fasteners wherever possible.
3. For exposed locations, provide Phillips flathead screws with finish matching item fastened.
4. For concealed locations, provide manufacturer's standard fasteners.

E. Expansion Anchor Devices: Lead-shield or toothed-steel, drilled-in, expansion bolt anchors.

F. Protective Coatings: Cold-applied asphalt mastic complying with SSPC, compounded for 30 mil thickness for each coat; or alkyd type zinc chromate primer complying with FS TT-P-645.

G. Touch-Up Primer for Galvanized Components: Zinc oxide conforming to FS TT-P-641.

H. Glazing Gaskets:
   1. Compression type design, replaceable, molded or extruded, of neoprene, polyvinyl chloride (PVC), or ethylene propylene diene monomer (EPDM).
   2. Profile and hardness as required maintaining uniform pressure for watertight seal.

I. Weather stripping:
   1. Wool pile conforming to AAMA 701.2.
   2. Provide EPDM or vinyl blade gasket weather stripping in bottom door rail, adjustable for contact with threshold.

J. Internal Sealants and Baffles.

2.3 GLASS AND GLAZING ACCESSORIES: Refer to Drawings for glass type.

2.4 FABRICATION

A. Coordination of Fabrication:
   1. Check actual frame or door openings required in construction work by accurate field measurements before fabrication.
   2. Fabricate units to withstand loads that will be applied when system is in place.

B. General
   1. Conceal fasteners wherever possible.
   2. Reinforce work as necessary for performance requirements, and for support to structure.
   3. Separate dissimilar metals and aluminum in contact with concrete utilizing protective coating or preformed separators, which will prevent contact and corrosion.
   4. Comply with drawings for glazing requirements.

C. Aluminum Framing:
   1. Provide members of size, shape and profile indicated, designed to provide for glazing from exterior.
   2. Provide manufacturer's standard thermal break between exterior and interior aluminum surfaces.
   3. Fabricate frame assemblies with joints straight and tight fitting.
   4. Reinforce internally with structural members as necessary to support design loads.
   5. Maintain accurate relation of planes and angles, with hairline fit of contacting members.
   6. Seal horizontals and direct moisture accumulation to exterior.
   7. Provide flashings and other materials used internally or externally that are corrosive resistant, non-staining, non-bleeding and compatible with adjoining materials.
   8. Provide manufacturer's extrusions and accessories to accommodate expansion and contraction due to temperature changes without detrimental to appearance or performance.

D. Welding:
   1. Comply with recommendations of the American Welding Society.
   2. Use recommended electrodes and methods to avoid distortion and discoloration.
   3. Grind exposed welds smooth and flush with adjacent surfaces; restore mechanical finish.

E. Flashings: Form from sheet aluminum with same finish as extruded sections. Apply finish after fabrication. Material thickness as required to suit condition without deflection or "oil-canning".

2.5 FINISHES

A. Color Anodized:
   1. Conforming to AA-M12C22A44 and AAMA 611.
   2. Architectural Class I, etched, clear anodic coating, 0.7 mil minimum thickness.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine conditions and proceed with Work in accordance with Section 01400.

3.2 INSTALLATION

A. Erection Tolerances:
   1. Limit variations from plumb and level:
      a. 1/8 inch in 10'-0" vertically.
      b. 1/8 inch in 20'-0" horizontally.
   2. Limit variations from theoretical locations: 1/4 inch for any member at any location.
   3. Limit offsets in theoretical end-to-end and edge-to-edge alignment: 1/16 inch from flush surfaces not more than 2 inches apart or out-of-flush by more than 1/4 inch.

B. Install doors and hardware in accordance with manufacturer's printed instructions.

C. Set units plumb, level and true to line, without warp or rack of frame.

D. Anchor securely in place, allowing for required movement, including expansion and contraction.

E. Separate dissimilar materials at contact points, including metal in contact with masonry or concrete surfaces, with bituminous paint or preformed separators to prevent contact and corrosion.

F. Set sill members in bed of sealant. Set other members with internal sealants and baffles to provide weather-tight construction.

G. Coordinate installation of perimeter sealant and backing materials between assemblies and adjacent construction in accordance with requirements of Section 07900.

H. Glazing: Refer to requirements of drawings.

3.3 ADJUSTING

A. Test door operating functions. Adjust closing and latching speeds and other hardware in accordance with manufacturer's instructions to ensure smooth operation.

3.4 CLEANING

A. Clean surfaces in compliance with manufacturer's recommendations; remove excess mastic, mastic smears, foreign materials and other unsightly marks.

B. Clean metal surfaces exercising care to avoid damage.

END OF SECTION

SECTION 13700
ACCESS CONTROL SYSTEM

PART 1 GENERAL

1.1 SCOPE OF WORK:

A. New IP Based Access Control system shall be a non-proprietary system, no control panels required, compatible with school district network system and video management system, remote access, mobile acces, new software to be installed on NEW servers, New servers shall be included in the project and build as required for the access control system software requirements and with additional spare capacity for future additions, server shall be installed at a central location (confirm location with owner) to control all 11 campus plus future use. exterior IP door readers, **Include 150 cards for each 11 campuses and a grand total of 25 keyfobs for project.** Power shall be P.O.E(no 120V power supplies allowed), IP 2-way camera and intercom in the main entrance only, release pushbutton in the main entrance reception area (to be field verify exact location),panic mode, include surge protection, expandable for future devices, owner having capability for future programming (no 3rd party), include software and codes, and integration with existing security intrusion and fire alarm system. Include a photo badge creation printer, PC, software and provide training on how to use photo badge system. CAT 6 cable jacket finish color shall be green.

B. A certified technician shall provide 12 hours of training on the following but not limited: add future devices, update software, change software to a different server, integrate other building systems, delete existing card data, assign new card to system, trouble shoot, etc..

C. SUBMITTALS

1. Submit under provisions of Section 13700.
2. Manufacturer's Data: Submit copies of the following:
    a. Product data sheets and system description.
    b. Installation instructions.
    c. Authorized dealer certificate and certified training certificates of installers who will be working on this project.
    d. Block diagrams.
    e. Equipment list.
3. Shop Drawings: Submit the following:
    a. Access system layout and locations, including size requirements.
    b. Detailed wiring diagrams of access equipment.
    c. Load calculations of all equipment for proper sizing of electrical provided by the customer and standby emergency generator circuits.
4. As-Built Drawings: Update shop drawings to create final as-built drawings. Submit 3 copies and digitally in AutoCAD 14 or later format on a CD (3 copies).
5. Operation Data: Include 3 copies of the software administrator and operator manuals.
6. Maintenance Data: Include maintenance and repair procedures.

D. References

1. Reference Standards: Systems specified in this section must meet or exceed the following requirements:

a. Federal Communications Commission (FCC)
    i. FCC Part 15 – Radio Frequency Device

b. Underwriters Laboratories (UL)
    i. UL294 – Access Control Systems Units
    ii. UL991 - Standard for Tests for Safety-Related Controls Employing Solid-State Devices.
    iii.

c. Electronic Industries Alliance (EIA)
    i. RS485 - Electrical Characteristics of Generators and Receivers for use in Balanced Digital Multi-Point Systems

d. Federal Information Processing Standards (FIPS)
    i. Advanced Encryption Standard (AES) (FIPS197)
    ii. Personal Identity Verification (PIV) of Federal Employees and Contractors

e. Homeland Security Presidential Directive 12 (HSPD12)

1.2 QUALITY ASSURANCE

A. Quality Assurance:

1. Manufacturer: The access control system shall be from a single-source manufacturer that specializes in IP Based access control systems with a minimum of 5 years of experience.

2. Installer: Company specializing in access control systems with a minimum of 3 years of experience on systems of similar size and scope. Technicians working on project must have been certified on the hardware and software used for this project.

1.3 WARRANTY

A. Manufacturer's Standard Warranty:

3. Access Control System Warranty: 1 year limited warranty.

B. Definitions

a) Access Card: A coded employee card, usually the size of a credit card, recognizable to the access control system and read by a reader to allow access. It can be used for photo identification of the cardholder and for other data collection purposes. Card technologies include magnetic strips, wiegand-effect, proximity (active/passive), barium ferrite, smart/intelligent cards, and NFC enable applications on mobile devices.

b) Access Control System: An interconnected set of controllers, managing the entrance and exit of people through secure areas.

c) Access Level: The door or combination of doors and/or barriers an individual is authorized to pass through.

d) Anti-Pass back (Anti-Tailgating): This feature protects against more than one person using the same card or number. It defines each system card reader and card ID number as IN, OUT or other. Once a card is granted access to an IN reader, it must be presented to an OUT reader before another IN reader access is granted. Cards will continue to have access to all authorized OTHER readers.

e) Alarm: A signal that indicates a problem.

f) Alarm input: A device that is monitored by the access control panel. An alarm signal will be generated if the device is activated.

g) Badge: Badge is a template or a design for creating a card. WIN-PAK includes a full-featured badge layout utility for designing, creating, and printing badges. Badge design includes magnetic stripe encoding, bar coding, signatures, and so on.

h) Bar Code: A method of encoding information using lines and blank spaces of varying size and thickness to represent alphanumeric characters.

i) Biometrics: A general term for the verification of individuals using unique biological characteristics (i.e. fingerprints, hand geometry, voice analysis, the retinal pattern in the eye).

j) Card and Card Holder: A card is an identity proof of a person and a card holder is a person who holds the card. Multiple cards can be assigned to a single card holder to provide different access.

k) Controller: A microprocessor based circuit board that manages access to a secure area. The controller receives information that it uses to determine through which doors and at what times cardholders are granted access to secure areas. Based on that information, the controller can lock/unlock doors, sound alarms, and communicate status to a host computer.

l) Card Reader: A device that retrieves information stored on an access card and transmits that information to a controller.

m) Digital Video Recorder (DVR): A security system device that records the video from the surveillance cameras (IP and Analog) on a hard disk.

n) Door: A generic term for a securable entry way. In many access control applications, a "door" may be a gate, turnstile, elevator door, or similar device.

o) Duress: Forcing a person to provide access to a secure area against that person's wishes.

p) Input: An electronic sensor on a controller that detects a change of state in a device outside the controller.

q) Integrated lockset: An integrated, intelligent locking solution that requires typically runs on batteries, but can be externally powered, that contains most of the door components, i.e. reader, door contact, and request to exit in a single, mountable unit.

r) Keypad: An alphanumeric grid which allows a user to enter an identification code. A flat device which has buttons that may be pressed in a sequence to send data to a controller, and which differs from a typewriter-like computer board.

s) Output Relay: A device that changes its state upon receiving a signal from a controller. Typically, the state change prompts an action outside of the controller such as activating or inactivating a device. The auxiliary relays found in access control panels or NODES that control external devices.

t) Shunt Time: The length of time a door open alarm is suppressed (shunted) after a valid card access or free egress request. This time should be just enough to allow a card user to open a door or gate, pass through, and then close it.

u) Time Schedules: Schedules that allow cards to function or not function depending on the time of day. This is used to limit access to the facility. The schedule may include not only time but which days of the week a card is valid.

v) Video Management System (VMS): An enterprise-class video management and storage solution.

PART 2. PRODUCTS

2.2 GENERAL

A. Contractor Responsibility

All products not provided by [Client] shall be new and unused, and be provided from the manufacturer's current and standard production. Where two or more equipment items of the same kind are provided, all shall be identical and provided by the same manufacturer. Drawings and specifications shall indicate major system components, and may not show every component, connector, module, or accessory required to support the operation specified. Contractor will provide all components needed for complete and satisfactory operation.

2.3 PRODUCT AVAILABILITY

A. Wire and Cable

1. Installation

All wire and cable required to install systems shall be provided as indicated. Wire and cable shall be sized to provide minimum voltage drop and minimum resistance to the devices being supplied.

2. All cables will be specifically designed for their intended use (direct burial, aerial, etc.).
3. All wire and cable will comply with the equipment manufacturer's recommendations for wire and cable.
4. Color codes will be consistent in cables used for the same purpose.
5. All wire and cable will comply with all applicable codes and ordinances.
6. All Power over Ethernet (PoE) cable will be either Cat 6 plenum rated.

B. Conduit and Raceway Systems

1. General: [Client] shall approve the placing of surface mounted conduit on the exterior of any building prior to its installation.
2. All interior and exterior conduit and raceway systems used shall be compliant with applicable codes and ordinances.
3. Interior Conduit
   a. Electrical metallic tubing (EMT)
   b. Flexible Metal Conduit
   c. Provide fittings and connectors as required for installation of EMT or flexible conduit.
4. Surface Raceways
   a. Sheet metal channel with fitted cover, suitable for use as surface metal raceway, Wiremold or approved equal.
   b. Provide fittings, elbows, and connectors designed for use with raceway system.
5. Exterior Conduit
   a. Rigid steel conduit
   b. Rigid aluminum conduit
   c. Rigid nonmetallic conduit (only if buried 18 inches below ground surface).

d. Intermediate metal conduit

e. Provide rain-tight fittings and connectors as required for installation of exterior conduit.

6. Exterior Flexible Conduit

a. Liquid-tight flexible conduit: Flexible metal conduit with PVC jacket.

b. Provide rain-tight fittings and connectors as required for installation of Liquid tight Flexible Conduit.

C. Junction and Pull Boxes

1. Interior Boxes; Sheet Metal Outlet Boxes: Sizes are determined in accordance with code requirements for conductor fill. No box will be smaller than a single gang 1-1/2 inch deep. Box covers will be provided as required.

2. Exterior Boxes: All exterior boxes shall be NEMA 4 or NEMA 3R, watertight and dust-tight.

3. Controller Boxes: All controller boxes provided are 2-gang boxes.

4. All interior and exterior box covers will be fastened using security screws.

D. Lightning Protection

1. The Contractor shall provide suitable lightning protection for all EAC equipment.

2. All lightning protection equipment will be UL Listed.

E. Surge Protection

1. The Contractor shall provide suitable surge protection for all EAC equipment.

2.4 GENERAL REQUIREMENTS FOR ACCESS CONTROL SYSTEM

A. The ACSMS shall be a highly scalable, robust access control and security management system developed using the latest in development technology. The ACSMS shall provide a singular interface capable of controlling multiple, geographically independent sites and provide alarm monitoring, video management integration, ID badging, personnel and cardholder management, and situational control of all connected devices from a single application.

B. The ACSMS must support credential readers that communicate via wiegand, RS-485, or clock and data communications formats.

C. The ACSMS must support the Open Supervised Device Protocol (OSDP).

D. A sufficient number of controllers and sub-controllers will be provided to monitor all credential reader, monitor point, and relay point locations shown on plan.

E. Capacities

1. Maximum intelligent controllers per application server: 256
   i. Intelligent controllers can be geographically independent
   ii. Must support IP and/or RS-485 communication methods.

2. Maximum sub-controllers per controller: 32
   i. This number varies per model of controller.
   ii. Some controller models may have a smaller number for maximum sub-controllers.
   iii. Must be able to expand for future use.

3. Maximum doors per intelligent controller: 64
   i. This number varies per model of controller.
   ii. Some controller models may have a smaller number for maximum doors
   iii. Must be able to expand for future use.

4. Maximum pin digits: 15

5. Maximum card formats: Unlimited

6. Maximum Time Schedules per intelligent controller: 255

7. Maximum holidays per intelligent controller: 255

8. Maximum number of personnel records: Unlimited

9. Maximum number of operators: Unlimited

10. Maximum number of client connections: Unlimited

F. The ACSMS shall be capable of the following features:

1. Multi-User/Network Capabilities: The ACSMS shall support multiple operator workstations via local area network/wide area network (LAN/WAN). The communications between the workstations and the server computer shall utilize the TCP/IP standard over industry standard IEEE 802.3 (Ethernet). The communications between the server and workstations shall be supervised, and shall provide the ability to generate alarm messages when the server is unable to communicate with a workstation.

2. Operating Environment: The ACSMS shall be a 3-tier client/server, ODBC compliant application based on Microsoft tools and standards. The ACSMS application shall operate in the following environments: Microsoft Windows® Server 2008 R2 SP1, Microsoft Windows® 7 Professional SP1 (64-bit), Windows Server 2012 R2, Windows 8.1 Enterprise/Professional, and Windows 10 Enterprise/Professional.

3. Multi-level Password Protection: The ACSMS application shall provide multi-level password protection, with user-defined operator name/password combinations. Name/password log-on shall restrict operators to selected areas of the program. The application shall allow the assignment of operator levels to define the system components that each operator has access to view, operate, change, or delete.

4. NT Authentication: The ACMS application will support the implementation of NT authentication, thereby utilizing the credentials supplied by the network administrator to authenticate during the login process of the system.

5. Strong Password Enforcement: The ACSMS application shall have an option to enforce strong passwords and by setting minimum character lengths and complexity requirements.

6. Graphical User Interface: The ACSMS shall be fully compliant with Microsoft Graphical User Interface (GUI) standards, with the look and feel of the software being that of a standard Windows application, including hardware tree-based system configuration.

7. Concurrent Licensing: The ACSMS shall support concurrent client workstation licensing. The ACSMS application shall be installed on any number of client workstations, and shall provide the ability for any of the client workstations to connect to the application server as long as the maximum number of concurrent connections purchased has not been exceeded.

8. Access Control Software Suite: The ACSMS shall be a scalable application such that there is no requirement for separate tiers or editions of software. The same code set used for smaller, more localized installations, shall be the same code set used for enterprise system deployments.

9. Relational Database Management System: The ACSMS shall support industry standard relational database management systems (RDMS). This shall include the following: Microsoft SQL Server 2012 Express/Enterprise Edition, Microsoft SQL Server 2008 R2 Express/Enterprise Edition, Microsoft SQL Server 2014 Express/Enterprise Edition, and Microsoft SQL Server 2016 Express/Enterprise edition.

10. System Partitioning/Filtering: The ACSMS shall provide the option to restrict access to personnel and hardware data based on login and profile.

11. Encryption: The ACSMS shall provide multiple levels of data encryption.

    i. Must support 128-bit or 256-bit AES data encryption between the host and intelligent controllers. The encryption shall ensure data integrity that is compliant with the requirements of FIPS-197 and SCIF environments. Master keys shall be downloaded to the intelligent controller, which shall then be authenticated through the Access Control and Security Management System based on a successful match.

    ii. Transparent database encryption, including log files and backups.

    iii. SQL secure connections via SSL.

12. Industry Standard Panel Communication: The ACSMS shall communicate with the access control intelligent controllers via LAN/WAN connections utilizing industry standard communication protocols.

13. Supervised Alarm Points: The ACSMS shall provide both supervised and non-supervised alarm point monitoring with the ability to specify custom values of resistance. On recognition of an alarm, the ACSMS shall be capable of switching and displaying the video from the camera connected to the video management system that is associated with the alarm point.

14. Multiple Account Support: The ACSMS shall allow support for multiple accounts allowing separate access to the personnel database, badge layout, operator access, and reporting. Physical hardware may be filtered by profile level into “sites”. “Sites” may be assigned to one or more operator profiles. The system shall allow control of common areas between operator profiles. Access levels and time schedules shall be global to allow for easy administration and filtering. The global access levels and time schedules shall be capable of being used by one or more operator profiles.

15. Video Management System Support: The ACSMS shall integrate with no less than 10 brands of video management systems (VMS) Shall support owners existing system Insight video management system version 7.1214.

16. Camera Support: The ACSMS shall support, via integrated VMS platforms, pan, tilt, zoom, and touring features. Shall support owners existing cameras.

17. Display Live Video: The ACSMS shall support an option to view live video from a camera connected to an integrated VMS. The cameras from the integrated VMS shall be able to be associated with any hardware device programmed in the ACSMS and opened automatically on any system event or operator initiated command sequence.

18. Global/Anti-Passback: The ACSMS shall support multiple modes of anti-passback, by which cardholders must follow a specified sequence of card reads in the configured areas.

19. Alarm Events: The ACSMS shall include a feature where alarm events with defined priorities shall be able to pop-up automatically in an Alarm event window for operator attention. The pop-up shall display the following information: description of the event, time, date, point description, if a card event the card number, type of event and cardholder name. An event counter shall also display the number of times the event was reported to the Alarm event monitor prior to Acknowledgement or Clearing the event. Event instructions shall be made available by double clicking on the event. The Alarm shall also display an icon to indicate that a camera is associated to the device. The Alarm event window shall allow the operator to initiate a physical response to the event as well as a written response. Responses shall include but not be limited to: acknowledge, clear, open a pre-programmed floor plan, activate, de-activate, pulse, time pulse, add comment, retrieve archived video, and bring up live video, disarm, or arm.

20. Global Device Control: The ACSMS shall allow manual control of one or more selected inputs, outputs, and doors. Global device control shall include pulse, timed pulse, and energize/de-energize or return to normal options for output points and arm/disarm or return to normal options for input points. For global control of doors the ACSMS shall include Disabled, Unlocked, Locked, Facility Code Only, Card Only, PIN Only, Card and PIN, Override Mode, and Cancel Override Mode.

21. Global Edit: The ACSMS shall support, by way of a multi-select function, a method to globally edit input points, outpoint points, doors, readers, personnel and cards.

22. Levels of System Operation: The ACSMS shall include a feature to define the levels of system operation for each individual operator using passwords and profiles. System operation for individual operators shall include, but not be limited to, restricted time periods for login, inactivity notifications, and lockout for failed logon attempts. Operator actions range from no view or control rights to basic monitoring including the ability to block the viewing of card and or personal identification numbers, to full control of the system including programming.

23. Distributed Processing: All the control components of the ACSMS shall utilize “Distributed-Processing” design. The distributed processing shall include the ability to download operating parameters to any field panel, thus allowing the field panel to provide full operating functions independent of the ACSMS application server.

G. The ACSMS shall have the major functional capabilities (considered essential for the system described in this specification) categorized as follows:

1. All transactions and audits shall be logged by date and time to the database.

2. The end-user shall have the ability to make any system configuration changes such as, but not limited to door open time, door contact shunt time, point and door names, when and where a cardholder is authorized, and the ability to add or modify personnel records at any time and without assistance from the manufacturer or system installer.

3. Shall support Global Anti-pass back, feature allowing cardholders to enter/exit any such defined card reader area on any intelligent control panel provided they follow the required in/out flow.

4. Anti-pass back modes shall include: hard (no forgiveness), soft (allows access but generates an alarm event) and timed for all readers on the intelligent controller, on specified reader or card for a definable period of time up to 1092 minutes.

5. Shall support a Duress PIN feature that is configurable in operation by which the cardholder either adds a specified digit to their unique PIN or appends a specified digit to their unique PIN.

6. Shall support Two Card Control on any door, by which two different credentials with the proper access must be presented at the same door within a 5 second window of time.

7. Shall support a Photo Recall option with four separate, configurable windows that displays the photo(s) associated with the personnel records as the credentials are used. The Photo Recall windows shall be configurable to show the credential reads from all doors, or only specific doors. In addition, the Photo Recall window shall be configurable as to what system data will be displayed for each transaction.

8. Shall support the scheduling of any system or custom system reports.

9. Shall support Auto-Email function, by which any event or device in the system can be configured to send an email using replacement parameters. The replacement parameters

shall be used to query data from the database for insertion into the body, subject line, or address field of the email.

10. All updates and changes to the programming in the intelligent controllers shall take place real-time and will not require manual downloads to propagate system changes.

11. Shall have an available Application Program Interface (API) built on current development technologies that allows the integration of third party programs or systems.

12. Shall be an intuitive Graphical User Interface (GUI) that implements a multi-document layout. An operator will not be required to close or switch views to another part of the application in order to edit or view any aspect of the system. The GUI must be fully customizable allowing for an infinite number of operator views to be created and assigned. The GUI must support drag and drop functions within the multi-document interface.

13. Shall support global I/O functions, by which any point in programmed in the system can be configured to control any other point on the system regardless of which intelligent controllers they reside on.

14. All necessary system drivers shall run as Windows services and as such do not require the Operating System to be logged in on the application server.

15. Shall have support for thick client, web client and mobile client applications that provide system management functions.

16. Shall support a Situation Level Manager that provides five different states that can be initiated by clicking on a single, color coded button. The Situation Levels shall by configurable on the following objects: Doors, Time Schedules, Input Points, Output/Relay Points, and Credentials.

17. Shall provide intuitive Info-Ready™ reporting by which an operator must only right click on an object to run a Trace History Report, Has Access To, Who Has Access, Who Does Not Have Access, Last Used, and Non-Use.

18. The GUI shall be developed in such a manner that any place that a personnel record or hardware device is shown that an operator can right click on it and open the properties or execute control functions.

19. Shall support a method of controlling any device connected to the system in order to effectively change the state of a single point or group of points where supported by the hardware.

20. Shall support Direct Commands, which allow the creation of a single button to control a single or multiple devices simultaneously by clicking one button, based on operator privileges.

21. The Direct Commands shall be one of many ways to incorporate facility lockdowns and return to normal or all clear states.

22. Shall support the ability to password protect the Direct Commands to require additional authentication prior to execution.

23. Must support the ability to remove an input point from service, where by any change of state on that point is ignored, regardless of the point arm/disarm state. Removing a point from service goes beyond disarming the point, as it can be rearmed via a programmed or manual event, thereby reporting alarm conditions once again. A point that has been removed from service must be returned to service in order to see change of state events on it.

24. Must support Override Modes on doors, whereby the current mode of the door can be overridden to another state. (i.e. Card Only, Card & PIN, Locked, Disabled). When the mode

of door has been overridden, it will remain in that state, regardless of any scheduled commands or manual control initiated based on time or operator execution. When the override mode is canceled, the door will revert to the state that it is supposed to be in. I.E. if a time schedule has activated to unlock the door, then it will revert to that state without any additional programming or intervention from the operator.

25. Removal from service and override modes must be selectable with the following options:
    i. Indefinite – Meaning the state will remain until it has been canceled
    ii. For a specified number of minutes.
    iii. Until a specific time of the current day.

H. Personnel and Cardholder Management

1. Shall provide a personnel browser method of managing personnel data in a hierarchical tree. The personnel browser shall be sortable by any field of data stored in the personnel record.

2. Shall have the ability to create unlimited custom personnel groups that personnel records can be assigned to where by personnel records can be assigned to one or more personnel groups.

3. Shall have the ability to assign default access levels to custom personnel groups that cardholders will inherit or disinherit as they are added or removed to or from custom personnel groups.

4. Shall have the ability to assign one or more credentials to a single personnel record.

5. Shall support a maximum of 128 access levels per credential per intelligent controller.

6. Shall support Precision Access Levels, by which an operator must only click and drag a door into the access level assignment window of the credential and associate a time schedule with it.

7. Shall support a Vacation Start function on credentials to allow the temporary disabling of cards for a specified number of days.

8. Shall support a Temporary Upgrade of Access Levels by which an operator can temporarily assign an access level with start and stop dates.

9. Shall support an activation and deactivation date and time of a credential down to the minute within a day.

10. Shall support the capture of personnel photos and signatures to be used for ID badge printing.

11. Shall support the ability for any personnel or credential field to be retrieved and printed on an ID badge.

12. Shall support the ability for any or all credentials activate or deactivate based on a system controlled Situation Level.

13. Shall support Info-Ready™ ™ reports on personnel groups providing the following information: Last Used and Non-Use.

14. Shall support the ability to assign/re-assign credentials to personnel records by way of a drag and drop convention.

I. Time Schedules and Holidays

1. Shall support up to 255 individual time schedules per time schedule set.

2. Shall support up to 255 individual time schedule sets that are then assignable to intelligent controllers.

3. Shall support up to 12 different start and stop intervals for each day, including holidays.

4. Shall support time schedule templates to quickly build common time schedules.

5. Shall support a copy feature to copy time schedules between time schedule sets.

6. Time schedules shall be assignable to any or all access levels or precision access levels.

7. Shall support the ability to manually control any or all time schedules programmed in the system by providing the following commands: Temporary Off, Temporary On, Override Off, Override On, and Resume Normal State.

8. Shall support the ability for any or all time schedules to be manually controlled by the changing of the Situation Level Manager.

9. Shall support up to 255 holiday sets that are then assignable to intelligent controllers.

10. Shall support creating a holiday to span up to 365 days.

11. Shall support up to eight different holiday types.

J. Access Levels

1. Shall support an unlimited number of access levels.

2. Access levels shall be capable of being global or intelligent controller based.

3. Shall support the option to assign activation and deactivation dates/times to access levels.

4. Shall support three types of escort requirements for access levels: Not an Escort, Is an Escort, and Requires an Escort.

5. Shall support a default time schedule to be assigned to the access level or separate time schedules to individual doors within the access level.

6. Shall support eight different access level categories that can then be assigned to operator profiles granting rights to assign the category of access level or not.

7. Shall support an Info-Ready report named Assigned To that provides a list of all credentials the access level is assigned to with the ability to remove the access level from cardholders directly from the result set window.

8. Shall support a click and drag method of assigning access levels to a single credential, personnel record, or group of personnel records.

K. Hardware

1. Shall support a browser based, hierarchical tree structure that displays the programmed hardware with current states and provides command and control capabilities based on operator privileges.

2. The tree structure shall be developed in such a way that it is intuitive for the operator to navigate by providing common groupings of like devices and supports scrolling within the window by a scrollbar or mouse scroll wheel.

3. The tree structure shall provide, based on operator privileges, the ability to group edit and control similar devices.

4. The tree structure shall have an option to display a tooltip upon hovering over a specific device to obtain detailed status information. Tooltips will be configurable as to size, duration, and content presented when displayed.

L. Integrated ID Badging

1. Shall have an integrated photo capture and ID badging module.

2. The integrated ID badging module shall support an unlimited number of badge templates.

3. The badging station shall include a badge designer to create badge templates.

4. The badge designer shall allow any data field associated with a personnel record to be printed or otherwise used on the credential.

5. The integrated ID badging module shall support a dedicated, high end photo badging camera from Valcam
    i. Model# 9000-628

6. The integrated ID badging module shall support, through the use of a third party TWAIN Driver, the ability to use any TWAIN compliant USB camera.

7. The badge designer shall provide scripting capabilities to create a robust and streamlined template process by which the layout of a single template can be edited based on data retrieved from the personnel record.

8. The integrated ID badging module shall support a cropping mechanism in order to resize photos and select the printable area of the picture.

9. The integrated ID badging module shall support any credential printer that has a Windows print driver

10. The integrated ID badging module shall offer, depending upon the printer selected, the ability to create a template that will read the encoded card number from the credential as it passes through the printer during the printing process and then associate it with the personnel record automatically, thereby removing the need for the operator to manually enter the credential number. This feature will require a reader/encoder be installed inside the printer prior to setup.

11. The integrated ID badging module shall provide a print preview function that allows the operator to verify the credential format prior to actually printing it.

12. The integrated ID badging module shall support the capturing of signatures during the credentialing process.

13. The integrated ID badging solution should support a batch printing function, by which operators can create batches to print based on specific search criteria.

14. Batch printing module will support intelligent card printing functions, by which the encoded credential numbers can be read during the printing process and populate the personnel records with new card information.

M. Photo Badge Creation and Printing:

The system shall be able to design Photo Identification ID Badges using the same cardholder photographs that are stored in the System Manufacturer database / system and shall support and perform the following:

1. Digital photographs shall be stored as Blob in the database, or as JPEG, or both methods as a Blob and JPEG, as determined by system owner.
2. System shall be able to add static and dynamic data fields from the cardholder information, as well as photographs, graphic images, shapes logos, and backgrounds.
3. System shall be able to apply style and layout changes to any static or dynamic data fields; including resize, scale, rotate, flip, border/outline, color, font-style, font-size, and text related attributes such as bold, italics, underline.
4. Shall support standard graphic image editing, cropping, resize/scale, flip and rotate, border.
5. Shall be able to add and print unique, functioning bar codes in 1D (linear) and 2D (data matrix) formats.
6. Shall print badge designs in portrait or landscape layout, and shall be able to print single-sided or double-sided (i.e. one or both sides) PVC type cards using an IP or USB compatible, dye-sublimation printer.

N. Integrated Graphics Maps

1. Shall provide, with no additional licensing fees required, an integrated and robust graphical map module allowing for the importation of floor plans and other .JPG or .BMP files for use in plotting hardware and other connected devices programmed in the system onto the graphic layouts.

2. Shall support the ability to assign a graphic map as a homepage of any point in the system, thereby linking that device to that map and allowing the system to automatically load the graphic upon an alarm condition from any point that is plotted on it.

3. Shall support any command and control or reporting functions available in the Hardware Browser for any point that is plotted on a graphic map.

4. Shall support the hyperlinking of graphic maps to one another, thereby creating a “drill down” effect.

5. Shall support the ability to plot any camera that is integrated to the core application onto a graphics map and display the live video in a tooltip window upon the operator hovering over the icon, or displaying of live video in a video container window upon left clicking the camera icon.

6. Shall support the real-time status updating of points that are plotted on a graphics map by configurable colors, shapes, or icons.

7. Shall support the ability to plot the same device on a single graphic map multiple times to get varying states of status reported simultaneously.

8. Shall support the ability to create buttons on the graphic maps which can then be linked to Direct Commands.

O. Mobile Applications

1. Must have mobile applications supported on Android and iOS devices

2. Mobile applications will be native applications and not remote/mobile browser solutions.

3. Mobile applications will be available for download from the respective application markets, and will not require side loading of any kind.

4. Mobile applications will utilize profiles established in the DNA Fusion system to control what the operator has the ability to do via the mobile application.

5. Mobile application will support the following features:
    i. Secure login using SSL
    ii. Alarm viewing/acknowledgement
    iii. Door status and control
    iv. Add personnel record and take photo using device camera
    v. Personnel control, to include adding access levels and taking photos using the devices camera
    vi. Direct Command execution allowing for site or system lockdowns.
    vii. Trace History reporting
    viii. Live camera viewing from supported/integrated Video Management Systems.

P. Integrated IP based access control hardware

1. The ACSMS must fully support the intelligent, IP based readers.
2. The ACSMS must support the intelligent, IP based access control panel from Axis Communications.
    i. A1001

Q. Integrated Video Management Systems

1. Shall support the integration of Digital Video Recorders (DVR) and Network Video Recorders (NVR) from the following manufacturers:

    i. Milestone
        1. Corporate
        2. Enterprise
        3. Professional
    ii. ONSSI
        1. Occularis
    iii. ExacQ Vision
    iv. Video Insight (owners existing) version 7.1214
    v. Bosch
    vi. Salient Systems
    vii. 3XLogic
    viii. Avigilon
    ix. March Networks
    x. Act-I

2. Shall support the ability to associate cameras from DVR/NVR to hardware devices in the software.

3. Shall support, at minimum, the ability to launch live and recorded video based on a right click command in the owner software, or automatically based on a pre-programmed event based action.

4. Shall support the ability to initiate presets or PTZ controls

5. Shall support a bi-directional function, where by access control hardware, events, and controls are available in the respective VMS application.

    i. Video Insight

R. Integrated Biometrics

1. Shall support an integration with the following biometric solutions

    i. Morpho
        1. Morpho 3D Face Reader
        2. MorphoAccess SIGMA Series
        3. Outdoor MorphoAccess 500 Series
        4. MorphoAccess J Series
        5. MorphoAccess 500+ Series
        6. MorphoAccess VP Series
        7. MorphoSmart 300 Series (Enrollment Only)

    ii. Suprema
        1. BioEntry Plus
        2. BioEntry W
        3. BioLite Net
        4. BioStation
        5. BioStation T2
        6. FaceStation
        7. FaceStation 2

    iii. Allegion
        1. HK
        2. HKII

2. The integration shall be direct, by which the biometric templates are captured via the software and will not require manual entry via 3rd party application.

S. Integrated Wireless/Intelligent Locks

1. Shall support the following wireless/intelligent lock sets from Mfr. Stanely:

T. Integrated Intrusion Detection Systems

1. Shall support an integration with the following Intrusion Detection Systems (IDS) by providing real-time event reporting and control capabilities.

    i. DMP
        1. XR500N

2. Shall show in the Hardware Browser real-time states of the areas and zones from the IDS panels.

3. Shall support right click functionality for controlling the arm/disarm states of the areas/zones.

4. Shall allow for the areas/zones from the IDS panels to be plotted on graphic maps in the software.

5. The following IDS receivers shall be supported by the ACSMS to provide monitoring only capabilities of connected IDS panels.
    i. DMP SCS1R

U. Integrated Visitor Management Systems

1. Shall provide a mechanism, Flex API, which allows for the integration of the following 3rd party Visitor Management Systems.

i. Raptor Technologies (existing)
ii. HID EasyLobby
iii. iVisitor
iv. Stopware

2. The integrated Visitor Management Systems shall be certified as an approved integrated solution by ACSMS.

3. Visitor Management shall support the ability to assign access privileges and add credentials to the access control system, as well as set credential expiration through the visitor management interface. Shall include ability to manage visitor credentials and access privileges including credential expiration from the access control system (System Galaxy). Shall support visitor signing into and out of the visitor management system and be registered with the Access Control System (ACS) and with the access privileges activated/deactivated as appropriate. Shall support visitor management through HID Global Easy Lobby® or Stopware™ PassagePoint Global

V. Real-time Guard Tour shall track and monitor progress and times from tour start and progress to check points, to tour stop. Sequential and Random tours supported, Track late/overdue tour start, late/overdue to check points, late to finish tour. System shall report missed points, expired and incomplete tours, successful tours, and time expired between tours. System shall support multiple tours using a common start reader and starting tours with PIN codes
W. Real-time Hall Pass / Card Tour shall track and monitor progress and times from tour start and progress to select checkpoints, to tour stop. The system shall provide notification based on skipped checkpoints and incomplete / overdue tours.
X. Graphical Display of building maps shall be provided on all access control workstations using dynamic icons that display real-time status of doors and alarm points.
Y. Report Generation shall be provided for all system events and alarm events by date and time.

1. System Interface shall provide the following:
a. A real-time display of all alarms and system events
b. The ability to archive all events to the SQL database
c. And shall serve as the instrument through which all system programming is accomplished.

Z. Integrated Intercom Systems

1. Shall provide a means to integrate intercom master and sub-stations into the application.

2. The master and sub-stations shall be displayed in the Hardware tree in a hierarchical manner (i.e. Master station with associated sub-stations)

3. The status of the connected devices shall be represented in the Hardware tree notated by the following colors:

i. Green – Station is online and idle (i.e. ready for a call)
ii. Blue – Station is busy
iii. Red – Station is currently connected to another station (in a call)
iv. Black – Offline or non-existent

4. Shall provide a means in which to control the connected devices by a right-click menu option to execute the following functions:

i. Make Call – Initiates a call to the selected station
ii. Cancel Call – Terminates the current call in progress
iii. Answer Call – Opens communications for the incoming call

5. Shall provide the ability to plot the intercom devices on a graphics map.

i. Intercom devices on the map shall provide the ability to indicate status

ii. Intercom devices on the map shall provide the ability to control the connected devices

6. Shall provide the ability for automatic camera call up on intercom device status changes (i.e. Incoming call from sub-station calls up a live camera view)

7. Shall provide a means of triggering system or hardware control actions based on status changes of the connected intercom hardware

8. Supported Intercom Solutions

   i. Zenitel – Stentofon AlphaCom with supported master and sub-stations
   ii. Other brand manufacture is acceptable as long it can integrate with the ACSMS

2.4 ACCESS CONTROL AND SECURITY MANAGEMENT SYSTEM REQUIREMENTS

A. The ACSMS may consist of multiple components based on the type of ACMS. These components may run on a single computer, virtual or physical, or on multiple computers allowing scalability in the configured architecture.
Contractor is responsible to verify with ACSMS manufacturer on sizing a server with additional 25% spare capacity and include the number of servers the ACSMS requires.

B. Application Services and Driver Components

   i. OpenDX
   ii. DVR/NVR integration driver
   iii. Alarm panel driver
   iv. Axis driver
   v. Flex API
   vi. Stentofon driver
   vii. Camera events driver
   viii. Thyssen-krupp driver
   ix. Kone driver
   x. SMTP mailer
   xi. Scheduled export
   xii. Time and attendance module
   xiii. Time tracking module
   xiv. Mustering module
   xv. Badge Designer
   xvi. Photo ID module
   xvii. Video audio

C. Mobile and web interfaces

   i. Web browser

   ii. Mobile for iOS & Android

D. Access Control Software Interfaces

   i. Open DX – Personnel data exchange tool used for provisioning personnel/cardholder information and access level assignment within the ACSMS there by creating a logical link to the authoritative data source. The authoritative data source shall be one or more ActiveX Data Objects (ADO)

compliant connections. Some examples of ADO compliant connections are Microsoft Active Directory, PeopleSoft, SQL Server database, CSV file, etc.

ii. Flex API – A robust Application Programmer's Interface to be used for the integration of 3rd party systems in order to expand the overall ACSMS. These systems can include, but are not limited to, visitor management systems, video managements systems, identity management systems, intrusion detection systems, and physical security integration modules (PSIM).

B. Technical Requirements

1. Environment

a. The system shall be designed to operate, per the requirements in this technical specification, within the following ambient conditions:

b. Computer Components

1) Temperature: 50 °F to 86 °F (10 °C to 30 °C)

2) Humidity: 20% to 80%, noncondensing

c. Components installed interior or exterior

1) Temperature: -4 °F to 200 °F (-20 °C to 70 °C)

2) Humidity: 0 to 95% (non-condensing)

d. The security contractor shall take all necessary precautions to ensure the proper functioning of the system components within the above-defined ranges, or within the manufacturer's defined ranges, whichever applies.

2. System Capacities

a. The functional capabilities shall be considered standard, without the need for add-on software or hardware.

b. The system shall require a server with the ability to support a minimum of 20 concurrent (logged on) control locations utilizing LAN/WAN network connection.

c. The system minimum capacity shall be 500 readers and 10,000 cardholders. The system shall be able to expandable for future use.

3. System Components

a. The complete system integrates three distinct groups of components:

1) Primary Components such as the power/communication unit, door controllers, and readers.

2) Secondary Components such as magnetic contacts, motion detectors, and locking devices.

3) Control Stations such as the server, secondary station, and display monitors.

b. Primary Components

1) Ethernet Access Controllers

a) The Ethernet access controller shall be one of recent technology, based on a microprocessor, and shall be compatible with a reader for proximity type cards. It shall have previously demonstrated its capacities in a similar access control application. It shall be capable of storing a maximum of 16,000 events in a stand-alone operation, and be capable of transmitting this information to a management system when the network is reconnected.

b) The Ethernet access controller shall incorporate a web browser interface server for administration of the controller through a standard Microsoft® Internet Explorer® browser. The Web page shall closely emulate the optional rich-client host software used to administer the system.

c) Memory for the Ethernet access controller shall be flash-based and

nonvolatile. If power to a controller is lost, upon restoration of power, the unit shall retain all information contained at the time of the power loss including cardholder database, system configuration, and event transaction history.

d) The Ethernet access controller shall be modular and include terminations for wiring to other electronic modules.

e) The Ethernet controller shall communication using 10BASE-T standard.

f) Ethernet access controllers shall provide encryption (AES 128 Bit) at both the system level and domain level.

g) The following information shall be set and accessed from each controller by way of Ethernet communication:

   (1) IP address

   (2) Protocol used for assigning address: DHCP or Static

   (3) Serial number

   (4) Ability to either enable or disable Web mode (direct browser-based communication with the controller)

   (5) Ability to provide verification/validation of a security key

h) The Ethernet access controller shall incorporate support for peer-to-peer communications between Ethernet access controllers. Up to 32 Ethernet access controllers shall be configured in a single domain and shall communicate peer-to-peer with each other.

i) The Ethernet access controller shall be equipped with an input/output port allowing communication with a network switch. If one of the Ethernet access controllers should lose power, it shall not affect the operation of the other access controllers.

j) The Ethernet access controllers shall have the ability to acquire alarms, validate the cards, and command doors when required.

k) The Ethernet controller shall be placed in a 2-gang box housing, recessed or surface mounted, as close as possible to the zone. The controller housing shall be secured with an anti-theft screw.

l) The Ethernet controller shall have an integrated warning buzzer to locally signal alarms.

m) The mounting position of the Ethernet controller within its housing shall have two levels:

   (1) Extended: The Extended level shall allow the connection of the equipment wiring.

   (2) Recessed: The Recessed level shall allow for the installation of the protective cover.

n) The wiring distance between the network switch and each Ethernet controller shall be a maximum distance of 100 meters (328 feet). The VDC voltage from a Power over Ethernet (PoE) switch shall be convertible to the VDC power necessary (48 VDC [350 mA]) to maintain appropriate power to the equipment connected to the controller.

o) Address confirmation of each controller shall occur automatically without the use of DIP switches.

p) The controller shall be able to integrate two card readers allowing for timed “hard” and “soft” anti-passback. Using peer-to-peer communications, the controller shall not require server communications for the anti-passback function to fully operate.

q) LED displays shall indicate the status of the input and output points directly on the controllers to facilitate local visual diagnostics.

r) Each Ethernet controller shall have four input points, four output points including an integrated warning buzzer, two external 12 Vdc power outputs, and two ports for intelligent proximity card reader with or without keypad.

s) Ethernet controllers shall be capable to fulfill the following power requirements to the following connected devices:

(1) 12 Vdc (250 mA) to each reader

(2) 12 Vdc (450 mA) for a lock using an open collector relay

t) The controller shall electronically protect output points against overloads and display them on the Event screen.

u) The security contractor shall define the quantity of Ethernet controllers required for the building to be controlled and shall ensure that the quantity conforms to the actual needs.

v) Ethernet controllers shall be concealed above the ceiling. Operating temperatures shall be 0 °C to 54 °C (32 °F to 130 °F).

w) The four input points shall be either normally closed (N.C.) or normally open (N.O.) programmable and shall accept optional end-of-line supervision.

x) Two of the four output points shall share a maximum power source of 450 mA at 12 Vdc with electronic overload protection, and it shall be capable of transferring the necessary voltage from one point to another in the event of a transition. The third output point shall be a single pull double throw (SPDT) relay type or C form with an initial state programmable to a maximum capacity of 5 A at 30 Vdc.

aa) The integrated warning buzzer shall provide a sound level maximum of 85 dB.

bb) The two external power outputs shall provide 250 mA at 12 Vdc, be regulated, and have an electronic overload protection.

2) Card and Code Reader

a) Physical Characteristics

(1) Shall be proximity HID.

(2) Smart Cards.

(3) Battery backup with a 10 year life expectancy.

(4) Bluetooth technology.

(5) Weather proof for exterior use.

(6) Mullion Readers: Reader shall have a width of less than 1.75 inches to mount without modification to narrow rail stile doors.

(7) Mid-Range Reader: Reader must be capable of providing a read range up to 6 inches without modification.

(8) Reader shall be potted with a UL Listed flame-retardant potting material.

(9) Reader cover shall be secured to the reader using a security screw.

(10) Reader shall be designed for both surface mounting and mounting on a single-gang electrical box.

(11) Reader shall operate in a temperature range -31 °F to 151 °F (-35 °C to 67 °C).

b) Performance Requirements

(1) Reader shall provide an operating distance of 1–6 inches depending on the reader model, card model, and mounting environment.

(2) Reader shall be capable of transmitting the card data in the Wiegand

protocol.

(3) Reader shall operate across a voltage range of 8 – 16 Vdc.

(4) Reader shall operate at an average current not to exceed 130 mA DC, and it shall not exceed a peak of 260 mA DC for mid-range keypad units (100 mA DC average, 260 mA DC Peak for Mullion and Mid-Range units).

(5) Reader shall have a lifetime warranty against manufacturer defects and workmanship.

c) Proximity Cards

(1) The Wiegand cards shall be of either proximity or swipe type. They shall be sealed and resistant to normal usage and weather conditions. They shall be of ISO standard credit card size and thickness. They shall also be available in a key chain/key fob format.

(2) They shall be HID iclass.

(3) The cards shall not affect nor be affected by:

(a) Magnetically encoded cards such as credit cards or bankcards, even when stored side by side in a wallet.

(b) Coins, keys, or other metal parts.

(c) Shoplifting detections systems installed in certain retail outlets.

(d) Communication equipment.

(e) Magnetic fields normally found in offices.

(4) It shall be impossible for a person who discovers a card to determine that the card belongs to a particular client.

(5) The access cards shall be guaranteed for a minimum period of two years from any defects resulting from normal use.

(6) The software shall electronically encode the cards so that their availability shall be restricted by the requirement of a particular site code.

(7) HID 125 KHz proximity cards of all standard formats, including Corporate 1000 and long format cards of up to 64 bits, shall be supported.

(8) XceedID 125KHz proximity cards of all standard formats shall be supported.

3) Ethernet 32 I/O Device (for elevator integration)

a) The Ethernet 32 I/O device shall be installed on the same subnet as the system management server.

b) The Ethernet 32 I/O device shall be configured with the system management system.

c) The Ethernet 32 I/O device shall contain 32 channels configurable as inputs or outputs.

d) When the Ethernet 32 I/O device channel is configured as an output can be configured as “normally open” or “normally closed”. When configured as “normally closed, the output will provide a TTL level voltage (5 Vdc).

e) When I/O channels are configured as outputs, the device shall provide a combined current of at least 400 mA to connected devices.

4. Communication Network and Cable

a. Cabling Conduits

1) The general contractor shall supply and the security contractor shall install the primary and secondary conduits in compliance with the following specifications:

a) In the event that the power voltage is superior to 48 V or a hazardous condition exists, the following shall be completed.

b) The wiring shall not be hidden in the divisions or the walls.

c) All conditions shall be subject to codes or norms in force.

d) If there are visible conduits, it shall be possible to use surface conduits. An authorization to do so shall be obtained prior to installation.

e) The use of flexible conduits shall be authorized in the case of descent into a division or in areas that are difficult to access.

f) The sizing of the conduits shall respect a maximum fill of 40%.

g) The general contractor shall use cable paths or designated spaces for cable passage.

2) The contractor shall coordinate the planning and installation of the conduits with the general contractor.

3) The contractor shall verify that the size of the conduits meets the aforementioned requirements and is compatible with the needs. The security contractor shall present any conduit network modifications and adjustments to the general contractor for approval prior to installation.

b. Cables

1) The general contractor shall supply and the security contractor shall install the power cables, control cables, and other cables for the primary and secondary networks.

2) All wires, cables, and connectors shall bear the same identification number at both ends.

3) The cabling required for the readers shall be 6 conductors, 22 gauge.

4) If the use of a terminal block is required, the cables shall be equipped with a fork connector or ring.

5) All spliced connections shall be soldered and indicated on the mechanical plan before soldering. Splices shall be covered with shrink tubing.

6) Cables in housings shall be securely attached with “tie wrap” bindings.

7) All cables used for the installation shall meet the manufacturer recommendations.

c. Equipment Supplied by Others

1) Some specific equipment may be provided and installed by other contractors. The security contractor is responsible for the coordination of his work with that of the other contractors. The security contractor is responsible for the interconnection and shall test the operation of all equipment with that installed by other contractors.

5. Final Inspection:
At the final inspection, a factory-trained representative of the manufacturer of the major equipment shall demonstrate that the system functions properly in every respect.

6. Instruction:
Instruction shall be provided as required for operating the system. Hands-on demonstrations of the operation of all system components and the entire system including program changes and functions shall be provided.

2.5 SYSTEM PERFORMANCE

A. The system shall use a single database for access-control and credential-creation functions.

B. Distributed Processing - The system shall be a fully distributed processing system so that information, including time, date, valid codes, access levels, and similar data, is downloaded to the IP based Reader/Controllers so that each IP based Reader-Controller can make access-control decisions for that location. If communications to ACS Host Workstation is lost, all IP based Reader-Controllers shall automatically buffer event transactions until communications are restored, at which time buffered events shall automatically be uploaded to the ACS Host.

C. Network

1. The TCP/IP network interconnecting the system components shall provide automatic communication of status changes, commands, field-initiated interrupts, and other communications required for proper system operation.
2. Network communication issues shall not require operator initiation or response, and the network shall return to normal after partial or total network interruption such as power loss or transient upset.
3. Data Line Supervision - The system shall monitor the status of the data transmission lines with the use of heartbeat messages. The loss of the heartbeat messages will cause an alarm condition within the ACS host, and the reader-controller to switch to standalone mode.

a. Microsoft Active Directory Integration
System shall allow for the integration to Microsoft Active Directory Administrator's ability to centrally manage ACSMS operators and operator configurations from LDAP

D. Reference Standards

1. SIA BIO-01-1993.02(R2000.06) - Biometric Standard - Vocabulary for Testing
2. Institute of Electronic and Electrical Engineers (IEEE) 802.3 standards
3. Underwriters Laboratories
   a. UL 294 - Access Control System Units
   b. UL 294B - Power Over Ethernet
4. FCC 47, CFR Part 15
5. Industry Canada - Radio Standards Specification RSS-210 License-exempt Radio Apparatus
6. National Institute of Standards and Technology (NIST)
   a. FIPS 197 - Advanced Encryption Standard (AES)
7. ISO 14443A, 14443B - Proximity Cards
8. EIA/TIA-569 - Commercial Building Standard for Telecommunications Pathways and Spaces
9. ETSI EN300, EN330-2, EN301 489-1

PART 3. INSTALLATION

A. Install in accordance with manufacturer's instructions including but not limited to the following:

1. Wire in accordance with National Electric Code.
2. Enclose all splices in easily accessible junction boxes or on terminal boards.
3. Tag and identify all cable runs in all junction boxes.

END OF SECTION

SECTION 16010
SUMMARY OF ELECTRICAL WORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 WORK COVERED BY CONTRACT DOCUMENTS

A. The following Summary of Work is intended as an aid to achieve an understanding of the various elements of work included in the project, as is not intended to be all-inclusive. Detailed descriptions of work and requirements are given in drawings and specifications.
General Scope of Work:
1. Providing a new IP-based access control system with complete software, door control devices, wiring, raceways, etc...

1.4 COORDINATION

A. Contractor shall coordinate all work through General Contractor, even in areas where only electrical work is to take place.

B. Work shall take place with minimal disruption to Owner's operations in areas surrounding the new building.

C. Cooperate fully with other contractors so that work under those contracts may be carried out smoothly, without interfering with or delaying work under this Contract.

D. Fully coordinate with mechanical contractor for providing power to mechanical equipment.

1.5 UTILITIES

1. Coordinate with power company and provide conduit, and trenching from transformer to power source.

1.6 CONTRACTOR USE OF PREMISES

A. Use of the Site: Limit use of the premises to work in areas indicated. Confine operations to areas within contract limits indicated. Do not disturb portions of the site beyond the areas in which the Work is indicated.

1. Owner Occupancy: Allow for Owner occupancy and use by the public.
2. Driveways and Entrances: Keep driveways and entrances serving the premises, clear and available to the Owner, the Owner's employees, and emergency vehicles at all time. Do not use these areas for parking or storage of materials. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

B. Site Safety: Take every precaution to ensure the site does not present a threat to the safety of occupants and/or workers. Minimal safety requirements include, but are not limited to the following:

1. Temporary fencing around construction areas.
2. Yellow caution tape and construction barricades along open trenches during the day. Trenches shall be covered at night and warning lights provided on construction barricades.
3. Temporary fencing around equipment while site work is in progress.

1.7 SUBMITTALS

1. To extradite the submittal process more efficiently, do not piece-meal the submittals. Submit entire electrical in a bound enclosure. This will eliminate delays in the submittal process. Unbound submittals shall be returned without review. Submit 10 copies minimum.

1.8 CONTINGENCY FUND

1. The contractor shall provide a $25,000 Electrical contingency fund in the base bid.

END OF SECTION

SECTION 16130
RACEWAYS AND BOXES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

1. Raceways include the following:
    a. RMC.
    b. IMC.
    c. PVC externally coated, rigid steel conduits.
    d. PVC externally coated, IMC.
    e. EMT.
    f. FMC.
    g. LFMC.
    h. LFNC.
    i. RNC.
    j. ENT.
    k. Wireways.
    l. Surface raceways.
2. Boxes, enclosures, and cabinets include the following:
    a. Device boxes.
    b. Floor boxes.
    c. Outlet boxes.
    d. Pull and junction boxes.
    e. Cabinets and hinged-cover enclosures.

B. Related Sections include the following:

1. Division 16 Section "Basic Electrical Materials and Methods" for raceways and box supports.
2. Division 16 Section "Wiring Devices" for devices installed in boxes and for floor-box service fittings.

1.3 DEFINITIONS

A. EMT: Electrical metallic tubing.

B. ENT: Electrical nonmetallic tubing.

C. FMC: Flexible metal conduit.

D. IMC: Intermediate metal conduit.

E. LFMC: Liquidtight flexible metal conduit.

F. LFNC: Liquidtight flexible nonmetallic conduit.

G. RMC: Rigid metal conduit.

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: Include layout drawings showing components and wiring for nonstandard boxes, enclosures, and cabinets.

1.5 QUALITY ASSURANCE

A. Listing and Labeling: Provide raceways and boxes specified in this Section that are listed and labeled.

1. The Terms "Listed" and "Labeled": As defined in NFPA 70, Article 100.

2. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" as defined in OSHA Regulation 1910.7.

B. Comply with NECA's "Standard of Installation."

C. Comply with NFPA 70.

1.6 COORDINATION

A. Coordinate layout and installation of raceways and boxes with other construction elements to ensure adequate headroom, working clearance, and access.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Metal Conduit and Tubing:

a. Alflex Corp.

b. Anamet, Inc.; Anaconda Metal Hose.

c. Anixter Brothers, Inc.

d. Carol Cable Co., Inc.

e. Cole-Flex Corp.

f. Electri-Flex Co.

g. Flexcon, Inc.; Coleman Cable Systems, Inc.

h. Grinnell Co.; Allied Tube and Conduit Div.

i. Monogram Co.; AFC.

j. Spiraduct, Inc.

k. Triangle PWC, Inc.

l. Wheatland Tube Co.

2. Nonmetallic Conduit and Tubing:

a. Anamet, Inc.; Anaconda Metal Hose.

b. Arnco Corp.

c. Breeze-Illinois, Inc.

d. Cantex Industries; Harsco Corp.

e. Certainteed Corp.; Pipe & Plastics Group.

f. Cole-Flex Corp.

g. Condux International; Electrical Products.

h. Electri-Flex Co.

i. George-Ingraham Corp.

j. Hubbell, Inc.; Raco, Inc.

k. Lamson & Sessions; Carlon Electrical Products.

l. R&G Sloan Manufacturing Co., Inc.

m. Spiraduct, Inc.

n. Thomas & Betts Corp.

3. Conduit Bodies and Fittings:

a. American Electric; Construction Materials Group.

b. Crouse-Hinds; Div. of Cooper Industries.

c. Emerson Electric Co.; Appleton Electric Co.

d. Hubbell, Inc.; Killark Electric Manufacturing Co.

e. Lamson & Sessions; Carlon Electrical Products.

f. O-Z/Gedney; Unit of General Signal.

g. Scott Fetzer Co.; Adalet-PLM.

h. Spring City Electrical Manufacturing Co.

4. Metal Wireways:

a. Hoffman Engineering Co.

b. Keystone/Rees, Inc.

c. Square D Co.

2.2 METAL CONDUIT AND TUBING

A. Rigid Steel Conduit: ANSI C80.1.

B. Rigid Aluminum Conduit: ANSI C80.5.

C. IMC: ANSI C80.6.

D. EMT and Fittings: ANSI C80.3.

1. Fittings: Set-screw type.

E. Fittings: NEMA FB 1; compatible with conduit/tubing materials.

2.3 NONMETALLIC CONDUIT AND TUBING

A. RNC: NEMA TC 2, Schedule 40 or 80 PVC.

B. RNC Fittings: NEMA TC 3; match to conduit or conduit/tubing type and material.

C. LFNC: UL 1660.

2.4 METAL WIREWAYS

A. Material: Sheet metal sized and shaped as indicated.

B. 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.

C. Select features, unless otherwise indicated, as required to complete wiring system and to comply with NFPA 70.

D. Wireway Covers: Screw – cover type flanged-and-gasketed type.

E. Finish: Manufacturer's standard enamel finish.

2.5 OUTLET AND DEVICE BOXES

A. Sheet Metal Boxes: NEMA OS 1.

B. Cast-Metal Boxes: NEMA FB 1, Type FD, cast box with gasketed cover.

2.6 PULL AND JUNCTION BOXES

A. Small Sheet Metal Boxes: NEMA OS 1.

B. Cast-Metal Boxes: NEMA FB 1, cast aluminum with gasketed cover.

2.7 ENCLOSURES AND CABINETS

A. Hinged-Cover Enclosures: NEMA 250, Type 1, with continuous hinge cover and flush latch.

1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
2. Nonmetallic Enclosures: Plastic, finished inside with radio-frequency-resistant paint.

B. Cabinets: NEMA 250, Type 1, galvanized steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel. Hinged door in front cover with flush latch and concealed hinge. Key latch to match panelboards. Include metal barriers to separate wiring of different systems and voltage, and include accessory feet where required for freestanding equipment.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine surfaces to receive raceways, boxes, enclosures, and cabinets for compliance with installation tolerances and other conditions affecting performance of raceway installation. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 WIRING METHODS

A. Outdoors: Use the following wiring methods:

1. Exposed: Rigid steel.
2. Concealed: Rigid steel.
3. Underground, Single Run: RNC.
4. Underground, Grouped: RNC.
5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
6. Boxes and Enclosures: NEMA 250, Type 3R .

B. Indoors: Use the following wiring methods:

1. Exposed: EMT.
2. Concealed: EMT.
3. Underground, Single Run: RNC.
4. Underground, Grouped: RNC
5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC; except in wet or damp locations, use LFMC.
6. Damp or Wet Locations: Rigid steel conduit.
7. Boxes and Enclosures: NEMA 250, Type 1, except as follows:
    a. Damp or Wet Locations: NEMA 250, Type 4, stainless steel.

3.3 INSTALLATION

A. Install raceways, boxes, enclosures, and cabinets as indicated, according to manufacturer's written instructions.

B. Minimum Raceway Size: 3/4-inch trade size (DN21).

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

D. 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.

E. Install raceways level and square and at proper elevations. Provide adequate headroom.

F. Complete raceway installation before starting conductor installation.

G. Support raceways as specified in Division 16 Section "Basic Electrical Materials and Methods."

H. Use temporary closures to prevent foreign matter from entering raceways.

I. Protect stub-ups from damage where conduits rise through floor slabs. Arrange so curved portion of bends is not visible above the finished slab.

J. Make bends and offsets so ID is not reduced. Keep legs of bends in the same plane and straight legs of offsets parallel, unless otherwise indicated.

K. Use raceway fittings compatible with raceways and suitable for use and location. For intermediate steel conduit, use threaded rigid steel conduit fittings, unless otherwise indicated.

L. Run concealed raceways, with a minimum of bends, in the shortest practical distance considering the type of building construction and obstructions, unless otherwise indicated.

M. Raceways Embedded in Slabs (Must be indicated on drawings to be embedded. Please notify Engineer if required but not shown): Install in middle third of slab thickness where practical, and leave at least 1-inch (25-mm) concrete cover.

1. Secure raceways to reinforcing rods to prevent sagging or shifting during concrete placement.
2. Space raceways laterally to prevent voids in concrete.
3. Run conduit larger than 1-inch trade size (DN27) parallel to or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support.
4. Transition from nonmetallic tubing to Schedule 80 nonmetallic conduit, rigid steel conduit, or IMC before rising above floor.

N. Install exposed raceways parallel to or at right angles to nearby surfaces or structural members, and follow the surface contours as much as practical.

1. Run parallel or banked raceways together, on common supports where practical.
2. Make bends in parallel or banked runs from same centerline to make bends parallel. Use factory elbows only where elbows can be installed parallel; otherwise, provide field bends for parallel raceways.

O. Join raceways with fittings designed and approved for the purpose and make joints tight.

1. Make raceway terminations tight. Use bonding bushings or wedges at connections subject to vibration. Use bonding jumpers where joints cannot be made tight.
2. Use insulating bushings to protect conductors.

P. Tighten set screws of threadless fittings with suitable tools.

Q. Terminations: Where raceways are terminated with locknuts and bushings, align raceways to enter squarely and install locknuts with dished part against the box. Where terminations are not secure with 1 locknut, use 2 locknuts: 1 inside and 1 outside the box.

R. Where raceways are terminated with threaded hubs, screw raceways or fittings tightly into the hub so the end bears against the wire protection shoulder. Where chase nipples are used, align raceways so the coupling is square to the box and tighten the chase nipple so no threads are exposed.

S. Install pull wires in empty raceways. Use No. 14 AWG zinc-coated steel 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 the pull wire.

T. Install raceway sealing fittings according to manufacturer's written instructions. Locate fittings at suitable, approved, and accessible locations and fill them with UL-listed sealing compound. For concealed race-

ways, 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 the boundaries of refrigerated spaces.
2. Where otherwise required by NFPA 70.

U. Stub-up Connections: Extend conduits through concrete floor for connection to freestanding equipment. Install with an adjustable top or coupling threaded inside for plugs set flush with the finished floor. Extend conductors to equipment with rigid steel conduit; FMC may be used 6 inches (150 mm) above the floor. Install screwdriver-operated, threaded flush plugs flush with floor for future equipment connections.

V. Flexible Connections: Use maximum of 6 feet (1830 mm) of flexible conduit for recessed and semirecessed lighting fixtures; for equipment subject to vibration, noise transmission, or movement; and for all motors. Use liquidtight flexible conduit in wet or damp locations. Install separate ground conductor across flexible connections.

W. Install nonferrous conduit or tubing for circuits operating above 60 Hz. Where aluminum raceways are installed for such circuits and pass through concrete, install in a nonmetallic sleeve.

X. Do not install aluminum conduits embedded in or in contact with concrete.

Y. PVC Externally Coated, Rigid Steel Conduits: Use only fittings approved for use with that material. Patch all nicks and scrapes in PVC coating after installing conduits.

Z. Surface Raceways: Install a separate, green, ground conductor in raceways from junction box supplying the raceways to receptacle or fixture ground terminals.

1. Select each surface raceway outlet box, to which a lighting fixture is attached, of sufficient diameter to provide a seat for the fixture canopy.
2. Where a surface raceway is used to supply a fluorescent lighting fixture having central-stem suspension with a backplate and a canopy (with or without extension ring), no separate outlet box is required.
3. Provide surface metal raceway outlet box, and the backplate and canopy, at the feed-in location of each fluorescent lighting fixture having end-stem suspension.
4. Where a surface metal raceway extension is made from an existing outlet box on which a lighting fixture is installed, no additional surface-mounted outlet box is required. Provide a backplate slightly smaller than the fixture canopy.

AA. Install hinged-cover enclosures and cabinets plumb. Support at each corner.

3.4 PROTECTION

A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure coatings, finishes, and cabinets are without damage or deterioration at the time of Substantial Completion.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
2. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.

3.5 CLEANING

A. On completion of installation, including outlet fittings and devices, inspect exposed finish. Remove burrs, dirt, and construction debris and repair damaged finish, including chips, scratches, and abrasions.

END OF SECTION

SECTION 16060
GROUNDING AND BONDING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes grounding and bonding of electrical systems and equipment. Grounding requirements specified in this Section may be supplemented by special requirements of systems described in other Sections.

B. Related Sections include the following:

1. Division 2 Section "Underground Ducts and Utility Structures" for ground test wells.

1.3 SUBMITTALS

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

B. Product Data: For the following:

1. Ground rods.
2. Chemical rods.

C. Qualification Data: For firms and persons specified in "Quality Assurance" Article.

D. Field Test Reports: Submit written test reports to include the following:

1. Test procedures used.
2. Test results that comply with requirements.
3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.

1.4 QUALITY ASSURANCE

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

1. Comply with UL 467.

B. Comply with NFPA 70; for overhead-line construction and medium-voltage underground construction, comply with IEEE C2.

C. Comply with NFPA 780 and UL 96 when interconnecting with lightning protection system.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Grounding Conductors, Cables, Connectors, and Rods:
    a. Apache Grounding/Erico Inc.
    b. Boggs, Inc.
    c. Chance/Hubbell.

d. Copperweld Corp.

e. Dossert Corp.

f. Erico Inc.; Electrical Products Group.

g. Framatome Connectors/Burndy Electrical.

h. Galvan Industries, Inc.

i. Hastings Fiber Glass Products, Inc.

j. Ideal Industries, Inc.

k. ILSCO.

l. Kearney/Cooper Power Systems.

m. Korns: C. C. Korns Co.; Division of Robroy Industries.

n. Lightning Master Corp.

o. Lyncole XIT Grounding.

p. O-Z/Gedney Co.; a business of the EGS Electrical Group.

q. Raco, Inc.; Division of Hubbell.

r. Robbins Lightning, Inc.

s. Salisbury: W. H. Salisbury & Co.

t. Superior Grounding Systems, Inc.

u. Thomas & Betts, Electrical.

2.2 GROUNDING CONDUCTORS

A. For insulated conductors, comply with Division 16 Section "Conductors and Cables."

B. Material: copper.

C. Equipment Grounding Conductors: Insulated with green-colored insulation.

D. Grounding Electrode Conductors: Stranded cable.

E. Underground Conductors: stranded, unless otherwise indicated.

F. Copper Bonding Conductors: As follows:

1. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG copper conductor, 1/4 inch (6.4 mm) in diameter.

2. Bonding Conductor: No. 4 or No. 6 AWG, stranded copper conductor.

3. Bonding Jumper: Bare copper tape, braided bare copper conductors, terminated with copper ferrules; 1-5/8 inches (42 mm) wide and 1/16 inch (1.5 mm) thick.

4. Tinned Bonding Jumper: Tinned-copper tape, braided copper conductors, terminated with copper ferrules; 1-5/8 inches (42 mm) wide and 1/16 inch (1.5 mm) thick.

2.3 CONNECTOR PRODUCTS

A. Comply with IEEE 837 and UL 467; listed for use for specific types, sizes, and combinations of conductors and connected items.

PART 3 - EXECUTION

3.1 APPLICATION

A. Use only copper conductors for both insulated and bare grounding conductors in direct contact with earth, concrete, masonry, crushed stone, and similar materials.

B. In raceways, use insulated equipment grounding conductors.

C. Equipment Grounding Conductor Terminations: Use bolted pressure clamps.

D. Grounding Bus: Install in electrical and telephone equipment rooms, in rooms housing service equipment, and elsewhere as indicated.

1. Use insulated spacer; space 1 inch (25.4 mm) from wall and support from wall 6 inches (150 mm) above finished floor, unless otherwise indicated.

2. At doors, route the bus up to the top of the door frame, across the top of the doorway, and down to the specified height above the floor.

3.2 EQUIPMENT GROUNDING CONDUCTORS

A. Comply with NFPA 70, Article 250, for types, sizes, and quantities of equipment grounding conductors, unless specific types, larger sizes, or more conductors than required by NFPA 70 are indicated.

B. Install equipment grounding conductors in all feeders and circuits.

C. Install insulated equipment grounding conductor with circuit conductors for the following items, in addition to those required by NEC:

1. Feeders and branch circuits.

2. Flexible raceway runs.

3. Armored and metal-clad cable runs.

D. Signal and Communication Systems: For telephone, alarm, voice and data, and other communication systems, provide No. 4 AWG minimum insulated grounding conductor in raceway from grounding electrode system to each service location, terminal cabinet, wiring closet, and central equipment location.

1. Service and Central Equipment Locations and Wiring Closets: Terminate grounding conductor on a 1/4-by-2-by-12-inch (6.4-by-50-by-300-mm) grounding bus.

2. Terminal Cabinets: Terminate grounding conductor on cabinet grounding terminal.

3.3 INSTALLATION

A. Ground Rods: Install at least three rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes.

1. Drive ground rods until tops are 2 inches (50 mm) below finished floor or final grade, unless otherwise indicated.

2. Interconnect ground rods with grounding electrode conductors. Use exothermic welds, except at test wells and as otherwise indicated. Make connections without exposing steel or damaging copper coating.

B. Grounding Conductors: Route along shortest and straightest paths possible, unless otherwise indicated. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

C. Bonding Straps and Jumpers: Install so vibration by equipment mounted on vibration isolation hangers and supports is not transmitted to rigidly mounted equipment. Use exothermic-welded connectors for outdoor locations, unless a disconnect-type connection is required; then, use a bolted clamp. Bond straps directly to the basic structure taking care not to penetrate any adjacent parts. Install straps only in locations accessible for maintenance.

3.4 CONNECTIONS

A. General: Make connections so galvanic action or electrolysis possibility is minimized. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact will be galvanically compatible.

1. Use electroplated or hot-tin-coated materials to ensure high conductivity and to make contact points closer to order of galvanic series.

2. Make connections with clean, bare metal at points of contact.

3. Make aluminum-to-steel connections with stainless-steel separators and mechanical clamps.

4. Make aluminum-to-galvanized steel connections with tin-plated copper jumpers and mechanical clamps.

5. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.

B. Equipment Grounding Conductor Terminations: For No. 8 AWG and larger, use pressure-type grounding lugs. No. 10 AWG and smaller grounding conductors may be terminated with winged pressure-type connectors.

C. Noncontact Metal Raceway Terminations: If metallic raceways terminate at metal housings without mechanical and electrical connection to housing, terminate each conduit with a grounding bushing. Connect grounding bushings with a bare grounding conductor to grounding bus or terminal in housing. Bond electrically noncontinuous conduits at entrances and exits with grounding bushings and bare grounding conductors, unless otherwise indicated.

D. Tighten screws and bolts for grounding and bonding 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.

E. Compression-Type Connections: Use hydraulic compression tools to provide correct circumferential pressure for compression connectors. Use tools and dies recommended by connector manufacturer. Provide embossing die code or other standard method to make a visible indication that a connector has been adequately compressed on grounding conductor.

F. Moisture Protection: If insulated grounding conductors are connected to ground rods or grounding buses, insulate entire area of connection and seal against moisture penetration of insulation and cable.

3.5 FIELD QUALITY CONTROL

A. Testing: Perform the following field quality-control testing:

1. After installing grounding system but before permanent electrical circuitry has been energized, test for compliance with requirements.

END OF SECTION

SECTION 16020
BASIC ELECTRICAL REQUIREMENTS

PART 1 – GENERAL

1.1 RELATED REQUIREMENTS

A. The General Provisions, Supplemental General Provisions, Special Provisions, Division 1 Specification Sections and all relevant documents shall form a part of this Division of the Specifications, and shall be incorporated in this Section and each Division 16 Section hereinafter as if repeated verbatim herein. All conditions imposed by these documents shall be applicable to all portions of the work under this Division. Certain specific paragraphs of said references may be referred to hereinafter in this Division. These references are intended to point out specific items to the Contractor, but in no way relieve him of the responsibility of reading and complying with all relevant parts of the entire Specification.

B. The Contractor shall examine and coordinate with all Contract Drawings and Specifications, and all Addenda issued. Failure to comply shall not relieve him of responsibility. The omission of details of other portions of the work from this Division shall not be used as a basis for a request for additional compensation.

C. The specific features and details for other portions of the work related to the construction in progress or to the adjacent building shall be determined by examination at the site.

1.2 SCOPE OF WORK

A. The requirements contained in this Section apply to all work performed under Division 16 of these Specifications.

B. The work covered by this Division of the Specifications comprises the furnishing of labor, material, equipment, transportation, tools and services, and performing operations required for, and reasonably incidental to, the installation of the work in accordance with the applicable Contract Documents, and subject to the terms and conditions of the Contract.

C. Refer to other Divisions of the Specifications for related work.

1.3 DEFINITION OF "CONTRACTOR"

A. Where the word "Contractor" is used under any Section of this Division of the Specifications, it shall mean the Contractor engaged to execute the work included under that Section, even though this Contractor may be technically described as a Subcontractor, or an authorized representative.

B. If the Contractor, engaged to execute a portion of the work, employs a Subcontractor to perform some of that work, he shall be completely responsible for the proper execution of this Subcontractor’s work, in full conformity with the Contract Documents.

1.4 RESPONSIBILITY OF THE CONTRACTOR

A. The Contractor shall be responsible for all work of every description in connection with this Division of the Specifications. The Contractor shall specifically and distinctly assume, and does so assume, all risk for damage or injury from whatever cause to property or person used or employed on or in connection with this work and of all damages or injury to any person or property wherever located, resulting from an action or operation under the Contract in connection with the work, and undertake the responsibility to defend the Owner against all claims on account of any such damage or injury.

B. The Contractor will be held responsible for the satisfactory execution and completion of the work in accordance with the true intent of the Contract Documents. The Contractor shall provide without extra charge all incidental items required as part of the work, even though it may not be specifically indicated. If the Contractor has reason for objecting to the use of any material, equipment, device or method of construction as indicated, the Contractor shall make report of such objections to the Owner's Representative, obtain proper approval and adjustment to the Contract, and shall proceed with the work.

1.5 TERMINOLOGY

A. Whenever the words "furnish", "provide", "furnish and install", "provide and install", and similar phrases occur, it is the intent that the materials, equipment and devices described be furnished, installed and connected under this Division, complete for operation, unless specifically noted to the contrary.

B. It is also the intent, unless specifically noted to the contrary, that all materials, equipment and devices described and specified under this Division of the Specifications be similarly furnished, installed and connected under this Division, whether or not a phrase as described in the preceding paragraph has been actually included.

C. Whenever the words “Owner’s Representative” occurs, it is intended to refer to the Architect, Engineer and/or specific Owner’s Representative responsible for or capable of providing the necessary direction pertaining to the referenced issue.

1.6 ORDINANCES, PERMITS AND CODES

A. It shall be the Contractor's duty to perform the work and provide the materials covered by these specifications in conformance with all ordinances and regulations of all authorities having jurisdiction.

B. All work herein shall conform to all applicable laws, ordinances and regulations of the local utility companies.

C. The Contractor shall obtain and pay for all permit and connection fees as required for the complete installation of the specified systems, equipment, devices and materials.

D. The Contractor shall obtain permits, plan checks, inspections and approvals applicable to the work as required by the regulatory authorities. Fees and costs of any nature whatsoever incidental to these permits, inspections and approvals shall be assumed and paid by the Contractor. The pro-rata costs, if any, for utilities serving this property will be paid for by the Owner and shall not be included as part of this Contract.

E. The work shall be in accordance with, but shall not be limited to, the requirements of:

1 National Fire Protection Association

2 National Electrical Code

3 National Safety Code

4 State of Texas Safety Code

5. Local City Building Codes

6. State of Texas Building Codes

F. Codes and standards referred to are minimum standards. Where the requirements of the Drawings or Specifications exceed those of the codes and regulations, the Drawings and Specifications

govern.

1.7 MATERIALS, EQUIPMENT AND DEVICE DESCRIPTION

A. Materials, equipment and devices shall be of the best quality customarily applied in quality commercial practice, and shall be the products of reputable manufacturers. Each major component shall bear a nameplate giving the name and address of the manufacturer, and the catalog number or designation of the component.

B. Materials, equipment and devices furnished under this Division of the Specifications shall be essentially the standard product of the specified manufacturer, or where allowed, an alternate manufacturer. Where two or more units of the same kind or class of a specific item are required, these shall be the products of a single manufacturer; however, the component parts of the item need not be the products of one manufacturer.

C. In describing the various materials, equipment and devices, in general each item will be described singularly, even though there may be a multiplicity of identical items. Also, where the description is only general in nature, exact sizes, duties, space arrangements, horsepower requirements and other data shall be determined by reference to the Contract Documents.

D. Space allocations for materials, equipment and devices have been made on the basis of present and known future requirements and the dimensions of items of equipment or devices of a particular manufacturer whether indicated or not. The Contractor shall verify that all materials, equipment and devices proposed for use on this project are within the constraints of the allocated space.

1.8 QUALITY ASSURANCE

A. Materials, equipment and devices shall be new and of the quality specified, and shall be free from defects at the time of installation. Materials, equipment and devices damaged in shipment or otherwise damaged or found defective prior to acceptance by the Owner shall not be repaired at the job site, but shall be replaced with new materials, equipment or devices identical with those damaged, unless specifically approved otherwise by the Owner's Representative.

B. Wherever a UL standard has been established for a particular type of material, equipment or device, each item of such material, equipment or device provided on this project shall meet the requirements of the UL standard in every way, and shall be UL listed and labeled.

1.9 REFERENCE STANDARDS

A. Materials, equipment, devices and workmanship shall comply with applicable local, county, state and national codes, laws and ordinances, utility company regulations and industry standards.

B. In case of differences between building codes, state laws, local ordinances, industry standards, utility company regulations and the Contract Documents, the most stringent shall govern. The Contractor shall promptly notify the Owner's Representative in writing of any such difference. Should the Contractor perform any work that does not comply with local codes, laws and ordinances, industry standards or other governing regulations, the work shall be corrected of noncompliance deficiencies with the Contractor bearing all costs.

C. In addition to the aforementioned ordinances, industry standards published by the following organizations shall apply:

AABM - American Association of Battery Manufacturers

ADA - American’s with Disabilities Act

AIA - American Institute of Architects

ANSI - American National Standards Institute

ASTM - American Society for Testing and Materials

CBM - Certified Ballast Manufacturers Association

ETL - Electrical Testing Laboratories

FM - Factory Mutual

ICEA - Insulated Cable Engineers Associated

IEEE - Institute of Electrical and Electronic Engineers

IES - Illuminating Engineering Society

IRI - Industrial Risk Insurance

NBS - National Bureau of Standards

NEC - National Electrical Code

NECA - National Electrical Contractors Association

NEMA - National Electrical Manufacturers Association

NESC - National Electrical Safety Code

NETA - National Electrical Testing Association

NFPA - National Fire Protection Association

UL - Underwriters Laboratories

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1.10 DRAWINGS AND SPECIFICATIONS

A. The interrelation of the Drawings (including the schedules) and the Specifications are as follows:

1 The Drawings establish quantities, locations, dimensions and details of materials, equipment and devices. The schedules on the Drawings indicate the capacities, characteristics and components.

2 The Specifications provide written requirements for the quality, standard and nature of the materials, equipment, devices and construction systems.

B. The Drawings and Specifications shall be considered as being compatible; therefore, the work called for by one and not by the other shall be furnished and installed as though called for by both. Resolution of conflicts between Drawings and Specifications shall be as follows:

1 If the Drawings and Specifications disagree in themselves, or with each other, the Contractor's pricing shall be based on furnishing and installing the most expensive combination of quality and quantity of work indicated for a complete operable system.

Contractor is responsible to notifying the Architect and Engineer. In the event of this type of disagreement, the resolution shall be determined by the Owner's Representative. The contractor shall assume for an operable system at the most expensive combination as per the latest National Electrical Code. The contractor shall review all drawings and specifications prior to bid date.

2 The Contractor shall be responsible for bringing any conflicts in the Drawings and the Specifications to the attention of the Owner's Representative immediately, prior to bid date.

3 In general, if there is conflict between the Drawings and Specifications, the Drawings shall govern the Specifications.

4 Where the Specifications do not fully agree with schedules on the Drawings, the schedules shall govern. Actual numerical dimensions indicated on the Drawings govern scale measurements and large scale details govern small scale drawings.

5 Materials, equipment and devices called for on the Drawings and not indicated herein, shall be completely provided and installed as though it were fully described herein.

6 Materials, equipment and devices called for herein shall be completely provided and installed, whether or not it is fully detailed, scheduled or indicated on the Drawings.

C. The Contractor shall examine the Drawings and Specifications of the other portions of the work for fixtures and finishes in connection with this work. The Contractor shall carefully examine the Drawings to determine the general construction conditions, and shall familiarize himself with all limitations caused by such conditions.

D. When discrepancies exist between scale and dimension, or between the Drawings of the various portions of the work, they shall be called to the attention of the Owner's Representative for further instruction, whose instructions shall be final and binding and work promptly resumed without any additional cost to the Owner.

E. Review the construction details of the building(s) as illustrated on the Drawings of the other portions of the work, i.e., architectural, structural, civil, landscape, etc., and be guided thereby. Route conduits and set all boxes as required by the pace of the general construction.

F. The Drawings diagrammatically show the sizes and locations of the various equipment and devices, and the sizes of the major interconnecting wires, without showing exact details as to elevations, offsets, control wiring and other installation requirements. Carefully layout the work at the site to conform to the architectural and structural conditions, to avoid obstructions and to permit proper grading of pipe associated with other portions of the work. In cooperation with other Contractors, determine the exact location of equipment and devices and connections thereto by reference to the submittals and rough-in drawings, and by measurements at the site. Make minor relocations necessitated by the conditions at the site, or directed by the Owner's Representative, without additional cost to the Owner.

G. The Drawings and Specifications are intended to describe and illustrate systems which will not interfere with the structure of the building(s), fit into the available spaces, and insure complete and satisfactory operating installations. Prepare installation drawings as required for all critical areas illustrating the installation of the work in this Division as related to the work of all other Divisions and correct all interferences with the other portions of the work or with the building structures before the work proceeds.

H. The Drawings do not indicate the existing electrical installations other than to identify modifications or extensions thereto. Visit the site and ascertain the conditions to be met and the work to be accomplished in removing and modifying the existing work, and in installing the new work. Failure to comply with this shall not constitute grounds for any additional payment in connection with removing or modifying any part of the existing installation or installing any new or temporary work under this Division.

1.11 SUBMITTALS

A. Submit product data and shop drawings in accordance with Division 1 of the Specifications.

B. Process product data and shop drawings to insure that the proposed materials, equipment and devices conform to the requirements of the Contract Documents, and that there are no omissions or duplications. Provide layouts, fabrication information and data for systems, materials, equipment and devices proposed for the project.

C. Submittals shall be provided for review and approval on all systems, equipment, devices and materials proposed for use on this project. Submittals shall include, but not be limited to, the following:

1 Lighting and Appliance Panelboards

2 Disconnect Switches

3 Circuit Breakers and Fuses

4 Materials: conduit, conductors, connectors, supports, etc.

5 Lighting Fixtures, Lamps and Control Systems/Devices

6 Wiring Devices

7 Transformers

8 Distribution Panelboards

9 Motor Control Center

10 As indicated on each submittal section

D. The product data shall not consist of manufacturer's catalogs or cut sheets that contain no indication of the exact item offered. The submission on individual items shall designate the exact item offered.

E. Do not submit detailed quantitative listings of materials, equipment and devices. It is the Contractor's responsibility to provide proper sizes and quantities to conform to Contract Documents.

F. Assemble submittals on related items procured from a single manufacturer in bound brochures or other suitable package form, rather than submitting a multiplicity of loose sheets.

G. Prepare shop drawings whenever equipment proposed varies in physical size and arrangement from that indicated thus causing rearrangement of equipment space, where tight spaces require extreme coordination between this work and other work, where called for elsewhere in these Specifications and where specifically requested by the Owner's Representative. Shop drawings shall be prepared at a scale of not less than 1/4 inch equals 1 foot.

H. The Contractor shall sign the submittal as an indication of compliance with the Contract Documents. If there are any deviations from the Contract Documents, he shall so indicate on the submittal. Any deviations not so indicated shall be cause for rejection and removal of the non-complying equipment at the Contractor’s expense.

1.12 SUBSTITUTIONS

A. Where a single manufacturer is mentioned by trade name or manufacturer's name, unless specifically noted otherwise, it is the only manufacturer that will be accepted.

B. Where multiple manufacturers are listed, none other than those manufacturers will be accepted.

C. Manufacturers not listed will be considered for substitution prior to bid only. The substitute manufacturer shall submit a complete copy of the appropriate technical specification section minimum seven (7) business days prior to bid with each sub-paragraph noted with the comment, "compliance", "deviation", "alternate" or “not applicable”. In the case of non-primary, vendor-supplied items, the name of the sub-vendor supplying said item, including model number, shall be indicated.

1 By noting the term "compliance" or "C", it shall be understood that the manufacturer is in full compliance with the item specified and will provide exactly the same with no deviations.

2 By noting the term "deviation" or "D", it shall be understood that the manufacturer prefers to provide a different component in lieu of that specified. Manufacturer shall indicate all deviations.

3 By noting the term "alternate" or "A", it shall be understood that the manufacturer proposes to provide the same operating function but prefers to do it in a different manner. An alternate shall be fully described as to what the manufacturer proposes to provide.

4 By noting the term “not applicable” or “N/A”, it shall be understood that the specified item is not applicable to the project.

D. It shall be understood that space allocations have been made on the basis of present and known future requirements and the dimensions of items of equipment or devices of a particular manufacturer whether indicated or not. If any item of equipment or device is offered in substitution which differs substantially in dimension or configuration from that indicated on the Drawings or specifications, provide as part of the submittal 1/4 inch equals 1 foot scaled drawings showing that the substitute can be installed in the space available without interfering with other portions of the work or with access for operations and maintenance in the completed project.

E. Where substitute equipment or devices requiring different arrangement or connections from that indicated is accepted by the Owner's Representative, install the equipment or devices to operate properly and in harmony with the intent of the Contract Documents, making all incidental changes in piping, ductwork or wiring resulting from the equipment or device selection without any additional cost to the Owner. The Contractor shall pay all additional costs incurred by other portions of the work in connection with the substituted equipment or device.

F. The Owner's Representative reserves the right to call for samples of any item of material, equipment or device offered in substitution, together with a sample of the specific item when, in their opinion, the quality of the item and/or the appearance is involved, and it is deemed that an evaluation of the item may be better made by visual inspection.

G. When any request for a substitution of material, equipment or device is submitted and rejected, the item named in the Contract Documents shall be furnished. Repetitive submittal of substitutions for the same item will not be considered.

1.13 INSTALLATION DRAWINGS

A. Prepare installation drawings for coordinating the work of this Division with the work of other Divisions, to illustrate its concealment in finished spaces, to avoid obstructions, and to demonstrate the adaptability of any item of material, equipment or device in the space upon which the Contract Documents are based.

B. Use these drawings in the field for the actual installation of this work. Provide three (3) copies, not for approval, to the Owner's Representative for his information, review and record.

1.14 WORKMANSHIP AND INSTALLATION

A. In no case shall the Contractor provide a class of material, equipment, device or workmanship less than that required by the Contract Documents or applicable codes, regulations, ordinances or standards. All modifications which may be required by a local authority having legal jurisdiction over all or any part of the work shall be made by the Contractor without any additional charge. In all cases where such authority requires deviations from the requirements of the Drawings or Specifications, the Contractor shall report same to the Owner's Representative and shall secure his approval before the work is started.

B. The work shall be performed by properly licensed technicians skilled in their respective trades. All materials, equipment and devices shall be installed in accordance with the recommendations of the manufacturer and in the best standard practice to bring about results of a first class condition.

C. The NECA "Standards of Installation" as published by the National Electrical Contractors Association shall be considered a part of these Specifications, except as specifically modified by other provisions contained in these Specifications.

1.15 INSPECTION OF SITE

A. The accompanying drawings do not indicate existing installations other than to identify modifications of and extensions thereto. The Contractor shall visit the site, inspect the installations and ascertain the conditions to be met and the work to be performed. Failure to comply with this shall not constitute ground for any additional payments in connection with removing or modifying any part of the existing installations and/or installing any new work under this Division.

B. Review construction details of the adjacent building presently under construction during the site inspection and include all work required to modify the existing installations and install new materials, comprising a part of the installation. Review all construction details of the new building as illustrated on the drawings and be guided thereby.

1.16 WARRANTY

A. All materials, equipment, devices and workmanship shall be warranted for a period of one year from the date of acceptance by the Owner's Representative for beneficial use by the Owner, except that where specific equipment is noted to have extended warranties. The warranty shall be in accordance with AIA Document A201. The Contractor shall be responsible for the proper registration of these warranties so that the Owner can make all proper claims should future need develop.

B. The Contractor shall furnish to the Owner's Representative for transmittal to the Owner, the name, address and telephone number of those persons responsible for service on systems and equipment covered by the warranty.

1.17 OPERATION PRIOR TO ACCEPTANCE

A. When any equipment is operable, and it is to the advantage of the Contractor to operate the equipment, the Contractor may do so provided that he properly supervises the operation, and retains full responsibility for the equipment operated. Regardless of whether or not the equipment has or has not been operated, the Contractor shall clean the equipment properly, make required adjustments and complete punch list items before final acceptance by the Owner.

1.18 INSTRUCTION OF OWNER'S PERSONNEL

A. Provide the services of competent engineers and/or technicians acceptable to the Owner's

Representative to instruct other representatives of the Owner in the complete and detailed operation of each item of equipment or device of all the various electrical systems. These instructions shall be provided for whatever periods may be necessary to accomplish the desired results. Upon completion of these instructions, the Contractor shall obtain a letter of release, acknowledged by the Owner or his authorized representative, stating the dates on which the various kinds of instruction were given, and the personnel to whom the instructions were given.

B. The Contractor shall be fully responsible for proper maintenance of equipment and systems until the instructions have been given to the Owner's personnel and the letter of release acknowledged.

C. In providing the instructions to the Owner's personnel, the written operating and maintenance manuals shall be followed in all instances, and the Owner's personnel shall be familiarized with such manuals. Operating and maintenance manuals used for instructions shall include wiring diagrams, manufacturer's operating and maintenance instructions, parts lists (with sources identified), and other data as appropriate for each system.

1.19 SCHEDULE AND SEQUENCE OF WORK

A. The Contractor shall meet and cooperate with the Owner and Owner's Representative to schedule and sequence this work so as to insure meeting scheduled completion dates and avoid delaying other portions of the work. Work requiring special sequencing shall be at no additional cost to the Owner and shall have no impact on the schedule.

1.20 INSTALLATION INSPECTIONS AND CERTIFICATIONS

A. Obtain timely inspections of the installation by the regulatory authorities. Remedy any deficiencies to the satisfaction of the inspecting official.

B. Upon final completion of the work, obtain certificates of acceptance from the regulatory authorities. Deliver the certificates to the Owner's Representative for transmission to the Owner.

1.21 EQUIPMENT INSTALLATION

A. Install equipment and devices in a manner to permit access to all surfaces or components, requiring such access, without the need to disassemble other unrelated parts of the work.

B. Equipment specified to be factory assembled and tested prior to shipment shall not be disassembled at the job site and reassembled at its final location. Apparatus not so specified may be disassembled and reassembled in the proper location.

C. Furnish all scaffolding, rigging and hoisting required for the installation of all the work.

1.22 CONCRETE HOUSEKEEPING PADS

A. Concrete housekeeping pads shall be provided for all floor mounted equipment, unless noted or required otherwise.

B. All pads shall be not less than 3-1/2" high and extend a maximum 3" beyond the actual equipment size. Coordinate the proper size of the pad with the equipment furnished. Pads shall be poured in forms built of new dressed lumber with corners chamfered using sheet metal or triangular wood strips nailed to the form. Use 6 x 6 No. 3 mesh for reinforcing. Install heavy duty adjustable anchor bolts, set in the form and positioned using templates, prior to pouring concrete. After the equipment is set on the pad, the equipment shall be aligned, leveled and fully grouted to the pad and all void spaces shall be filled with a non-shrinking grout.

C. Perform all concrete work specified to be provided under this Division in strict accordance with the applicable provisions of Division 3, CONCRETE.

1.23 SLEEVES

A. Each conduit, regardless of material, which passes through a concrete slab, masonry wall, or roof or portion of the building structure shall be free from the structure and shall pass through a sleeve.

B. All sleeves shall be constructed from electrical-metallic tubing or equivalent weight galvanized steel tubing and shall be flush on both sides of the surface penetrated, unless noted otherwise. All sleeves penetrating the roof areas shall extend a minimum 10 inches above the roof with approved weatherproof counterflashing attached to the conduit above the roof. All sleeves penetrating floors shall extend a minimum of 6 inches above the finished floors. The sleeves shall be sized to allow free passage of the conduit to be inserted.

C. Sleeves passing through walls or floors on or below grade or in moist areas shall be constructed of galvanized rigid steel and shall be designed with a suitable flange in the center to form a waterproof passage. After the conduit has been installed in the sleeves, the void space around the conduit shall be caulked and filled with an asphalt-base compound to insure a waterproof penetration. Jute twine caulking shall not be used due to susceptibility to termite infestation.

1.24 ESCUTCHEONS

A. In each finished space, provided a chromium plated, sectional escutcheon on each conduit, or hanger rod penetrating a wall, floor or ceiling.

B. Size escutcheons and collars to fit snugly around conduit and rods.

C. Where required, provide escutcheons with set screws so that they fit snugly against the finished surface.

1.25 ACCESS PANELS

A. Provide wall and ceiling access panels for unrestricted access to all concealed electrical equipment items and devices installed behind furrings, chases or non-removable suspended ceilings.

B. Access panels shall be UL listed and labeled as required to suit the fire rating of the surface in which installed, with mounting straps, concealed hinges, screwdriver locks, 180 degree open door design, 16 gauge steel construction and door and frame finished in prime coat finish. Panels shall be 12-inch by 12-inch minimum size, but shall be larger as the access requirement of the concealed electrical equipment item or device increases.

1.26 SEALING OF PENETRATIONS

A. All penetrations in horizontal or vertical fire-rated construction shall be sealed using approved fire-rated sealing materials equivalent to the following:

1 Foam: Dow Corning 3-6548 RTV silicone foam, liquid component Part 4 (black) and liquid component Part B (off-white).

2 Sealant: Dow Corning 96-081 RTV silicone adhesive sealant.

3 Damming Materials: Mineral fiberboard, mineral fiber matting, mineral fiber putty, plywood or particle board, as selected by applicator.

B. Preparation: Remove combustible materials and loose impediments from penetration opening and involved surfaces. Remove free liquid and oil from penetration surfaces.

C. Installation: In accordance with manufacturer's instructions, install damming materials and sealant to cover and seal penetration openings; inject foam mixtures into openings.

D. In addition to the Dow Corning products, equal products by Spec Seal Firestop Products, 3M Fire Barrier or CS240 Firestop are acceptable.

1.27 PROTECTION OF APPARATUS

A. At all times take every precaution to properly protect apparatus from damage due to dust, dirt, water, etc. or from damage due to physical forces. Include the erection of temporary shelters as required, to adequately protect any apparatus stored at the site, the cribbing of any apparatus directly above the construction, and the covering of apparatus in the incomplete building with tarpaulins or other protective covering. Failure on the part of the Contractor to comply with the above to the entire satisfaction of the Owner's Representative will be sufficient cause for the rejection of the pieces of apparatus in question.

B. Responsibility for the protection of apparatus extend also to existing apparatus involved in this Division of the work, whether such apparatus is designated to be used temporarily and later removed, or is to be reused as a part of the permanent installation. Erect temporary sheltering structures, provide temporary bracing and supports, or cover equipment as required or directed to afford proper protection for that equipment.

C. The Contractor shall protect this work and the work of all other Contractors from damage by his work or workmen and shall make good any damage thus caused. He shall also be responsible for the proper protection of his equipment, machinery, materials and accessories delivered and installed on the job.

1.28 INSTALLATION OF CONTROL AND OPERATING DEVICES

A. The highest operable part of controls (light switches, dimmer switches, emergency power off devices, etc.), receptacles (electrical and communications) and other operable devices shall be 48" above finish floor. The lowest operable part shall be no less than 15" above finished floor. For purposes of uniformity, unless noted otherwise, the top of a device shall be maximum 48" AFF and the bottom of a device shall be minimum 15" AFF. Refer to the electrical symbols list on the Drawings for specific requirements.

B. Visual alarm appliances shall be placed 80" above finished floor (the highest floor level within a space) or 6" below the ceiling, whichever is lower.

1.29 INSTALLATION AND CONNECTION OF OTHER DIVISION'S EQUIPMENT

A. Verify the electrical requirements of all equipment furnished under other Divisions, separate contracts, or by the Owner. Install conduit, power wiring, control wiring, devices, etc. as required for complete operation of all equipment.

1.30 OPTION TO RELOCATE OUTLETS AND RELATED DEVICES

A. The location of power, data and telephone outlets, wall switches and other related devices may be relocated at the Owner's option, at no additional cost to the Owner, to a point within 10 feet of their present location provided the Contractor is notified prior to installation.

1.31 COOPERATION AND CLEAN-UP

A. It shall be the responsibility of the Contractor to cooperate fully to keep the job site in a clean and safe condition. Upon the completion of the job, the Contractor shall immediately remove all of his tools, equipment, surplus materials and debris.

B. After the installation is complete, and before the equipment is energized, clean the interior and exterior of all equipment thoroughly. Clean equipment, removing all debris, rubbish and foreign

materials. Each component shall be cleaned and all dust and other foreign material removed. Components shall be cleaned of oxidation. The inside and outside of all switchgear shall also be wiped clean with a lemon-oil rag after all other cleaning is complete.

C. Any portion of the work requiring touch-up finishing shall be so finished to equal the specified finish on the product.

1.32 RECORD DRAWINGS AND DOCUMENTATION FOR OWNER

A. The Contractor shall obtain at his own expense a complete set of blueline prints on which to keep an accurate record of the installation of all materials, equipment and devices covered by the Contract. The Contractor shall record up to date information at least once a week and retain the set of prints on site for periodic review by the Architect/Engineer. The record drawings shall indicate the location of all equipment and devices, and the routing of all systems. If the Contractor prepared large scale installation drawings of electrical rooms, conduit routing, busduct, routing, etc., these drawings or reproducible sepias therefrom shall be revised as required to accurately illustrate the actual installation. All conduit buried in concrete slabs, walls and below grade shall be located by dimension; both horizontally and by vertical elevation, unless a surface mounted device in each space indicates the exact location.

B. Upon anticipated completion of the job, obtain one complete reproducible set of the original drawings on which to neatly, legibly and accurately transfer all project related notations and deliver these record drawings to the Architect/Engineer at job completion before final payment and delivery to the Owner. This information shall be delivered prior to final acceptance.

C. The Contractor shall accumulate in duplicate during the job progress, the following data prepared in indexed 3-ring looseleaf, hard-back binders sized for 8-1/2 inch by 11 inch sheets. No binder shall exceed 3-1/2 inches thick. This data shall be turned over to the Owner's Representative for review and subsequent delivery to the Owner prior to final acceptance.

1 Warranties, guarantees and manufacturer's directions on material, equipment and devices covered by the Contract.

2 Approved lighting fixture brochures, wiring diagrams and control diagrams.

3 Copies of approved submittals and shop drawings.

4 Operating instructions and recommended maintenance procedures for major apparatus.

5 Copies of all other data and/or drawings required during construction.

6 Repair parts list of major apparatus, including name, address and telephone number of local supplier or representative.

7 Tag charts and diagrams hereinbefore specified.

1.33 FINAL OBSERVATION

A. The purpose of the final observation is to determine whether the Contractor has completed the construction in accordance with the Contract Documents and that in the Owner Representative's opinion the installation is satisfactory for final acceptance by the Owner.

B. It shall be the responsibility of the Contractor to assure that the installation is ready for final acceptance prior to calling upon the Owner's Representative to make a final observation.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION