PROJECT MANUAL

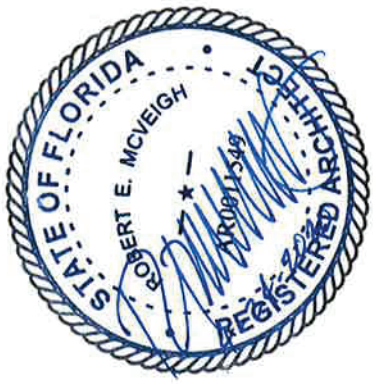
Safety Deficiencies Renovations at Baseball and Softball Fieldhouses, Wolfson High School No. 224

DCPS Project No.M-83680

Jacksonville, Florida

DUVAL COUNTY PUBLIC SCHOOLS

PERMIT SET



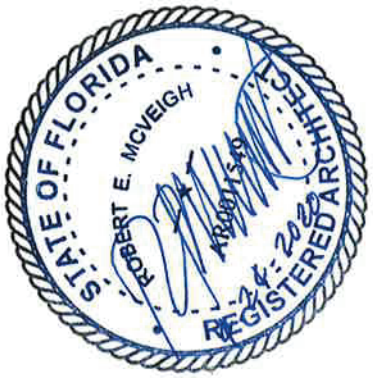
Bhide & Hall Architects, P.A.
Orange Park, Florida
BH No. 15054

April 22, 2020

PROJECT MANUAL

Safety Deficiencies Renovations at Baseball and Softball Fieldhouses,
Wolfson High School No. 224
DCPS Project No. M-83680

JACKSONVILLE, FLORIDA



DUVAL COUNTY PUBLIC SCHOOLS

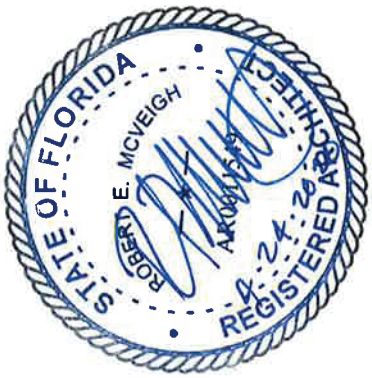
PERMIT SET

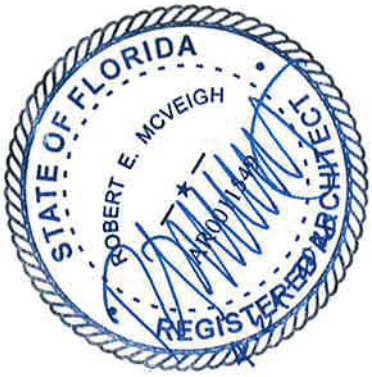
Bhide & Hall Architects, P.A.
1329-C Kingsley Ave.
Orange Park, FL 32073
(904)-264-1919
AAC-000569

Electrical & Mechanical Engineer
Haddad Engineering, Inc.
3030 Hartley Road
Suite 290
Jacksonville, Florida
#4000
(904)-262-5066

B/H No. 15054
April 22, 2020

TABLE OF CONTENTS





END OF TABLE OF CONTENTS

Namir Haddad
Digitally signed by Namir Haddad
Date: 2020.04.24 17:26:44 -04'00'

NAMIR A. HADDAD LICENSE No. 31967 STATE OF FLORIDA PROFESSIONAL ENGINEER

THIS ITEM HAS BEEN DIGITALLY SIGNED AND SEALED BY NAMIR A. HADDAD ON THE DATE ADJACENT TO THE SEAL.

PRINTED COPIES OF THIS DOCUMENT ARE NOT CONSIDERED SIGNED AND SEALED AND THE SIGNATURE MUST BE VERIFIED ON ANY ELECTRONIC COPIES.

SECTION 01000

GENERAL REQUIREMENTS

DIVISION 1: GENERAL REQUIREMENTS

A. The project consists of correcting safety deficiencies at the Baseball & Softball fieldhouses located at Samuel W. Wolfson High School. Under this project, Buildings 9, 10 and 11 will receive safety deficiency renovations which will also include removing the existing LP Gas storage tank, providing a new remote storage building for combustibles and adding a new noncombustible exterior exit stair.

B. Project Location: Wolfson High School, No. 224
7000 Powers Avenue
Jacksonville, FL 32217

C. Rules and Regulations Governing this Project:

2017 Florida Building Code (FBC), 6th Edition The State Requirements for Educational Facilities (SREF) are incorporated in the FBC under Section 453.
Florida Fire Protection Code (FFP), 2017, 6th Edition. Life Safety Code, NFPA101, 2015.

D. CONSTRUCTION MANAGEMENT

1. This project will be constructed by a General Contractor providing services to the Duval County School Board under a Construction Management Contract.

1.1 Construction Manager's responsibilities:

1.1.1 The Contractor shall be responsible for all work indicated in the contract documents in accordance with the contract. Work includes, but not limited to the following:

a. Concurrence with the project scope
b. Preconstruction phase services including bidding and establishing the project Guaranteed Maximum Price (GMP)
c. Direct Purchase of Materials and coordination with DCPS staff.
d. Scheduling of the work.
e. All required construction services
f. Compliance with the Duval County School Board Minority Business Enterprise (MBE) policy
g. Project clean-up and close out

1.2 The instructions to bidders, instructions to the Contractor, general conditions of the contract, special conditions, if any, specific contracts, and requirements for close out documents are included in the Construction Manager's agreement with the Duval County School Board.

1.3 Standard Basis for Bidding

1.3.1. Proprietary Products

1.3.1.1 In these Specifications where one certain kind, type or brand of manufacturer of materials is named, it shall be regarded as the required minimum standard of quality. Substitutions lowering the performance, quality, method of assembly or installation, or in general, not in keeping with the Drawings and Specifications will not be permitted. It is understood that when a bid is submitted, the Bidder is aware of these requirements and that the materials within his bid are "equal to" or "better than" such items and that prior approval of any substitutions has been obtained from the Architect Engineer and acknowledged by written Addenda.

1.3.1.2 Extension of the Bid Opening Date will not be permitted in order to substitute a product.

1.3.1.3 Since time is of the essence, the Owner cannot be expected to delay the Bid Opening Date. In addition to the Specifications, it shall be understood that the details supplied with proprietary products shall become part of these Specifications as if contained herein. If a conflict should occur between these details and the Drawings and Specifications, it shall be brought to the attention of the Architect Engineer prior to submitting a Bid proposal.

1.3.2 Nonproprietary Products

Where materials, etc., are referred to in the Specifications as "equivalent to", or words of similar meaning, the Architect Engineer with Owner approval will decide as to their "equivalency." In addition to data required under paragraphs entitled "Shop Drawings" or "Manufacturer's Description Data," the Bidder shall furnish other detailed data as required by the Design Professional for comparison if the product is mentioned by name. All data shall be submitted at least ten (10) days prior to the scheduled bid opening date. No extra time will be allowed because of such substitution, if permitted, either for the article substituted or for revisions in other work affected by the substitution.

1.3.3 Substitutions

Where a particular system, product or material is specified by one or more trade names without the "equivalent" qualification, it shall be considered as a standard basis for bidding and is most satisfactory for its particular purpose in the work. Substitutions for the named systems, products or

materials and substitutions for any other product or material or modification of the specified material which the Bidder considered pertinent will be considered under the following conditions only:

1.3.3.1 All data shall be submitted at least ten (10) days prior to the scheduled bid opening date. No extra time will be allowed because of such substitution, if permitted, either for the article substituted or for revisions in other work affected by the substitution.

1.3.3.2 To insure a uniform basis for bidding, the Bidder shall base his Proposal on the particular system, product or material named in the Drawings and Specifications or Addendum.

1.3.3.3 The Bidder shall attach to his Form of Proposal, at the time of submission, a separate sheet upon which he shall list the particular system, product or material that he wishes to substitute. Directly opposite each item he wishes to substitute, he shall indicate the amount of money that he will add to or deduct from his Base Bid, if such substitution is approved by the Owner and the Architect Engineer prior to the signing of the Contract.

1.3.3.4 If no addition or deduction to the Base Bid is allowed by the Bidder for such substitutions, it shall be so stated opposite the item involved on the sheet attached. Substitutions so submitted shall include any and all adjustments of that or any other work affected by the substitution. Such substitutions shall be permitted and adopted only upon the written approval of the Architect Engineer and the Owner.

1.3.3.5 Any Proposal submitted that does not conform to the above requirements shall be considered as informal and unfair to other Bidders and will not be accepted.

1.3.3.6 The Bidder shall not use or install any material containing asbestos in the construction of this project or in the substitution of any product or material used in the construction.

1.3.4 Adjustments Because of Substitutions

In general, the Drawings and Specifications, of necessity, have been prepared based upon sizes, loads and requirements of specific items of equipment, products or materials. In the event the Bidder elects to use other equipment, products or materials than those for which designs have been prepared and included in the Drawings and Specifications, and if

because of such substitutions or changes from those shown, the Architect Engineer is required to revise the Drawings or is caused added expense, the Owner shall be equitably reimbursed by the Bidder for such costs.

1.3.4.1 Price variance resulting from substitution in accordance with Sub-paragraph 1.07.C.2 is allowed, but it shall not be a consideration in the award of this Contract.

1.3.4.2 No changes in the bid amount appearing on the outside of the bid envelope will be considered. Only the amount shown inside the envelope will be considered. All changes, corrections and erasures must be initialed by the person signing the bid.

1.3.4.3 Bidder recommending substitution shall be responsible for all associated costs to the project.

1.3.4.4 Nonconformance of Bid with Specifications

The Bidder shall be responsible for providing all items specifically called for in the Specifications, and the Owner shall not be responsible for any costs associated with the removal of nonconforming work and the substitution of work as called for in the Specifications.

1.4 Interpretation of Drawings and Specifications: Should a bidder find discrepancies, ambiguities, or conflicts in, or omissions from the Drawings and Specifications, or should he be in doubt as to their meaning, the Bidder shall notify the Design Professional at once for an interpretation. If such notification is within five (5) working days of the established Bid Opening, the Design Professional may respond to all Bidders if a change in the Bid Document is in order by means of telephone or electronic communication. Bidder will acknowledge such Addendum on his proposal form. Interpretive addenda will be forwarded to all Bidders, and each Bidder shall acknowledge the addenda will be forwarded to all Bidders, and each Bidder shall acknowledge the receipt of each Addendum on his proposal in the spaces provided. Bidders shall address all inquiries for this project to:

Bhide & Hall Architects, P.A.
1329-C Kingsley Avenue
Orange Park, FL 32073
Contact: Robert McVeigh
904.264.1919
bmcveigh@bhide-hall.com

END OF SECTION

SECTION 01040

COORDINATION

1.01 Architect/Engineer Control

A. The ARCHITECT/ENGINEER will render all interpretations of the Construction Documents upon request by the Owner or Contractor.

B. The ARCHITECT/ENGINEER will provide assistance for and approve solutions of construction problems.

C. Decisions relating to quality shall be approved by the ARCHITECT/ENGINEER.

D. Prior approval of the ARCHITECT/ENGINEER shall be obtained unless the approval of others is specifically required. Contractor is not to assume that approval has been given.

E. Product or System Approvals:

1. Where products or systems are specified by manufacturer's name and noted as approved, subsequent approval is not required if utilized exactly as specified.

2. The ARCHITECT/ENGINEER's approval implies only that a system is acceptable as it directly relates to the requirements of the Contract Documents. ARCHITECT/ENGINEER approval neither implies endorsement nor absence of fault.

F. Requests for changes shall be in writing. ARCHITECT/ENGINEER approval shall be in writing and obtained prior to work being performed.

G. Contract sum and/or time changes (Change Orders) shall require Owner's written approval prior to proceeding.

1.02 Contractor's Control

A. The Contractor shall be responsible for coordinating the entire project.

B. The Contractor shall insure that work is performed according to the Contract Documents.

C. The Contractor shall:

1. Assign work to subcontractors as required by:
   a. Labor and trade jurisdictions.
   b. Government regulations.
   c. Contract Documents.

D. The Project Manual (PM) is organized according to types of work effort. However, additional work of similar type may be called for in more than one section. The Contractor is responsible for the total, overall coordination of work effort and shall insure the distribution and accomplishment of the total work effort regardless of PM organization.

E. The Contractor shall insure the distribution of all documents, correspondence, instructions, etc., to affected parties, subcontractors, material suppliers, etc.

F. The Contractor shall ensure that all Subcontractors are informed of the requirements of the Contract Documents with specific emphasis to Division 1 of the Project Manual.

G. The Contractor shall cooperate with individuals authorized to visit the Work and insure that they conform to all safety and security requirements.

H. The Contractor shall notify the ARCHITECT/ENGINEER immediately of any condition, which will cause a delay, hindrance, or disruption in the construction process.

I. The Contractor shall coordinate the scheduling of work to be performed under other separate Owner contracts.
The Contractor shall inform the Owner of work observed to be improperly executed and shall also reflect it on its daily reports.

1.03 Contractor/Subcontractor Joint Control Responsibilities.

A. The Contractor shall coordinate with Subcontractors, suppliers, etc. for the timely:

1. Submittal of Product Data
2. Samples
3. Product orders
4. Material deliveries
5. Installations

B. The Contractor shall not expect nor receive time extensions or product substitutions as a result of improper administration. However, delays beyond the control of the Contractor and his agent may be legitimate reasons for time extensions.

C. The Contractor shall determine that material deliveries do not overload the structure and cause permanent deformation.

D. The Contractor shall be responsible for the protection of all work completed and in progress.

E. The Contractor shall educate his Superintendent of the importance of protecting completed work. The Superintendent will insure that Subcontractors protect work by other trades and thereby minimize damage to other work as well as their own. The Superintendent will insure that completed work is protected from the weather.

F. The Contractor shall coordinate the efforts of different trades for the building-in or connection of devices, equipment or services necessary for the installation of work.

G. The Contractor shall be responsible for receiving, storing and accounting for all deliveries of materials and equipment for the Work.

1.04 Installation of Products

A. Contractor shall install products in complete compliance with Contract Documents. This shall include the preparation or provision to receive the installation of a product, the preparation of a product for installation or application, the application or installation of a product or the adjustment and protection of a product.

B. Normally, Contract Documents require compliance with the manufacturer's instructions. In some cases, requirements greater than the manufacturer's are imposed. However, under no circumstances should Contract Documents reduce those imposed by the manufacturers. The Contractor shall review both; where doubt exists, seek ARCHITECT/ENGINEER clarification prior to proceeding.

1.05 Adjustment and Cleaning

A. As work progresses, clean and protect completed work from the subsequent work of other trades.

B. Protect work until commencing preparations for final inspection.

C. The Contractor shall review the work to determine that:

1. The installation is a sound, structurally adequate assembly.
2. The assembly is correctly installed and operates or functions as intended.
3. Assembly is adjusted for smooth operation and performance.
4. No debris shall be buried on the site. All debris shall be hauled from site and disposed of in compliance with governmental regulations.

D. Protection of Completed Work: The Contractor shall make certain all portions or trades of work are protected as completed from subsequent work, traffic, etc. Such protection shall include but not be limited to:

1. Finish Flooring: Install 30# rosin-sized paper in traffic and storage paths. Tape all joints. Allow no traffic, storage or work in or above unprotected surfaces.

END OF SECTION 01040

SECTION 01270
INCLUSIVE REQUIREMENTS

1. GENERAL:

1.1 The general provision of the Contract, General Conditions, Supplementary Conditions, Special Conditions (if any) along with the General Requirements, apply to all work specified in every section of the Project Manual.

1.2 Subcontractors shall examine all drawings and all other Sections of the Specifications for requirements therein affecting the work of their trade. Some tasks and work items may not be shown on the drawings in locations expected by the subcontractor. Regardless, such work remains a requirement of the project.

1.3 Responsibility: The General Contractor shall be responsible to inform all subcontractors and vendors of this requirement, and to enforce compliance.

1.4 It is not realistic to expect every item or component needed for each system and subcontract to be described on the drawings or to be specified. The Owner expects a complete and thorough job. The Contractor and his subcontractors and suppliers shall be held responsible to furnish and install all items and components that are usual and customarily needed to complete the work whether or not each item or component has been specified as shown. By submitting a bid to supply materials and/or to perform work on the project a supplier and/or sub-contractor is acknowledging his full awareness of its implications, agrees to perform accordingly with diligence and good cheer all aspects of his work that are usual and customary. In cases of dispute, the Architect shall be the sole judge and shall decide on what constitutes usual and customary.

END OF SECTION

SECTION 01300

SUBMITTALS

1.01 Submittals

A. The following submittals are required by the Contract Documents and are briefly explained herein:

1. Construction Schedule
2. Schedule of Values
3. Product Data

B. Information regarding submittal administration is also included herein.

1.02 Construction Schedule

A. The Contractor shall submit to the Owner and the Architect/Engineer two (2) copies of his Construction Schedule.

B. Upon acceptance by the Owner and ARCHITECT/ENGINEER, the Contractor shall post a copy of the Schedule within the Field Office where it can be readily referenced.

1.03 Schedule of Values

A. The Contractor shall submit to the Owner and the Architect/Engineer, two (2) copies of his Schedule of Values within ten (10) days of the Notice to Proceed.

B. The Schedule shall be in an outline format divided into major categories of construction as established by the Table of Contents. A value (amount) for each category shall be assigned thereto.

C. Submit on AIA Form G703, Continuation Sheet for the Application and Certificate for Payment, AIA Form G702.

1.04 Product Data

A. Product Data includes:

1. Shop drawings
2. Descriptive data
3. Samples
4. Schedules
5. Certificates
6. Guarantees

7. Warranties
8. Maintenance manuals

B. Submittal requirements for Product Data are listed in the technical sections of the Project Manual. The ARCHITECT/ENGINEER may, at his option, request additional Product Data.

1.05 Submittal Routing

A. Submittals shall be routed in the following manner:

1. Subcontractors, suppliers and others shall route to the Contractor.
2. The Contractor shall route to the ARCHITECT/ENGINEER.
3. The ARCHITECT/ENGINEER shall route to the Owner (certain approved Product Data only).

B. Return shall be in the reverse order.

C. The Contractor shall furnish copies of approved Submittals to governmental agencies as may be required or requested.

1.06 Review Procedures

A. Contractor's Review: The Contractor shall thoroughly review data submitted for compliance with the Contract Documents.

1. Data found not to be in accordance with the Contingent Document's shall be returned for compliance.
2. Data found to be acceptable shall be:
   a. Noted as required.
   b. Stamped indicating action taken.
   c. Forwarded to ARCHITECT/ENGINEER.

B. ARCHITECT/ENGINEER Review: The ARCHITECT/ENGINEER will review submittals and advise of his findings.

1. ARCHITECT/ENGINEER will not accept material for review that has not been reviewed and approved by the Contractor, and he will return data immediately.
2. The ARCHITECT/ENGINEER will review data which has been properly approved by the Contractor and will either mark it "NET (No Exceptions Taken)", "MCAN (Make Corrections as Noted)", "RAR (Revise and Resubmit)", "SSI (Submit Specified Item)", or "R (Rejected)".
3. Items marked "RAR (Revise and Resubmit)", "SSI (Submit Specified Item)", or "R (Rejected)". shall be resubmitted by the Contractor after making any required corrections or additions.
4. Items marked "NET (No Exceptions Taken)" or "MCAN (Make Corrections

as Noted)"may be resubmitted for further clarification.

5. ARCHITECT/ENGINEER approval does not relieve the Contractor of his responsibility for deviations from the Construction Documents unless he has notified the ARCHITECT/ENGINEER in writing of these deviations at the time of submittal.

C. ARCHITECT/ENGINEER Review Time Limit: Submittals shall be processed by the ARCHITECT/ENGINEER and returned to the Contractor within fourteen (14) days of receipt. The ARCHITECT/ENGINEER will make every effort to expedite review. The Owner shall not be liable to the Contractor for any delay in processing the submittals.

D. No work for which submittals are required (with the exception of test certificates for completed work, final guarantees and maintenance manuals) shall be performed until submittals are approved by the ARCHITECT/ENGINEER except at the Contractor's risk.

1.07 Definitions

A. Shop Drawings:

1. Fabrication drawings for custom products.
2. Modified catalog data annotated for a specific condition of service.
3. Installation drawings for product assemblies or systems.

B. Description Data: Manufacturer's catalog data, literature, etc., on product or system.

C. Samples: Physical examples of products proposed for use.

D. Schedules: Itemized listing of products and proposed locations.

E. Certificates: Notarized statements made and signed by authorized company representatives attesting to their product having met the Contingent Document requirements.

F. Guarantee or Warranty: Specific guarantees required in Project Manual in addition to the completed work guarantee required of Contractor. See Section 01700, Contract Closeout.

G. Maintenance Manuals:

1. Three-ring (minimum) 8-1/2" x 11" hardback, vinyl-covered binder for Owner's permanent record.
2. Contents to include reproductions of shop drawings, descriptive data, schedules, etc., corrected through final approval, plus operation, maintenance, parts listing, service availability, cleaning instructions, etc.

3. Permanently mark edge of binder to indicate contents and project title.

1.08 Required Information to be Included with all Submittals

A. Date of Submittal

B. Name of Project

C. Name of Contractor

D. Reference to a specific section, drawing or detail

E. Manufacturer's or fabricator's name

F. Owner's name

G. Installer's name

1.09 Required Information to be Included with Shop Drawings and Descriptive Data

A. Factory or shop applied finish or protective coating.

B. Installation requirements and recommendations.

C. Product protection requirements.

D. Cleaning precautions and/or requirements.

E. Applicable activation requirements or procedures.

1.10 Quantities (Minimum)

A. Shop Drawings

1. Generally, E-mail submittals are acceptable. For large drawings such as custom fabrications or assemblies, provide 2 full size sheets for review.

B. Physical Samples/Examples: Two copies

C. Mockups: One site constructed example

D. Certificates: Four copies

E. Guarantees or Warranties

1. Examples for initial review and approval: Two copies.
2. After approval, actual construction completion documents: Two copies

G. Maintenance Manual: Two copies (in 3 ring binders)

1.11 Off-Site Shop Fabrication Facilities

The Contractor shall provide the Architect/Engineer and the Owner a list of all off-site shop fabricated items so that the Architect/Engineer and/or the Owner may visit the Shop Fabrication facilities to inspect the work if so desired. The list shall include the item or product being fabricated, the name, street address, telephone number and person to contact to arrange a visit.

END OF SECTION 01300

SECTION 01700

CONTRACT CLOSEOUT

1.01 Purpose

This section generally outlines Contractor responsibilities for the Project or Contract closeout, including:

A. Adjustment and Cleaning.

B. Record Drawings and Maintenance Manuals.

C. Substantial Completion.

D. Release of Lien.

E. Consent of Surety to Final Payment

F. Inspection Certificates.

G. Bonds and Guarantees.

H. Application for Final Payment

1.02 Adjustment and Cleaning

A. Prior to the final inspection, the Contractor shall perform and complete the following:

1. Repair or replace defective products or areas damaged by the Contractor.
2. Clean all exposed or semi-exposed surfaces which have been soiled as a result of the work effort (even though previously cleaned).
3. Remove all stains, spots, marks and dirt from finished surfaces. Clean in accordance with the manufacturer's written instructions.
4. Replace mechanical equipment filters, adjust all finish hardware and schedule service instruction conferences with the Owner just prior to final inspection.

B. Cleaning shall include, but not be limited to, the following:

1. Removal of product protective coverings and labels. Do not remove UL, FM or other permanent labels or placards necessary for life-safety operations or to establish Construction Documents compliance.

2. Removal of all debris from the site. Debris shall not be buried on the site. Debris shall be disposed of according to government requirements.

3. Other cleaning as required:
   a. Dry or wet vacuum cleaning.
   b. Dusting of all new and existing surfaces.
   c. Cleaning of inside glazed surfaces and outside glazed surfaces if new or soiled by the work of this contract.
   d. Cleaning required by various specification sections with particular attention to instructions and specific requirements.

C. Adjustment shall include, but not be limited to, the following:

1. Adjustment of products, assemblies, equipment, hardware, components, etc., to achieve an installation, which operates smoothly, correctly, and as intended.

2. Adjustment as required by various sections of the Specifications.

1.03 Record Documents and Maintenance Manuals

A. Maintenance Manuals shall be submitted to the ARCHITECT/ENGINEER for approval.

1. Manuals shall contain maintenance and record documents as provided for by the Specifications.
2. Upon ARCHITECT/ENGINEER approval, manuals shall be forwarded to the Owner.
3. Final Payment shall be withheld until approved manuals are received by the Owner.

B. The Contractor shall submit his Field Notes on "as-built" conditions to the ARCHITECT/ENGINEER and shall have ARCHITECT/ENGINEER approval before Final Payment will be released by the Owner. See Section 01720, Project Record Documents.

C. The ARCHITECT/ENGINEER shall provide Record Documents which identify "as-built" conditions of the work. These documents shall be based on the Contractor's Field Notes maintained throughout the life of the project. See Section 01720, Project Record Documents.

D. Deviations from the above requirements will not be accepted without prior written approval. Failure to comply shall result in Final Payment being withheld. The Contractor waives any claim associated with withholding of retainage by the School Board if it fails to provide the above referenced materials and comply with all closeout requirements.

1.04 Substantial Completion

A. Inspection: The Contractor shall provide the ARCHITECT/ENGINEER with a written notification of project completion, a punch list of items to be completed, and request an inspection tour of the project.

B. The Contractor, ARCHITECT/ENGINEER and Owner shall be present for the inspection.

C. The ARCHITECT/ENGINEER will prepare a Certificate of Substantial Completion, AIA Form 9704, based on the results of the inspection. Attached thereto will be a list of items, "punch list," requiring additional Contractor attention and/or resolution. The Certificate shall be executed by all parties. The Owner signing after Board approval.

D. At the end of the allotted time for punch list work to be completed, a final inspection shall be held. Failure to identify all items shall not be deemed a waiver of those discrepancies, and Contractor shall have seven (7) days to remedy items identified after notice of the deficiency. Any items remaining incomplete will be completed by the Owner and the cost of the work charged against the Contractor's retainage.

1.05 Final Payment

A. The Contractor shall provide all applicable items and the DCPS 'Close-out Checklist' attached at the end of this section.

B. Release of Lien or Claim

1. Along with his Application for Final Payment, the Contractor shall submit a sworn statement that all work has been completed and that all bills for labor, materials and Subcontractor's work have been paid in full.

2. Additionally, the Contractor shall submit statements from each of his Subcontractors, material or labor suppliers that they too have completed all work and that all bills for labor, materials and their Subcontractor's work have been paid in full.

3. Sworn statements shall be made on the Owner's standard Release of Lien form.

4. Owner shall have no obligation or responsibility to make any payments to any subcontractor or supplier.

5. Upon request by the Contractor and a subcontractor or supplier together with the written consent of surety, the Owner may at its sole discretion issue joint checks. Failure of the Owner to elect this option should not give rise to any cause of action by any party.

C. Consent of Surety to Final Payment

1. Along with his Application for Final Payment, the Contractor shall provide a Consent of Surety to Final Payment.

2. Consent of Surety may be made on AIA Standard Form G707 or on a letter from the bonding company.

D. Inspection Certificates

1. Upon completion of the Project and before applying for Final Payment, the Contractor shall have the electrical, plumbing and mechanical work (and any other work) as applicable, inspected and approved by the Office of Building Code Enforcement, Duval County Public Schools, as required by the Specifications and all applicable codes, laws and ordinances, per *Florida Statutes*.

2. The Contractor shall submit all inspection certificates to the Owner with his Application for Final Payment.

E. Bonds and Guarantees

1. The Contractor shall submit copies of all Bonds and Guarantees as required.

2. The Contractor's "one year" Guarantee shall commence on the date of Substantial Completion.

3. The Contractor shall submit all Bonds and Guarantees with his Application for Final Payment.

4. This unconditional guarantee shall not replace or supersede any cause of action that may exist pursuant to the Contractor or law which has a limitation period in excess of one (1) year.

F. Application for Final Payment

1. The Final Certificate and Application for Payment shall be submitted with the required Release of Lien statements, Contractor's Guarantee and Consent of Surety to Final Payment.

2. The Application shall be marked "FINAL" and shall account for all Change Orders, including any liquidated and actual damages that may have been assessed for late completion.

END OF SECTION

DUVAL COUNTY PUBLIC SCHOOLS
CONTRACTOR PROJECT CLOSE-OUT CHECKLIST

DCSB PROJECT NAME: _____

DCSB PROJECT NO.: _____

CONTRACTOR: _____

The following Items shall be submitted by the Contractor along with the Contractor's Final Payment Requisition. The Contractor shall initial beside each applicable item provided. "N/A" shall be marked beside any items not applicable. The Contractor shall sign the document at the designated location on the bottom of the form.

INITIAL	CONTRACTOR REQUIRED DOCUMENTATION:
_____	1. Final Payment Requisition w/ Final Approved SOVs and OEO Forms - Submit (3) Originals with signatures and seals. Number the application as the next consecutive number with "FINAL" as the suffix; as in, "4 - FINAL".
_____	2. Final Change Order or Contigency Modification Form - Submit (3) Originals with all required backup.
_____	3. Consent of Surety to make Final Payment - Submit (1) Original. This is only required for bonded projects.
_____	4. Final Waiver & Release of Lien - Submit (1) Original from each Subcontractor and Supplier who was issued a contract or purchase order for materials or labor on the Project.
_____	5. Certificate of Substantial Completion Form - Submit (2) Copies of the previously executed DCPS Substantial Completion Form along with a copy of the associated punchlist.
_____	6. Contractor's 1-Year Material and Workmanship Warranty Statement - Submit (2) Originals from the GC, CM, or Prime Contractor, plus all project subcontractors.
_____	7. Contractor Certificate of Asbestos Use - Submit (2) Originals of the DCPS Form.
_____	8. Contractor Affidavit / Certificate of Contract Completion - Submit (2) Originals of the DCPS Form.
_____	9. Fully Executed Roofing Warrantees in accordance with Project Specifications - Submit (2) Originals (when applicable).
_____	10. Special Manufacturer's Warrantees for Minimum 1-Year and Multi-Year Extensions - Submit (1) Original from each Manufacturer or Supplier of Building Fixtures or Building System Units that are applicable.
_____	11. Proof of Training in accordance with Project Specifications - Submit (1) Copy of the sign-in sheet from each required training session.
_____	12. Certificate of Acceptance from DCPS Technology (when applicable) - Submit (1) Copy.
_____	13. Final Inspection report from DCPS Code Enforcement - Submit (1) Copy.
_____	14. Certificate of Completion or Occupancy from DCPS Code Enforcement - Submit (1) Copy.
_____	15. O&M Manuals - Submit (2) hard copies and (3) CD's.
_____	16. As-Built Drawings - Submit (1) hard copy and (1) CD.

CONTRACTOR SIGNATURE: _____

PROVIDE DOCUMENTS IN NUMERICAL ORDER TO MATCH ABOVE / DO NOT USE STAPLES

SECTION 01720

PROJECT RECORD DOCUMENTS

1.01 Purpose

This section provides Contractor guidance for the creation, preparation and maintenance of:

A. "Job Set" Record Documents (RD's)

B. Final Record Documents

C. Visitor's Log

1.02 Quality Assurance

A. The Contractor shall delegate the responsibility for the maintenance of Record Documents and the Visitor's Log to one person on his staff as approved by the ARCHITECT/ENGINEER.

B. The contractor shall ensure the accuracy of RD's and shall:

1. Thoroughly coordinate all changes.
2. Make adequate and proper entries.

C. Timeliness of Entries: The Contractor shall make all entries within a reasonable amount of time (24 hours) after receipt of information or the need for an entry arises.

1.03 Submittals

A. The ARCHITECT/ENGINEER's approval of current Job Set RD's will be a prerequisite to his approval of the Contractor's monthly Applications for Payment.

B. The ARCHITECT/ENGINEER's approval of the Final RD's will be a prerequisite to his approval of the Contractor's Application for Final Payment.

C. The Contractor shall submit his Visitor's Log for the inspection of the ARCHITECT/ENGINEER or Owner as may be requested.

D. The Contractor shall submit a copy of his prior month's Visitor's Log with each Application for Payment. He shall indicate the name of the project and the period covered by the log.

1.04 Protection of RD's

Take precautions to protect RD's from deterioration, loss or damage. Conserve, as necessary, the "Job Set" until the completion of work and the transfer of information from the "Job Set" to the "Final Record Documents."

1.05 "Job Set" Record Documents

A. Identification

Upon receipt of the set of documents to be used as the job set, identify each of the documents with the title, "Record Documents - Job Set."

B. Preservation

1. Devise a suitable method for protecting the "Job Set" from anticipated user wear.
2. Use the "Job Set" only for the entry of new data and the ARCHITECT/ENGINEER's review.
3. Maintain the "Job Set" at the project work site designated by the ARCHITECT/ENGINEER.

C. Making Entries

1. Use an erasable colored pencil.
2. Clearly describe the change by note or by graphic line.
3. Date all entries.
4. Highlight the change by the use of a "cloud" around the area(s) affected.
5. Use different colors for overlapping changes.

D. Other Entries

1. Indicate any ARCHITECT/ENGINEER directed changes by note; i.e., "ARCHITECT/ENGINEER directed change."
2. Contractor originated changes and inadvertent errors which are approved by the ARCHITECT/ENGINEER shall be clearly indicated by note.

E. Schematic Layout Conversion

1. General Background: Most mechanical, electrical, and plumbing drawings are schematic in nature and not intended to portray precise physical layout or location.

a. Final physical layout is determined by the Contractor and may be different from that shown on the Drawings.

b. Future modifications or maintenance will require accurate, final, physical arrangement information.

2. "Job Set" RD's: The Contractor shall annotate the "Job Set" RD's to show:

   a. Plan Location: Dimension layout of mechanical/electrical runs to within 1" of the centerline of each run.

   b. Identification: Identify the item by accurate note showing size, material and function; i.e., "4" cast iron drain," "1/2" copper water," etc.

   c. Show the vertical (height) location by symbol or note; i.e., "in ceiling plenum," "exposed ceiling mounted," "under slab," etc.

   d. Make identifications sufficiently descriptive so that they may be easily related to the Specifications.

1.06 Final Record Documents

A. General: The Contractor shall furnish Final Record Drawings that provide factual reference information of a permanent nature, enabling future modifications and maintenance to proceed without expensive site investigation. As-Built markups shall include markups from all Sub-Contractors, ASI's, RFI's, etc.

B. Contractor, at his own expense, shall obtain a set of the latest Drawings in AUTOCAD format from the ARCHITECT/ENGINEER, including ASI's, RFI's, etc., as applicable, to be used for Final Record Drawings.

C. Prior to the transfer of information from the "Job Set" to the Final RD's, the Contractor shall obtain a review by the ARCHITECT/ENGINEER of all recorded data on the Job Set and the Sub-Contractor Markups. Make <u>all</u> required revisions.

D. Transfer of Data to Drawings

1. Carefully transfer all changed data from the approved "Job Set" and Sub-Contractor Markups to AUTOCAD.
2. Coordinate all changes as required. Clearly indicate changes to <u>all</u> drawings affected; i.e., plans, sections, details, etc. Give the full description of changes to provide a comprehensive record. Show actual locations, dimensions, notes, etc.
3. Call attention to each entry by drawing a "cloud" around it.
4. Make changes neatly and consistently. Line quality shall be crisp, consistent, and equal to the original.
5. Each sheet of the Final Record Drawings shall be dated, marked "Record Drawings" with the Contractor's name.
6. Final Record Drawings shall be delivered in AutoCAD Release 13 DWGS and in pdfs.
   a. Bind all x-references into each drawing file sheet.
   b. Rename each sheet per DCPS naming standards, see below.
   c. Provide files in folders by discipline, see examples below.

7. Rename each drawing file to include the following information: “Project No” - “School Name & No” - “Proj Description - “RecDwgs” - “Date” - “A/E Proj No” - “Dwg No” “Dwg Description”. Examples:

   #1: “M-83680-WolfsonFieldhouses-RecDwgs-08.01.20-15054-E2.1 Floor Plan.dwg”

   #2: “M-83680-WolfsonFieldhouses-RecDwgs-08.01.20-15054-A3.1 Ext Elevations.dwg”

   File names shall not exceed 100 characters, including dashes and spaces.

8. Files shall then be placed into separate folders, organized by discipline. Under each discipline’s folder, create two subfolders. One shall be named “PDF” and the other “DWG”. Combined all PDF files into a single, consolidated file and place under the main “Record Drawings” folder. Examples:

//Record Drawings	/Arch Files	/PDF
		/DWG
	/Strl Files	/PDF
		/DWG
	/Mech Files	/PDF
		/DWG
	/Plumb Files	/PDF
		/DWG
	/Fire Spr Files	/PDF
		/DWG
	/Elec Files	/PDF
		/DWG

   “M-83680-WolfsonFieldhouses-RecDwgs-08.01.20-15054-Complete Set.pdf”

9. On CD format, provide:
   a. Final Record Drawings in AutoCAD, including the As-Built Survey.
   b. Final Record Drawings in PDF.
   c. Job Set, Sub-Contractors markups, ASIs, RFIs, etc. scanned into PDF format (color).

E. The cost of transfer of Data to the Final Record Drawings to AutoCAD and to pdf shall be paid by the Contractor.

F. Review and Approval: Submit the complete set of Record Documents to the ARCHITECT/ENGINEER for his approval. Revise as necessary.

1.07 Changes Subsequent to Acceptance

The Contractor's responsibility for recording change ends upon acceptance of the Work by the Owner (Approved Certificate of Final Inspection by State DOE). However, changes resulting from replacements, repairs, and alterations required as a result of the Contractor guarantee work shall be recorded.

1.08 Visitor's Log

1. The Contractor shall maintain a log in the Field Office to record visits by the ARCHITECT/ENGINEER, his consultants, and all visitors, including Owner's representatives and inspectors.

2. This log shall become the official record of all job visits and shall show:

   a. Date
   b. Time of Arrival
   c. Time of Departure
   d. Person's Name
   e. Entity Represented

3. The Contractor shall furnish a copy of the log to the Architect/Engineer or Owner.

1.09 Contractors' Project Related Documents

All documents shall be made available to the Owner upon request.

END OF SECTION

SECTION 02050

DEMOLITION

1. GENERAL:

1.1 Demolish as necessary to accomplish the new work and results indicated. Remove existing items carefully. Demolition of items is part of the work whether specifically shown on the drawings or not.

1.2 Existing school buildings will be occupied by the Owner for the duration of the Contract.

Contractor's activities shall be reasonably coordinated with the Owner to minimize disruption of the Owner's schedule and disruption of the students.

2. HANDLING DEBRIS:

2.1 All debris shall be removed from site or stored in a dumpster on a daily basis.

2.2 Construction dumpsters shall have adequate protection from student contact. Dumpsters shall be secured at the end of each work day.

3. SCHEDULES:
The Contractor shall coordinate with the Principal and DCSB Project Manager for appropriate times for demolition activities.

4. PROTECTION:

4.1 **SAFETY**:

4.1.1 Exercise caution and safe measures in demolition and removal of materials within the building.

4.1.3 Comply with OSHA requirements for job safety. Provide caution signs.

4.1.4 Ventilation: Provide continuous exhaust directly to the exterior to maintain negative pressure in the work area. Do not allow dust and construction fumes to mix with the air of adjacent rooms or mix with the ventilation system of the school.

4.2 Leaks occurring as a result of demolition and construction activity shall be promptly repaired and terminated. Any damage to building and contents resulting from construction/demolition shall be made good by the Contractor. Damage to carpet, flooring, furnishings, or equipment shall be corrected or replaced. It is recommended that the Contractor make a survey of the existing interior conditions prior to the start of

work.

4.4 Protect existing work that is to remain in place.

4.5 Where pedestrian and driver safety is endangered in area of removal of work, provide protection as required.

4.6 The existing corridor and adjacent classroom spaces shall be protected from construction dust. If necessary, provide a plastic barrier to separate the construction areas from other spaces.

5. CLEAN-UP:

5.1 Debris and Rubbish: Remove and transport debris and rubbish in manner that will prevent spillage on streets or adjacent areas. The Contractor shall remove all demolished materials unless directed otherwise by the Owner.

5.1.1 Clean-up spillage from streets and adjacent areas.

5.1.2 Comply with Federal, State, and local hauling and disposal regulations.

6. OWNER'S SALVAGE OF MATERIALS:

6.1 Upon demolition, the Owner shall be given the opportunity to salvage any material for their use.

6.2 Prior to demolition, the Owner may select certain items to be salvaged. Upon removal, the Contractor shall place these items at an on-site location designated by the Owner.

END OF SECTION

SECTION 02055

CUTTING & PATCHING

1. DESCRIPTION OF REQUIREMENTS:

1.1 Definition: Cutting and patching includes cutting into existing construction to provide for the installation or performance of other work and subsequent fitting and patching required to restore surfaces to their original condition.

1.1.1 Cutting and patching is performed for coordination of the work, to uncover work for access or inspection, to obtain samples for testing, to permit alterations to be performed or for other similar purposes.

1.1.2 Cutting and patching performed during the manufacture of products, or during the initial fabrication, erection or installation processes is not considered to be cutting and patching under this definition. Drilling of holes to install fasteners and similar operations are also not considered to be cutting and patching. Core-drilling of holes larger than 1" requires approval of the project structural engineer.

1.2 Quality Assurance:

1.2.1 Requirements for Structural Work: Do not cut and patch structural work in a manner that would result in a reduction of load-carrying capacity or of load-deflection ratio.

1.2.2 Before cutting and patching the following categories of work, obtain the Structural Engineer's approval to proceed with cutting and patching:

A. Miscellaneous structural metals, including lintels, equipment supports, and similar categories of work.

B. Masonry bearing walls.

C. Structural concrete including floor slabs.

D. Exterior wall construction.

E. Roof deck

F. Roof trusses or structural roof members.

1.2.3 Operational and Safety Limitations: Do not cut and patch operational elements or safety related components in a manner intended, including energy performance, or that would result in increased maintenance, or decreased operational life or decreased safety.

1.2.4 Visual Requirements: Do not cut and patch work exposed on the building's exterior or in its occupied spaces, in a manner that would, in the Design Professional's opinion, result in lessening the building's aesthetic substantial visual evidence of cut and patch work. Remove and replace work judged by the Design Professional to be cut and patched in a visually unsatisfactory manner.

2. PRODUCTS:

2.1 General: Except as otherwise indicated, or as directed by the Design Professional, use materials for cutting and patching that are identical to existing materials. If identical materials are not available, or cannot be used, use materials that match existing adjacent surfaces to the fullest extent possible with regard to visual effect. Use materials for cutting and patching that will result in equal-or-better performance characteristics.

3. EXECUTION:

3.1 Inspection: Before cutting, examine the surfaces to be cut and patched and the conditions under which the work is to be performed. Examination should include a study of the existing drawings for the building. If unsafe or otherwise unsatisfactory conditions are encountered, take corrective active before proceeding with the work.

3.1.1 Before the start of cutting work, meet at the work site with all parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict between the various trades. Coordinate layout of the work and resolve potential conflicts before proceeding with the work.

3.2 Preparation:

3.2.1 Temporary Support: To prevent failure, provide temporary support of work to be cut. Provide shoring, bracing and support as required to maintain structural integrity of the work.

3.2.2 Protection: Protect other work during cutting and patching to prevent damage. Provide protection from adverse weather conditions for that part of the project that may be exposed during cutting and patching operations. Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

Take precautions not to cut existing pipe, conduit or duct serving the building but scheduled to be relocated until provisions have been made to bypass them.

3.3 Performance:

3.3.1 Employ skilled workmen to perform cutting and patching work. Except as otherwise indicated or as approved by the Design Professional, proceed with cutting and patching at the earliest feasible time and complete work without delay.

3.3.2 Cutting: Cut the work using methods that are least likely to damage work to be retained or adjoining work. Where possible review proposed procedures with the original installer; comply with original installers recommendations.

3.3.2.1 In general, where cutting is required, use hand or small power tools designed for sawing or grinding, not hammering and chopping. Cut through concrete and masonry using a cutting machine or core drill to insure a neat hole. Cut holes and slots neatly to size required with minimum disturbance of adjacent work. To avoid marring existing finished surfaces, cut or drill from the exposed or finished side into concealed surfaces. Temporarily cover openings when not in use.

3.3.2.2 By-pass utility services such as pipe and conduit, before cutting, where such utility services are shown or required to be removed, relocated or abandoned. Cut-off conduit and pipe in walls or partitions to be removed. After by-pass and cutting, cap, valve, or plug and seal tight remaining portion of pipe and conduit to prevent entrance of moisture or other foreign matter.

3.3.3 Patching: Patch with seams which are durable and as invisible as possible. Comply with specified tolerances for the work.

3.3.3.1 Where feasible, inspect and test patched areas to demonstrate integrity of work.

3.3.3.2 Restore exposed finishes of patched areas and where necessary extend finish restoration into retained adjoining work in a manner which will eliminate evidence of patching and refinishing.

3.3.3.3 Patch and repair floor and wall surfaces to provide an even surface of uniform color and appearance remove existing floor and wall coverings and replace with new materials, if required by the Architect.

3.4 Cleaning:

3.4.1 Thoroughly clean areas and spaces where work is performed or used as access to work. Remove completely point, mortar, oils, putty, and items of similar nature. Thoroughly clean piping, conduit and similar features before painting or other finishing is applied. Restore damaged pipe covering to its original condition.

END OF SECTION

SECTION 02830

CHAIN LINK FENCING AND GATES

1. GENERAL:

1.1. Related Documents: The requirements of Division 1 are hereby made a part of this section as if fully repeated herein.

1.1.1. DIRECT PURCHASING: This Section is subject to the terms and procedures of Direct Purchasing, whereby the Owner reserves the right to recover the sales tax on materials by purchasing directly the materials required for this Section. Issuance of Purchase Orders by the Owner shall not relieve the Contractor of any of his responsibilities regarding material purchases or installations, with the exception of the payments for the materials as purchased.

1.2. Related Topics

1.2.1. Earth Work
1.2.2. Concrete Work

1.3. Submittals

1.3.1. Shop Drawings shall be submitted for approval prior to any fabrication or delivery of materials to the site. Drawings shall indicate all details of fabrication and installation.
1.3.2. Submit manufacturer's data on all fencing materials.

1.4. Certificates

1.4.1. Upon request Contractor shall provide Certificates of Compliance with the applicable standards and referenced Specifications.

1.5. Coordination

1.5.1. Contractor shall examine and accept grading at fence line.

1.5.2. Grade should be such that approximately two inches between the fence fabric and the ground shall be held along the line of the fence.

2. PRODUCTS:

2.1. All chain link fencing shall be 9 gauge 2" mesh hot dipped galvanized after weaving knuckle and knuckle top and bottom regardless of the fence heights. Do not provide any barbed selvage on this project.

2.2. Top rail shall be 1- 5/8" O.D. hot dipped galvanized inside and outside with wall thickness to be .140 and weight to be 2.280 lbs. per foot. 21 ft lengths, schedule 40 only.

2.3. Line posts shall be hot dipped galvanized inside and outside schedule 40 only. 2" O.D. with wall thickness of .145 for all fence heights.

2.4. Terminal posts shall be 3" O.D. hot dipped galvanized inside and outside wall thickness to be .154 and weight per foot 3.650 lbs. Schedule 40 only unless specified below.

2.5. All fencing shall be constructed with a top rail.

2.6. Tension Wire: 7 gauge, galvanized, continuous. Install through line posts. Bottom tension wire shall be woven through fabric and pulled taught.

2.7. Gates

2.7.1. All gates are to be constructed of schedule 40 pipe with wall thickness of .140 or greater. Gate pipe shall be hot dipped galvanized, inside and outside and of welded construction. All welds are to be chipped and wire brushed and brush painted with cold galvanized coating.

2.7.2.

Gate Length	Fencing Height	Gate Terminal Post
$\geq$ 10 ft.	$\geq$ 6 ft.	4" dia/sch. 40
< 10 ft.	$\geq$ 6 ft.	3" dia/sch. 40

2.7.3. Gate Hardware

a. All gates shall be equipped with a 3/16" galvanized chain welded to the gate. The chain shall extend 8" on each side of the link welded to the gate for locking purposes.
b. All swinging gates shall have "Bulldog" industrial hinges only.
c. Provide T-handle locking device at all gates.

2.8. Fencing at equipment cages shall be 8' high. All cages will have 6" wide single gates unless indicated otherwise. Provide top fencing with railing at 4'-0" o.c.

2.9. All fencing with a straight run of 400' or greater shall have a center pull post and bracing installed.

2.10. All terminals shall have bracing installed.

2.11. No trespassing signs shall be installed at all retention pond access points.

3. EXECUTION

3.1. New fencing: Provide new fencing and gates as indicated. Provide terminal post where new fencing intersects existing.

3.2. Removal of debris: Contractor shall remove all fencing components left over at the completion of the project, whether generated from new fence work or from retrofitting or removing of existing fencing, and dispose of properly off-site.

3.3. Installation:

3.3.1. Install framework, fabric, and accessories in accordance with ASTM F567 and manufacturer's recommendations.

3.3.2. Set terminal and line posts plumb in concrete footings with top of footing 4 inches below finish grade. Embed terminal posts in 12 inch x 36 inch deep concrete. Embed line posts in 12 inch x 24 inch concrete.

3.3.3. Stretch fabric between posts or at intervals of 100 feet maximum, whichever is less.

3.3.4. Fasten fabric to top rail, line posts, braces, and bottom tension wire with wire ties spaced 15 inches on center using the double twist method on each tie.

3.3.5. Attach fabric to end and corner posts with tension bars and tension bar clips.

3.3.6. Install bottom tension wire stretched taut between terminal posts.

3.3.7. Brace each gate and corner post to adjacent line post with horizontal center brace tail and diagonal truss rods. Install brace tail, on bay from end and gate posts.

3.3.8. Install each gate leaf with fabric fence. Install hardware specified and as required by the manufacturer.

3.4. Erection Tolerances:

3.4.1. Maximum variation from plumb: 1/4 inch.

3.4.2. Maximum offset from true position: one inch.

END OF SECTION

SECTION 03 30 00

CONCRETE

1. GENERAL:

1.1 Related Documents: The requirement of Division 1 is hereby made a part of this section as if fully repeated herein.

1.1.1 DIRECT PURCHASING: This section is subject to the terms and procedures of Direct Purchasing, whereby the Owner reserves the right to recover the sales tax on materials by purchasing directly the materials required for this Section. Issuance of Purchase Orders by the Owner shall not relieve the Contractor of any of his responsibilities regarding material purchases or installations, with the exception of the payments for the materials as purchased,

1.2 Concrete is required on the project for slabs at the exterior work.

2. PRODUCTS:

2.1 Concrete: 3,000 psi at 28 days.

a. Portland Cement: ASTM C-150, Type 1
b. Aggregates:ASTM C-33 and ASTM C-40
c. Water: Potable

2.2 Reinforcing Materials:

2.2.1 Reinforcing Bars: ASTM A-615 Grade 60.

2.2.2 Slab reinforcement: Provide:

a. Welded Wire Fabric: ASTM A-185

2.3 Control joints: Provide sawcut control joints at 100 s.f. intervals. Coordinate control joints with equipment pads. Locate control joints with Architect's approval prior to pouring concrete.

2.4 Expansion Joints: Construct expansion joints using ½ inch wide full depth foam strips around the perimeter edges of the new slabs. Provide expansion joints at all joints of slab/building and slab/equipment pads.

2.5 Moisture Barrier: 10 MIL Polyethylene sheets, seal joint and punctures with barrier manufacturer approved mastic. Barrier shall meet ASTM E-154 and E-96. Provide moisture barrier for all interior slabs.

3. EXECUTION:

3.1 Preparation:
1. Remove excess water, debris, and foreign matter from formwork and/or excavation prior to placing concrete.

2. Insure that subgrade is moist prior to concrete placement where polyethylene film is not used.

3.2 Placing

3.2.1 Reinforcing and concrete shall be placed in accordance with the latest edition of ACI standards.

3.2.2 Monitor slump of concrete loads and be prepared, with appropriate equipment, to perform slump tests of individual loads which appear to be outside slump limits specified herein.

a. Excessive slump is cause for rejection of concrete.
b. Do not retamper or use concrete which has begun to set.

3.2.3 Use mechanical vibrating equipment for consolidation to eliminate air bubbles or stone pockets which may cause honeycombing, pitting, or planes of weakness.

3.2.4 Vibrate concrete minimum amount required for consolidation.

a. Do not allow consolidation to segregate ingredients.
b. Do not use vibrating equipment to move concrete horizontally in forms.

3.3 Slabs on Grade

3.3.1 All concrete slabs shall be not less than 4" thick. Install over compacted fill. Interior slabs shall be chemically treated against termites and installed on a moisture barrier.

3.3.2 Where concrete is sawcut and removed for plumbing or other work, the replacement concrete slab shall be bonded to the existing slab with 12-in. long #5 reinforcement dowels at 24" o.c. Drill holes in the existing slab and set dowels in epoxy with 6" embedment.

3.4 Repair of Defective Areas:

3.4.1 Patch all honeycombs, voids, stone pockets, and tie holes as soon as practicable after form removal.

3.4.2 Chip away defective area to a depth of not less than one inch, with edges that are tight angles to surface.

3.4.3 Wet area to be patched including adjacent surrounding area approximately 6 inches wide.

3.4.4 Patch with cement grout of same sand-cement ratio and material source concrete.

3.4.5 Any other structural repair method and products require approval of Architect/Engineer.

3.5 Finishes – Floors and Other Wearing Surfaces:

3.5.1 General:

a. Screed all slabs carefully to grades shown on drawings
b. Do not work surface until ready for floating.

3.5.2 Screed: Vibratory types and arranged not to interfere with top of steel slab.

3.5.3 Float Finish:

a. Float surface on disappearance of water sheen.
b. Do not dust on dry sand or cement
c. Lightly tool all edges of construction joints
d. Hand float areas inaccessible to power float.

3.5.4 Broom Finish: Float finish and brush surface at right angles to traffic with soft bristled brush. Provide broom finish at sidewalks and other exterior surfaces subject to pedestrian traffic.

3.6 Curing:

3.6.1 General: Begin curing all concrete as soon as practicable after placing and finishing concrete.

3.6.2 Flatwork: Cure by one of the following:

a. Moist Curing:
   1) Keep concrete moist and above 50 degrees by use of saturated covering with ponding or spraying, waterproof paper or polyethylene film.
   2) Lap joints 3 inches and seal.
   3) Continue moist curing for a minimum period of 7 days.

b. Membrane Curing Compound:
   1) Apply liquid membrane curing compound immediately after final finishing.
   2) Apply curing compound in accordance with manufacturer's recommendations and approved submittals.

3.7 Protection And Clean-Up

3.7.1 Protection: During curing period protect concrete from damaging mechanical disturbances, water flow, loading, shock and vibration.

3.7.2 Clean-up: Remove all unused material, debris and equipment from site upon completion of work.

END OF SECTION

SECTION 05400

MISCELLANEOUS METAL

1. GENERAL:

1.1 Related Documents: The requirements of Division 1 are hereby made a part of this section as if fully repeated herein.

1.1.1 DIRECT PURCHASING: This Section is subject to the terms and procedures of Direct Purchasing, whereby the Owner reserves the right to recover the sales tax on materials by purchasing directly the materials required for this Section. Issuance of Purchase Orders by the Owner shall not relieve the Contractor of any of his responsibilities regarding material purchases or installations, with the exception of the payments for the materials as purchased.

1.2 Summary: Provide miscellaneous metal work shown on the Drawings, as specified herein, and as needed of a complete and proper installation.

1.3 Submittals:

1.3.1 Product data: Within 35 calendar days after the Contractor has received the Owner's Notice to Proceed, submit:

A. Materials list of items proposed to be provided under this Section;
B. Manufacturer's specifications and other data needed to prove compliance with the specified requirements;
C. Shop Drawings in sufficient detail to show fabrication, installation, anchorage, and interface of the work of this Section with the work of adjacent trades. All shop drawings must be prepared under the supervision of a registered structural engineer in the State of Florida, and must bear his seal and signature on each print;
D. Manufacturer's recommended installation procedures which, when approved by the Architect, will become the basis for accepting or rejecting actual installation procedures used on the Work.

1.4 Quality Assurance:

1.4.1 Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section

1.4.2 Perform shop and/or field welding required in connection with the work of this Section in strict accordance with pertinent recommendations of the American Welding Society.

2. PRODUCTS:

2.1 Materials:

2.1.1 In fabricating items which will be exposed to view, limit materials to those which are free from surface blemishes, pitting, rolled trade names, and roughness.

2.1.2 Comply with following, as pertinent:

A. Steel plates, shapes, and bars: ASTM A36;
B. Steel plates to be bent or cold-formed: ASTM A283, grade C;
C. Steel tubing (hot-formed, welded, or seamless): ASTM A501;
D. Steel bars and bar-size shapes: ASTM A306, grade 65, or ASTM A36;
E. Cold-finished steel bars: ASTM A108;
F. Cold-rolled carbon steel sheets: ASTM A336;
G. Galvanized carbon steel sheets: ASTM A526, with G 90 zinc coating in accordance with ASTM A525;
H. Stainless steel sheets: AISI type 302 or 304, 24 gauge with number 4 finish;
I. Gray iron castings: ASTM A48, class 10;
J. Malleable iron castings: ASTM A47;
K. Steel pipe: ASTM A53, grade A, schedule 40, black finish unless otherwise noted;
L. Concrete inserts:
    1. Threaded or wedge type galvanized ferrous castings of malleable iron complying with ASTM A27;
    2. Provide required bolts, shims, and washers, hot-dip galvanized in accordance with ASTM A153.
M. Miscellaneous metals for exterior use shall be hot-dipped galvanized.

2.2 Fasteners:

2.2.1 General:

A. For exterior use and here built into exterior walls, provide hot-dipped zinc-coated fasteners.
B. Provide fasteners of type, grade, and class required for the particular use.

2.2.2 Comply with following standard as pertinent:

A. Bolts and nuts: Provide hexagon-head regular type complying with ASTM A307, grade A;
B. Lag bolts; Provide square-head type complying with Fed Spec FF-B-561;
C. Machine screws: Provide cadmium plated steel type complying with Fed Spec FF-S-111;
D. Washers:
   1. Plain washers: Comply with Fed Spec FF-W-92; round, carbon steel;
   2. Lock washers: Comply with Fed Spec FF-W-84, helical spring type carbon steel;
E. Toggle bolts: Provide type, class, and style needed but complying with Fed Spec FF-B-588;
F. Anchorage devices: Provide expansion shield complying with Fed Spec FF-S-325.

2.3 Other Materials: Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

2.4 Shop Paint:

2.4.1 Primer: Use "10-99 Tnemec Primer" or "Rustoleum Number 5769 Primer."

2.4.2 For repair of galvanizing, use a high zinc-dust content paint complying with MIL-P-21035.

2.5 Fabrication:

2.5.1 Except as otherwise shown on the Drawings or the approved Shop Drawings, use materials of size, thickness, and type required to produce reasonable strength and durability in the work of this Section.

2.5.2 Fabricate with accurate angles and surfaces which are true to the required lines and levels, grinding exposed welds smooth and flush, forming exposed connections with hairline joints, and using concealed fasteners whenever possible.

2.5.3 Prior to shop painting or priming, properly clean metal surfaces as required for the applied finish and for the proposed use of the item.

2.5.4 On surfaces inaccessible after assembly or erection, apply two coats of the specified primer. Change color of second coat to distinguish it from the first.

3. EXECUTION:

3.1 Surface Conditions: Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.2 Coordination: Coordinate as required with other trades to assure proper and adequate provision in the work of those trades for interface with the work of this Section.

3.3 Installation:

3.3.1 General:

A. Set work accurately into position, plumb, level, true, and free from rack.
B. Anchor firmly into position.
C. Where field welding is required, comply with AWS recommended procedures of manual-shielded metal-arc welding for appearance and quality of weld and for methods to be used in correcting welding work.
D. Grind exposed welds smooth, and touch up shop prime coats.
E. Do not cut, weld, or abrade surfaces which have been hot-dip galvanized after fabrication and which are intended for bolted or screwed field connections.

3.3.2 Immediately after erection, clean the field welds, bolted connections, and abraded areas of shop priming. Paint the exposed areas with same material used for shop priming.

END OF SECTION

SECTION 05410

METAL STUDS

1. GENERAL:

1.1 Related Documents: The requirements of Division 1 are hereby made a part of this section as if fully repeated herein.

1.1.1 DIRECT PURCHASING: This Section is subject to the terms and procedures of Direct Purchasing, whereby the Owner reserves the right to recover the sales tax on materials by purchasing directly the materials required for this Section. Issuance of Purchase Orders by the Owner shall not relieve the Contractor of any of his responsibilities regarding material purchases or installations, with the exception of the payments for the materials as purchased.

1.2 All materials and products specified in this Section are manufactured by United States Gypsum Company. Equivalent materials and products of other manufacturers such as National Gypsum Company are acceptable.

2. MATERIALS:

2.1 Metal Studs (complete stud/framing systems including matching top and bottom tracks).

2.1.1. Metal Studs/Framing:

Standard No.	Gauge (minimum metal thickness	Partition Height Limit
A. 3 5/8 Studs:	358ST20, 20 gauge (.030)	0-9 ft
	358ST18, 18 gauge (.040)	9-15 ft
B. 6" Studs:	600ST20, 20 gauge (.030)	0-20 ft

2.2 Fasteners: Self-tapping, Type S, Bugle Head, 1-1/8 inch minimum length. (Where gypsum board is required to be laminated to gypsum board provide Type G screws, Bugle Head, 1-1/2 inch length minimum.)

2.3 Metal Furring Strips: Galvanized, standard gauge hat channels, or similar shape suitable to support wall finish scheduled. Effective depth of 1 inch. Products of United States Gypsum are approved.

2.4 Submittals: submit manufacturer’s product data including fasteners.

3. ERECTION:

3.1 Bottom track and all studs shown to install against concrete masonry shall be set in two (2) continuous beads of sealant prior to securing in place. Sealant shall be as specified in Section 07920, "Sealants and Caulking."

3.2 Fasten top and bottom track to structural elements and as shown with suitable fasteners, located 2" from each end and spaced 24" on center unless indicated otherwise on the drawings.

3.3 Provide metal stud framing within ¼ inch on all sides of ductwork where it penetrates any partition. Provide metal stud each side of structural member for securing gypsum board where partition runs perpendicular to structural orientation.

3.4 Position studs vertically, engaging top and bottom track. Stud spacing shall be 16" on center unless indicated otherwise. Provide bracing between roof purling or diagonal bracing of vertical studs as required.

3.4.1 Secure stud plumb with two (2) screws to top track and two (2) screws to bottom track.

3.4.2 Provide diagonal bracing above the ceiling at 4’-0” o.c. or as recommended by the manufacturer. Bracing penetrating gypsum board shall be sealed with joint compound.

3.5 All joints or splices in top and/or bottom track shall be lapped 8" minimum.

3.6 No joints or splices shall be permitted in full length of stud.

3.7 Installation, bridging, etc., not specifically indicated to the contrary shall be in accordance with manufacturer's suggested and recommended details.

3.8 Provide double studs boxed and rigidly anchored at all discontinuous ends of partitions, and at all door jambs.

3.8.1 To prevent flexing and breaking of the wall along the door frames, a nest of metal studs shall be provided around each door installation to accommodate the weight of the door and the shock caused by the closing of the door at drywall installation.

END OF SECTION

SECTION 05500

METAL FABRICATIONS

1. GENERAL:

1.1 Related Documents: The requirements of Division 1 are hereby made a part of this section as if fully repeated herein.

1.1.1 DIRECT PURCHASING: This Section is subject to the terms and procedures of Direct Purchasing, whereby the Owner reserves the right to recover the sales tax on materials by purchasing directly the materials required for this Section. Issuance of Purchase Orders by the Owner shall not relieve the Contractor of any of his responsibilities regarding material purchases or installations, with the exception of the payments for the materials as purchased.

1.2 Scope: Work included in this Section:

1.2.1 Handrails and guardrails.

1.2.2 Miscellaneous metal items for which drawing information is fully descriptive are not necessary named herein, but shall be provided as shown.

1.3 Submittals:

1.3.1 Shop Drawings: Submit shop drawings to the Architect for approval of all fabricated miscellaneous items. Shop drawings shall indicate the following: fastenings, supports, and anchors; patterns; clearances, and necessary connections to work of other trades.

1.3.2 Catalog Cuts: For standard manufactured items, catalog cuts shall be submitted.

2. PRODUCTS:

2.1 Structural Shapes: ASTM A 36

2.2 Steel Pipe: ASTM A 120-76 seamless steel pipe, standard weight, Schedule 40, black, sizes as noted on the drawings or herein specified.

2.3 Malleable Iron Castings: ASTM A 47-74.

2.4 Fastenings: Furnish anchors, bolts, nuts, washers, screws, sleeves, and other devices necessary for use in connection with or incidental to securing this work into the building.

2.5 Bolts, Nuts, and Washers: Machine bolts. Square head unfinished bolts with square nuts. ASTM Standard Specification A 307-76 and ASA A-18.

2.6 Power Actuated Anchors: Hardened-steel drive-pins of size to provide withdrawal resistance of four times the anticipated load.

2.7 Drive Anchors: Self-drilling (for hand-hammer installation), hardened steel, tapped (for bolts or studs), flush type, electro-cadmium plated with expander plug. Approved: Phillips "Red Head"; Fastway Fasteners, 2157 East 28th Street, Lorain, Ohio.

2.8 Paint:

2.8.1 Primer: Rust Inhibitive: Red. No lead content permitted. Approved: 10-99 Tnemec Primer or Rustoleum number 5769 Primer.

2.8.2 Finish coats: All metal fabrications, except galvanized items, shall be fully painted with (2) coats of industrial enamel as specified.

2.9 Handrails and Guardrails:

2.9.1 Schedule 40 1½" dia. aluminum tubing in configurations as shown on the drawings, fully welded with all joints ground smooth. Welded connection at anchor to concrete slab or base. Pickets shall be nominal 1" diameter aluminum.

2.11 FABRICATION

2.11.1 Shop prefabricate in as large sections as practicable, and in strict accordance with the approved Shop Drawings and pertinent requirements of governmental agencies having jurisdiction.

2.11.2 Railings and handrails: Unless otherwise indicated or approved by the Architect:

2.11.2.1 Railing: 1 ½" diameter tube fully welded with all joints ground smooth. Recessed pipe sleeve or seat with anchor bolt at concrete.

2.11.2.1 Fabricate from schedule 40 pipe to shapes and dimensions indicated or otherwise required for the use.

2.11.2.2 Make joints flush, with concealed and seamless fittings.

2.11.2.3 Accurately cut, miter, weld, and grind to achieve flush surfaces.

2.11.2.4 Make bend to preserve contour of the pipe.

3. EXECUTION

3.1 SURFACE CONDITION

3.1.1 Examine the areas and conditions under which work of this section will be performed. Correct conditions detrimental to timely and proper completion of the work. Do not proceed until unsatisfactory conditions are corrected.

3.2 INSTALLATION

3.2.1 Coordinate as required with other trades to assure proper and adequate provision in the work of those trades for interface with the work of this section.

3.2.2. Install the work of this section in strict accordance with the original design, the approved shop drawings, pertinent requirements of governmental agencies having jurisdiction, and the manufacturer's recommended installation procedures as approved by the Architect, anchoring all components firmly into position for long life under hard use.

3.2.3 Pipe railings and handrails: Unless otherwise indicated or approved by the Architect:

3.2.4 Upon completion of installation, touch up field welds and abraded surfaces, using primer specified for shop use.

END OF SECTION

SECTION 05510
PRE-ENGINEERED METAL STAIRS

1. GENERAL:

1.1 Related Documents: The requirements of Division 1 are hereby made a part of this section as if fully repeated herein.

1.1.1 DIRECT PURCHASING: This Section is subject to the terms and procedures Direct Purchasing, whereby the Owner reserves the right to recover the sales tax on materials by purchasing directly the materials required for this Section. Issuance of Purchase Orders by the Owner shall not relieve the Contractor of any of his responsibilities regarding material purchases or installations, with the exception of the payments for the materials as purchased.

1.2 Scope: Provide and install prefabricated, pre-engineered aluminum stair structure. The metal stair and landings will serve as the secondary means of egress from the second floor of building 10.

1.3 Submittals:

1.3.1 Full shop drawings
1.3.2 Manufacturers data on all material furnished under this Section.
1.3.3 Assembly instructions
1.3.4 Manufacturer's Warranty
1.3.5 Shop drawings shall include connections design to foundation by the metal stair specialty engineer.
1.3.6 The metal stair shall conform to the design wind load requirements of the Florida Building Code 6th Edition and the wind loads indicated on the drawings. The shop drawings and calculations shall be signed, sealed and dated by a structural engineer registered in the State of Florida.

2. PRODUCTS:

2.1 Metal stair structure shall be equivalent to products by G & A Manufacturing, 6587 State Road 21, Keystone Heights, FL 32656. Tel. (352) 473 6882 www.gamanufacturing.com

2.2 Aluminum construction using 6000 series aluminum alloys with structural members of 6061-T6, 6063-T6 and 6005-T5, all standard mill finish.

2.3 Fasteners to be 18-8 (series 304) stainless steel.

2.4 Stair and landings shall be designed for a minimum 100 PSF live load.

2.5 Landings designed for minimum concentrated vertical load of 300 LBS (over 12” x 12” area). Stair treads designed for minimum concentrated load of 300 LBS (4 square inch area).

2.6 Handrails designed to resist load of 50 PLF applied in any direction at top of the rail.

2.7 Provide minimum ¾” x ¾” handrail pickets spaced such that a 4 inch sphere will not pass through.

2.8 Handrails assemblies able to resist a single concentrated load of 200 LBS applied in any direction at any point along the top of the rail (this load not concurrent with loads noted in item 2.5)

2.9 G & A top cap shall be 2” x 2” x 1/8”

2.10 The metal stair shall be designed to be anchored to the slab and foundation.

2.11 Construction shall conform to the current edition of the Aluminum Association Specifications and Guidelines for Aluminum Structures.

3. INSTALLATION:

3.1 Installation of the stair shall adhere to approved shop drawings and manufacturer’s written instruction to deliver a sound and complete structure.

4. WARRANTY:

4.1 Provide written warranty for minimum of 12 months.

5. CLEANING:

5.1 Remove all debris from the base and leave the completed structure in clean condition.

END OF SECTION

SECTION 06100

CARPENTRY

1. GENERAL:

1.1 Related Documents: The requirements of Division 1 are hereby made a part of this section as if fully repeated herein.

1.1.1 DIRECT PURCHASING: This Section is subject to the terms and procedures of Direct Purchasing, whereby the Owner reserves the right to recover the sales tax on materials by purchasing directly the materials required for this Section. Issuance of Purchase Orders by the Owner shall not relieve the Contractor of any of his responsibilities regarding material purchases or installations, with the exception of the payments for the materials as purchased.

1.2 Items of work to be performed shall include, but are not limited to, the following:

1.2.1 Framing lumber, furring, backup lumber and blocking as required for the finish installation of materials and equipment by other trades.

1.2.2 Nail strips, grounds.

1.2.3 Hardware for securing rough carpentry materials.

1.2.4 Installation of finish carpentry items and other items and materials installed by carpentry trade.

1.3 Related work specified under other sections of these specifications.

1.3.1 Forms for Concrete.

2. MATERIALS:

2.1 Lumber shall be well-seasoned, sound stock, free from sap shakes and/or other defects which may impair the appearance, utility or strength of the materials.

2.2 Framing lumber, furring strips, blocking, etc., shall be dimension Southern Yellow Pine, No. 2 common, or better. Minimum bending stress (Fb) of 1400 psi.

2.2.1 Moisture content for framing lumber, blocking and other miscellaneous woodwork shall conform to the moisture content provision of the Grading Rules by the Southern Pine Inspection Bureau.

2.2.2 Lumber to be surfaced 4 sides to conform to simplified Practice Recommendation R16.

2.3 Ground Contact Preservative Treatment: All lumber, such as nailers, furring strips or others, which is to be placed in contact with concrete or masonry inside and outside the building envelope shall be pressure treated with Wolman Salts to a retention level of 0.60 pounds per cubic foot and then re-dried after treatment in accordance with AWPA 22. Provide pressure treated lumber at other locations as shown. All lumber used for edge blocking of the built-up roof shall be pressure treated.

2.4 Fasteners shall be of the type and size best suited for the work. All nails used exterior shall be hot dip galvanized, unless specified otherwise.

2.5 Finishes are specified in Section 09900.

3. INSTALLATION:

3.1 Fasten securely all parts of carpentry work in their proper place.

3.2 Sort material to suit its placement so that permitted defects will have the least detrimental effect on the stability and appearance of the work.

3.3 Installation of various carpentry materials and components shall follow standard industry practices of good construction and the instructions of the manufacturer's of the component being installed.

4. STORAGE AND PROTECTION: Stack framing lumber and plywood to insure proper ventilation and drainage. Protect lumber and plywood from elements. All stored material shall be placed on dunnage at nominal 4" above grade. No contact between stored material and ground shall be permitted.

END OF SECTION

SECTION 07840

FIRESTOPPING

1. GENERAL:

1.1 Related Documents: The requirements of Division 1 are hereby made a part of this section as if fully repeated herein.

1.1.1 DIRECT PURCHASING: This Section is subject to the terms and procedures of Direct Purchasing, whereby the Owner reserves the right to recover the sales tax on materials by purchasing directly the materials required for this Section. Issuance of Purchase Orders by the Owner shall not relieve the Contractor of any of his responsibilities regarding material purchases or installations, with the exception of the payments for the materials as purchased.

1.2 DEFINITIONS

1.2.1 Firestopping: Material or combination of materials to retain integrity of fire rated construction by maintaining an effective barrier against the spread of flame, smoke, and gases.

1.2.2 Through-Penetration Firestop Systems: Material or combination of materials which are field constructed to fill, void, or cavity materials and forming materials, designed to resist fire spread when installed as a complete firestop system.

1.2.3 Through-Penetration Firestop Devices: Factory built products designed to resist fire spread. Complete when delivered to site; ready for installation.

1.3 SUMMARY: Provide labor, materials, services, coordination, and equipment necessary for complete installation of tested or engineering judgment based firestopping materials and systems. Section includes firestopping for the following:

1.3.1 Penetrations through fire resistance rated floor and roof construction including both empty openings and openings containing cables, pipe, ducts, conduits, and other penetrating items.

1.3.2 Penetrations through fire resistance rated walls and partitions including both empty openings and openings containing cables, pipes, ducts, conduits, and other penetrating items.

1.3.3 Penetrations through smoke barriers and construction enclosing compartmentalized areas involving both empty openings and openings containing penetrating items.

1.3.4 Sealant joints in fire resistance rated construction.

1.3.5 Related Work Specified Elsewhere: Coordinate Work of this Section with work of other Sections as required to properly execute the work and as necessary to maintain satisfactory progress of the work of other Sections, including:

1.3.5.1.1 Section 07920 – Sealants: For sealants for nonfire resistive rated joint sealants.

1.3.5.1.2 Section 09250 – Gypsum Board: For gypsum board for joints in fire resistive rated gypsum board construction.

1.3.5.1.3 Division 15 Sections specifying ducts and piping penetrations.

1.3.5.1.4 Division 16 Sections specifying cable and conduit penetrations.

1.4 SYSTEM DESCRIPTION

1.4.1 General: Provide firestopping systems that are produced and installed to resist the spread of fire, according to requirements indicated, and the passage of smoke and other gases.

1.4.2 F-Rated Through-Penetration Firestop Systems: Provide through-penetration firestop systems with F ratings indicated as determined per ASTM E814, UL 1479 but not less than that equaling or exceeding the fire resistance rating of the constructions penetrated.

1.4.3 T-Rated Through-Penetration Firestop Systems: Provide through-penetration firestop systems with T ratings, in addition to F ratings, as determined per ASTM E814, where indicated and where systems protect penetrating items exposed to contact with adjacent materials in occupiable floor areas. T-rated assemblies are required where specified by codes or where the following conditions exist:

1.4.3.1 Where firestop systems protect penetrations located outside of wall cavities.

1.4.3.2 Where firestop systems protect penetrations located outside fire resistive shaft enclosures.

1.4.3.3 Where firestop systems protect penetrations located in construction containing doors required to have a temperature rise rating.

1.4.3.4 Where firestop systems protect penetrating items larger than a 4-inch diameter nominal pipe or 16 square inch in overall cross sectional area.

1.4.4 Fire Resistive Joint Sealants: Provide joint sealants with fire resistance ratings indicated, as determined per ASTM E119, UL 2079 but not less than that equaling or exceeding the fire resistance rating of the construction in which the joints occurs.

1.4.5 For firestopping exposed to traffic, moisture, and physical damage, provide products that do not deteriorate when exposed to these conditions and will meet load requirements.

1.5 SUBMITTALS

1.5.1 Product Data: Manufacturer's specifications and technical data for each material including the composition and limitations, documentation of UL or other nationally recognized independent testing laboratories firestop systems to be used, and manufacturer's installation instructions.

1.5.1.1 Manufacturer's engineering judgement identification number and drawing details when no tested systems is available.

1.5.1.2 Submit material safety data sheets (MSDS) provided with product delivered to jobsite.

1.5.2 Shop drawings detailing materials, installation methods, and relationships to adjoining construction for each through-penetration firestop system, and each kind of penetrating item. Include firestop design designation of qualified testing and inspecting agency-evidencing compliance with requirements for each condition indicated.

1.5.2.1 Submit documentation, including illustrations, from a qualified testing and inspecting agency that is applicable to each through-penetration firestop configuration for construction and penetrating items.

1.5.2.2 Where project conditions require modification of qualified testing and inspecting agency's illustration to suit a particular through-penetration firestop condition, submit illustration approved by firestopping manufacturer with modifications marked.

1.5.3 Product certificates signed by manufacturers of firestopping products certifying that their products and installation comply with specified requirements. Certification shall be signed by the Installer.

1.5.4 Certification is required from manufacturer that Installer has been trained in the handling and installation of their products.

1.5.5 The Firestopping Contractor shall provide a letter of certification stating that all firestopping systems have been installed in accordance with the Contract Documents.

1.6 QUALITY ASSURANCE

1.6.1 Conform to applicable governing codes, including local governing authorities.

1.6.2 Meet requirements of ASTM E814 or UL 1479 tested assemblies that provide a fire rating equal to that of construction being penetrated and other ASTM Standards as applicable for the installation.

1.6.2.1.1 ASTM E84 "Test Method for Surface Burning Characteristics of Building Materials."

1.6.2.1.2 ASTM E119 "Test Methods for Fire Tests of Building Construction and Materials."

1.6.3 Installer Qualifications: Engage an experienced Installer, successfully completed at least 3 firestop projects similar in type and size to that of this Project, who is certified or licensed as having necessary experience, staff, and training to install manufacturer's products per specified requirements. A manufacturer's willingness to sell its firestopping products to the Contractor or to an Installer engaged by the Contractor does not itself confer qualification on the buyer.

1.6.4 Single Source Responsibility: Obtain through-penetration firestop systems for kind of penetration and construction condition indicated from a single manufacturer.

1.6.5 Provide firestopping products containing no detectable asbestos as determined by the method specified in 40 CFR Part 763, Subpart F, Appendix A, Section 1, "Polarized Light Microscopy".

1.6.6 Do not use any product containing solvents that require hazardous waste disposal or which after curing dissolve in water.

1.6.7 Coordinating Work: Coordinate construction of openings and penetrating items to ensure that designated through-penetration firestop systems are installed per specified requirements.

1.7 DELIVERY, STORAGE, AND HANDLING

1.7.1 Deliver firestopping products to project site in original, unopened containers or packages with intact and legible manufacturer's labels identifying product and manufacturer; date of manufacturer; lot number; shelf life, if applicable; qualified testing and inspecting agency's classification marking applicable to Project; and mixing instructions for multi-component materials.

1.7.2 Store and handle firestopping materials to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

1.8 PROJECT CONDITIONS

1.8.1 Environmental Conditions: Do not install firestopping when ambient or substrate temperatures are outside limits permitted by firestopping manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.

1.8.2 Ventilation: Ventilate firestopping per firestopping manufacturers' instructions by natural means or, where this inadequate, forced air circulation.

1.9 SEQUENCING AND SCHEDULING

1.9.1 Coordinate this Work as required with work of other trades.

1.9.2 Do not cover up those firestopping installations that will become concealed behind other construction until Owner's inspection agency and authorities having jurisdiction, if required, have examined each installation.

2. PRODUCTS

2.1 MANUFACTURERS

2.1.1 Manufacturers: Subject to compliance with through-penetration firestop systems (XHEZ) listed in Volume II of the UL Fire Resistance Directory, provide products by one of the following:

2.1.1.1.1 Hilti Construction Chemicals, Tulsa, Oklahoma

2.1.1.1.2 Specified Technologies, Inc., (STI), Sommerville, New Jersey

2.1.1.1.3 3M Fire Protection Products, St. Paul, Minnesota

2.1.1.1.4 The Rectorseal Corporation, Houston, Texas

2.1.1.1.5 Tremco, Inc., Beachwood, Ohio

2.2 FIRESTOPPING, GENERAL

2.2.1 Compatibility: Provide firestopping composed of components that are compatible with each other, the substrates forming openings, and the items, if any, penetrating the firestopping under conditions of service and application, as demonstrated by firestopping manufacturer based on testing and field experience.

2.2.1.1.1 All materials shall comply with ASTM E814 or E119 (UL 1429), and shall be manufactured of nontoxic, nonhazardous, asbestos free materials, and unaffected by water or moisture when cured.

2.2.1.1.2 Primers: Conform to manufacturer's recommendations for primers required for various substrates and conditions.

2.2.1.1.3 Backup Materials: Backup materials, supports, and anchoring devices shall be provided as required by UL testing.

2.2.2 Accessories: Provide components for each firestopping system that are needed to install fill materials and to comply with "System Performance Requirements" in Part 1. Use only components specified by the firestopping manufacturer and approved by the qualified testing and inspecting agency for the designated fire resistance rated systems. Accessories include but are not limited to the following items:

2.2.2.1.1 Permanent forming/damming/backing materials must be noncombustible and may include the following:

a. Semirefracotry fiber (mineral wool) insulation.
b. Sealants used in combination with other forming/damming materials to prevent leakage of fill materials in liquid state.

c. Joint fillers for joint sealants.

2.2.2.1.2 Temporary forming materials.

2.2.2.1.3 Substrate primers.

2.2.2.1.4 Collars

2.2.2.1.5 Steel sleeves.

2.3 FIRESTOPPING, MATERIALS

2.3.1 Use only firestopping products that have been UL 1479 or ASTM E814 tested for specific fire rated construction conditions conforming to construction assembly type, penetrating item type, annular space requirements, and fire rating involved for each separate instance.

2.3.2 For penetrations by noncombustible items including steel pipe, copper pipe, rigid steel conduit, and electrical metallic tubing (EMT), the following items are acceptable:

1. Hilti FS 601 Elastomeric Firestop Sealant
2. STI SpecSeal Sealant SSS 100
3. 3M Fire Barrier CP25
4. The RectorSeal Corporation Metacaulk 1000, 950, 835, Putty, & Mortar
5. Fyre-Sil, Termco, Inc.
6. Biofireshield K10 and K2 Mortar, Biostop 500+, Biootherm 100/200 & Biostop Putty, The RectorSeal Corporation.

2.3.3 For penetrations by combustible items (penetrants consumed by high heat and flame) including insulated metal pipe, PVC jacketed, flexible cable or cable bundles and plastic pipe (closed piping systems), the following materials are acceptable:

1. STI Wrap Strip SSW12
2. Hilti FS One Intumescent Firestop Sealant
3. 3M Fire Barrier FS-195 Wrap Strip
4. Metacaulk Wrap Strip, Firestop Collars, Metacaulk 1000, 950, & 835
5. Biostop Wrap Strip, Collar, and Biostop 500+

2.3.4 For large size/complex penetrations made to accommodate cable trays, multiple steel and copper pipes, electrical busways in raceways, the following materials are acceptable:

1. STI SpecSeal lightweight mortar SSM22B or putty
2. Hilti FS635 Troelable Firestop Compound
3. 3M Fire Barrier CS-195 Composite Sheet
4. Biofireshield K-10 & K2 Mortar
5. Metacaulk Firestop Mortar

2.3.5 For fire rated construction joints and other gaps with movement the following materials are acceptable:

1. Hilti FS601 Elastomeric Firestop Sealant
2. STI Pensil 300
3. 3M (Dow Corning Fire Stop Sealant 2000)
4. Fyre-Sil, Termco, Inc.
5. Biofireshield, Biostop 700, Biostop 500+
6. Metacaulk 1000 & 1100

2.3.6 Provide a firestopping system with an "F" rating as determined by UL 1479 or ASTM E814, which is equal to the time rating of construction being penetrated.

3. EXECUTION

3.1 EXAMINATION

3.1.1 Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of firestopping. Do not proceed with installation until unsatisfactory conditions have been corrected.

1. Verify penetrations are properly sized and in suitable condition for application of materials.

3.2 PREPARATION

3.2.1 Surface Cleaning: Clean out openings and joints immediately prior to installing firestopping to comply with recommendations of firestopping manufacturer and the following requirements:

1. Remove all foreign materials from surfaces of opening and joint substrates and from penetrating items that could interfere with adhesion of firestopping.

2. Clean opening and joint substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with firestopping. Remove loose particles remaining from cleaning operation.
3. Remove laitance and form release agents from concrete.

3.3 INSTALLING THROUGH-PENETRATION FIRESTOPS

3.3.1 General: Comply with the "System Performance Requirements" in Part 1 and the through-penetration firestop manufacturer's installation instructions and drawings pertaining to products and applications indicated.

3.3.2 Install forming/damming materials and other accessories of types required to support fill materials during their application and in the position needed to produce the cross sectional shapes and depths required to achieve fire ratings of designated through-penetration firestop systems. After installing fill materials, remove combustible forming materials and other accessories not indicated as permanent components of firestop systems.

3.3.3 Install fill materials for through-penetration firestop systems by proven techniques to produce the following results.

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

3.4 INSTALLING FIRE RESISTIVE JOINT SEALANTS

3.4.1 General: Comply with the "System Performance Requirements" in Part 1, with ASTM C1193, and with the sealant manufacturer's installation instructions and drawings pertaining to products and applications indicated.

3.4.2 Install joint fillers to provide support of sealants during application and at position required to produce the cross sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability and develop fire resistance rating required.

3.4.3 Install sealants by proven techniques that result in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint configuration, and providing uniform, cross sectional shapes and depths relative to joint width that optimum sealant movement capability.

Install sealants at the same joint fillers are installed.

3.4.4 Tool nonsag sealants immediately after sealant application and prior to the time skinning or curing begins. Form smooth, uniform beads of configuration indicated or required to produce fire resistance rating, as well as to eliminate air pockets, and to ensure contact and adhesion of sealants with sides of joint. Remove excess sealant from surfaces adjacent to joint. Do not use tooling agents that discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.

3.5 CLEANING

3.5.1 Clean off excess fill materials and sealants adjacent to openings and joints as work progresses by methods and with cleaning materials approved by manufacturers of firestopping products and of products in which opening and joint occur.

END OF SECTION

SECTION 07920

SEALANTS AND CAULKING

1. GENERAL:

1.1 Related Documents: The requirements of Division 1 are hereby made a part of this section as if fully repeated herein.

1.1.1 DIRECT PURCHASING: This Section is subject to the terms and procedures of Direct Purchasing, whereby the Owner reserves the right to recover the sales tax on materials by purchasing directly the materials required for this Section. Issuance of Purchase Orders by the Owner shall not relieve the Contractor of any of his responsibilities regarding material purchases or installations, with the exception of the payments for the materials as purchased.

1.2 Summary: It is the intent of this section to provide for the furnishing and installing of sealants and caulking as described herein as is necessary to provide a complete, water-tight building for a complete, finished appearance.

1.3 Related Work Specified Elsewhere:

1.3.1 Section 09250 Gypsum Board

1.3.2 Section 09900, Painting

1.4 Submittals:

1.4.1 Samples:

1.4.1.1 Submit one cartridge of each type and color sealant to be used.

1.4.1.2 Submit three (3) pieces of backing material, minimum 6" long, of each size required.

1.4.2 Product Data:

1.4.2.1 Submit three (3) copies of product manufacturer's specifications, recommendations, and installation instructions for sealant, backing, and associated materials.

1.4.2.2 Submit two (2) copies of manufacturer's color chart for sealant selection.

1.4.3 Provide minimum three (3) copies of manufacturer's specification data sheets for each product specified.

1.5 Product Handling:

1.5.1 Deliver materials in original, tightly sealed containers or unopened packages with manufacturer's name, label, product identification and lot numbers, where appropriate, intact.

1.5.2 Store materials out of weather as recommended by manufacturer.

1.5.3 Protect materials from damage before, during, and after installation.

1.6 Job Conditions:

1.6.1 Environmental requirements:

1.6.1.1 Apply only when temperatures shall be a minimum of 50^{o} F. and when rain is not forecast for 24 hours.

1.6.1.2 Observe manufacturer's recommendations for safe handling and ventilation.

1.6.2 Protection:

1.6.2.1 Adjacent Surfaces: Protect work of other trades from damage by sealant with masking tape or other means necessary.

1.6.2.2 Damaged Work: Clean, repair, or replace damaged work, to include, but not limited to, work of other trades, at no additional cost.

1.7 Warranty:

1.7.1 Provide manufacturer's written warranty of five- (5) year period against material failure.

1.7.2 Provide a warranty for workmanship against leakage for two- (2) year period.

2. PRODUCTS:

2.1 Sealants:

2.1.1 Exterior Joints: (metal flashings to exterior building surface, exterior joints, exterior doors, trim, etc.) :Sikaflex -2cNS 2 component, premium grade, polyurethane-based elastomeric sealant.

2.1.2 Exposed locations on the building interior with no joint movement: Caulking – Acrylic Latex Caulk. Caulking shall be applied as part of preparation for interior painting to provide a smooth joint at dissimilar materials or at the intersection of surfaces.

2.2 Backer Rod:

2.2.1 Material: Open cell compressible, resilient, non-waxing, polyurethane foam compatible with sealant.

2.2.2 Size and Shape: Variable to control depth of sealant and provide 20% to 50% compression upon insertion.

2.3 Primer: Non-staining type approved by sealant manufacturer.

2.4 Bond Breaker: Pressure sensitive adhesive polyethylene tape approved by sealant manufacturer.

2.5 Masking Tape: Pressure sensitive adhesive paper tape.

2.6 Joint Cleaner: Xylol.

3. EXECUTION:

3.1 Inspection:

3.1.1 Examine surfaces to be caulked to assure that they are sound, smooth, clean, dry, and free of visible contamination, suitable and ready for sealant application.

3.1.2 Assure that surfaces requiring curing have been properly cured and ready for sealant application.

3.1.3 Do not start work until surface conditions to be caulked are satisfactory and defects have been corrected.

3.2 Preparation:

3.2.1 Cleaning: Clean joint surfaces, using joint cleaner as necessary, to be free of dust, dirt, oil, grease, rust, lacquers, moisture, or other contaminants and matter which may adversely affect proper adhesion of sealant.

3.2.2 Masking: Mask area adjacent to joints.

3.2.3 Primer: After cleaning joints, apply primer, if recommended by sealant manufacturer, to dry surfaces.

3.2.4 Joint Backer: Where joint depth exceeds required depth of sealant, install joint backing to provide backing and uniform depth of sealant.

3.2.5 Bond Breaker: Where joint backing is not required or cannot be installed, install bond breaker tape smoothly at back of joint.

3.3 Installation / Application:

3.3.1 Sealant Application:

3.3.1.1 Apply sealant in accordance with manufacture's application instructions.

3.3.1.2 Use hand guns or air-pressure equipment, with proper nozzle size, with sufficient pressure to drive and force sealant into and completely fill joints.

3.3.2 Tooling:

3.3.2.1 Tool joints to form smooth, uniform beads with slightly concave surfaces.

3.3.2.2 Finish joints to be straight, uniform, smooth, and neatly finished.

3.4 Cleaning:

3.4.1 Clean off excess compound or smears with cleaning agent recommended by sealant manufacturer.

3.4.2 Take care not to damage adjacent work with cleaning agent, to include but not limited to, defacing or marring finished surfaces.

3.4.3 Protect finished sealant work as required to prevent damage until acceptance of work.

3.5 Schedule:

3.5.1 Where different materials meet, adjoin, or abut.

3.5.2 Where sealant is required to prevent moisture intrusion into building.

END OF SECTION

SECTION 08100

HOLLOW METAL DOORS AND FRAMES

1. GENERAL:

1.1 Related Documents: The requirements of Division 1 are hereby made a part of this section as if fully repeated herein.

1.1.1 DIRECT PURCHASING: This Section is subject to the terms and procedures of Direct Purchasing, whereby the Owner reserves the right to recover the sales tax on materials by purchasing directly the materials required for this Section. Issuance of Purchase Orders by the Owner shall not relieve the Contractor of any of his responsibilities regarding material purchases or installations, with the exception of the payments for the materials as purchased.

1.2 Doors and frames shall be products of one manufacturer regularly engaged in manufacturing steel doors and frames of types specified.

1.3 Labeled Assemblies: Provide UL labeled door and frame assemblies with the time ratings scheduled.

1.4 Related Work:

1.4.1 Finish Hardware, Section 08710.

1.4.2 Glass and Glazing, Section 08800.

1.4.3 Painting, Section 09900.

1.5 Submittals:

1.5.1 Submit shop drawings covering door, frame, and complete anchorage details for doors and frames.

1.5.2 Wind Loads:

1.5.2.1 Exterior doors, frames and hardware are required to meet the requirements of wind loads per the structural drawings and the Florida Building Code 2017. Provide FL Product Approval numbers or Certified Test Lab reports showing tested assemblies of all exterior doors, frames and hardware that meet the FBC requirements. Each opening is to be tested as an assembly with doors, frames and finish hardware.

1.5.3 Submittals shall include door and frame elevations, internal reinforcements, finish hardware and installation instructions.

2. MATERIALS:

2.1 A minimum gauge of materials for doors, frames, and anchorage is specified herein. Provide a heavier gauge, if necessary, to meet the wind load and missile impact criteria.

2.2 FRAMES: Exterior frames shall be minimum of 14 gauge steel, mitered corners, pre prepped to receive required recess mounted security devices and seamless. Interior door frames shall be minimum 16 gauge steel (exception being frames over 3'-6", they shall be 14 gauge steel). All frames shall be hot dipped galvanized steel seamless with mitered corners. Minimum hinge reinforcement at both doors and frames shall be 7 gauge steel (at all locations).

2.2.2 Frames shall be prepped for security contacts as indicted in the electrical drawings.

2.3 Hardware Preparation: Mortise, reinforce, drill and tap as necessary for installation of finish hardware.

2.4 Closer Reinforcements: All doors shall be reinforced to receive door closers.

2.5 Silencers: Conical rubber inserts 3 per jamb.

2.6 Metal Doors: Shall be 16 gauge, minimum, as scheduled. Exterior doors shall be urethane-foam filled to provide a thermal barrier.

1. Provide 7 gauge hinge reinforcing, 16 gauge lock reinforcing, and 12 gauge closer reinforcing. All doors Physical Performance level shall be Level A (extra heavy duty) and shall be Model 2 (seamless). Exterior doors shall be G90 galvanized and interior doors G60 galvanized.

2. The latch edge of the door shall be beveled 7/64 inch. All labeled doors shall bear an embossed metal label. Mylar or similar labels are not acceptable. Close top and bottom edges of doors flush as an integral part of door construction or by addition of .053 thick, metallic-coated steel channels with channel webs placed even with top and bottom edges.

2.7 Frames for vision panels in doors shall be 16- gauge steel; clamp-on type; suitable for use in rated assemblies. Paint screws to match frame. All screws shall be firmly in place.

2.8 Frames for fixed interior windows (borrowed light) shall be of similar construction as door frames.

3. SHOP FINISH:

3.1 After assembly, clean steel thoroughly of rust, oil and grease, apply one coat of lead free primer paint; baked on 20 minutes at 325 degrees F to dry film thickness of 3 mils.

4. INSTALLATION:

4.1 Frames shall be erected plumb; properly braced, be rigid and in true alignment. Secure door frames to floor construction with two (2) fastenings at each jamb.

4.2 Hang doors so as to swing easily and freely on their hinges and close accurately against silencers on frame without binding. Doors shall remain stationary in any position without independent motion. Clearance at bottom max. ¾ inch above concrete where carpet will be installed; ½ inch" elsewhere; jambs and head, 1/8 inch; meeting style in pair of doors, 1/8 inch total maximum

4.3 Silencers: furnish and install three (3) silencers per jamb in predrilled holes within door stop. Installation of silencers shall not occur until frames are completely painted and dry.

END OF SECTION

SECTION 08710

FINISH HARDWARE

1. GENERAL:

1.1 Related Documents: The requirements of Division 1 are hereby made a part of this section as if fully repeated herein.

1.1.1 DIRECT PURCHASING: This Section is subject to the terms and procedures of Direct Purchasing, whereby the Owner reserves the right to recover the sales tax on materials by purchasing directly the materials required for this Section. Issuance of Purchase Orders by the Owner shall not relieve the Contractor of any of his responsibilities regarding material purchases or installations, with the exception of the payments for the materials as purchased.

1.2 Description of Work

1.2.1 Work under this section consist of furnishing and installing items known commercially as builders hardware as specified in this section and noted on the drawings for a complete and operational system.

1.2.2 Items include but are not limited to the following:

1. Hinges
2. Flush Bolts
3. Coordinators
4. Locks
5. Exit Devices
6. Door Closers
7. Push Plates
8. Door Pulls
9. Protective Plates
10. Door Stops and Holders
11. Thresholds and Weather-stripping
12. Silencers

1.3 RELATED WORK

A. Section 08100: Hollow Metal Doors and Steel Frames
B. Section 08800: Glazing
C. Section 09900: Painting
D. Division 16: Electrical

1.4 Quality Assurance

1.4.1 Manufacturers and model numbers listed in Part 2 of this section have been set to establish a standard of quality, design and function. Obtain each type of hardware (Hinges, Locks. Exit Devices, Closers, etc.) from a single manufacturer, although several may be listed as acceptable.

1.4.2 Substitutions: Refer to Section 01100 for procedures for product substitution.

Substitutions will not be accepted unless a request is made in writing 7 days, prior to the published bid date and approved by addendum accepting the product substitution. Any manufacturer submitting for approval on Locksets, Exit Devices, Mullions, Hinges, Flush and Surface Bolts, Weather strip and Thresholds must include Certified Testing Reports or NOA numbers specific to the door and frame elevations that meet the FLORIDA BUILDING CODE windload requirements and have been tested as an assembly with the listed approved manufacturers. Submit certified independent lab test or NOA report on each type of exterior opening specified. Only those manufacturers that have tested with this projects door and frame profile, elevations and hardware requirements will be considered.

1.4.3 The Hardware supplier is to be a qualified direct distributor of the products to be furnished, and is to regularly engage in furnishing products on projects of similar size and requirements. In addition, the supplier is to have in their regular employment a Certified Architectural Hardware Consultant who will be made available at reasonable times to consult with the Architect, General Contractor and/or the owner's representative regarding any matters that affect the project, inspect and direct detailing, applying, and adjusting of all hardware. No person shall be engaged in the installation of finish hardware without the prior approval of the Owner based on the acceptance of written certification.

1.4.4 Furnish Hardware for fire rated openings that meet NFPA 80 and the local building codes. Furnish only hardware that has been tested and listed by UL or FM for fire rated openings. All labeled doors to have ball bearing steel hinges, a door closer and a lockset to meet the requirements of NFPA 80. Where exit devices are specified or required on Fire Rated Doors furnish only those devices that have been tested and listed "FIRE EXIT HARDWARE."

1.4.5 Provide hardware that meets the hurricane and windload test requirements in accordance with the Florida Building code and are in compliance with the local authority having jurisdiction. All openings required to meet either the impact test or windload test as indicated by the architect shall be tested as systems with the finish hardware, hollow metal doors and frames and installed in accordance with the applicable tests. These requirements take precedence over other requirements for such hardware.

1.4.6 All lockers shall be of the proper type and function to meet the condition of use and all A.D.A. and accessibility regulations, as applicable. All locksets shall meet the requirements of the Duval County Plant Services Department.

1.5 References/(current editions):

A. NFPA 80 Fire Doors and Windows
B. NFPA 101 Life Safety Code
C. NFPA 105 Installation of Smoke-Control Door Assemblies
D. ADA The Americans with Disabilities Act: Title III Public Accommodations
E. ANSI A117.1: American National Standards Institute: Accessible and Usable Buildings and Facilities
F. ANSI : American National Standards Institute
G. UFAS: Uniform Federal Accessibility Standards
H. UL: Underwriter's Laboratories
I. WHI: Warnock Hersey International

J. DHI: Door and Hardware Institute
K. BOCA: Basic Building Code
L. NBC: National Building Code
M. SBS: Southern Building Code
N. UBC: Uniform Building Code
O. FBC: Florida Building Code

1.6 Submittals

1.6.1. Submit schedules in accordance with General Requirements and Contract Documents.

1.6.1.1. Submit an electronic copy of the Hardware Schedule and Door Schedule in Microsoft Word or Excel. Copy must be in an editable.

1.6.2. Schedules: Provide Finish Hardware Schedules detailing each opening individually. Use the Vertical format scheduling method as outlined in the DHI brochure "Sequence and Format for the Hardware Schedule". The horizontal format will not be allowed. Schedule each building separately. Separate fire rated doors and non-rated doors using different headings. Separate doors of different sizes in headings that have all doors of the same size and like hardware. Provide 6 copies.

1.6.3. Samples: Provide samples of the products listed in the Schedule as required by the Architect. Furnish 1 item that is representative of the manufacturers' series that is being supplied.

1.6.4. Templates: After Hardware Schedule provide template information to prepare for the installation of mortise hardware and reinforcement of surface mounted hardware. Provide 3 copies for distribution.

1.6.5. Product Data: Together with the Finish Hardware Schedule provide catalog cuts highlighting each item that is being proposed, including appropriate ANSI/BHMA criteria and special mounting instructions. Provide 6 copies.

1.6.6. Keying Schedule: Schedule a meeting with the Architect, General Contractor and/or the owner's representative for keying information. Incorporate the keying information as outlined in DHI's manual "Keying Procedures, Systems and Nomenclature". Provide 6 copies.

1.6.7. Cycle Testing: Submit independent lab test verifying the minimum cycle test requirements listed with this specification for locksets, door closers and exit devices. Provide 6 copies.

1.6.8. Florida Building Code-Windload: Submit certified independent lab test or NOA report on each type of exterior opening. All exterior opening submittals shall include door number, door and frame elevations and all finish hardware as tested as an assembly. Refer to structural drawings for wind pressures and code requirements.

1.6.9. Final Hardware Schedule Content: Based on finish hardware indicated, organize Hardware Schedule into "hardware sets" indicating complete designations of every item required for each door or opening. Include the following information:

a. Type, style, function, size and finish of each hardware item.
b. Name and Manufacturer of each item.

c. Fastenings and other pertinent information.
d. Location of hardware set cross-referenced to indications on drawings both on floor plans and in door and frame schedule.
e. Explanation of all abbreviations, symbols, codes, etc., contained in Schedule"
f. Mounting locations for hardware.
g. Door and frame sizes and materials.
h. Keying information

1.7 Delivery, Storage and Handling

1.7.1 Delivery: Deliver hardware to the jobsite in the manufacturer's original packages. Tag and mark each item of package to correspond with the door and heading number on the finish hardware schedule. Inventory hardware jointly with a representative of the General contractor and the Hardware supplier until both are satisfied with the count.

1.7.2 Storage: Store material in a dry, secured area, within the building, free from dust and dirt within a controlled environment.

1.7.3 Handling: Provide strict control over access to the storage area so that completion of the work will not be delayed due to hardware losses.

1.8 Warranty

1.8.1 Submit warranties in accordance with General Requirements and Contract Documents. This requirement does not take the place of Division 1 requirements but is in addition to the Warranties and Bonds section. This warranty shall cover against defects in materials and workmanship, commencing with substantial completion of the project.

1.	All Finish Hardware	1 Year
2.	Locks	5 Years
3.	Exit Devices	3 Years
4.	Door Closers	10 Years

2. PRODUCTS:

2.1 Materials:

2.1.1 Screws and Fasteners: Provide all necessary screws, bolts and fasteners of suitable size and type to anchor the hardware properly. Fasteners are to match the finish and the base metal of the applied item. Provide the manufactures standard and recommended fasteners to template. Furnish fasteners where required with expansion shields, toggle bolts, and other anchors designated by the Architect according to the hardware requirements. All door closers and exit devices applied to labeled wood doors shall be thru-bolted. Thresholds are to be secured with machine screws and set with an adjustable sill anchor. All hardware applied to exterior doors shall be of non-ferrous material matching the finish of the hardware specified for interior openings or as specified in 3.6 of this section.

The Installation Subcontractor use the Manufacturer's full thread machine and /or wood screws as furnished and recommended. Tek screws shall be permitted only if furnished as the Manufacturer's standard fastener and will not negatively impact Product Warranty or fire door rating.

2.1.2 Hinges: Provide hinges as specified in 3.6 of this section. Furnish five-knuckle, heavyduty, button tip, full mortise template type hinges with non-rising loose pins at exterior doors, interior openings with exit devices and high frequency openings. Provide five-knuckle, standard duty, button tip, full mortise template hinges with non-rising loose pins at all other interior openings. At exterior locations and reverse bevel openings provide with non-removable pins.

Furnish 1 hinge for every 30 inches in door height or fraction thereof with a minimum of 2 hinges per leaf. For doors 3'-0" and wider use heavy weight four ball bearing hinges. All exterior hinges shall be stainless steel ball bearing type with non-removable pins. Hinges at wet rooms and chemical rooms shall be stainless steel. For doors up to 36 inches in width provide hinges 4.5 inches in height; for doors over 36 inches and up to 48 inches in width provide hinges 5.0 inches in height. The width of the hinges are to be sufficient to clear all trim and allow the door to swing 180 degrees.

Exterior doors and secured reverse bevel doors are to be furnished with non-removable pins or security stud. Use ball bearing steel hinges on labeled door openings and non-ferrous hinges on exterior doors or doors located in high humidity areas.

Available manufacturers: Subject to compliance with requirements, and complete assembly testing for the Florida Building Code windload requirements, manufacturers offering products that may be incorporated into the work include the following:

IVES, HAGER, STANLEY

2.1.3 Flush Bolts: Provide flush bolts of the type listed in 3. 6 of this section. Manual flush bolts are to have a length that will position the lever at no more than 6 feet above the finished floor. Automatic flush bolts are to be applied at labeled pairs of doors. Furnish a Dust Proof Strike at each set of flush bolts specified.

Available manufacturers: Subject to compliance with requirements, and complete assembly testing for the Florida Building Code windload requirements, manufacturers offering products that may be incorporated into the work include the following:

IVES, ROCKWOOD

2.1.4 Locks: Provide locks of the type and function listed in 3.06 of this section. Provide heavy-duty commercial mortise locks that exceed ANSI A156.13, Series 1000, Grade 1 Operational and Grade 1 Security and have been cycle tested to 6,000,000 cycles. Provide certification of cycle testing by independent lab testing organization with complete documentation. Provide lock body that can be rehanded on site without disassembling the lock case. High strength steel alloy cylinder retainer and a replaceable breakaway spindle preventing damage to lever trim and internal lock case components as standard. On locks with an interior turnpiece provide with an oversized turn that provides an easy grip.

2.1.5 The latchbolt is to be a 2-piece anti-friction stainless steel mechanism, with ¾ inch throw. Deadbolts are to have a 1-inch throw. Provide manufacturer's standard wrought box strike for each latchset, with curved lip extended to protect the frame.

Provide wrought levers-cast levers are not acceptable.

Manufacturers are subject to compliance with requirements, and complete assembly testing for the Florida Building Code windload requirements. Acceptable Lock Manufacturers, Models and Trims **No other substitutions are acceptable nor will be considered:**

1. Manufacturer – Corbin/Russwin
   Model- ML2000
   Physically Handicap Trim – LWM
2. Manufacturer – Yale (with Corbin/Russwin permanent cylinders)
   Model – 8700SL
   Physically Handicap Trim – Augusta ASL

2.1.6 Exit Devices: Furnish exit devices of the type and function listed in 3.6 of this section. Provide devices that are UL Listed for Accident Hazard, or when applied to fire rated doors, UL Listed "Fire Exit Hardware" and meets or exceeds ANSI A156.3 Grade 1 and have been cycle tested to 1,000,000 cycles. Provide certification of cycle testing by independent lab testing organization with complete documentation. Supply a dampener as standard that will decelerate the push pad to reduce the noise of operation. Provide break away lever trim at locations exposed to abuse or vandalism. All devices are to have deadlatch feature. Surface strikes are to be roller type.

Provide all accessories necessary for a complete and proper installation. Where molding from lite kits may interfere with the exit device provide glass bead kits to secure the device to the door.

Exterior non-fire rated doors to have night latch function (dummy trim for inactive leaves) ANSI F03/F02

Fire-rated doors to have Classroom function ANSI F08.

Rim Exit Devices to be used for all doors requiring exit device locking.

Exterior double doors to have Rim Devices with approved mullion of same Manufacturer. All removable hardware mullions shall be key removable type for quick key controlled disengagement.

All exit devices shall meet A.D.A. and all other accessibility requirements.
Concealed vertical rods shall not be used. dogging of non-fire rated exit devices to be by standard allen or hex key. Keyed cylinder doggings not desired or acceptable.

Available manufacturers: Subject to compliance with requirements, and complete assembly testing for the Florida Building Code windload requirements, manufacturers offering products that may be incorporated into the work include the following:

VONDUPRIN 99 Series
Trim Standard - 99ONL Active Leaves and Single Doors/ 990DT Inactive Leaf of Pairs of Doors
Operable Thumb Pieces are not acceptable

Fire Rated Trim Standard to meet Physically Handicapped –
994L-R (Heavy Duty Breakaway Type)

2.1.7 Door Closers: Furnish door closers of the type listed in 3.06 of this section. Closers are to exceed ANSI A156.4 Grade 1 and have been cycle tested to 10,000,000 cycles. Provide certification of cycle testing by independent lab testing organization with complete documentation. Provide fully hydraulic, rack and pinion action with high strength cast iron cylinders and one piece forged steel pistons, aluminum closers are not acceptable. The pinion shaft to have a minimum diameter of 11/16". Hydraulic regulation controlled by tamper proof non-critical valves with separate adjustments for backcheck, latch and closing speed. Door closers shall not have pressure relief valves (PRV's); these valves are not acceptable. Arms are to be heavy duty, constructed of forged steel; stamped steel is not acceptable. Door closers shall utilize temperature stable fluid capable of withstanding temperature ranges of 120 degrees Fahrenheit to -30 degrees Fahrenheit, without requiring seasonal adjustment of closer speed to properly close the door. Closers for fire-rated doors shall be provided with temperature stabilizing fluid that complies with the standards UBC 7-2 (1997) and UL 10C. Provide closers with regular arm, parallel arm or top jamb mount as required to keep corridors clear and for proper installation. Provide all brackets, arms and plates as necessary for complete installation. Size closers according to the manufacturer's recommendations for the size and location of the door. Where multi-sized closers are required size closers to the proper setting at the factory. Provide adjustable units complying with ANSI A117.1 provisions for door opening force and delayed action closing. Closers shall not be used as stops or holders. Provide parallel arm closers where possible.

All closers to have full coverage non-ferrous covers, steel arms, separate valves for adjusting backcheck, closing and latching cycles and adjustable spring power to provide a full range of sizes 2-6. Closers shall be furnished parallel arm mounted on all doors accommodating students, opening into corridors or other public spaces, and shall be mounted to permit 180 degrees door swing wherever wall conditions permit. Regular arm mounted closers shall be used only on in swinging doors not accommodating students to conceal them from public view (i.e. in swinging Mechanical, Custodian etc.). Furnish with non-hold open arms. Closers shall be of the proper type to meet the conditions of use and shall allow for the full swing of the doors.

All closers to be of rack and pinion construction. Delayed action closures only to be used when required by ADA or other accessibility requirements. Closers to be Underwriter Laboratories listed for all classes of labeled doors. All closers shall be non-handed.

Closer valves to be concealed against unauthorized adjustment and all attached parts, such as cover and arm, will be tamper resistant, requiring tools to dismantle. All door closers to be installed on doors with through bolts or sex nuts and bolts.

Available manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the work include the following:

YALE 3501 F series
NORTON 8501 BF series

2.1.8 Protective Plates: Furnish kick plates as specified in 3.6 of this section. For the width of the plates furnish 2 inches less the door width on the push side of the door for single doors and 1 inch less the door width on the pull side and on the push side of pairs of doors. Bevel three edges and provide in 0.05 in thickness.
Acceptable Manufacturers IVES, ROCKWOOD

2.1.9 Door Trim: Furnish push plates, door pulls, wall stops and floor stops as specified in 3.6 of this section. Provide with fasteners as required for proper installation." All door push and pull devices shall comply with A.D.A. and all other accessibility requirements. Push plates (on doors with no lights) shall be 8" x 16" and pull plates shall be 4" x 16" minimum.

Door Stops: Floor mounted at all applicable locations with the exception as to impeded or provide a tripping hazard. Floor stops are the preference of the district and shall contact the door leaf within the first quarter of the panel at the strike edge. Floor stops shall be "heavy-duty" type. The door closer assembly shall not be used as a stop.
Acceptable Manufactures:

Trim IVES, ROCKWOOD
Door Stops Rockwood Model 463

2.1.10 Overhead Holders: Furnish overhead holders of the type listed in 3.6 of this section. Holders and Stops to meet or exceed ANSI A 156.8 Grade 1 requirements. They shall be non-handed and field reversible and have adjustable holding force. Provide all brackets necessary for proper installation. Provide overhead stops wherever wall stops will not stop the door.

Acceptable Manufacturers GLYNN-JOHNSON, ABH

2.1.11 Thresholds and Weather-Stripping: Furnish in the type listed in 3.6 of this section. Use vinyl or silicone inserts in face of stop at exterior doors. Verify threshold requirements with drawings and sill conditions for proper application. For exterior doors provide a threshold anchor channel assembly that sets firmly into the concrete and secures the threshold. Provide an abrasive, skid and corrosion resistant threshold at all exterior locations. For weather-strip provide at the jambs and head of the frame. On pairs of doors provide an overlapping astragal with a seal running the full height of the door or two split astragals at the meeting stile to seal doors that require independent operation.

All thresholds and saddles to be full-width aluminum and shall meet accessibility requirements.

Available manufacturers: Subject to compliance with requirements, and complete assembly testing for the Florida Building Code windload requirements, manufacturers offering products that may be incorporated into the work include the following:

HAGER, PEMKO

2.1.12 Silencers: Furnish silencers at all interior openings. Provide 3 ea. at single doors and

2 ea. at paired openings. Do not install silencers until painting of the door frames has been completed.

Acceptable Manufacturers IVES, HAGER

2.2 Finishes

HINGES, EXTERIOR	630
HINGES, INTERIOR	652
LOCKSETS	626
EXIT DEVICES	626
CLOSERS	689
DOOR TRIM	630
PROTECTION PLATES	630
THRESHOLDS	AL

2.3 Keying

2.3.1 Locks shall be keyed to the existing master key system of the existing school.

Mechanical cylinders shall be removal core. The contractor shall provide the following:

5 factory cut change keys per lock, 10 master keys per group, 8 grand master keys, 8 controls keys, 10 pre-combinated cores and 100 key blanks.

Cylinders to be 7-pin Russwin N Series (Reverse) in keyways N15 through N28 as directed by the owner. All cylinders shall be furnished with appropriate cams and trim rings as required by the lock manufacturer requirements. All cylinders shall be factory great grand master keyed as directed in a keying meeting to be held with Duval County's representative from their locksmith department. Keys shall be furnished in Russwin/Corbin type 12 bow. The bow will be stamped "Do Not Duplicate" on one side and with the appropriate keyset (eg. AA1) on the opposite side. All permanent cylinders and keys shall be packed separate from locksets and other hardware. During construction, the finish hardware supplier shall furnish temporary cylinders for all exterior doors and all interior mechanical, electrical, and telephone/communications rooms on the project. In, addition, the finish hardware supplier shall also furnish an additional 10 cylinders for the contractor's discretionary use during the course of construction. At the time of substantial completion, the contractor shall install all permanent cylinders in all locksets, exit devices, keyed mullions, rolling shutters, overhead doors, and any other locking device specified to have a cylinder. Turn all permanent keys directly over to the DCPS Locksmith Shop.
Please note: this factory system is not capable of being construction keyed.

3. Execution

3.1 Inspection:

3.1.1 After installation has been completed a representative of the hardware supplier is to inspect the installation of the finish hardware to ensure that each item of hardware is operating properly and installed according to the approved hardware schedule.

3.1.2 All door hardware to be installed with care and per good industry practice. Store hardware on site, in a safe, dry, and protected manner. Protect installed hardware during the construction process. Present hardware to owner in a clean and operable condition at time of substantial completion.

3. 2 Installation:

3.2.1 Mount hardware units at heights indicated in “Recommended Locations for Builders Hardware for Standard Steel Doors and Frames” by the Door and Hardware Institute except as specifically indicated or required to comply with governing regulations, and as may be indicated otherwise by the Architect.

3.2.2 Install each hardware item in compliance with the manufacturer’s instructions and recommendations (failure to install hardware correctly and to make proper adjustments will result in monetary penalties applied to the installation team to correct improper installation). Wherever cutting and fitting is required to install hardware onto or into surfaces which are later to be painted or finished, coordinate removal, storage and reinstallation of items. Do not install surface mounted hardware until finishes have been applied.

3.2.3 Set units level, plumb and true. Adjust and reinforce the surface material as necessary for proper installation and operation.

3.2.4 Drill and countersink units that are not factory prepared for anchors and fasteners.

3.2.5 Set thresholds for exterior doors in full bed of butyl-rubber or polyisobutylene mastic Sealant to completely fill voids and exclude moisture. Remove excess sealant.

3.3 Adjusting and Cleaning

3.3.1 Adjust and check each operating item of hardware at each door to ensure proper operation and function. Replace units that cannot be adjusted to operate freely as intended. Make final adjustments to door closers and floor closers to ensure that all valves are set properly for proper functioning of the door.

3.3.2 After installation and before turning the building over all hardware shall be left clean and free from dirt, dust or disfigurement.

3.3.3 Instruct the owners personnel in the proper adjustment and maintenance of hardware and electrical security systems. Turn over installation instructions, final approved finish hardware schedules, custom wiring diagrams and any special tools that were required for installation.

3.3.4 Wall or floor-mounted electro-magnetic hold open devices may be used at doors where they are required by Code. Electro-magnetic devices must be mounted above 6'-3" from the finished floor.

3.4 Protection

3.4.1 The General contractor shall be responsible for protecting all hardware and finishes of each item of hardware until the owner accepts the project as complete.

3.5 Extra Stock

3.5.1 At the completion of the project, supply to the Owner the following items:

1 set of instruction sheet for each item furnished
1 each of any non-standard tool for installation of items furnished

3.6 PROVIDE FINISH HARDWARE AS SPECIFIED IN THE PREVIOUS ARTICLES IN SETS ACCORDING TO THE FOLLOWING SCHEDULE:

HW.01			
Quantity	**Description**	**Model Number**	**Finish**
-	Standard Hinges	Reuse existing	
-	Lockset	Reuse existing	
-	Cylinder	Reuse existing	
1	Surface Closer	3501-Yale - REG SNB BF4	689
2	Kick Plates	Ives 8400 US32D 10” x 34” (one each side of door)	
3	Door Silencers	Ives SR64 GRY	
1	Threshold	NGP 950-V36”	A
1	Door Gasketing	Pemko 303-AS	A
1	Drip Cap	NGP 16A – 40”	A
1	Lockguard	LG 600 IVE	
1	Bottom Sweep	Pemko 345ANB	A
HW.02			
Quantity	**Description**	**Model Number**	**Finish**
-	Standard Hinges	Reuse existing	
1	Exit Device	Von Duprin 99-NL	US26D
-	Cylinder	Reuse existing	
1	Surface Closer	3501 Yale	689
2	Kick Plates	Ives 8400 US32D 10” x 34” (one each side of door)	
1	Gasketing	Pemko 303-AS	A
1	Drip Cap	NGP 16A – 40”	A
1	Bottom Sweep	Pemko 345 ANB	A
1	Lockguard	LG12 600 IVE	

HW.03			
Quantity	**Description**	**Model Number**	**Finish**
3	Standard Hinges	Ives 5BB1HWNRP 4-1/2” x 4-1/2”	652
1	Lockset	Corbin Russwin ML2055 LWM	626
1	Cylinder	Yale K820 1 – 11/16” 626 A BO 1220 VKC2	626
1	Kick Plate	Ives 8400 US32D 10” x 34”	
3	Door Silencers	IVES SR64	GRY
1	Surface Closer	3501 Yale-PA SNB BF4	689
HW.04			
Quantity	**Description**	**Model Number**	**Finish**
3	Standard Hinges	Ives 5BB1HW NRP 4-1/2” x 4-1/2”	652
1	Exit Device	Von Duprin 99-NL	US26D
1	Cylinder	Yale K820 1 – 11/16” 626 A BO 1220 VKC2 (match existing at school)	626
1	Surface Closer	3501 Yale	689
2	Kick Plates	Ives 8400 US32D 10”x34” (one each side of door)	
1	Floor Stop	Rockwood 463	630
1	Gasketing	Pemko 303-AS	A
1	Threshold	NGP 950 V-36”	A
1	Drip Cap	NGP a6A – 40”	A

3	Silencers	Ives SR64	Gry
1	Bottom Sweep	Pemko 345ANB	A
1	Lockguard	LG12 600 IVE	A
HW.05			
Quantity	**Description**	**Model Number**	**Finish**
-	Standard Hinges	Reuse existing	
-	Surface Bolts	Reuse existing	
-	Lockset	Reuse existing	
-	Cylinder	Reuse existing	
1	Astragal	STLCRFT One Piece Z Astragal	
2	Kick Plates	Ives 8400 10” x 2" LDW	US32D
1	Threshold	NGP 950V – 72”	
2	Door Bottom Sweep	Pemko 345 ANB	A
1	Gasketing	Pemko 303-AS Head & Jambs (Pair of Doors)	
1	Miscellaneous Item	NGP Drip Cap 16A – 76”	A
1	Lockguard	LG 600 IVW	
HW.06			
Quantity	**Description**	**Model Number**	**Finish**
1	Lockset	By overhead door manufacturer	
1	Cylinder	Match existing at the school	
*	Balance of hardware by overhead door manufacturer		
HW.07			
Quantity	**Description**	**Model Number**	**Finish**
3	Standard Hinges	Ives 5BB1HWNRP 4-1/2” x 4-1/2”	630
1	Lockset	Corbin Russwin ML2057 LWM 626 LHR LC	626
1	Cylinder	Yale K820 1 – 11/16” 626 A BO 1220 VKC2 (match existing at school)	626
1	Surface Closer	3501 Yale	689
1	Kick Plate	Ives 8400 US32D 10” x 34” (one each side of door)	
1	Threshold	NGP 950 V-36”	A
1	Bottom Sweep	Pemko 345 ANB	A
1	Gasketing	Pemko 303-AS Head & Jambs (Single Door)	1
1	Miscellaneous Item	NGP Drip Cap 16A – 40”	1
1	Door Stop	Rockwood 463	630
3	Silencers	IVES SR64	GRY
1	Lockguard	LG 600 IVE	GRY

END OF SECTION

SECTION 09080

MISCELLANEOUS FINISH REPAIR

1. GENERAL:

1.1 In the course of this project, the contractor can anticipate encountering finish material not specifically indicated or mentioned on the drawings or in these specifications. The method of the work chosen by the Contractor has bearing on the quantity and extent of finishes encountered.

1.2 Exercise care in demolition to reduce extent of patching and repair required.

1.3 Contractor shall repair all existing work damaged or disturbed by the work using similar material to that requiring repair.

1.3.1 Patch to match existing and leave all work in a finished and complete condition.

END OF SECTION

SECTION 09250

GYPSUM BOARD

1. GENERAL:

1.1. Related Documents: The requirements of Division 1 are hereby made a part of this section as if fully repeated herein.

1.1.1. DIRECT PURCHASING: This Section is subject to the terms and procedures of Direct Purchasing, whereby the Owner reserves the right to recover the sales tax on materials by purchasing directly the materials required for this Section. Issuance of Purchase Orders by the Owner shall not relieve the Contractor of any of his responsibilities regarding material purchases or installations, with the exception of the payments for the materials as purchased.

1.2. Description of Work: The extent of the gypsum board work is shown on the drawings and in schedules. The types of work required include the following:

1.2.1. Gypsum drywall partitions and ceilings.
1.2.2. Drywall finishing (joint tape-and-compound treatment).

1.3. Quality Assurance:

1.3.1. Fire-Resistance Rating: Where work is indicated for fire-resistance ratings, including those required to comply with governing regulations, provide materials and installations identical with applicable assemblies which have been tested and listed by recognized authorities, including F.M., U.L., N.F.P.A., and A.S.T.M.
1.3.2. Industry Standard: Comply with applicable requirements of ASTM C476 and "Application and Finishing of Gypsum Board" by the Gypsum Association except where more detailed or more stringent requirements are indicated, including the recommendations of the manufacturer.
1.3.3. Allowable tolerances: 1/16" offsets between planes of board faces, and 1/8" in 8'-0" for plumb, level, warp and bow. Where substrates have been installed by other trades, tolerances may vary to those for that trade.
1.3.4. Manufacturer: Obtain gypsum boards, trim accessories, adhesives and joint treatment products from a single manufacturer, or from manufacturers recommended by the prime manufacturer of gypsum boards. **Gypsum board shall be of domestic manufacture. Provide certification from manufacturer stating city and state of where gypsum board was manufactured.**

1.4. Submittals: Submit manufacturer's product specifications and installation instructions for each gypsum drywall component, including other data as may be required to show compliance with these Specifications.

1.4.1. Signed/sealed shop drawings and calculations for engineered ceilings and soffits. (See 2.5.2)

1.5. Product Handling: Deliver gypsum drywall materials in sealed, containers and bundles, fully identified by manufacturer's same brand, type and grade; store in a dry, well-ventilated space, protected from the weather, under cover and off the ground.

1.6. Job Conditions: Maintain ambient temperatures at not less than 55 degrees F., for the period of 24 hours before drywall finishing, during installation, and until compounds are dry.

2. PRODUCTS:

2.1. Gypsum Board Products:

2.1.1. Very High Impact (VHI) Gypsum Fiber Panels: Gold Bond brand Hi-Abuse XP Gypsum Board with mold resistance treatment, 5/8" thickness, TypeX.

2.2. Trim Accessories: General manufacturer's standard galvanized steel beaded units with flanges for concealment in joint compound, including corner beads, edge trim and control joints.

2.3. Joint Treatment Materials:

2.3.1. General: ASTM C475; type recommended by the manufacturer for the application indicated, except as otherwise indicated.
2.3.2. Joint Tape: Perforated type.
2.3.3. Joint Compound Ready-mixed vinyl-tape for interior use. Commercial quality general purpose grade specifically formulated for bedding tapes, filling depressions and topping and sanding. Comply with ASTM C475.

2.4. Steel Framing for Gypsum Board:
2.4.1. Metal Studs – refer to Section 05410.
2.4.2. Wall furring channels: 7/8" depth, ASTM C645 hat-shaped, hot dip galvanized coated. Provide furring of greater depth as necessary for wall utilities.

2.5. Suspended or Furred Ceilings:

2.5.1. Suspend gypsum board ceilings using Don Product series 10,000 Rigid 'X' drywall suspension system or equivalent. Contractor's Option: Provide suspension system of 16 gauge, 1 ½" deep carrying channels with 7/8", 0.0179" thick furring channels. Components shall be galvanized.

2.6. Miscellaneous Materials:

2.6.1. General: Provide auxiliary materials for gypsum drywall work of the type an grade recommended by the manufacturer of the gypsum board.
2.6.2. Gypsum Board Fasteners: ASTM C646, Type S Bugle head screws for steel and ASTM C894, Type W Bugle head and ASTM C514 nails for wood. Provide galvanized fasteners for application of Cement Board.

3. EXECUTION:

3.1. Installation - Gypsum Boards:

3.1.1. General Standards: In addition to compliance with GA-216, comply with SA-923.
3.1.2. Install ceiling boards by screws (prior to adjacent wall boards) in the direction and manner which will minimize the number of end-butt joints, and which will avoid end joints in the central area of each ceiling. Stagger end joints in ceilings at least 4'-0", maximum. All joints shall have solid backing.
3.1.3. Install wall/partition boards by screws in metal support. At high walls install boards horizontally with end joints staggered over studs. Cut boards as required around joists, beams, decking, etc., as required to provide the least practical voids.
3.1.4. Cover both faces of steel studs with gypsum board in concealed spaces (above ceilings, etc.), except in chase walls which are properly braced internally or smoke walls specifically indicated to receive gypsum board on only face above ceilings.
3.1.5. Isolate perimeter of drywall partitions at masonry abutments. Provide 1/8" space and trim edge with continuous casing bead drywall molding. Seal joints with acoustical sealant.
3.1.6. Floating construction: Where feasible, including where recommended by manufacturer, install gypsum board with "floating" internal corner construction unless control or expansion joints are indicated. “Provide metal stud backing at all interior corners, both directions.”

3.2. Installation of Drywall Trim Accessories:

3.2.1. General: Where feasible, use the same fasteners to anchor trim accessory flanges as required to fasten gypsum board to the supports. Otherwise, fasten flanges in accordance with manufacturer's instructions and recommendations.
3.2.2. Exposed Work:

3.2.2.1. Install metal corner beads at all external corners of drywall work. Corner beads shall be crimped and screw applied, not just crimped.
3.2.2.2. Install metal edge trim or drywall moldings whenever edges of gypsum board would otherwise be exposed or semi-exposed. Provide type with face flange to receive joint compound except where semi-flashing type is indicated. Install L-Type trim where work is tightly abutted to other work, and install special kerf-type where other work is kerfed to receive long leg of L-type trim.

3.2.2.3. Install J-Type trim where edge is exposed, revealed, gasketed, or sealant-filled (including expansion joints). Install W-Type moldings where masonry abuts drywall work.

3.2.2.4. Install metal control joint (beaded-type) where indicated or required for crack control.

3.3. Drywall Finishing:

3.3.1. General: Apply treatment at gypsum board joints (both directions), flanges of trim accessories, penetrations, fastener heads, surface defects and elsewhere as required to type to compound specified.

3.3.1.1. Apply joint tape at joints between gypsum boards, except where a trim accessory is indicated.

3.3.1.2. Apply joint compound in three (3) coats (not including prefill) and sand between last two coats and after last coat. Level 4 finish is required.

3.3.2. Partial Finishing: Omit third coat and sanding on concealed drywall work.

3.3.3. Refer to the other Sections for decorative finishes to be applied to drywall work.

3.4. Protection of Work: Protect gypsum drywall and maintain conditions necessary to ensure the work will be without damage or deterioration at the time of acceptance.

END OF SECTION

SECTION 09900

PAINTING

1. GENERAL:

1.1 Related Documents: The requirements of Division 1 are hereby made a part of this section as if fully repeated herein.

1.1.1 DIRECT PURCHASING: This Section is subject to the terms and procedures of Direct Purchasing, whereby the Owner reserves the right to recover the sales tax on materials by purchasing directly the materials required for this Section. Issuance of Purchase Orders by the Owner shall not relieve the Contractor of any of his responsibilities regarding material purchases or installations, with the exception of the payments for the materials as purchased.

1.2 The following specifications cover the complete painting and finishing of all surfaces, interior and exterior, as shown on the drawings and described in the specifications except as otherwise specified.

1.3 Work not included:

1.3.1 Copper, bronze, chromium plate, nickel, stainless steel, anodized aluminum, lead, and bright metals normally not intended to be painted.

1.3.2 Factory applied finishes.

1.3.3 Shop painting of structural and miscellaneous iron and steel.

1.3.4 Concealed ducts, pipes and conduit.

1.3.5 Refinished wall, ceiling and floor coverings.

1.4 The painting contractor shall supply all labor, materials, tools, ladders, scaffolding and equipment necessary for the completion of the work according to the drawings and specifications.

1.5 The painting contractor is responsible for inspecting the work of others prior to the application of any paint or finishing material. If any surface to be finished cannot be put in proper condition for finishing by customary cleaning, sanding and puttying operations, the painting contractor will immediately notify the general contractor or the Architect in writing, and shall not proceed with this work until conditions have been corrected and are acceptable.

1.6 Before proceeding with any painting, the painting contractor shall prepare and finish a sample room complete or in part, as directed by the Architect. Finish all areas or items in accordance with the specification and in colors selected by the Architect. These areas or items will be inspected by the Architect. When approved, they shall serve as a standard for workmanship, appearance, and materials approved for similar areas or items throughout this project.

1.7 Submittals: Manufacturer's data on painting products item by item and warranties.

1.7.1 Colors:

1. Contractor will furnish a set of color cards to match existing conditions together with a schedule showing where the various colors shall be used.
2. Final work shall match approved color samples, except if the Architect so directs between coats, the succeeding coat or coats may be slightly lightened or darkened.

2. STORAGE: Store all materials used on the job in a single place designated by Architect. Keep storage place neat and clean. All damaged areas shall be corrected by cleaning, repairing or replacing. All soiled or used rags, waste and trash must be removed from the building every night, and every precaution taken to avoid the danger of fire.

3. EXTRA MATERIAL: Upon substantial completion, the Contractor shall deliver to the Owner an extra stock consisting of one gallon of each color used in painting. Such stock shall be new, tightly sealed in clearly labeled containers.

4. MATERIALS:

4.1 All paints, varnishes, enamels, lacquers, stains, paste fillers, and similar materials must be delivered in the original containers, with the seals unbroken and labels intact and shall be used from the original containers.

4.2 Use only first line products of approved manufacturers.

4.3 Use materials only in accordance with the manufacturer's directions.

4.4 Fungicidal agent shall be incorporated into the paint by the manufacturer.

5. WORKMANSHIP:

5.1 Employ skilled mechanics to ensure the very best workmanship. Quality workmanship is required. Materials to be applied by craftsman experienced in the use of the specific product involved.

5.2 Where interior or exterior wood and metal are primed in the mill or shop as a part of the painting contract, use materials specified in every case for such surfaces and use in accordance with manufacturer's directions for the first or priming coat.

5.3 When surface temperature is below 50 degrees F., do not apply paints, varnishes, and special coatings, unless otherwise specified. Do not prime exteriors during frosty or rainy weather. Avoid painting surfaces while they are exposed to direct sunlight.

5.4 Clean floors and adjacent surfaces as well as all surfaces to be painted, before painting. Painting environment shall be relatively dust free.

5.5 Touch up knots, pitch streaks and sappy spots with recommended sealer before priming.

5.6 Putty nail holes, cracks and other defects after the first coat, with putty color to match the finish. Bring putty flush with the adjoining surface.

5.7 Wash metal surfaces with mineral spirits to remove dirt, oil and grease, before applying materials. Remove rust and scale by wire brushing or sanding clean before painting. Clean and touch up shop coats of paint that have become badly weathered, worn or marred with the primer specified.

5.8 Clean galvanized metal thoroughly and apply recommended primer.

5.9 Back-prime interior and exterior trim before installation with primer specified.

5.10 Apply all materials under adequate illumination, spread evenly and flow on smoothly without runs or sags.

5.11 All coats must be thoroughly dry before applying succeeding coats.

5.12 Sand smooth all woodwork to be finished with enamel or varnish. Clean surface before proceeding with the application of the first coat.

5.13 After doors are fitted, finish tops, bottoms and edges same as face and back. Finish tops and bottoms in a yellow or brown-pigmented sealer.

5.14 Secure color schedules before applying paint or finish. Tint primer and undercoat to the approximate shade of the finish coat.

5.15 Masonry surfaces shall be dry and clean from all dust, dirt, oil and efflorescence before painting. When recommended, etch concrete that is dense and smooth or that has had a hardener applied before painting. Fill masonry before painting.

5.16 Do not paint drywall containing more than 15% moisture. Touch up suction spots or "hot spots" as recommended after application of the first coat and before applying the second coat.

5.17 Repair scratches, cracks and abrasions in drywall surfaces and openings adjoining trim with a spackling compound, flush with adjoining surface, and when dry, sand smooth and seal before applying prime coat.

5.18 Cover surfaces to be stained with a uniform coat and wipe off if required.

5.19 Between coats, sand enamel or varnish finish, applied to wood or metal, with fine sandpaper and clean to produce an even, smooth finish.

5.20 Finish closets the same as adjoining rooms, unless otherwise specified. Finish all other surfaces the same as nearest or adjoining surfaces unless specified or directed otherwise by the Architect.

5.21 Protect work, adjacent work, and materials at all times, by suitable covering. Upon completion of the work, remove all paint and varnish spots from the floors, glass and other surfaces. Remove from the premises all rubbish and accumulated materials of whatever nature not caused by others and leave work in clean, orderly and acceptable condition.

6. PAINTING SCHEDULE: (Products by Sherwin Williams)

Painting Schedule – Exterior Finishes:
Block (Cinder and Concrete)
Primer: B42W00150- PI HD BLOCK FILLER
2 Coats: CF16W0051 – CNFLX SHER EW

CMU and Stucco – Previously Painted
Primer: B51W00620 - PrepRite® ProBlock® Interior/Exterior Latex Primer/Sealer White
2 Coats: CF16W0051 – CNFLX SHER EW

Steel/Ferrous Metal
Primer: B50WZ0001 – Kem Kromik® Universal Metal Primer Off White
2 Coats: B53W01551 – PI WB ALK UR SG EW

Hollow Metal Doors and Frames
Primer: B66W00310 – Pro Industrial Pro-Cryl® Universal Acrylic Primer Off White
2 Coats: B53W01151 – PI WB ALK UR SG EW

Painting Schedule – Interior Finishes:

Steel/Ferrous Metal

Primer: B66W00310 – Pro Industrial Pro-Cryl® Universal Acrylic Primer Off White

2 Coats: B66W00651 – Pro Industrial High Performance Acrylic – Semi-Gloss Extra White

Block (Cinder and Concrete)

Primer: B42W00150 – PI HD BLOCK FILLER

2 Coats: B66W00661 – Pro Industrial High Performance Acrylic – Satin Extra White

Block (Cinder and Concrete) Previously Coated With Epoxy

Primer: Y24W08980 – Fast Drying Interior/Exterior Oil-Based Primer White

2 Coats: B66W00661 – Pro Industrial High Performance Acrylic – Satin Extra White

Drywall

Primer: B51W00620 - PrepRite® ProBlock® Interior/Exterior Latex Primer/Sealer White

2 Coats: B66W00661 – Pro Industrial High Performance Acrylic – Satin Extra White

6.3 Labeling of Fire-Rated or Smoke-Tight Walls:

6.3.1 Frequency: Provide message at 20 feet nominally on center on each side of wall located at nominally 6" above ceiling line. Where no ceiling is scheduled, locate at nominally 12" below roof deck. As a minimum provide two messages, one on each side of the rated partition, for each wall segment.

6.3.2 Letters to be 2" high x ¼"-stroke and be red in color. Follow the same instruction for each rated wall type. 20 foot interval for all labeling. Rated firewalls shall be stenciled with message as applicable:

"1-HOUR FIREWALL
PROTECT ALL OPENINGS"

7. APPROVED MANUFACTURER:

7.1 All painting products shall be first line products from a single manufacturer. Products from recognized major manufacturers shall be submitted to the Architect for approval. Approved manufacturers are: Sherwin Williams, ICI, Benjamin Moore, PPG, Pratt & Lambert.

END OF SECTION

SECTION 10440

INTERIOR SIGNAGE

1. GENERAL:

1.1 Related Documents: The requirements of Division 1 are hereby made a part of this section as if fully repeated herein.

1.1.1 DIRECT PURCHASING: This Section is subject to the terms and procedures of Direct Purchasing, whereby the Owner reserves the right to recover the sales tax on materials by purchasing directly the materials required for this Section. Issuance of Purchase Orders by the Owner shall not relieve the Contractor of any of his responsibilities regarding material purchases or installations, with the exception of the payments for the materials as purchased.

1.2 Quality Assurance: For each sign form a graphic image process. Furnish products of a single manufacturer.

1.3 Submittals:

1.3.1 Shop Drawings: Submit shop drawings for fabrication and erection of specialty signs.

1.3.2 Production Data: Submit manufacturer's technical data and installation instructions for each type of sign required.

1.3.3 Samples: Submit samples of each sign form and material showing finishes, colors, surface textures, and qualities of manufacturer and design of each sign component including graphics.

2. PRODUCTS:

2.1 An informational sign with Braille is required at the Concessions building No. 9. Refer to detail 7/A5.1 for text.

2.2 Tactile Exit Signs, nominally 6" wide x 4" tall with 1 ½" text, red background with white letters, including Braille. Locate at each exit door.

2.3 Construction:

2.3.1 ES plastic, double layer "sand carved" engraved signs with squared corners.

Colors as selected by the Owner.

2.3.2 Fasteners: Use screw fasteners that are non-corrosive to both the sign material and the mounting surface.

3. EXECUTION:

3.1 Installation: Locate sign units and accessories as directed by Owner using mounting method and type described and compliance with the manufacturers' instructions. Install sign units level, plumb and at the height directed with sign surfaces free from distortion or other defects in appearance.

3.2 Cleaning and Protection: At completion of the installation, clean soiled sign surfaces in accordance with the manufacturer's instructions. Protect units for damage until acceptance by the Owner.

END OF SECTION

SECTION 10700

PRE-ENGINEERED METAL BUILDING

1. GENERAL:

1.1 Related Documents: The requirements of Division 1 are hereby made a part of this section as if fully repeated herein.

1.1.1 DIRECT PURCHASING: This Section is subject to the terms and procedures Direct Purchasing, whereby the Owner reserves the right to recover the sales tax on materials by purchasing directly the materials required for this Section. Issuance of Purchase Orders by the Owner shall not relieve the Contractor of any of his responsibilities regarding material purchases or installations, with the exception of the payments for the materials as purchased.

1.2 Scope: Provide and install prefabricated, pre-engineered, metal structure. The metal building will serve as an enclosure for yard maintenance equipment and combustibles.

1.3 Submittals:

1.3.1 Full shop drawings
1.3.2 Manufacturers data on all material furnished under this Section.
1.3.3 Assembly instructions
1.3.4 Manufacturer's Warranty
1.3.5 Finish color samples
1.3.6 Shop drawings shall include foundation design by the metal building specialty engineer.

2. PRODUCTS:

2.1 Metal building structure shall be equivalent to products by Space Age Structures. Local Representative: Darrell Coleman, (904) 291-4776 office. (904) 571-8150 cell.

2.2 The metal building and doors shall conform to the design wind loads indicated on the structural drawings and meet the requirements of the Florida Building Code 6th Edition. The shop drawings and calculations shall be signed, sealed and dated by a structural engineer registered in the State of Florida.

2.3 The metal building shall be designed to be anchored to the slab and foundation.

2.4 Construction:
2.4.1 Base rail, side frames, and roof trusses: 2" x 3", 14ga. minimum rectangular galvanized steel tubing. Yield strength= 50,000psi Tensile strength: 55,000psi.

2.4.2 Roof Pitch: 3.12

2.4.3 Roof and wall panels: 26ga galvalume 'Tuff Rib' panel, 36 inch width with ¾" ribs at 9" o.c. Panels shall have Kynar paint finish.

2.4.4 Provide front and side boxed eave trim all around.

2.4.5 Provide front and side wall panels as indicated on the drawings.

2.4.6 Provide all fasteners, trim and accessories for a complete installation.

2.4.7 Provide roof and wall insulation consisting of ¾" rigid insulation with a metal facing.

2.4.8 Exterior swing doors shall be provided as scheduled and specified in Section 08100.

2.4.9 Provide wall flashing and seal tight at roof and wall joint at the existing masonry building.

2.4.10 Provide manually operated, insulated overhead rollup door as indicated. Door shall be factory finished and weather stripped.

2.4.11 Coordinate with the electrical and mechanical equipment indicated.

3. INSTALLATION:

3.1 Installation of building shall adhere to approved shop drawings and manufacturer's written instruction to deliver a sound and complete structure. Concrete foundations shall have cured for not less than 14 days or until test cylinder results concrete has reach 85% of its design strength.

3.2 Warranty:

1. Manufacturer shall provide a 30-year paint warranty against fading.

4. CLEANING:

4.1 Remove all debris from the base and leave the completed structure in clean condition.

END OF SECTION

SECTION 16050

BASIC ELECTRICAL MATERIALS AND METHODS

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 the following:

1. Electrical equipment coordination and installation.
2. Sleeves for raceways and cables.
3. Sleeve seals.
4. Common electrical installation requirements.

1.3 DEFINITIONS

A. ATS: Acceptance Testing Specifications.

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

C. NBR: Acrylonitrile-butadiene rubber.

1.4 SUBMITTALS

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

1.5 QUALITY ASSURANCE

A. Test Equipment Suitability and Calibration: Comply with NETA ATS, "Suitability of Test Equipment" and "Test Instrument Calibration."

1.6 COORDINATION

A. Coordinate arrangement, mounting, and support of electrical equipment:

1. To allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.

2. To provide for ease of disconnecting the equipment with minimum interference to other installations.
3. To allow right of way for piping and conduit installed at required slope.
4. So connecting raceways, wireways, cable trays, and busways will be clear of obstructions and of the working and access space of other equipment.

B. Coordinate installation of required supporting devices and set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.

C. Coordinate location of access panels and doors for electrical items that are behind finished surfaces or otherwise concealed.

D. Coordinate electrical testing of electrical, mechanical, and architectural items, so equipment and systems that are functionally interdependent are tested to demonstrate successful interoperability.

PART 2- PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the follow requirements apply to product selection:

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

2.2 SLEEVES FOR RACEWAYS AND CABLES

A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.

B. Cast-Iron Pipe Sleeves: Cast or fabricated “wall pipe,” equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.

C. Sleeves for Rectangular Openings: Galvanized sheet steel with minimum 0.052- or 0.138-inch (1.3- or 3.5-mm) thickness as indicated and of length to suit application.

D. Coordinate sleeve selection and application with selection and application of firestopping specified in other divisions of specifications.

2.3 SLEEVE SEALS

A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.

1. Manufacturers:

   a. Advance Products & Systems, Inc.

   b. Calpico, Inc.

   c. Metraflex Co.

   d. Pipeline Seal and Insulator, Inc.

2. Sealing Elements: EPDM interlocking links shaped to fit surface of cable or conduit. Include type and number required for material and size of race or cable.
3. Pressure Plates: Stainless steel. Include two for each sealing element.
4. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating of length required to secure pressure plates to sealing elements. Include one for each sealing element.

PART 3 – EXECUTION

3.1 COMMON REQUIREMENTS FOR ELECTRICAL INSTALLATION

A. Comply with NECA 1.
B. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounted items.
C. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.
D. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electrical equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.
E. Right of Way: Give to raceways and piping systems installed at a required slope.

3.2 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Electrical penetrations occur when raceways, wireways, cable trays, or busways penetrate concrete slabs, concrete or masonry walls, or fire-rated floor and wall assemblies.
B. Coordinate sleeve selection and application with selection and application of firestopping.
C. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.
D. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
E. Rectangular Sleeve Minimum Metal Thickness:

   1. For sleeve cross-section rectangle perimeter less than 50 inches (1270 mm) and no side greater than 16 inches (400 mm), thickness shall be 0.052 inch (1.3 mm).

2. For sleeve cross-section rectangle perimeter equal to, or greater than, 50 inches (1270 mm) and 1 or more sides equal to, or greater than, 16 inches (400 mm), thickness shall be 0.138 inch (3.5 mm).

F. Fire-Rated Assemblies: Install sleeves for penetrations of fire- rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.
G. Cut sleeves to length for mounting flush with both surfaces of walls.
H. Extend sleeves installed in floors 2 inches (50 mm) above finished floor level.
I. Size pipe sleeves to provide ¼-inch (6.4-mm) annular clear space between sleeve and raceway or cable unless sleeve seal is to be installed.
J. Seal space outside of sleeves with grout for penetrations of concrete and masonry and with approved joint compound for gypsum board assemblies.
K. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint.
L. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at raceway and cable penetrations. Install sleeves and seal raceway and cable penetration sleeves with firestop materials. Comply with Division 7 Section "Through-Penetration Firestop Systems."
M. Roof-Penetration Sleeves: Seal penetration of individual raceways and cables with flexible boot-type flashing units applied in coordination with roofing work.
N. Aboveground, Exterior-Wall Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.
O. Underground, Exterior-Wall Penetrations: Install cast-iron "wall pipes" for sleeves. Size sleeves to allow for 1-inch (25-mm) annular clear space between raceway or cable and sleeve for installing mechanical sleeve seals.

3.3 SLEEVE-SEAL INSTALLATION

A. Install to seal underground, exterior wall penetrations.

B. Use type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.4 FIRESTOPPING

A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly. Firestopping materials and installation requirements are specified in other divisions of specifications.

3.5 FIELD QUALITY CONTROL

A. Inspect installed sleeve and sleeve-seal installations and associated firestopping for damage and faulty work.

END OF SECTION

SECTION 16060

GROUNDING AND BONDING

PART 1 - GENERAL

1.1 SUMMARY

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

1.2 SUBMITTALS

A. Product Data: For ground rods.

B. Field quality-control test reports.

1.3 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled under UL 467 as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with NFPA 70; 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. Apache Grounding/Erico Inc.
2. Boggs, Inc.
3. Chance/Hubbell.

4. Copperweld Corp.
5. Dossert Corp.
6. Erico Inc.; Electrical Products Group.
7. Framatome Connectors/Burndy Electrical.
8. Galvan Industries, Inc.
9. Harger Lightning Protection, Inc.
10. Hastings Fiber Glass Products, Inc.
11. Heary Brothers Lightning Protection Co.
12. Ideal Industries, Inc.
13. ILSCO.
14. Kearney/Cooper Power Systems.
15. Korns, C. C. Co.; Division of Robroy Industries.
16. Lightning Master Corp.
17. Lyncole XIT Grounding.
18. O-Z/Gedney Co.; a business of the EGS Electrical Group.
19. Raco, Inc.; Division of Hubbell.
20. Robbins Lightning, Inc.
21. Salisbury, W. H. & Co.
22. Superior Grounding Systems, Inc.
23. Thomas & Betts, Electrical.

2.2 GROUNDING CONDUCTORS

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

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

C. Grounding Electrode Conductors: Stranded cable.

D. Underground Conductors: Bare, tinned, stranded, unless otherwise indicated.

E. Bare, Solid-Copper Conductors: ASTM B 3.

F. Assembly of Bare, Stranded-Copper Conductors: ASTM B 8.

G. Bare, Tinned-Copper Conductors: ASTM B 33.

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

I. Copper 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.

J. Tinned-Copper 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.

K. Grounding Bus: Bare, annealed copper bars of rectangular cross section, with insulated spacer.

L. Connectors: Comply with IEEE 837 and UL 467; listed for use for specific types, sizes, and combinations of conductors and connected items. Bolted type, compression type or exothermic-welded type, in kit form, selected per manufacturer's written instructions.

2.3 GROUNDING ELECTRODES

A. Ground Rods: Sectional type; copper-clad steel, total length of 20 feet

1. Size: 3/4” diameter by 10 feet (per section)

PART 3 - EXECUTION

3.1 INSTALLATION

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. Ground rods: Prior to installation, perform ground resistivity test to determine best placement of ground rods. Grounding shall not exceed 5 Ohms. Provision of additional grounds rods will be required as necessary to meet required grounding criteria.

D. Exothermic-Welded Connections: Use for connections to structural steel and for underground connections.

E. 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.

F. Equipment Grounding Conductors: 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.

1. Install insulated equipment grounding conductors in feeders, branch circuits, receptacle circuits, and lighting circuits.
2. Outlet Circuits: Install insulated equipment grounding conductor in branch-circuit runs from computer-area power panels or power-distribution units.
3. Nonmetallic Raceways: Install an equipment grounding conductor in nonmetallic raceways unless they are designated for telephone or data cables.

G. 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.

H. Bonding Straps and Jumpers: Install so vibration by equipment mounted on vibration isolation hangers or 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.

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

J. Connections: 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.
6. Exothermic-Welded Connections: Comply with manufacturer's written instructions. Welds that are puffed up or that show convex surfaces indicating improper cleaning are not acceptable.
7. 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.
8. 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.
9. 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.
10. 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.

11. 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.

END OF SECTION 16060

SECTION 16073

HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Hangers and supports for electrical equipment and systems.
2. Construction requirements for concrete bases.

1.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design supports for multiple raceways, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

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

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

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

1.3 SUBMITTALS

A. Product Data: For steel slotted support systems.

B. Shop Drawings: Show fabrication and installation details and include calculations for the following:

1. Trapeze hangers. Include Product Data for components.
2. Steel slotted channel systems. Include Product Data for components.
3. Equipment supports.

1.4 QUALITY ASSURANCE

A. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

A. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Allied Tube & Conduit.
      b. Cooper B-Line, Inc.; a division of Cooper Industries.
      c. ERICO International Corporation.
      d. GS Metals Corp.
      e. Thomas & Betts Corporation.
      f. Unistrut; Tyco International, Ltd.
      g. Wesanco, Inc.
   2. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
   3. Channel Dimensions: Selected for applicable load criteria.

B. Raceway Supports: As described in NECA 1 and NECA 101.

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

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

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

F. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
   1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
      a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1) Hilti Inc.
2) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
3) MKT Fastening, LLC.
4) Simpson Strong-Tie Co., Inc.; Masterset Fastening Systems Unit.

2. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel, for use in hardened portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.
   a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

      1) Cooper B-Line, Inc.; a division of Cooper Industries.
      2) Empire Tool and Manufacturing Co., Inc.
      3) Hilti Inc.
      4) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
      5) MKT Fastening, LLC.

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

2.2 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

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

B. Materials: Comply with requirements in Division 5 Section "Metal Fabrications" for steel shapes and plates.

PART 3 - EXECUTION

3.1 APPLICATION

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

B. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMT, IMC, and RMC as scheduled in NECA 1, where its Table 1 lists maximum spacings less than stated in NFPA 70. Minimum rod size shall be 1/4 inch (6 mm) in diameter.

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

1. Secure raceways to these supports with two-bolt conduit clamps.

D. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2-inch (38-mm) and smaller raceways serving branch circuits and communication systems above suspended ceilings and for fastening raceways to trapeze supports.

3.2 SUPPORT INSTALLATION

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

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

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

D. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:

1. To Wood: Fasten with lag screws or through bolts.
2. To New Concrete: Bolt to concrete inserts.
3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
4. To Existing Concrete: Expansion anchor fasteners.
5. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inches (100 mm) thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches (100 mm) thick.
6. To Steel: Beam clamps (MSS Type 19, 21, 23, 25, or 27) complying with MSS SP-69.
7. To Light Steel: Sheet metal screws.
8. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate by means that meet anchorage requirements.

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

3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

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

B. Field Welding: Comply with AWS D1.1/D1.1M.

3.4 CONCRETE BASES

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

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

C. Anchor equipment to concrete base.

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

3.5 PAINTING

A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils (0.05 mm).

B. Touchup: Comply with requirements in painting Sections for cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal.

C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION

SECTION 16075

ELECTRICAL IDENTIFICATION

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 the following:

1. Identification for raceway.
2. Identification for conductors and communication and control cable.
3. Underground-line warning tape.
4. Warning labels and signs.
5. Instruction signs.
6. Equipment identification labels.
7. Miscellaneous identification products.

1.3 SUBMITTALS

A. Product Data: For each electrical identification product indicated.

B. Identification Schedule: An index of nomenclature of electrical equipment and system components used in identification signs and labels.

C. Samples: For each type of label and sign to illustrate size, colors, lettering style, mounting provisions, and graphic features of identification products.

1.4 QUALITY ASSURANCE

A. Comply with ANSI A13.1 and ANSI C2.

B. Comply with NFPA 70.

C. Comply with 29 CFR 1910.145.

1.5 COORDINATION

A. Coordinate identification names, abbreviations, colors, and other features with requirements in the Contract Documents, Shop Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual, and with those required by codes, standards, and 29 CFR 1910.145. Use consistent designations throughout Project.

B. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

C. Coordinate installation of identifying devices with location of access panels and doors.

D. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 RACEWAY IDENTIFICATION MATERIALS

A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway and cable size.

B. Self-Adhesive Vinyl Tape: Colored, heavy duty, waterproof, fade resistant; 2 inches (50 mm) wide; compounded for outdoor use.

2.2 CONDUCTOR AND COMMUNICATION- AND CONTROL-CABLE IDENTIFICATION MATERIALS

A. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.

2.3 UNDERGROUND-LINE WARNING TAPE

A. Description: Permanent, bright-colored, continuous-printed, polyethylene tape.

1. Not less than 6 inches (150 mm) wide by 4 mils (0.102 mm) thick.
2. Compounded for permanent direct-burial service.
3. Embedded continuous metallic strip or core.
4. Printed legend shall indicate type of underground line.
5. Provide #12 stainless steel locator wire above tape.

2.4 WARNING LABELS AND SIGNS

A. Comply with NFPA 70 and 29 CFR 1910.145.

B. Self-Adhesive Warning Labels: Factory printed, multicolor, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment, unless otherwise indicated.

C. Baked-Enamel Warning Signs: Preprinted aluminum signs, punched or drilled for fasteners, with colors, legend, and size required for application. 1/4-inch (6.4-mm) grommets in corners for mounting. Nominal size, 7 by 10 inches (180 by 250 mm).

D. Metal-Backed, Butyrate Warning Signs: Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs with 0.0396-inch (1-mm) galvanized-steel backing; and with colors, legend, and size required for application. 1/4-inch (6.4-mm) grommets in corners for mounting. Nominal size, 10 by 14 inches (250 by 360 mm).

E. Warning label and sign shall include, but are not limited to, the following legends:

1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."
2. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES (915 MM)."

2.5 INSTRUCTION SIGNS

A. Engraved, laminated acrylic or melamine plastic, minimum 1/16 inch (1.6 mm) thick for signs up to 20 sq. in. (129 sq. cm) and 1/8 inch (3.2 mm) thick for larger sizes.

1. Engraved legend with black letters on white face.
2. Punched or drilled for mechanical fasteners.
3. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.

2.6 EQUIPMENT IDENTIFICATION LABELS

A. Adhesive Film Label with Clear Protective Overlay: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch (10 mm). Overlay shall provide a weatherproof and ultraviolet-resistant seal for label.

B. Self-Adhesive, Engraved, Laminated Acrylic or Melamine Label: Adhesive backed, with white letters on a dark-gray background. Minimum letter height shall be 3/8 inch (10 mm).

PART 3 - EXECUTION

3.1 APPLICATION

A. Accessible Raceways Systems: Identify the following systems with color-coded self-adhesive vinyl tape applied in bands at intervals not to exceed 10 feet. Tape shall be 2" wide.

1. Fire Alarm System: Red.
2. Emergency power: Orange.
3. Cable TV: Blue and yellow.
4. Intercom: White black.
5. Telecommunication System: Green and yellow.

B. Power-Circuit Conductor Identification: For primary and secondary conductors No. 1/0 AWG and larger in vaults, pull and junction boxes, manholes, and handholes use color-coding conductor tape. Identify source and circuit number of each set of conductors. For single conductor cables, identify phase in addition to the above.

C. Conductors to Be Extended in the Future: Attach marker tape to conductors and list source and circuit number.

D. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, signal, sound, intercommunications, voice, and data connections.

1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.
2. Use system of marker tape designations that is uniform and consistent with system used by manufacturer for factory-installed connections.
3. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and Operation and Maintenance Manual.

E. Locations of Underground Lines: Identify with underground-line warning tape for power, lighting, communication, and control wiring and optical fiber cable.

F. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Comply with 29 CFR 1910.145 and apply baked-enamel warning signs. Identify system voltage with black letters on an orange background. Apply to exterior of door, cover, or other access.

1. Equipment with Multiple Power or Control Sources: Apply to door or cover of equipment including, but not limited to, the following:

a. Power transfer switches.
b. Controls with external control power connections.

2. Equipment Requiring Workspace Clearance According to NFPA 70: Unless otherwise indicated, apply to door or cover of equipment but not on flush panelboards and similar equipment in finished spaces.

G. Instruction Signs:

1. Operating Instructions: Install instruction signs to facilitate proper operation and maintenance of electrical systems and items to which they connect. Install instruction signs with approved legend where instructions are needed for system or equipment operation.
2. Emergency Operating Instructions: Install instruction signs with white legend on a red background with minimum 3/8-inch- (10-mm-) high letters for emergency instructions at equipment used for power transfer.

H. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and Operation and Maintenance Manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm systems unless equipment is provided with its own identification.

1. Labeling Instructions:

a. Indoor Equipment: Self-adhesive, engraved, laminated acrylic or melamine label. Unless otherwise indicated, provide a single line of text with 1/2-inch- (13-mm-) high letters on 1-1/2-inch- (38-mm-) high label; where 2 lines of text are required, use labels 2 inches (50 mm) high.
b. Outdoor Equipment: Engraved, laminated acrylic or melamine label.
c. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.

2. Equipment to Be Labeled:

a. Panelboards, electrical cabinets, and enclosures.
b. Access doors and panels for concealed electrical items.
c. Electrical switchgear and switchboards.
d. Transformers.
e. Emergency system boxes and enclosures.
f. Disconnect switches.
g. Enclosed circuit breakers.
h. Motor starters.
i. Push-button stations.
j. Power transfer equipment.
k. Contactors.
l. Remote-controlled switches, dimmer modules, and control devices.
m. Power-generating units.
n. Voice and data cable terminal equipment.

o. Intercommunication and call system.
p. Television/audio components, racks, and controls.
q. Fire-alarm control panel and annunciators.
r. Monitoring and control equipment.
s. Uninterruptible power supply equipment.
t. Terminals, racks, and patch panels for voice and data communication and for signal and control functions.

3.2 INSTALLATION

A. Verify identity of each item before installing identification products.

B. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.

C. Apply identification devices to surfaces that require finish after completing finish work.

D. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.

E. Attach non-adhesive signs and plastic labels with screws and auxiliary hardware appropriate to the location and substrate.

F. System Identification Color Banding for Raceways: Each color band shall completely encircle conduit. Place adjacent bands of two-color markings in contact, side by side. Locate bands at changes in direction, at penetrations of walls and floors, at 50-foot (15-m) maximum intervals in straight runs, and at 25-foot (7.6-m) maximum intervals in congested areas.

G. Color-Coding for Phase and Voltage Level Identification, 600 V and Less: Use the colors listed below for ungrounded service, feeder, and branch-circuit conductors.

1. Color shall be factory applied or, for sizes larger than No. 10 AWG if authorities having jurisdiction permit, field applied.
2. Colors for 208/120-V Circuits:

    a. Phase A: Black.
    b. Phase B: Red.
    c. Phase C: Blue.

3. Colors for 480/277-V Circuits:

    a. Phase A: Brown.
    b. Phase B: Orange.
    c. Phase C: Yellow.

4. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches (150 mm) from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.

H. Aluminum Wraparound Marker Labels and Metal Tags: Secure tight to surface of conductor or cable at a location with high visibility and accessibility.

I. Underground-Line Warning Tape: During backfilling of trenches install continuous underground-line warning tape directly above line at 6 to 8 inches (150 to 200 mm) below finished grade. Use multiple tapes where width of multiple lines installed in a common trench exceeds 16 inches (400 mm) overall. Provide #12 stainless steel locator wire.

J. Painted Identification: Prepare surface and apply paint according to Division 9 painting Sections.

END OF SECTION

SECTION 16120

CONDUCTORS AND CABLES

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 building wires and cables and associated connectors, splices, and terminations for wiring systems rated 600 V and less.

1.3 SUBMITTALS

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

B. Qualification Data: For testing agency.

C. Field Quality-Control Test Reports: From a qualified testing and inspecting agency engaged by Contractor.

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.

B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:

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

2.2 CONDUCTORS AND CABLES

A. Manufacturers:
   1. American Insulated Wire Corp.; a Leviton Company.
   2. General Cable Corporation.
   3. Senator Wire & Cable Company.
   4. Southwire Company.

B. Refer to Part 3 "Conductor and Insulation Applications" Article for insulation type, cable construction, and ratings.

C. Conductor Material: Copper complying with NEMA WC 5; solid conductor for No. 10 AWG and smaller, stranded for No. 8 AWG and larger.

D. Conductor Insulation Types: Type THHN-THWN complying with NEMA WC 5.

2.3 CONNECTORS AND SPLICES

A. Manufacturers:

   1. AFC Cable Systems, Inc.
   2. AMP Incorporated/Tyco International.
   3. Hubbell/Anderson.
   4. O-Z/Gedney; EGS Electrical Group LLC.
   5. 3M Company; Electrical Products Division.

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

PART 3 - EXECUTION

3.1 CONDUCTOR AND INSULATION APPLICATIONS

A. Service Entrance: Type THHN-THWN, single conductors in raceway.

B. Exposed Feeders: Type THHN-THWN, single conductors in raceway.

C. Feeders Concealed in Ceilings, Walls, and Partitions: Type THHN-THWN, single conductors in raceway.

D. Feeders Concealed in Concrete, below Slabs-on-Grade, and in Crawlspaces: Type THHN-THWN, single conductors in raceway.

E. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN-THWN, single conductors in raceway.

F. Branch Circuits Concealed in Concrete and below Slabs-on-Grade: Type THHN-THWN, single conductors in raceway.

G. Underground Feeders and Branch Circuits: Type THHN/THWN, single conductors in raceway.

H. Cord Drops and Portable Appliance Connections: Type SO, hard service cord.

I. Fire Alarm Circuits: Type THHN-THWN, in raceway.

3.2 INSTALLATION

A. Wires and cables shall be in conduit.

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

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

D. Identify and color-code conductors and cables according to Division 16 Section "Electrical Identification."

3.3 CONNECTIONS

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

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

1. Use oxide inhibitor in each splice and tap conductor for aluminum conductors.

C. Wiring at Outlets: Install conductor at each outlet, with at least 12 inches (300 mm) of slack.

3.4 FIELD QUALITY CONTROL

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

1. After installing conductors and cables and before electrical circuitry has been energized, test for compliance with requirements.
2. Perform each electrical test and visual and mechanical inspection stated in NETA ATS, Section 7.3.1. Certify compliance with test parameters.

B. Test Reports: Prepare a written report to record the following:

1. Test procedures used.
2. Test results that comply with requirements.
3. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.

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.

B. Related Sections include the following:
   1. Division 16 Section "Basic Electrical Materials and Methods" for supports, anchors, and identification products.
   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. FMC: Flexible metal conduit.

C. IMC: Intermediate metal conduit.

D. LFMC: Liquid tight flexible metal conduit.

E. LFNC: Liquid tight flexible nonmetallic conduit.

F. 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: Show fabrication and installation details of components for raceways, fittings, boxes, enclosures, and cabinets.

C. Coordination Drawings: Reflected ceiling plans drawn to scale and coordinating penetrations and ceiling-mounted items. Show the following:

1. Ceiling suspension assembly members.
2. Method of attaching hangers to building structure.
3. Size and location of initial access modules for acoustical tile.
4. Ceiling-mounted items including lighting fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.

1.5 QUALITY ASSURANCE

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

B. Comply with NFPA 70.

1.6 COORDINATION

A. Coordinate layout and installation of raceways, boxes, enclosures, cabinets, and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:

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

2.2 METAL CONDUIT AND TUBING

A. Manufacturers:
1. Alflex Inc.
2. Anamet Electrical, Inc.; Anaconda Metal Hose.
3. Electri-Flex Co.
4. Grinnell Co./Tyco International; Allied Tube and Conduit Div.
5. LTV Steel Tubular Products Company.
6. Manhattan/CDT/Cole-Flex.

7. O-Z Gedney; Unit of General Signal.
8. Wheatland Tube Co.

B. Rigid Steel Conduit: ANSI C80.1.

C. IMC: ANSI C80.6.

D. Plastic-Coated Steel Conduit and Fittings: NEMA RN 1.

E. Plastic-Coated IMC and Fittings: NEMA RN 1.

F. EMT and Fittings: ANSI C80.3.

1. Fittings: Compression type.

G. FMC: Zinc-coated steel.

H. LFMC: Flexible steel conduit with PVC jacket.

I. Fittings: NEMA FB 1; compatible with conduit and tubing materials.

2.3 NONMETALLIC CONDUIT AND TUBING

A. Manufacturers:

1. American International.
2. Anamet Electrical, Inc.; Anaconda Metal Hose.
3. Arnco Corp.
4. Cantex Inc.
5. Certainteed Corp.; Pipe & Plastics Group.
6. Condux International.
7. ElecSYS, Inc.
8. Electri-Flex Co.
9. Lamson & Sessions; Carlon Electrical Products.
10. Manhattan/CDT/Cole-Flex.
11. RACO; Division of Hubbell, Inc.
12. Spiralduct, Inc./AFC Cable Systems, Inc.
13. Thomas & Betts Corporation.

B. RNC: NEMA TC 2, Schedule 40 and Schedule 80 PVC.

2.4 METAL WIREWAYS

A. Manufacturers:

1. Hoffman.
2. Square D.

B. Material and Construction: Sheet metal sized and shaped as indicated, NEMA 1 for dry location. NEMA 3R for outdoor locations.

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

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

E. Wireway Covers: Hinged type.

F. Finish: Manufacturer's standard enamel finish.

2.5 BOXES, ENCLOSURES, AND CABINETS

A. Manufacturers:

1. Cooper Crouse-Hinds; Div. of Cooper Industries, Inc.
2. Emerson/General Signal; Appleton Electric Company.
3. Erickson Electrical Equipment Co.
4. Hoffman.
5. Hubbell, Inc.; Killark Electric Manufacturing Co.
6. O-Z/Gedney; Unit of General Signal.
7. RACO; Division of Hubbell, Inc.
8. Robroy Industries, Inc.; Enclosure Division.
9. Scott Fetzer Co.; Adalet-PLM Division.
10. Spring City Electrical Manufacturing Co.
11. Thomas & Betts Corporation.
12. Walker Systems, Inc.; Wiremold Company (The).
13. Woodhead, Daniel Company; Woodhead Industries, Inc. Subsidiary.

B. Sheet Metal Outlet and Device Boxes: NEMA OS 1.

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

D. Floor Boxes: Wiremold Series RFB4.

E. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.

F. Cast-Metal Pull and Junction Boxes: NEMA FB 1, cast aluminum with gasketed cover.

G. Hinged-Cover Enclosures: NEMA 250, Type 1, NEMA-3R for exterior location, 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.

H. 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.

2.6 FACTORY FINISHES

A. Finish: For raceway, enclosure, or cabinet components, provide manufacturer's standard prime-coat finish ready for field painting.

B. Finish: For raceway, enclosure, or cabinet components, provide manufacturer's standard paint applied to factory-assembled surface raceways, enclosures, and cabinets before shipping.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

A. Outdoors:

1. Exposed: Rigid steel or IMC.
2. Concealed: Rigid steel or IMC.
3. Underground, Run: RNC. PVC Schedule 40. Change from nonmetallic tubing (including ells) to rigid steel conduit or IMC before rising above the floor. Primary and secondary power runs shall be encased in concrete. Provide 3” thick envelope around conduits. Concrete encasements are required for conduit runs property line to transformer, transformer to building and between buildings. Concrete encasements are not required for branch circuits such as site lighting.
4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
5. Boxes and Enclosures: NEMA 250, Type 3R.

B. Indoors:

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

a. Damp or Wet Locations: NEMA 250, Type 4, stainless steel.

6. THE USE OF MC CABLE IS PROHIBITED.

C. Minimum Raceway Size: 1/2-inch trade size (DN 16).

D. Raceway Fittings: Compatible with raceways and suitable for use and location.

1. Intermediate Steel Conduit: Use threaded rigid steel conduit fittings, unless otherwise indicated.
2. 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.
3. EMT conduit: Steel compression type.

3.2 INSTALLATION

A. 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.

B. Complete raceway installation before starting conductor installation.

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

D. Install temporary closures to prevent foreign matter from entering raceways.

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

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

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

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

H. Raceways Embedded in Slabs: Install in middle 1/3 of slab thickness where practical and leave at least 2 inches (50 mm) of 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 (DN 27) parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support.
4. Change from nonmetallic tubing (including ells) to rigid steel conduit or IMC before rising above the floor.

I. Install exposed raceways parallel or at right angles to nearby surfaces or structural members and follow surface contours as much as possible.

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

J. Join raceways with fittings designed and approved for that purpose and make joints tight.

1. Use insulating bushings to protect conductors.

K. Tighten setscrews of threadless fittings with suitable tools.

L. Terminations:

1. Where raceways are terminated with locknuts and bushings, align raceways to enter squarely and install locknuts with dished part against box. Use two locknuts, one inside and one outside box.
2. Where raceways are terminated with threaded hubs, screw raceways or fittings tightly into hub so end bears against wire protection shoulder. Where chase nipples are used, align raceways so coupling is square to box; tighten chase nipple so no threads are exposed.

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

N. Install raceway-sealing fittings at suitable, approved, and accessible locations and fill them with UL-listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings at the following points:

1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
2. Where otherwise required by NFPA 70.

O. 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 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 plugs flush with floor for future equipment connections.

P. Flexible Connections: Use maximum of 72 inches (1830 mm) of flexible conduit for recessed and semi recessed lighting fixtures; for equipment subject to vibration, noise transmission, or movement; and for all motors. Use LFMC in damp or wet locations. Install separate ground conductor across flexible connections.

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

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

3.3 PROTECTION

A. Provide final protection and maintain conditions that ensure coatings, finishes, and cabinets are without damage or deterioration at 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.

3.4 CLEANING

A. After completing installation of exposed, factory-finished raceways and boxes, inspect exposed finishes and repair damaged finishes.

END OF SECTION

SECTION 16140

WIRING DEVICES

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 the following:

1. Single and duplex receptacles, ground-fault circuit interrupters, integral surge suppression units.
2. Single- and double-pole snap switches and dimmer switches.
3. Device wall plates.

1.3 DEFINITIONS

A. EMI: Electromagnetic interference.

B. GFCI: Ground-fault circuit interrupter.

C. PVC: Polyvinyl chloride.

D. RFI: Radio-frequency interference.

E. TVSS: Transient voltage surge suppressor.

F. UTP: Unshielded twisted pair.

1.4 SUBMITTALS

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

B. Shop Drawings: List of legends and description of materials and process used for premarking wall plates.

C. Samples: One for each type of device and wall plate specified, in each color specified.

D. Field quality-control test reports.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain each type of wiring device through one source from a single manufacturer.

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

C. Comply with NFPA 70.

1.6 COORDINATION

A. Receptacles for Owner-Furnished Equipment: Match plug configurations.

1. Cord and Plug Sets: Match equipment requirements.

1.7 EXTRA MATERIAL

A. Furnish extra material described below:

1. Single or double gang switch or receptacle cover plate: 10%.

2. Multiple gang switch or receptacle cover plate: 100%.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Wiring Devices:

a. Bryant Electric, Inc./Hubbell Subsidiary.
b. Eagle Electric Manufacturing Co., Inc.
c. Hubbell Incorporated; Wiring Device-Kellems.
d. Leviton Mfg. Company Inc.
e. Pass & Seymour/Legrand; Wiring Devices Div.

2. Multioutlet Assemblies:

a. Panduit.

2.2 RECEPTACLES

A. Straight-Blade-Type Receptacles: Comply with NEMA WD 1, NEMA WD 6, DSCC W-C-596G, and UL 498. 20 Amp, 120 Volts.

B. Straight-Blade and Locking Receptacles: Heavy-Duty grade.

C. Serving line outlets: Marine grade.

D. GFCI Receptacles: Straight blade, feed-through type, Heavy-Duty grade, with integral NEMA WD 6, Configuration 5-20R duplex receptacle; complying with UL 498 and UL 943. Design units for installation in a 2-3/4-inch- (70-mm-) deep outlet box without an adapter.

2.3 SWITCHES

A. Single- and Double-Pole Switches: Comply with DSCC W-C-896F and UL 20.

B. Snap Switches: Heavy-Duty (Commercial Spec) grade, quiet type.

2.4 WALL PLATES

A. Single and combination types to match corresponding wiring devices.

1. Plate-Securing Screws: Metal with head color to match plate finish.
2. Material for Finished Spaces: Stainless steel.
3. Material for Unfinished Spaces: Smooth, nylon.
4. Material for Wet Locations: Cast aluminum with spring-loaded lift cover, and listed and labeled for use in "wet locations."

2.5 FINISHES

A. Color:

1. Wiring Devices Connected to Normal Power System: Ivory, unless otherwise indicated or required by NFPA 70.
2. Wiring Devices Connected to Emergency Power System: Red.
3. Power receptacles serving computers: Gray.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install devices and assemblies level, plumb, and square with building lines.

B. Install wall dimmers to achieve indicated rating after derating for ganging according to manufacturer's written instructions.

C. Install unshared neutral conductors on line and load side of dimmers according to manufacturers' written instructions.

D. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical, and with grounding terminal of receptacles on top. Group adjacent switches under single, multigang wall plates.

E. Remove wall plates and protect devices and assemblies during painting.

F. Adjust locations of floor service outlets and service poles to suit arrangement of partitions and furnishings.

3.2 IDENTIFICATION

A. Comply with Division 16 Section "Electrical Identification."

1. Receptacles (Emergency Power): Identify panelboard and circuit number from which served. Use hot, stamped or engraved machine printing with black-filled lettering on face of plate, and durable wire markers or tags inside outlet boxes.

3.3 CONNECTIONS

A. Ground equipment according to Division 16 Section "Grounding and Bonding."

B. Connect wiring according to Division 16 Section "Conductors and Cables."

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

3.4 FIELD QUALITY CONTROL

A. Perform the following field tests and inspections and prepare test reports:

1. After installing wiring devices and after electrical circuitry has been energized, test for proper polarity, ground continuity, and compliance with requirements.
2. Test GFCI operation with both local and remote fault simulations according to manufacturer's written instructions.

B. Remove malfunctioning units, replace with new units, and retest as specified above.

END OF SECTION

SECTION 16289

TRANSIENT VOLTAGE SUPPRESSION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes TVSS's for low-voltage power equipment.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated. Include rated capacities, operating weights, operating characteristics, furnished specialties, and accessories.

B. Field quality-control test reports.

C. Operation and Maintenance Data.

1.3 QUALITY ASSURANCE

A. Source Limitations: Obtain suppression devices and accessories through one source from a single manufacturer.

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

C. Comply with IEEE C62.41, "IEEE Guide for Surge Voltages in Low Voltage AC Power Circuits," and test devices according to IEEE C62.45, "IEEE Guide on Surge Testing for Equipment Connected to Low-Voltage AC Power Circuits."

D. Comply with NEMA LS 1, "Low Voltage Surge Protection Devices."

E. Comply with UL 1283, "Electromagnetic Interference Filters," and UL 1449, "Transient Voltage Surge Suppressors."

1.4 PROJECT CONDITIONS

A. Service Conditions: Rate surge protection devices for continuous operation under the following conditions, unless otherwise indicated:

1. Maximum Continuous Operating Voltage: Not less than 115 percent of nominal system operating voltage.

2. Operating Temperature: 30 to 120 deg F (0 to 50 deg C).
3. Humidity: 0 to 85 percent, noncondensing.
4. Altitude: Less than 20,000 feet (6090 m) above sea level.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. EDCO

2.2 POWER SUPPRESSORS FOR CONTROL PANEL

A. Surge Protection Device Description: Series hybrid design, three stage of protection with 3 suppression modes, 120V, single phase.

1. LED indicator lights for power and protection status.
2. Audible alarm, with silencing switch, to indicate when protection has failed.

B. Peak Single-Impulse Surge Current Rating: 25 kA per phase.

2.3 ENCLOSURES

A. NEMA 250, with type matching the enclosure of panel or device being protected. NEMA-1 for dry location, NEMA-3R for outdoor or wet locations.

2.4 LOW VOLTAGE SIGNAL PROTECTION

A. This section describes the materials and installation requirements for transient voltage surge suppressors (TVSS) for the protection of all electronic equipment low voltage signal conductors.

B. Alarm systems which communicate by wire outside the confines of a protected building shall be protected by the provisions of this section. Each conductor of cable shall have protection at both ends (leaving a building and entering a building).

C. Surge Suppression for each electronic system requiring protection shall be furnished and installed by the vendor of the electronic systems requiring the protection.

D. The system parameters of the electronic system requiring protection shall be accessible upon request to the surge suppression manufacturer designing the protection for the system. The system parameters shall include but not be limited to:

Conductor size

Maximum conductor length

Maximum allowable conductor length

Maximum worst case series current if it exceeds one ampere

Signal speed of transmission and signal type

Peak to peak voltages with relation to ground

Shielding requirements, if any, of the cable at both ends of the equipment

Maximum single impulse current withstand, conductor to ground or conductor to conductor 10,000 amperes (8x 20 us - waveform)

Pulse life rating 3,000 amperes (8 x 20 us – waveform) 2,000 occurrences

E. Suppressors shall have turn-on and turn-off times of less than on nanosecond.

F. Maximum clamping voltages at 10,000 amperes, 8 x 20 us current waveform, shall not exceed the peak of the normal applied signal voltage by 200%.

G. Suppressors shall be a hybrid design with a minimum of three (3) stages utilizing solidstate componentry and shall operate bidirectionally.

H. The suppressor manufacturer shall provide certified test data confirming a fail short failure mode.

I. Suppressors shall be housed in an enclosure that is compatible with the system being protected.

PART 3 - EXECUTION

3.1 INSTALLATION OF SURGE PROTECTION DEVICES

A. Install power protector at the security control panel.

B. Provide surge protectors for all signal and sound cables leaving a building or entering a building as specified on the drawings and as required by DCPS Electronics.

3.2 PLACING SYSTEM INTO SERVICE

A. Do not energize or connect intercom equipment to their sources until surge protection devices are installed and connected.

3.3 FIELD QUALITY CONTROL

A. Testing: Perform the following field tests and inspections and prepare test reports:

1. Complete startup checks according to manufacturer's written instructions.
2. Perform each visual and mechanical inspection and electrical test stated in NETA ATS, "Surge Arresters, Low-Voltage Surge Protection Devices" Section. Certify compliance with test parameters.

END OF SECTION 16289

SECTION 16410

ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following individually mounted, enclosed switches and circuit breakers:

1. Fusible switches.
2. Nonfusible switches.
3. Molded-case circuit breakers.
4. Enclosures.

1.3 DEFINITIONS

A. GD: General duty.

B. GFCI: Ground-fault circuit interrupter.

C. HD: Heavy duty.

D. RMS: Root mean square.

E. SPDT: Single pole, double throw.

1.4 SUBMITTALS

A. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated. Include dimensioned elevations, sections, weights, and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.

1. Enclosure types and details for types other than NEMA 250, Type 1.
2. Current and voltage ratings.
3. Short-circuit current rating.

4. UL listing for series rating of installed devices.
5. Features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.

B. Shop Drawings: Diagram power, signal, and control wiring.

C. Field quality-control test reports including 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.

D. Manufacturer's field service report.

E. Operation and Maintenance Data: For enclosed switches and circuit breakers to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 1 Section "Operation and Maintenance Data," include the following:

1. Manufacturer's written instructions for testing and adjusting enclosed switches and circuit breakers.
2. Time-current curves, including selectable ranges for each type of circuit breaker.

1.5 QUALITY ASSURANCE

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

B. Comply with NFPA 70.

C. Product Selection for Restricted Space: Drawings indicate maximum dimensions for enclosed switches and circuit breakers, including clearances between enclosures, and adjacent surfaces and other items. Comply with indicated maximum dimensions.

1.6 COORDINATION

A. Coordinate layout and installation of switches, circuit breakers, and components with other construction, including conduit, piping, equipment, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

1.7 EXTRA MATERIALS

B. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Fuses: 20% of each type utilized.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 FUSIBLE AND NONFUSIBLE SWITCHES

A. Manufacturers:

   1. Square “D”.
   2. Eaton.

B. Fusible Switch, 600 A and Smaller: NEMA KS 1, Type HD, with clips or bolt pads to accommodate specified fuses, lockable handle with capability to accept two padlocks, and interlocked with cover in closed position.

C. Nonfusible Switch, 600 A and Smaller: NEMA KS 1, Type HD, lockable handle with capability to accept two padlocks, and interlocked with cover in closed position.

D. Accessories:

   1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
   2. Neutral Kit: Internally mounted; insulated, capable of being grounded, and bonded; and labeled for copper and aluminum neutral conductors.
   3. Auxiliary Contact Kit: Auxiliary set of contacts arranged to open before switch blades open.

2.3 MOLDED-CASE CIRCUIT BREAKERS AND SWITCHES

A. Manufacturers:

   1. Eaton Corporation; Cutler-Hammer Products.
   2. General Electric Co.; Electrical Distribution & Control Division.

3. Siemens Energy & Automation, Inc.

B. Molded-Case Circuit Breaker: NEMA AB 1, with interrupting capacity to meet available fault currents.

1. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 400 A and larger.

C. Molded-Case Circuit-Breaker Features and Accessories:

1. Standard frame sizes, trip ratings, and number of poles.
2. Lugs: Mechanical style suitable for number, size, trip ratings, and conductor material.
3. Application Listing: Type SWD for switching fluorescent lighting loads; Type HACR for heating, air-conditioning, and refrigerating equipment.
4. Ground-Fault Protection: Integrally mounted relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator.

2.4 ENCLOSURES

A. NEMA AB 1 and NEMA KS 1 to meet environmental conditions of installed location.

1. Outdoor Locations: NEMA 250, Type 3R.
2. Kitchen Areas: NEMA 250, Type 4X, stainless steel.
3. Other Wet or Damp Indoor Locations: NEMA 250, Type 4.
4. Hazardous Areas Indicated on Drawings: NEMA 250, Type 7C.
5. Indoor locations: NEMA-1.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine elements and surfaces to receive enclosed switches and circuit breakers for compliance with installation tolerances and other conditions affecting performance.

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

3.2 CONCRETE BASES

A. Coordinate size and location of concrete bases. Verify structural requirements with structural engineer.

B. Concrete base is specified in Division 16 Section "Electrical Supports and Seismic Restraints," and concrete materials and installation requirements are specified in Division 3.

3.3 INSTALLATION

A. Comply with applicable portions of NECA 1, NEMA PB 1.1, and NEMA PB 2.1 for installation of enclosed switches and circuit breakers.

B. Mount individual wall-mounting switches and circuit breakers with tops at uniform height, unless otherwise indicated. Anchor floor-mounting switches to concrete base.

C. Comply with mounting and anchoring requirements specified in Division 16 Section "Electrical Supports and Seismic Restraints."

D. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.

3.4 IDENTIFICATION

A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs as specified in Division 16 Section "Electrical Identification."

B. Enclosure Nameplates: Label each enclosure with engraved metal or laminated-plastic nameplate as specified in Division 16 Section "Electrical Identification."

3.5 FIELD QUALITY CONTROL

A. Prepare for acceptance testing as follows:

1. Inspect mechanical and electrical connections.
2. Verify switch and relay type and labeling verification.
3. Verify rating of installed fuses.
4. Inspect proper installation of type, size, quantity, and arrangement of mounting or anchorage devices complying with manufacturer's certification.

B. Perform the following field tests and inspections and prepare test reports:

1. Test mounting and anchorage devices according to requirements in Division 16 Section "Electrical Supports and Seismic Restraints."
2. Perform each electrical test and visual and mechanical inspection stated in NETA ATS, Section 7.5 for switches and Section 7.6 for molded-case circuit breakers. Certify compliance with test parameters.
3. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

4. Infrared Scanning:

   a. Initial Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each enclosed switch and circuit breaker. Open or remove doors or panels so connections are accessible to portable scanner.
   b. Follow-Up Infrared Scanning: Perform an additional follow-up infrared scan of each unit 11 months after date of Substantial Completion.
   c. Instruments, Equipment and Reports:

      1) Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
      2) Prepare a certified report that identifies enclosed switches and circuit breakers included and describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.6 ADJUSTING

A. Set field-adjustable switches and circuit-breaker trip ranges.

3.7 CLEANING

A. On completion of installation, vacuum dirt and debris from interiors; do not use compressed air to assist in cleaning.

B. Inspect exposed surfaces and repair damaged finishes.

END OF SECTION

SECTION 16710

FIRE ALARM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes fire alarm systems.

1.3 DEFINITIONS

A. FACP: Fire alarm control panel.

B. LED: Light-emitting diode.

C. NICET: National Institute for Certification in Engineering Technologies.

D. Definitions in NFPA 72 apply to fire alarm terms used in this Section.

1.4 SYSTEM DESCRIPTION

A. New stand-alone fire alarm system will be provided for building 10. The system will include a new Simplex 4005 control panel and a new security panel which will transmit a trouble signal to the Central Station through the school's telephone lines.

1.5 BIDDING

A. The material costs associated with the fire alarm System work shall not be based on the DCPS Maintenance Contract pricing. Work shall be bid similar to all other systems, pricing shall be as per current industry pricing at the time of bid. As part of the bid submittal, the contractor shall provide a breakdown of all specific material line item costs for the fire alarm system equipment as shown on the bid sheets.

1.6 PERFORMANCE REQUIREMENTS

A. Comply with NFPA 72.

B. Fire alarm signal initiation shall be by one or more of the following devices:

1. Manual stations.
2. Heat detectors.
3. Smoke detectors.
4. Verified automatic alarm operation of smoke detectors.

C. Fire alarm signal shall initiate the following actions:

1. Identify alarm at the FACP and remote annunciators.
2. Transmit an alarm signal to the remote alarm receiving station. See installation Part III Installation for specific requirements.
3. Alarm notification appliances shall operate continuously.
4. Switch heating, ventilating, and air-conditioning equipment controls to fire alarm mode, shutting down AHU's and exhaust fans.
5. Close smoke dampers in air ducts of system serving zone where alarm was initiated.
6. Record events in the system memory.
7. Shutdown sound systems in field area.

D. System trouble signal initiation shall be by one or more of the following devices or actions:

1. Open circuits, shorts and grounds of wiring for initiating device, signaling line, and notification-appliance circuits.
2. Opening, tampering, or removal of alarm-initiating and supervisory signal-initiating devices.
3. Loss of primary power at the FACP.
4. Ground or a single break in FACP internal circuits.
5. Abnormal ac voltage at the FACP.
6. A break in standby battery circuitry.
7. Failure of battery charging.
8. Abnormal position of any switch at the FACP or annunciator.

E. System Trouble and Supervisory Signal Actions: Annunciate at the FACP and remote annunciators.

1.7 SUBMITTALS

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

B. Shop Drawings:

1. Shop Drawings shall be prepared by persons with the following qualifications:

a. Trained and certified by manufacturer in fire alarm system design.
b. Fire alarm certified by NICET, minimum Level III.

2. System Operation Description: Detailed description for this Project, including method of operation and supervision of each type of circuit and sequence of operations for manually and automatically initiated system inputs and outputs. Manufacturer's standard descriptions for generic systems are not acceptable.
3. Device Address List: Coordinate with final system programming.
4. System riser diagram with device addresses, conduit sizes, and cable and wire types and sizes.
5. Wiring Diagrams: Power, signal, and control wiring. Include diagrams for equipment and for system with all terminals and interconnections identified. Show wiring color code.
6. Batteries: Size calculations.
7. Floor Plans: Indicate final outlet locations showing address of each addressable device. Show size and route of cable and conduits.

C. Qualification Data: For Installer.

D. Field quality-control test reports.

E. Operation and Maintenance Data: For fire alarm system to include in emergency, operation, and maintenance manuals. Comply with NFPA 72, Appendix A, recommendations for Owner's manual. Include abbreviated operating instructions for mounting at the FACP.

F. Submittals to Authorities Having Jurisdiction (DCPS Code Enforcement): In addition to distribution requirements for submittals specified in Division 01 Section "Submittals," make an additional copy to be submitted to authorities having jurisdiction as described below. To facilitate review, include copies of annotated Contract Drawings as needed to depict component locations. Resubmit if required to make clarifications or revisions to obtain approval. The Authority having jurisdiction is DCPS Code Enforcement. A copy of the fire alarm system shop drawings with the Engineer of Record (EOR) approval stamp shall be submitted to DCPS Code Enforcement *prior to installation*. Work shall commence only after receiving approvals from EOR and DCPS Code Enforcement.

G. Documentation:

1. Approval and Acceptance: Provide the "Record of Completion" form according to NFPA 72 to Owner, Architect, and authorities having jurisdiction.
2. Record of Completion Documents: Provide the "Permanent Records" according to NFPA 72 to Owner, Architect, and authorities having jurisdiction. Format of the written sequence of operation shall be the optional input/output matrix.
3. Provide a copy of the program and programmer (software) to the Electronics Department. Supply on CD at the end of the project.

    a. Hard copies on paper to Owner, Architect, and authorities having jurisdiction.

b. Electronic media may be provided to Architect and authorities having jurisdiction.

1.8 QUALITY ASSURANCE

A. Installer Qualifications: Personnel shall be trained and certified by manufacturer for installation of units required for this Project.

B. Installer Qualifications: Work of this Section be performed by a UL-listed company.

C. Installer Qualifications: Personnel certified by NICET as Fire Alarm Level II.

D. 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.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Provide new complete system. Subject to compliance with requirements, provide products by one of the following:

1. FACP and Equipment (unless noted otherwise):
   a. SimplexGrinnell LP; a Tyco International Company.

2. Wire and Cable:

   a. See Part 2.11.E for requirements.

2.2 FACP

A. General Description:

1. New FACP shall be Simplex #4005.
2. Modular, power-limited design with electronic modules, UL 864 listed.

B. Circuits:

1. Signaling Line Circuits: NFPA 72, Class B, Style 4.
2. Notification-Appliance Circuits: NFPA 72, Class B.
3. Electrical monitoring for the integrity of wiring external to the FACP for mechanical equipment shutdown is not required, provided a break in the circuit will cause mechanical equipment to shut down.

C. Notification-Appliance Circuit: Operation shall sound in a temporal pattern, complying with ANSI S3.41.

D. Power Supply for Supervision Equipment: Supply for audible and visual equipment for supervision of the ac power shall be from a dedicated dc power supply, and power for the dc component shall be from the ac supply.

E. Alarm Silencing, Trouble, and Supervisory Alarm Reset: Manual reset at the FACP , after initiating devices are restored to normal.

1. Silencing-switch operation halts alarm operation of notification appliances and activates an "alarm silence" light. Display of identity of the alarm zone or device is retained.
2. Subsequent alarm signals from other devices or zones reactivate notification appliances until silencing switch is operated again.
3. When alarm-initiating devices return to normal and system reset switch is operated, notification appliances operate again until alarm silence switch is reset.

F. Transmission to Remote Alarm Receiving Station: Automatically transmit alarm, trouble, and supervisory signals to a remote alarm station through a digital alarm communicator transmitter. See installation Part III Installation for specific requirements.

1. Notification-Appliance Circuits: NFPA 72, Class B.
2. Status Annunciator: Indicate the status of various zones.
3. Preamplifiers, amplifiers, and tone generators shall automatically transfer to backup units, on primary equipment failure.

G. Primary Power: 24-V dc obtained from 120-V ac service and a power-supply module. Initiating devices, notification appliances, signaling lines, trouble signal, supervisory signal shall be powered by the 24-V dc source.

1. The alarm current draw of the entire fire alarm system shall not exceed 80 percent of the power-supply module rating.
2. Power supply shall have a dedicated fused safety switch for this connection at the service entrance equipment. Paint the switch box red and identify it with "FIRE ALARM SYSTEM POWER."

H. Secondary Power: 24-V dc supply system with batteries and automatic battery charger and an automatic transfer switch.

1. Batteries: Sealed lead calcium.
2. Battery and Charger Capacity: Comply with NFPA 72.

I. Surge Protection:

1. Install surge protection on normal ac power for the FACP and its accessories. Comply with Division 26 Section "Transient-Voltage Suppression for Low-Voltage Electrical Power Circuits" for auxiliary panel suppressors.

2. Install surge protectors as follows:
   Emerson/EDCO Surge Suppression
   FAS-2-033HC: Two circuit suppressor for signal circuits
   PC642C-036: for IDNET
   PCB1B Base: for PC642C-036

3. Install on all system wiring routed underground and entering or exiting a building. For systems at existing facilities, place the surge suppressors in Nema-3R enclosures located on the building exterior. For systems on new construction, place the surge suppressors at the first entrance termination point. For buildings other than the building housing the FACP, cables simply passing through surge or terminal boxes without terminating do not require surge suppression. Surge suppression shall only be provided for cabling being terminated within the enclosure.

4. Surge suppression for portables, flammable storage buildings, sheds, and similar structures shall be located at the nearest permanent building from which the service is fed and shall be wired to protect the modules which shall be placed in the same location. When free-standing racks are provided for modules, surge suppression shall be provided on both the incoming and outgoing cables.

5. See the related grounding section under Part 3.4.

2.3 MANUAL FIRE ALARM BOXES

A. Description: UL 38 listed; finished in red with molded, raised-letter operating instructions in contrasting color. Station shall show visible indication of operation. Mounted on recessed outlet box; if indicated as surface mounted, provide manufacturer's surface back box.

1. Single-action mechanism, pull-lever type. With integral addressable module, arranged to communicate manual-station status (normal, alarm, or trouble) to the FACP.
2. Station Reset: Key- or wrench-operated switch.
3. Indoor Protective Shield: Factory-fabricated clear plastic enclosure, hinged at the top to permit lifting for access to initiate an alarm. Lifting the cover actuates an integral battery-powered audible horn intended to discourage false-alarm operation.
4. Weatherproof Protective Shield: For any location exposed to the elements, provide factory-fabricated clear plastic enclosure, hinged at the top to permit lifting for access to initiate an alarm.

2.4 SYSTEM SMOKE DETECTORS

A. General Description:

1. UL 268 listed, operating at 24-V dc, nominal.
2. Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore them to normal operation.
3. Integral Visual-Indicating Light: LED type. Indicating detector has operated and power-on status.

B. Photoelectric Smoke Detectors:

1. Sensor: LED with matching silicon photodiode receiver.
2. Detector Sensitivity: Between 0.2 and 3.7 percent/foot smoke obscuration when tested according to UL 268A.

2.5 HEAT DETECTORS

A. General: UL 521 listed.

B. Heat Detector, Combination Type: Actuated by either a fixed temperature of 135 deg F (57 deg C) or rate-of-rise of temperature that exceeds 15 deg F (8 deg C) per minute, unless otherwise indicated.

C. Heat Detector, Fixed-Temperature Type: Actuated by temperature that exceeds a fixed temperature of 200 deg F (93 deg C).

D. Heat Detector, Explosion Proof, Combination Type: Actuated by either a fixed temperature of 135 deg F (57 deg C) or rate-of-rise of temperature that exceeds 15 deg F (8 deg C) per minute, unless otherwise indicated.

E. Continuous Linear Heat-Detector System: Consists of detector cable and control unit.

1. Detector Cable: Cable shall include two steel actuator wires twisted together with spring pressure, wrapped with protective tape, and finished with PVC outer sheath. Each actuator wire is insulated with heat-sensitive material that reacts with heat to allow the cable twist pressure to short circuit wires at the location of elevated temperature.
2. Provide rated detection temperature suitable to individual spaces receiving protection. Contractor shall provide breakdown that indicates the proposed rated detection temperature for each space scheduled for protection.
3. Components: All components, accessories, enclosures, mounting hardware, etc. shall be manufactured by the same company as the cable itself.
4. Remote Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to the FACP.
5. Heat tape terminal enclosure: This shall house the IAM and associated terminal strip. For general spaces (classrooms, offices, corridors, etc.), mount the

enclosure as high as possible on the wall (and below the drop ceiling) while still allowing for access with use of a 6-foot ladder. For other spaces (electrical rooms, custodial closets, stages, etc.), mount the enclosure at 48”AFF (to the bottom of the enclosure). The enclosure shall be a 4” square or similar size box. Provide box deep enough to comfortably accommodate the IAM and terminal strip. The box shall be finished (not stamped) with solid blank cover (no openings). Provide label indicating “Fire Alarm”.

6. End-of-line resistor and test switch enclosure: For general spaces (classrooms, offices, corridors, etc.), mount the enclosure as high as possible on the wall (and below the drop ceiling) while still allowing for access with use of a 6-foot ladder. For other spaces (electrical rooms, custodial closets, stages, etc.), mount the enclosure at 48”AFF (to the bottom of the enclosure). The enclosure shall be manufactured by the same company as the heat tape.

2.6 NOTIFICATION APPLIANCES

A. Description: Equipped for mounting as indicated and with screw terminals for system connections.

1. Combination Devices: Factory-integrated audible and visible devices in a single-mounting assembly.

B. Visible Alarm Devices: Xenon strobe lights listed under UL 1971, with clear or nominal white polycarbonate lens mounted on an aluminum faceplate. The word "FIRE" is engraved in minimum 1-inch- (25-mm-) high letters on the lens.

1. Rated Light Output: 75 or 110 candela.
2. Strobe Leads: Factory connected to screw terminals.

C. Horns: Electric-vibrating-polarized type, 24-V dc; with provision for housing the operating mechanism behind a grille. Comply with UL 464. Horns shall produce a sound-pressure level of 90 dBA, measured 10 feet (3 m) from the horn, using the coded signal prescribed in UL 464 test protocol.

D. Exterior devices shall be horn-only (no strobes). Provide Wheelock weatherproof kits.

2.7 GUARDS FOR PHYSICAL PROTECTION

A. Description: Welded wire mesh of size and shape for the smoke detector, gong, or other similar device. Cage for notification devices. All exterior devices require protection.

1. Factory fabricated and furnished by manufacturer of the device.
2. Finish: Paint of color to match the protected device.

2.8 WIRE AND CABLE

A. Wire and cable for fire alarm systems shall be UL listed and labeled as complying with NFPA 70, Article 760.

B. Signaling Line Circuits: Twisted, shielded pair, not less than No. 18 AWG. See below product specifications.

1. Circuit Integrity Cable: Twisted shielded pair, NFPA 70 Article 760, Classification CI, for power-limited fire alarm signal service. UL listed as Type FPL, and complying with requirements in UL 1424 and in UL 2196 for a 2-hour rating.

C. Non-Power-Limited Circuits: Solid-copper conductors with 600-V rated, 75 deg C, color-coded insulation. See below product specifications.

1. Low-Voltage Circuits: No. 14 AWG, minimum.
2. Line-Voltage Circuits: No. 12 AWG, minimum.

D. All underground wire and cable shall be suitably rated for that application.

E. Approved products:

Interior Cables

1. RUI/N2 communication: 2-conductor, #18 AWG, solid, twisted pair with overall shield
   a. Riser rated: Paige #740215 or Anixter #FA-1802C-1-1S-03
   b. Plenum rated: Paige #740214L or Anixter #FA-1802C-1-2S-03
   c. Provide red jacket.
2. Power circuit: 2 conductors, #14 AWG, THHN or THWN
   a. Colors: Red-Black
   b. Rating: THHN for general use / THWN for underground use
3. Relay circuit: 2 conductors, #14 AWG, THHN or THWN
   a. Colors: Orange-Brown
   b. Rating: THHN for general use / THWN for underground use
4. Visual/Signal circuit: 2 conductors, #14 AWG, THHN or THWN
   a. Colors: White-Purple
   b. Rating: THHN for general use / THWN for underground use
5. Zone circuit: 2 conductors, #14 AWG, THHN or THWN
   a. Colors: Yellow-Blue
   b. Rating: THHN for general use / THWN for underground use

Underground Cables

1. Initiating circuit: 2-conductor, #12 AWG, thwn
2. Visual/Signal circuit: Visual/Signal circuit: 2 conductors, #12 AWG, THWN
   a. Colors: Refer to above color codes.

b. Rating: THWN

PART 3 - EXECUTION

3.1 EQUIPMENT INSTALLATION

A. FACP: For the duration of the project, until the new system is accepted and brought online, the fire alarm control panel shall only be powered on during testing. The remainder of the time, the panel shall be left powered off.

B. Smoke or Heat Detector Spacing:

1. Smooth ceiling spacing shall not exceed 30 feet (9 m).
2. Spacing of heat detectors for irregular areas, for irregular ceiling construction, and for high ceiling areas, shall be determined according to Appendix A in NFPA 72.
3. Spacing of heat detectors shall be determined based on guidelines and recommendations in NFPA 72.

C. HVAC: Locate detectors not closer than 3 feet (1 m) from air-supply diffuser or return-air opening.

D. Coordinate below with Drawings.

3.2 WIRING INSTALLATION

A. Install wiring according to the following:

1. NECA 1.
2. TIA/EIA 568-A.

B. Wiring Method: Install wiring in metal raceway according to Division 16 Section "Raceway and Boxes for Electrical Systems."

1. Fire alarm circuits and equipment control wiring associated with the fire alarm system shall be installed in a dedicated raceway system. This system shall not be used for any other wire or cable. Provide 12” service loops in all surge and terminal boxes. Provide 6” service loops in all pathway pull boxes.

C. Wiring within Enclosures: Separate power-limited and non-power-limited conductors as recommended by manufacturer. Install conductors parallel with or at right angles to sides and back of the enclosure. Bundle, lace, and train conductors to terminal points with no excess. Connect conductors that are terminated, spliced, or interrupted in any enclosure associated with the fire alarm system to terminal blocks. Mark each terminal according to the system's wiring diagrams. Make all connections with approved crimp-on terminal spade lugs, pressure-type terminal blocks, or plug connectors.

D. Cable Taps: Use numbered terminal strips in terminal boxes, cabinets, or equipment enclosures where circuit connections are made. Wire nuts may be utilized in junction and device boxes.

E. Color-Coding: Color-code fire alarm conductors differently from the normal building power wiring. Use one color-code for alarm circuit wiring and a different color-code for supervisory circuits. Color-code audible alarm-indicating circuits differently from alarm-initiating circuits. Use different colors for visible alarm-indicating devices. Paint fire alarm system junction boxes and covers red.

F. Wiring to Remote Alarm Transmitting Device: Provide a 3/4" conduit with (2) #18 AWG, 2-conductor cables between the FACP and the security control panel (one for alarm and one for trouble). Install a 3/4" conduit with (2) 4-pair, Category 5e cables between the security panel and the main telephone board. Provide required DLM module at the security panel. Coordinate with DCPS Maintenance Electronics to obtain (2) telephone lines for use with reporting. Provide all required programming necessary to facilitate monitoring and reporting.

3.3 IDENTIFICATION

A. FACP: Provide phenolic sign on wall outside the room housing the fire alarm control panel.

B. Identify system equipment, enclosures, components, devices, wiring, cabling, and terminals. Refer to Division 16 Section "Identification for Electrical Systems" for specific criteria. The contractor shall be responsible for requesting clarification on any questions related to the required labeling not identified in the above referenced section.

C. Install maps in a location visible from the fire alarm annunciator panel. Mount maps on wall and frame with plexiglass.

D. Paint power-supply disconnect switch red and label "FIRE ALARM."

E. All initiation and notification devices shall be labeled by the contractor, independent of labeling (testing/tagging) performed by DCPS Maintenance. Labels on pull stations shall be placed on the side of the device and shall be visible with the Stopper II cover installed. Labels for heat and smoke detectors shall be placed on the base (not the head) and shall be easily visible from the ground.

F. Until the new system is accepted and online, provide temporary labels identifying "Not For Use" for all new manual pull stations. Upon acceptance of the new system, move the labels to the old pull stations until they can be removed. Clean the new pull stations to remove any residue.

3.4 GROUNDING

A. Ground the FACP and associated circuits; comply with IEEE 1100. For each separate building install a ground wire from the main electrical service ground to the new fire alarm system grounding system.

1. Permanent building grounding: Provide Nema-3R exterior surge boxes, sized to accommodate required modules and surge suppressors. Provide a ground bus bar or terminal strip within the exterior enclosure. Provide a ¾" diameter by 20 foot copper clad ground rod with test well. Provide a #4 AWG ground conductor between the bus bar/terminal strip and the ground rod. Provide an exothermic connection. Each surge suppressor shall be individually bonded to the terminal strip within the enclosure with a #12 AWG conductor. Provide a ground terminal strip within the associated interior terminal box. Provide a #4 AWG bonding conductor between the exterior surge box and the interior terminal box. Bond all interior terminal boxes together with #4 AWG conductors. Provide a #4 AWG bonding conductor from the main terminal box to the main electrical service ground.
2. Temporary building grounding: All modules and surge suppression for portables, flammable storage buildings, sheds, and similar structures shall be located at the nearest permanent building from which the service. See notes above regarding exterior surge boxes. The surge suppression shall be wired to protect the modules (electronics). When free-standing racks are provided for modules, surge suppression shall be provided on both the incoming and outgoing cables.

3.5 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust field-assembled components and equipment installation, including connections, and to assist in field testing. Report results in writing.

B. Perform the following field tests and inspections and prepare test reports:

1. Before requesting final approval of the installation, submit a written statement using the form for Record of Completion shown in NFPA 72.
2. Perform each electrical test and visual and mechanical inspection listed in NFPA 72. Certify compliance with test parameters. All tests shall be conducted under the direct supervision of a NICET technician certified under the Fire Alarm Systems program at Level III.

    a. Include the existing system in tests and inspections.

3. Visual Inspection: Conduct a visual inspection before any testing. Use as-built drawings and system documentation for the inspection. Identify improperly located, damaged, or nonfunctional equipment, and correct before beginning tests.
4. Testing: Follow procedure and record results complying with requirements in NFPA 72.

a. Detectors that are outside their marked sensitivity range shall be replaced.

5. Test and Inspection Records: Prepare according to NFPA 72, including demonstration of sequences of operation by using the matrix-style form in Appendix A in NFPA 70.

3.6 ADJUSTING

A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project outside normal occupancy hours for this purpose.

B. Follow-Up Tests and Inspections: After date of Substantial Completion, test the fire alarm system complying with testing and visual inspection requirements in NFPA 72. Perform tests and inspections listed for three monthly, and one quarterly, periods.

C. Semiannual Test and Inspection: Six months after date of Substantial Completion, test the fire alarm system complying with the testing and visual inspection requirements in NFPA 72. Perform tests and inspections listed for monthly, quarterly, and semiannual periods. Use forms developed for initial tests and inspections.

D. Annual Test and Inspection: One year after date of Substantial Completion, test the fire alarm system complying with the testing and visual inspection requirements in NFPA 72. Perform tests and inspections listed for monthly, quarterly, semiannual, and annual periods. Use forms developed for initial tests and inspections.

3.7 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain the fire alarm system, appliances, and devices. Refer to Division 01 Section "Demonstration and Training."

END OF SECTION

SECTION 16725

INTRUSION DETECTION SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The General Provisions of the Contract, including the General Conditions, Supplementary Conditions and Special Conditions (if any), along with the General Requirements, apply to the work specified in this Section.

1.2 DESCRIPTION

A. Work covered under this section consists of furnishing and installing a complete commercial UL listed, electronically supervised, battery backed-up, intrusion detection and control system as indicated on the drawings and specified herein. System shall include a central control panel, power supplies, remote modules, control keypads, motion detectors, magnetic contacts, and interconnecting wiring. Installation Company shall assume all responsibility for existing security system functionality and will maintain said equipment as operational or protect the premises by other means such as providing a security service to monitor the site and property.

1.3 QUALITY ASSURANCE

A. Reference Standards: Materials and workmanship shall conform to the Standards of the National Electrical Code, 2002 Edition, the latest edition of the Florida Building Code, Americans with Disabilities Act (Public Law 101-336), and any applicable state and local codes. All equipment shall be U.L. listed.

1.4 SUBSTITUTIONS

A. Requirements: To maintain compatibility with existing DCPS central monitoring equipment, no substitutions will be accepted.

1.5 GUARANTEE

A. Requirements: See Section 16050 "Electrical Basic Materials and Methods."

1.6 APPROVED MANUFACTURERS

A. All equipment shall be new, UL listed and of current production of a national firm regularly engaged in such manufacturing. Where products or materials are listed herein by manufacturer and model number, this information is provided to further establish the quality level and specific characteristics of the required product. Essentially, all products specified herein are manufactured by “Honeywell.”

1.7 SUBMITTALS

A. Prior to purchasing equipment, the Contractor shall submit information on the system and all associated equipment sufficient to assure full compliance with the contract requirements for approval. The submittal information shall include manufacturer's catalog information, drawings, diagrams, and any other information necessary to establish contract compliance. Submit the following:

1. Control panel
2. Control keypads
3. Remote point modules
4. Loop isolation modules
5. Cables
6. Transient protection devices

B. Data, which describe more than one type of item, shall be clearly marked to indicate which type the Contractor intends to provide. Submit one original for each item and clear, legible, first-generation photocopies for the remainder of the specified copies. Incomplete or illegible photocopies will not be accepted. Partial submittals will not be accepted.

C. Shop Drawings: Provide drawings that clearly and completely indicate the function of the control panel and devices connected thereto. Complete sequence of operation of all functions. Indicate termination points of devices and indicate the interconnection of modules required for proper operation of the system. Indicate interconnection between modules and devices connected thereto. Drawings shall indicate all wiring labels, physical location of all devices, (including end of line devices) and all externally operated equipment. Show wire color coding, and wire counts. Provide a zone location map comprised of plan views showing the mounting location and address for each alarm-initiating device. Drawings shall be the same size as the full size contract documents. In addition to paper copies, submit one set of electronic drawings on CD in AutoCAD Release 2006 format and PDF format. Also provide points list in electronic (Excel) format.

D. Qualifications of Installer: Submit data showing that the Contractor has successfully installed intrusion detection systems of the same type and design as specified herein. The data shall include the names and locations of at least two installations where the Contractor, has installed such systems. The Contractor shall indicate the type and design of each system and certify that each system has performed satisfactorily in the manner intended for a period of not less than 18 months. The intrusion detection system contractor shall have a factory trained service department on call 24 hours per day, 365 days per year that is located within a 75 mile radius of the project location.

E. Operation and Maintenance Manuals: Provide two copies of an abbreviated operation and maintenance manual with spare parts lists neatly bound and indexed in a three-ring binder. Manual shall include basic data regarding maintenance, operation and troubleshooting of all provided equipment.

F. Calculations: Provide resistance and/or cable length calculations to substantiate that all installed cables will be within the parameters recommended by the equipment manufacturer.

PART 2 - PRODUCTS

2.1 EQUIPMENT AND COMPONENTS

A. Equipment and components shall conform to applicable requirements of NFPA 70. Units of the same type of the equipment shall be the product of single manufacturer. All preexisting security system equipment not used in the installation shall be removed by the Security Contractor and returned to the DCPS Security Department.

2.2 CONTROL PANEL

A. The existing Honeywell Vista security control panel shall remain and be reused. Upgrade the existing control panel as necessary to accommodate the new design and quantity of devices. No more than four wires may be terminated per terminal. The control panel cabinet shall be a factory assembly incorporating DC power supplies, batteries, battery charger, circuit boards, and relays. The Control Panel shall be an 8-partition unit, capable of supporting hardwire, hardwire expansion, and wireless zones. Peripheral devices supported by the Control Panel shall include dialers (telephone lines), keypads, RF receivers, and relays. The control panel shall meet the following performance requirements:

1. Basic Hardwire Zones - A total of 8 style-B hardwire zones shall be capable of supporting the following:

a) EOLR supervision supporting normally open (N.O.) or normally closed (N.C.) sensors.

b) Individually assignable to one of 8 partitions.

c) Individually assignable to bell outputs and/or auxiliary relay.

d) For this application, use two of these zones for monitoring the fire alarm control panel for common trouble and common alarm.

2. Polling Loop Expansion Zones - The Control Panel shall also be capable of supporting up to 120 additional hardwire zones using a built-in, 2-wire, polling (multiplex) loop interface. The polling loop shall provide power and data to remote point modules, and constantly monitor the status of all zones on the loop. Maximum

current draw shall not exceed 128 mA. The polling loop zones shall be capable of:

a) Using Remote Point Module (RPM) devices.

b) Supervision by the Control Panel.

c) Individually assignable to one of the partitions.

d) Individually assignable to bell outputs and/or auxiliary relay.

e) 4,000-foot capability without shielded cable.

3. Wireless Expansion Zones - The Control Panel shall also be capable of supporting up to 128 wireless zones via a radio frequency (RF) receiver. The system wireless capabilities may be used in the future, but will not be utilized for this application. The Wireless zones shall be capable of:

a) Supervision by the Control Panel for check-in signals.

b) Individually assignable to one of the partitions.

c) Individually assignable to bell outputs and/or auxiliary relay.

d) Tamper protection shall be optional.

4. Partitions – The independent partitions shall provide the following features:

a) Master Partition shall be provided for assigning keypads capable of simultaneously viewing the system status of all 8 partitions.

b) All 8 partitions shall be capable of having keypads assigned.

c) All zones, except fire, shall be assignable to one of 8 partitions.

d) All 8 partitions shall be capable of supporting relays.

e) The ability to display fire and/or burglary and panic and/or trouble conditions at all other partition keypads shall be optional.

f) The ability to support selectable options including entry/exit delay and subscriber account information.

5. User Codes - The Control Panel shall accommodate 150 user codes with 7 authority levels. The following characteristics shall be assigned to each user code.

a) Authority level.

b) Partitions operated by the user code.

c) Global arming capability.

d) Use of RF button to arm and disarm the system.

e) Optional opening/closing central station reporting.

6. Peripheral Devices - The Control Panel shall support up to 31 addressable devices. The devices shall include any combination of keypads, RF receivers, relay modules, and VIP modules. Peripheral devices shall have the following characteristics: Each device shall be:

   a) Physically set to an individual address.

   b) Enabled using the Device Programming Mode.

   c) Remote Keypads: The Control Panel shall be compatible with remote keypads and allow the user to:

   d) Arm and disarm the system or one partition in a multiple partition system.

   e) Bypass zones.

   f) View messages from the central station.

   g) Display zone descriptors (alarm, trouble, bypass, etc) in the display window.

7. Ancillary Control - The Control Panel shall be capable of being programmed to activate up to 32 control relays, which open doors, turn off lights, etc.

8. Telephone Dialers - The Control Panel shall be equipped with a built-in supervised telephone dialer for communications with the central station. It shall also have a supervised back-up dialer for connecting to a second telephone line.

9. Trigger Output Connector - The Control Panel shall contain an internal connector equipped for a single input and seven outputs. The outputs shall interface with:

   a) Remote keypad sounder.

   b) UL listed key switch.

   c) LED indicator module.

   d) Auxiliary alarm signaling equipment.

   e) Event logging serial printer.

   f) Computer used to direct mire downloading via a serial module.

10. Key switch - All partitions within the Control Panel shall be capable of supporting a key switch.

11. Pager Interface - The Control Panel shall be capable of sending event information to an alphanumeric pager via a pager interface device.

12. Voltage Triggers - The Control Panel shall provide a trigger outputs. The trigger connector pins change state for different conditions in order to interface with equipment such as long range radio equipment (LRR), remote keypad sounders, key switch ARMED and READY LEDs, or a system event log printer.

13. Event Log - The Control Panel shall contain a programmable event log capable of the following:

    a) Storing up to 224 events.

    b) Viewable at the keypad.

    c) Printed on a serial printer.

    d) Storing access control system events.

    e) Sending printed events to an alphanumeric pager.

14. Scheduling - The Control Panel shall provide the following automated scheduling capabilities:

    a) Open/Close schedules used to control arming/disarming and reporting.

    b) Holiday schedules, which allow different, time windows for open/close schedules.

    c) Timed events, which activate relays, auto-bypassing, un-bypassing, auto- arming, and disarming.

    d) Access schedules, which limit system access to users, by name.

    e) End User Output Programming Mode shall provide 20 timers for relay control.

15. Communications Formats - The Control Panel Digital Communicator shall support the following formats for the primary and secondary central station receivers:

    a) Honeywell Low Speed (Standard or expanded)

    b) Sescoa/Radionics

    c) Honeywell Express

    d) Honeywell High Speed

    e) Honeywell Contact ID

16. Exit Error False Alarm Prevention - The Control Panel shall be capable of differentiating between an actual alarm and a false one caused by leaving an entry/exit door open. The Control Panel shall be capable of:

    a) Being arming while the faulted entry/exit zone(s) and/or interior zones are bypassed.

b) Generating an Exit Error report by user and zone.

17. Downloading Features - The Control Panel shall be capable of uploading and downloading at 300 baud. It shall also be capable of uploading ECP devices, their physical addresses, programmed addresses, and firmware revision levels.

18. Enhanced Fire Walk-Test Mode - The Control Panel shall provide the installer with the following features:

a) Automatic test of all integrated remote point module (RPM) devices, equipped with an automatic test feature.

b) While automatic test is in progress all fire zones that remain untested shall be displayed.

c) An event log shall be capable of logging the results of tested and untested zones.

d) The ability to report the result of tested and untested zones to the central station.

19. Built-in User's Manual and Descriptor Review - A built-in User's Manual shall be provided for End User convenience. The following shall be provided:

a) A brief explanation of keypad functions shall be provided at the keypad alphanumeric display.

20. Access Control

a) In addition, the Control Panel shall be capable of being connected to a Vista-Key V-Plex integrated access control system.

21. Enclosure - The Control Panel shall be enclosed in a metal cabinet, suitable for wall mounting.

22. System Power - The Fire and Burglary Alarm System shall operate using standard 120 volts AC, 50/60 Hz power. Obtain primary power from a circuit breaker as indicated. Provide a circuit breaker guard to prevent accidental tripping of the circuit breaker.

a) Control Primary Power – Open frame transformer providing 18 VAC, 72 VA in enclosure, connected to a dedicated circuit. Honeywell No. 1451

b) Backup Battery - A rechargeable 12 VDC, gel type, lead acid backup battery shall be provided. The battery shall be rated 7-ampere hours (AH).

c) Alarm Power - Alarm power shall be 12 VDC, 1.7 amps for each bell output.

d) Auxiliary Standby Power - Standby power shall be 12 VDC, I amp maximum.

e) Total Power - Combined auxiliary standby and alarm currents shall be 2.3 amps.

f) Fusing - The battery input, auxiliary, and bell outputs shall be protected using PTC circuit breakers. All outputs shall be power limited.

g) Use of control panel power to external devices shall be limited to remote keypads only. All other external devices requiring power shall be connected to the auxiliary power supply as further specified herein.

23. Environmental Conditions - The Alarm System shall be designed to meet the following environmental Conditions

a) Storage Temperature - The system shall be designed for a storage temperature of 10°C to 70°C.

24. Operating Temperature - The system shall be designed for an operating temperature of 0°C to 50°C (32°F to 120°F).

25. Humidity - The system shall be designed for normal operation in an 85% relative humidity environment.

26. Electromagnetic Interference – The system shall meet or exceed the requirements of FCC Part 15, Class B devices, FCC Part 68, IEC EMC directive.

2.3 CONTROL KEYPADS

A. Provide Honeywell Model #6160 control keypads located as indicated. Keypad located beside main security panel shall be Model #6160CR-2. Each control keypad shall comply with the following:

1. Keypads shall be surface mounted and capable of fully programming and operating the system. Each keypad shall be assignable to operate the entire system or an individual partition.

2. LCD keypads shall be complete with large two-line 32-character liquid crystal display (LCD) to provide plain language programming instructions, operating instructions and display of all alarms and supervisory conditions.

3. Keypad keys and displays shall be backlit.

4. Keypads shall have rotating key press buffer to reduce access code entry false alarms. Keypads shall be programmable to lock out if a series of incorrect access code entries are made.

5. Keypads shall have keypad activated emergency alarms for panic, auxiliary, and duress; and shall be equipped with a Piezo Buzzer to provide audible feedback for correct key entries, pre-alert, and trouble.

6. Keypads shall be mounted at a height no lower than sixty inches (60”), and where necessary shall be enclosed in a vandal-proof enclosure keyed to the DCPS Security Department’s existing key set.

2.4 REMOTE POINT MODULES

A. Provide Honeywell Model #4208SN universal eight zone remote point modules (RPM) and Honeywell Model #4190SN universal two zone remote point modules (RPM) as indicated. The characteristics of each remote point module shall be as follows:

1. Each RPM shall obtain 12-volt DC operating power from the auxiliary power supply Altronix No. SMP5PM-CTX.

2. RPM’s shall be used for monitoring conventional supervised zones and reporting zone status to the main control panel via the control panel data line-reporting loop.

3. Provide end-of-line resistors in each reporting zone in accordance with the manufacturer’s recommendations.

4. Adjust dipswitch settings for serial number zone identification mode and slow response as directed by the Owner.

5. 4208SN RPM modules are to be installed on ¾” thick plywood (painted light gray with fire retardant paint) in metal cabinets (Hoffman #A30N248LP) accessible for servicing. Zone assignments are to be labeled permanently on 4208SN covers.

2.5 LOOP ISOLATION MODULES

A. Provide Honeywell Model 4297 loop isolation modules to isolate open and short circuit faults on the system data line-polling loop.

1. Each isolation module shall obtain 12 volt DC operating power from the auxiliary power supply.

2. All isolation modules shall be properly connected and grounded.

3. The loop isolation module shall serve to isolate the extension-polling loop from the input-polling loop. Do not remove or disconnect the jumper that would inhibit or prevent this function.

4. Locate all #4297 modules at the main security panel location.

2.6 AUXILIARY POWER SUPPLY

A. An auxiliary power supply shall be used for providing regulated 12 volt DC operating power for all security system devices external to the control panel with the exception of keypad controls.

1. The combination supervised power supply/charger shall be Altronix No. SMP5PM-CTX.

2. The power supply will be furnished complete with a 120 volt input transformer, combination power supply/charger printed circuit board, and rechargeable battery housed in a surface mounted metallic enclosure.

3. The power supply shall have backup battery supervision monitored by the security control panel.

4. The power supply shall be configured for a 12 volt DC, 4.0 amp continuous power limited output.

5. Equip power supply with a 12 volt, 7-ampere hour backup battery identical to the battery provided in the control panel.

6. Obtain primary 120-volt AC operating power for the auxiliary power supply from the same power circuit that serves the control panel. Circuit connection shall be made on the load side of the provided line voltage surge arrester.

2.7 TRANSIENT PROTECTION DEVICES

A. Provide line voltage and low voltage surge suppression devices to suppress all voltage transients, which might damage the control panel components. Mount suppressors as indicated.

1. Line Voltage Surge Suppressor: Suppressor shall be UL 1449 listed with a maximum 330-volt clamping level and a maximum response time of 5 nanoseconds. Suppressor shall also meet IEEE C62.41 category B tests for surge capacity. Suppressor shall be a multi-stage construction, which includes inductors and silicon avalanche zener diodes. Suppressor shall have a long-life indicating lamp (light emitting diode or neon lamp), which extinguishes upon failure of protection components. Fuses shall be externally accessible. Wire in series with the incoming power source to the protected equipment using screw terminations. Suppressor shall be EDCO Model FAS-120AC.

2.8 CABLES

A. All cables shall utilize standard copper conductors with minimum 300 volt rated insulation. The outer jacket of each cable shall be labeled to denote the manufacturer's name, catalog number, cable size, and UL classification. Approved cable manufacturers are specified below. All cables shall be as indicated on the drawings. Cables installed underground shall be rated appropriately.

1. Approved Cables:

a) Belden #8444 – 4 conductor, #22 AWG, non-shielded (use for door contacts and motion sensors). For underground installations utilize Belden #5541P1.

b) Belden #9156 – 2-pair, #18 AWG, non-shielded (use for data runs up to 500 feet)

c) Belden #8620 – 4-conductor, #16 AWG, non-shielded (use for data runs up to 750 feet). For underground installations utilize Belden #5202U1.

d) Belden #8489 – 4 conductor, #18 AWG, non-shielded (use for keypad, run not to exceed 500 feet)

e) Belden #8620 – 4 conductor, #16 AWG, non-shielded (use for keypad, run not to exceed 750 feet). For underground installations utilize Belden #5202U1.

f) Genesis – 12 conductor, #22 AWG (for future annunciators)

2. Cable connections shall be made with both "B" type sealant filled connectors and nylon type terminal strips Newark Electronics # 31F2436 and # 31F2440.

PART 3 - INSTALLATION

3.1 INSTALLATION

A. Provide and install the system in accordance with the plans and specifications, all applicable codes and the manufacturer's recommendations. All wiring shall be installed in strict compliance with all the provisions of NEC.

B. The contractor shall clean all dirt and debris from the inside and the outside of equipment after completion of the installation.

C. End of Line Devices: Shall be furnished as required for mounting as directed by the manufacturer.

D. All conduits shall be installed in accordance with Specification 16050.

E. Pull all conductors splice free. Make all conductor connections under screw terminals. Provide insulated barrier type nylon terminal strips at junction points and as indicated to insure a neat and orderly termination of all cabling. Use of wire nuts, crimped connectors, or twisting of conductors is prohibited. Control panel and peripheral equipment shall be dressed out in a professional manner with all wires running in the vertical or horizontal plane, cut to exact length, making all turns at 90 degree angles, and tightly bundled and wire wrapped.

3.2 GENERAL INSTALLATION REQUIREMENTS

A. Wire and Cable.

1. The contractor will pull a 22 gauge, 12-conductor wire for future use by the DCPS Security Department (annunciation) in addition to a 16 gauge, 4-conductor wire for the office touch pad location from each control panel.

2. The contractor will install all wire and equipment in accordance with current NEC Electrical Code for Low Voltage Systems.

3. The contractor will pull a 4 conductor fire wire from the new security panel to the existing fire alarm control panel.

4. All wire used in installation of the new system shall be Belden wire (except for future annunciator wire).

5. No existing wiring is to be used. No joints or splices are allowed. All wiring shall be home run to the perspective termination point.

6. No more than 3 wires 18 gauge/4 wires 22 gauge or larger may be inserted under a terminal strip, and no more than 4 wires 18 gauge may be inserted under a terminal screw on the Vista Control Panel or Vista Peripheral Devices.

7. All wiring terminal strip connectors shall be Newark part # 31f2436, 12-position, Warland, Inc., 21.341.6253.0, 160MM), and #31F2440, 12-position, 80MM) or equivalent.

8. Use of tie-wraps (tie-straps) is not permitted. Utilize Velcro for all cable strapping.

9. All terminated wiring must be installed in a neat and professional manner utilizing wire management procedures.

B. Equipment, Devices, and Modules

1. The installed devices shall be normally closed (N/C) devices; any normally open (N/O) devices will be replaced with normally closed (N/C) devices.

2. The security system data point devices (Honeywell part #4190SN and 4208SN modules) are to be labeled, installed in groups, and

housed in cabinets to be accessible for servicing. The modules are to be installed on wooden backboards inside the cabinets. The 4208SN (8 point modules) shall be used as the primary devices. Resistors shall be terminated on the modules with unused zones terminated with resistors. Recommended location is indicated on map, other locations may be considered for acceptance.

3. The contractor will provide security device locator maps and "as-built" diagrams on CD in a compatible graphic file format and a printed form. The contractor will provide points list in an electronic (Excel) format and a printed form. Copies of updated maps and points lists must be located on-site and in the Security Office's Central Station before monitoring of new equipment can proceed.

   a) Maps shall be wall mounted behind plexi-glass in front office

   b) Provide wall mount holder for all other map books

   c) Kitchen map shall indicate kitchen partition

4. All devices, both new and existing, will independently report signals to the Central Station receiver. Provide a 3/4" conduit with (2) #18 AWG, 2-conductor cables between the FACP and the security control panel (one for alarm and one for trouble). Install a 3/4" conduit with (2) 4-pair, Category 5e cables between the security panel and the main telephone board. Provide required DLM module at the security panel. Coordinate with DCPS Maintenance Electronics to obtain (2) telephone lines for use with reporting. Provide all required programming necessary to facilitate monitoring and reporting.

5. Honeywell part number 4297 polling loop extenders are to be installed on all data loops, supplied power from the power supply units, and installed at the Vista control panel location.

6. All 4190SN and 4208SN modules, power supplies, terminal strips, etc. are to be installed with hardware fasteners. Double-sided tape used to secure these devices will not be acceptable.

7. All devices being utilized by the new security system shall be identified on each individual device. Old device numbers are to be removed at time of re-identification (i.e. Door Contacts, Motion Detectors, and Polling Devices).

8. All devices, panels, modules, or any equipment related to the old security system which is not being utilized by the new system shall be removed and returned to the DCPS Security Department location at 2100 Powers Avenue. Old wiring shall be removed and disposed of properly.

9. All motion detectors must be completely sealed against outside contaminants (bugs) using Clear RTV ® Silicone. (Specifically Wire Entry Area) Classroom and office motion detectors shall have the microwave sensitivity set to half range.

10. The DCPS District shall provide a dedicated voice grade telephone line for the system onsite at the d-marc location. The contractor shall make connection to this circuit, install a standard RJ-31x jack next to the Vista control panel, and identify the telephone circuit on the jack.

11. All zones to be numbered as shown on map. Map provided is exactly what completed install should reflect. Maps are to be located at each keypad location.

12. Keypads to be located as shown on map, installed at 60" AFF.

13. All module boxes to be mounted below drop ceiling.

14. All door contacts and motion detectors are to be installed using #6 ¾" screws with #2 Robinson drive screw head. No "self tapping" screws are to be used.

15. All classroom motion detectors shall be Intellisense DT-7450.

16. Hallway motion detectors shall have the optional narrow lens installed if using the DT-7450.

17. The principal shall determine installation of intercom master and sub master stations exact location in office.

C. Power and Surge Protection

1. Power supplies (Altronix SMP5PM-CTX) are to be supervised for both A/C loss and battery trouble. The power supplies shall be wired directly into a 120vac circuit. The contractor is responsible for performing this work and making necessary coordination with DCPS Central Station.

2. Surge protection for A/C (Edco FAS-120AC) and telephone line (Edco PC2-TEL) is to be installed.

3. The contractor may not power the expansion modules from the Vista keypad buss. The Auxiliary Power Supply must power the expansion modules.

4. Power supply current draw measurements shall be taken, dated, and labeled on the inside of the power supply cabinet.

D. Portables

1. Installations in portables must comply with these specifications. All work must be installed in accordance with the standard DCPS security details and riser diagrams.

3.3 QUALITY ASSURANCE

A. The electrical contractor shall install all conduit, enclosures, back boxes, and wiring required for the installation of the Intrusion Detection System. However, all security devices, control panels, etc. shall be installed and tested by a trained representative of the security equipment contractor.

3.4 IDENTIFICATION

A. Conductors: All wiring shall be color coded throughout as directed by the Owner, maintaining a uniform code throughout the entire system. All conductors shall be labeled at the Main Control Panel, intermediate junction boxes, and terminal cabinets. Labels shall be self-stick adhesive backed vinyl cloth wire markers.

B. Devices: All security initiating devices shall be neatly labeled to indicate the respective zone. The locations of all end-of-line devices shall be clearly indicated.

3.5 GROUNDING

A. Main Control Panel and transient protection devices shall be grounded in accordance with the manufacturer's recommendations.

3.6 TESTING

A. Upon completion of the installation, the contractor shall submit complete device descriptions and zone location information (including zone serial numbers) to the DCPS Central Monitoring Station. Once this information has been received and reviewed and upon a minimum 48-hour notice from the contractor that the installed system is ready to be programmed, the DCPS Central Monitoring Station will program the system. The contractor must be onsite during programming to assist with the uploading of the programming information.

B. Once programming is completed, the contractor shall test each individual device for proper operation. Upon completion of this preliminary testing, the contractor shall arrange for sending test signals to the DCPS Central Monitoring Station as directed by the Owner. Transmission of these test signals shall be accomplished in the presence of a DCPS security department representative. The contractor shall correct defects and conduct additional tests as directed by the security department representative as necessary to demonstrate that the system conforms to the contract specifications.

C. Upon successful testing of all devices to both the main security panel and the DCPS Central Monitoring Station, an appointment will be scheduled with the DCPS security personnel to perform a walk through test and inspection with both parties present. The contractor shall provide DCPS security personnel with electronic drawings of security maps and electronic spreadsheet of points list at a minimum of 2 weeks prior to this inspection. Electronic drawings of maps shall be provided on CD in AutoCAD Release

2006 format and PDF format. Drawings shall indicate device locations and zoning information and be sized to fit 8.5" x 11" pages. When more than 1 map is required, an overall key plan shall be included on each map. Points list shall be provided in Excel format.

D. Additional testing shall include testing of volts DC between the negative (keypad) and the ground at the panel. Reading must be less than 1.05 VDC and greater than 0.972 VDC. Test results must be recorded and sent to DCPS security personnel for their records.

E. For systems with multiple control panels, all testing shall be performed separately for each control panel. During the testing of one panel, all other panels shall be completely shut down and powered off.

3.7 TRAINING

A. Upon completion of the work and at a time designated by the Owner, personnel at the school shall receive a complete training session of a minimum of 2 hours. The training shall include an explanation and review of the theory of operation, the function, description, arming, and disarming procedures as a minimum. The instructional personnel providing requirements above shall be fully trained to provide instruction services. The training shall take place at the site. Obtain a signed roster of all personnel that attend the training sessions and submit the roster to the DCPS security department.

3.8 WARRANTY

A. The contractor's warranty shall provide for inspection of all trouble issues within 12 months of system acceptance. When contacted by DCPS, the contractor shall visit the site and determine cause of trouble at no cost to Owner. The contractor shall correct any problems related to product failure or system installation. If the trouble was the result of an event beyond the control of the contractor (vandalism, act of nature, etc.), the contractor shall notify DCPS of cause of trouble.

END OF SECTION