



Building 700 Renovation- Phase 1
UF Project #MP02649

Technical Specifications

AUTHORIZED REPRESENTATIVES AND CONTACT INFO:

OWNER

UF Planning, Design & Construction
Joe Garcia
232 Stadium, P. O. Box 115050, Gainesville, FL 32608
(352) 273-4593
jagarcia@ufl.edu

ARCHITECT

Studio MJG, llc
Michael Gilfilen
5211 SW 91st Terrace, Suite F, Gainesville, FL 32608
(352) 226-3213
michael@studiomjg.com

MEP ENGINEER

Campbell Spellicy Engineering, Inc.
Kevin Spellicy
3720 NW 43rd Street, Suite 106, Gainesville, FL 32606
(352) 372-6987
spellicy@campbellspellicy.com

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THE FOLLOWING FORM CAN BE FOUND ON PHYSICAL PLANT DIVISION
OPERATIONS ENGINEERING WEBSITE AT: www.ppd.ufl.edu/operations-dig.html

DIG PERMIT

THE FOLLOWING FORMS OR DOCUMENTS CAN BE FOUND ON THE
ENVIRONMENTAL HEALTH & SAFETY WEBSITE AT:
www.ehs.ufl.edu/buildingcode

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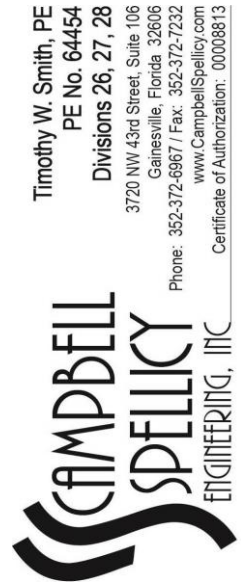
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GENERAL TERMS and CONDITIONS

(Construction Management At-Risk and Design-Bid-Build Projects)

Revised April 2014

Business Affairs
Planning Design & Construction
www.facilities.ufl.edu

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ARTICLE 1 – DEFINITIONS

When one of the following capitalized words, terms or phrases is used in the Contract for Construction, it shall be interpreted or construed first as defined below, second according to its generally accepted meaning in the construction industry, and third according to its common and customary usage.

Building Information Modeling (BIM): A process involving the generation and management of digital representations of physical and functional characteristics of a facility through the use of three-dimensional, intelligent design information. The resulting building information models become shared knowledge resources to support decision-making about a facility from the earliest conceptual stages, through design, construction, and the facility's operational life.

Builder: An entity, including but not limited to a general contractor, a trade contractor or a construction manager, engaged directly by the Owner pursuant to a contract for construction.

Construction Documents: Plans, specifications, change orders, revisions, addenda, and other information which set forth in detail the Work.

Construction Price: The dollar amount for which a Builder agrees to perform the Work set forth in a Contract For Construction.

Construction Schedule: The timetable which sets forth pertinent dates for timely completion of the Work.

Contract For Construction: The entire agreement between Owner and Construction Manager (CM) or General Contractor (GC), consisting of the Owner-CM or Owner-GC Agreement and all exhibits hereto; these General Terms and Conditions; special conditions, if any; proposal(s) submitted by Construction Manager and accepted by Owner, if any; the Construction Documents; any amendments or addenda executed by the Owner and the Construction Manager hereafter; and Owner-approved change order(s) or field orders. Documents not included or expressly contemplated in this definition do not, and shall not, form any part of the Contract for Construction. Without limiting the generality of the foregoing, shop drawings and other submittals from the CM/GC or its subcontractors and suppliers do not constitute a part of the Contract for Construction.

Contract For Professional Services: A written agreement between the Owner and the Professional for provision of services and related items required to design or engineer all or part of a Project.

Certificate Of Substantial Completion: Document declaring the Work substantially complete and suitable for occupancy or beneficial use by the Owner.

Final Completion: The stage of construction when the Work has been completed in accordance with the Contract For Construction and the Owner has received all documents and items necessary for closeout of the Work. See Article 12.

Hazardous Substances: The term "Hazardous Substances" means all hazardous or toxic substances, materials, wastes, pollutants and contaminants which are listed, defined, or regulated under applicable laws, rules, regulations, codes, ordinances, orders and directives pertaining or regulated to health, safety or the environment, including, but not limited to, the

Comprehensive Environmental Response Compensation and Liability Act as amended, (42 U.S.C. § 9601 et seq), the Resource Conservation and Recovery Act as amended, (42 U.S.C. § 6901 et seq), the Federal Water Pollution Control Act (33 U.S.C.A. §§ 1251 to 1387), the Clean Air Act (42 U.S.C.A. §§ 7401 to 7671q), the Emergency Planning and Community Right to Know Act (42 U.S.C.A. §§ 11001 to 11050), the Toxic Substances Control Act (15 U.S.C.A. §§ 2601 to 2692), the Solid Waste Disposal Act (42 U.S.C.A. §§ 6901 to 6992k), the Oil Pollution Act (33 U.S.C.A. §§ 2701 to 2761) and all rules and regulations promulgated pursuant thereto. Without limiting the generality of the foregoing, “Hazardous Substances” shall specifically include polychlorinated biphenyl, asbestos (friable and non-friable), radon, urea formaldehyde, gasoline, diesel, oil, hydrocarbons, petroleum derived constituents, biomedical waste, or hazardous or toxic residue.

Owner’s Related Parties: The Board of Governors and its officers, trustees and employees and the officers, trustees and employees of Owner.

Professional: An entity, including but not limited to a licensed architect or engineer, engaged directly by the Owner to provide design or engineering services.

Project Design Schedule: The timetable which sets forth the required relationships between, and pertinent dates for, required completion of design and engineering services, documents and related activities.

Site: The geographical location of a Project, usually defined by legal boundary lines, and the location characteristics including, but not limited to, grades and lines of streets, alleys, pavements and adjoining structures, rights-of-way, restrictions, easements, encroachments, zoning, deed restrictions, existing buildings and improvements, and service and utility lines.

Substantial Completion: The stage of construction when the Owner can occupy or beneficially use satisfactorily completed Work for its intended purpose and a certificate of occupancy has been issued. See Article 12.

Work: Any and all computers, construction machinery, documents, equipment, facilities, fixtures, furnishings, goods, heat, items, labor, licenses, management, materials, permits, products, services, supervision, supplies, systems, taxes, testing, tools, utilities, transportation, vehicles, and water, required to be performed or supplied and/or necessary for proper execution and completion of the Project, or some portion thereof, whether or not incorporated or to be incorporated into the Project; provided, however, that Work does not include performance of pre-construction services by a construction manager.

ARTICLE 2 – CONTRACT DOCUMENTS

2.1 Quantity and Format of Documents

The Owner shall provide the Builder with one printed set of documents, one set of electronic documents (plans and specifications) in PDF format, and one set of Building Information Modeling (BIM) files.

2.2 Minimum Requirements

In every case, requirements established by the Construction Documents shall be considered as the minimum acceptable.

2.3 Owner Disclaimer Of Warranty

The Owner has requested that its Professional(s) prepare documents for the Project, including the plans and specifications for the Project, which are to be complete, accurate, coordinated, and adequate for bidding, negotiating and constructing the Work. However, the Owner makes no representation or warranty of any nature whatsoever to the Builder concerning such documents, including BIM documents. The Builder hereby acknowledges and represents that it has not relied, and does not and will not rely, upon any representations or warranties by the Owner concerning such documents, as no such representations or warranties have been or are hereby made.

2.4 Conflicts In Documents

In the event of any conflict, discrepancy, or inconsistency among any of the documents which make up the Contract For Construction, the following shall control:

2.4.1 As between figures given on plans and scaled measurements, the figures shall govern;

2.4.2 As between large-scale plans and small-scale plans, the large-scale plans shall govern;

2.4.3 As between plans and specifications, the requirements of the specifications shall govern;

2.4.4 As between plans or specifications and BIM models, the requirements of the plans or specifications shall govern.

2.4.5 As between architectural drawings and (structural, civil, mechanical, electrical, plumbing, or fire protection) engineering drawings, the engineering drawings shall govern.

2.5 Shop Drawings And Submittals

Shop drawings and other submittals from the Builder or its subcontractors and suppliers do not constitute a part of the Contract for Construction.

2.6 Contract Changes

The Builder understands and agrees that the Contract for Construction cannot be changed except as provided herein. No act, omission or course of dealing by the parties shall alter the requirement that modifications of the Contract for Construction can be accomplished only by written documents signed by the parties.

2.7 Document Security

Not Applicable

ARTICLE 3 – BUILDER’S REVIEWS AND EVALUATIONS

3.1 Sufficiency Of Construction Documents And Drawings

The Builder acknowledges its continuing duty to review and evaluate the Construction Documents during the performance of its services and shall immediately notify the Owner and the Professional(s) about any (i) problems, conflicts, defects, deficiencies, inconsistencies or omissions it discovers in or between the Construction Documents;

and (ii) variances it discovers between the Construction Documents and applicable laws, statutes, building codes, rules and regulations.

3.1.1 If the Builder performs any Work which it knows or should have known involves (i) a recognized problem, conflict, defect, deficiency, inconsistency or omission in the Construction Documents; or (ii) a variance between the Construction Documents and requirements of applicable laws, statutes, building codes, rules, regulations, or the Owner's design and construction standards without notifying the Professional(s) and prior to receiving written authorization from the Professional(s) to proceed, the Builder shall be responsible for the consequences of such performance.

3.1.2 Drawings are generally drawn to scale; however, the figured dimensions or notes thereon shall govern. Before ordering any materials or doing any Work, the Builder and subcontractors shall verify all measurements at the Site and shall be responsible for the correctness of same. Discrepancies shall be reported in writing to the Professional prior to proceeding with the Work. No extra charge or compensation will be entertained due to differences between actual measurements and dimensions indicated on drawings, if such differences do not result in a change in the scope of Work or if the Professional failed to receive written notice before the Work was performed.

3.2 Sufficiency Of Site

Prior to signing the Contract for Construction, the Builder has:

- (i) visited the Site and become familiar with local conditions under which the Project is to be constructed and operated; and
- (ii) reviewed and familiarized itself with the Site survey and any existing structures on the Site, and gathered all other information necessary for a full understanding of the Work.

In addition, if the Work involves modifications to or remodeling of an existing structure(s) or other man-made feature(s) on the Site, the Builder has also:

- (iii) reviewed all as-built and record drawings, plans and specifications of which Owner has informed Builder; and
- (iv) thoroughly inspected the structure(s) and man-made feature(s) to be modified or remodeled prior to submission of bid, if any, but in all events prior to signing the Contract for Construction.

Claims resulting from the Builder's failure to familiarize itself with the Site or pertinent documents shall be deemed waived.

ARTICLE 4 – BUILDER'S DUTIES, OBLIGATIONS AND RESPONSIBILITIES

4.1 Performance Of Work

The Builder shall perform and complete its obligations under the Contract for Construction using its best skill and attention, and covenants with the Owner to furnish

management, supervision, coordination, labor and services (i) which expeditiously, economically and properly complete the Work in the manner most consistent with the Owner's interests and objectives; (ii) which comply with the Contract for Construction; and (iii) which are in accordance with the highest standards currently practiced by persons and entities performing or providing management, supervision, coordination, labor and services on projects similar in size, complexity and cost to the Project.

- 4.1.1 The Builder shall not be required to provide professional services which constitute the practice of architecture or engineering, unless provided in the Construction Documents and relating to those divisions of the Work for which it is appropriate for Builder's subcontractors to engage or employ licensed engineers for design associated with the Work, such as trusses.
- 4.1.2. All services rendered by the Builder for the Project shall be performed by or under the immediate supervision of persons possessing expertise in the discipline of the service being rendered.
- 4.1.3 The Builder shall, in the course of providing the Work, cooperate and communicate with the Owner, the Professional, the Owner's commissioning consultants, and all other persons or entities as required for satisfactory completion of the Project.
- 4.1.4 The Builder understands and acknowledges that the Work referred to in the Contract for Construction may be only part of the Project and that the Project may include the construction of other structures or other construction activities on the same Site. The Builder shall conduct all its activities so as not to interfere with the construction of, or operations within or from, other structures on the Site.
- 4.1.5 The Builder shall not damage, endanger, compromise or destroy any part of the Project or the Site, including by way of example and not limitation, work being performed by others on the Site, monuments, stakes, benchmarks and other survey points, utility services, and existing features or structures on the Site. Should the Builder damage, compromise or destroy any part of the Project or the Site, the Builder shall be fully and exclusively responsible for and bear all costs associated therewith.

4.2 Compliance With Legal Requirements

- 4.2.1 The Builder shall comply with all applicable laws, statutes, building codes, rules, regulations and lawful orders of all governmental, public and quasi-public authorities and agencies having jurisdiction over the Project;
- 4.2.2 The Builder shall prepare and file documents required to obtain, and shall obtain, all necessary approvals and permits, including building permit(s), of all governmental authorities having jurisdiction over the Work, provided Owner shall pay all building permit and state fire marshal inspection fees directly; and
- 4.2.3 The Builder shall give all notices required of it by governmental authorities relating to the Project.

4.3 Safety

Safety shall be a prime concern of the Builder at all times. The Builder shall be solely responsible for and have control over the means, methods, techniques, sequences and procedures for coordinating and constructing the Work, including Site safety and safety precautions and programs.

4.4 On Site Records

- 4.4.1 The Builder shall maintain at the Site one copy of all drawings, specifications, addenda, approved shop drawings, daily logs, change orders, submittals, other modifications and all other documents generated throughout the course of the project in good order and accurately marked depicting all changes as they occur during construction ("as-built" drawings).
- 4.4.2 The as-built drawings shall be available at all times to the Owner, the Professional(s), the Owner's consultants, and quality control and testing agency personnel. The drawings shall be neatly and clearly marked in color during construction to record all variations made during construction, and the Builder shall include such supplementary notes and details necessary to clearly and accurately represent as-built construction. The daily logs shall contain detailed information regarding weather conditions, materials delivered, work performed, operating hours, subcontractors working on the Project and staffing of each subcontractor.
- 4.4.3 Depending on the requirements of the project-specific BIM Execution Plan, the Builder shall also maintain copies of the BIM models that reflect the as-built or as-installed conditions, geometry, and product/equipment information.

4.5 Bribes And Kick-Backs

The Builder shall not by any means:

- (i) induce any person or entity employed in the construction of the Project to give up any part of the compensation to which that person or entity is entitled;
- (ii) offer nor accept any bribes or kick-backs in connection with the Project from or to any individual or entity, including any of its trade contractors, subcontractors, consultants, suppliers or manufacturers of Project goods and materials; or
- (iii) without the express written permission of the Owner in accordance with Owner's policies, call for or by exclusion require or recommend the use of any subcontractor, consultant, product, material, equipment, system, process or procedure in which the Builder has a direct or indirect proprietary or other pecuniary interest.

4.6 Quality Control And Testing

The Builder shall develop and implement a quality management program to ensure quality construction. Unless otherwise specified in the Contract for Construction, the Builder shall procure the quality control and testing agencies, subject to Owner's written approval. The Builder shall coordinate all tests and inspections required by the Construction Documents, and the Builder shall arrange for tests and inspections to be

conducted as necessary to avoid any interference with the progress of Work. No claims for extension of time or extra costs will be allowed on account of any testing, retesting, inspection, re-inspection, or rejection of Work when defective or deficient Work is found. Cost of specified measures and tests required by the Construction Documents and performed by Owner-approved quality control and testing agencies shall be included in the Cost of the Work.

4.7 Incident Reporting

The Builder shall immediately notify the Owner and Professional(s), both orally and in writing, of the nature and details of all incidents which may adversely affect the quality or progress of the Work including, but not limited to, union jurisdictional disputes, accidents, delays, damages to Work and other significant occurrences.

4.8 Hazardous Substances

The Builder shall immediately notify the Owner and the Professional(s), both orally and in writing, of the presence and location of any physical evidence of, or information regarding, environmental contamination on the Site (including but not limited to Hazardous Substances and petroleum releases) of which it becomes aware. If the Builder encounters environmental contamination (including but not limited to Hazardous Substances), the Builder shall (i) immediately stop performance of Work or that portion of the Work affected by or affecting such contamination; (ii) secure the contaminated area against intrusion; (iii) not disturb or remove the contamination; (iv) not proceed, or allow any subcontractor or supplier to proceed, with any Work or other activities in the area affected by such contamination until directed to do so by the Owner; and (v) take any other steps necessary to protect life and health.

4.9 Owner's Use Of And Access To The Site

The Builder shall perform the Work so as not to interrupt any operations of the Owner on, adjacent to, or near the Site.

4.9.1 The Builder understands and acknowledges that the Owner may need access to or use of certain areas of the Site or Work prior to the Builder's achievement of Substantial Completion, and that such occupancy, access or use shall not constitute the Owner's acceptance of any Work.

4.9.2 The Builder shall not enter any Owner-occupied area of the Site or Project unless first approved and scheduled by the Owner. The Builder understands and acknowledges that the Owner may incur damages if the Owner's operations on the Site are interrupted or impaired as a result of the Work.

4.9.3 The Builder shall afford the Owner's own forces, and other consultants, trade contractors, subcontractors and suppliers, access to the Site for performance of their activities, and shall connect and coordinate its construction and operations with theirs as required by the Construction Documents.

4.10 Commissioning

If the Work is to be commissioned through the use of a commissioning consultant, the Builder shall, through the Owner or the Owner's commissioning consultant, as the case may be, schedule and coordinate all equipment and systems start-ups and Project commissioning within its scope of the Work.

- 4.10.1 The Builder shall perform functional performance testing of items being commissioned under the supervision of the Owner's commissioning consultant, as directed by the Professional.
- 4.10.2 All training and commissioning activities, including functional performance tests, shall be satisfactorily completed prior to Substantial Completion.

ARTICLE 5 – BUILDER'S PERSONNEL, SUBCONTRACTORS, SUPPLIERS, AND SITE FACILITIES

5.1 Project Staffing

The Builder shall staff the Project with qualified and designated individuals and entities responsible for its obligations and performance.

- 5.1.1 An authorized representative of the Builder shall be present at all times when Work is being performed.
- 5.1.2 The Builder shall employ persons skilled in the tasks assigned to them and shall contract with subcontractors and suppliers skilled in the tasks assigned to them and capable of working harmoniously with all trades, crafts and other individuals on the Project. The Builder shall use its best efforts to minimize the likelihood of any strike, work stoppage or other labor disturbance.
- 5.1.3 The Builder shall immediately remove from the Site, for the duration of the Project, any person making an inappropriate religious, racial, sexual or ethnic comment, statement or gesture toward any other individual.
- 5.1.4 The Builder shall immediately remove from the Site, for the duration of the Project, any person who is incompetent, careless, or not working in harmony.
- 5.1.5 The Builder shall be responsible to the Owner for the acts and omissions of its agents and employees, consultants, subcontractors and suppliers.

5.2 Subcontractor / Supplier Contracts

The Builder shall enter into written contracts with its subcontractors and suppliers, and those written contracts shall be consistent with the Contract for Construction. It is the intent of the Owner and the Builder that the obligations of the Builder's subcontractors and suppliers inure to the benefit of the Owner and the Builder, and that the Owner be a third-party beneficiary of the Builder's agreements with its subcontractors and suppliers.

- 5.2.1 The Builder shall make available to each subcontractor and supplier, prior to the execution of written contracts with any of them, a copy of the pertinent portions of the Contract for Construction, including those portions of the Construction Documents to which the subcontractor or supplier will be bound, and shall require that each subcontractor and supplier shall similarly make copies of applicable parts of such documents available to its respective subcontractors and suppliers.
- 5.2.2 The Builder shall include in its written contracts with subcontractors and suppliers a provision that includes the acknowledgment and agreement of the

subcontractor or supplier that it has received and reviewed the applicable terms, conditions and requirements of the Contract for Construction included by reference in its written contract with the Builder, and that it will abide by those terms, conditions and requirements.

5.2.3 The Builder's written contracts with its subcontractors and suppliers shall preserve and protect the rights of the Owner and include the acknowledgment and agreement of each subcontractor or supplier that the Owner is a third-party beneficiary of the contract. The Builder's agreements with its subcontractors and suppliers shall require that in the event of default under, or termination of, the Contract for Construction, and upon request of the Owner, the Builder's subcontractors and suppliers will perform services for the Owner.

5.2.4 Without limitation of the foregoing subsections, the Builder's written contracts with its subcontractors and suppliers shall include the following provision: "When the Builder receives payment from the Owner for labor, services or materials furnished by subcontractors and suppliers hired by the Builder for the Project, the Builder shall remit payment due to those subcontractors and suppliers, less the value of any item contested in accordance with the Contract for Construction, within ten (10) days after the Builder's receipt of payment from the Owner. When the payment due the subcontractor is for final payment, including retainage, the subcontractor must include with the invoice for final payment, a conditional release of lien and all required warranties and closeout documentation. When the subcontractor receives payment from the Builder for labor, services, or materials furnished by the subcontractors and suppliers hired by the subcontractor, the subcontractor shall remit payment due to those subcontractors and suppliers, less the value of any item contested in accordance with the Contract for Construction, within ten (10) days after the subcontractor's receipt of payment".

5.3 Resolution Of Trade Disputes

The Builder shall promptly resolve claims, complaints, labor disputes and disputes over assignment of work tasks by and among its subcontractors and suppliers.

ARTICLE 6 – GOODS, PRODUCTS AND MATERIALS

6.1 Quality Of Materials

The Builder shall furnish goods, products, materials, equipment and systems which:

- (i) comply with the Contract for Construction;
- (ii) conform to applicable specifications, descriptions, instructions, drawings, data and samples;
- (iii) are new (unless otherwise specified or permitted) and without apparent damage;
- (iv) are of quality, strength, durability, capacity or appearance equal to or higher than that required by the Construction Documents;
- (v) are merchantable;

- (vi) are free from defects; and
- (vii) exceed and/or are in addition to those required by manufacturers' or suppliers' specifications where such additional items are required by the Construction Documents.

6.2 Installation And Use Of Materials

All goods, products, materials, equipment and systems shall, unless specifically stated otherwise, be furnished, used, installed, employed and protected in strict compliance with the specifications, recommendations and instructions of the manufacturer or supplier, unless such specifications, recommendations or instructions deviate from accepted construction practices, or the Construction Documents, in which case the Builder shall so inform the Owner and Professional and shall proceed as directed by that Professional, unless otherwise directed by the Owner. The Builder shall coordinate and interrelate all trade contracts, and subcontracts to ensure compatibility of goods, products, materials, equipment and systems, and validity of all warranties and guarantees, required by the Construction Documents for the Work.

6.3 Unsuitable Materials

The Builder shall inform the Owner of goods, products, materials and equipment or systems which the Builder knows are unsuitable or unavailable at the time of bid submission, and claims relating to or arising out of claims that goods, products, materials, equipment or systems are unsuitable or unavailable shall not be entertained by the Owner unless the Builder, subcontractor, or supplier notified the Owner in writing at the time of bid submission, along with proposed alternatives. Approval by the Owner and the Professional does not mean or imply final acceptance by the Owner and Professional if such items should be defective or not as previously represented. Should the Builder furnish any approved goods, products, materials, equipment or systems different from or in addition to those required by the Construction Documents which require supplemental materials or installation procedures different from or in addition to those required for specified items, the Builder shall provide such at no increased cost to the Owner.

6.4 Substitutions

There shall be no substitution of products, materials, or equipment unless approved by the Professional in advance of procuring such goods, except as expressly permitted by the Contract For Construction.

6.5 CM Responsibility

If Builder is acting as a construction manager, Builder shall also inform the Owner and Professional during the various stages of design development if proposed materials or equipment do not conform with the Project design concept and the Owner's construction budget.

6.6 Security For The Project

The Builder shall provide security for the Project, including but not limited to security for its Work in progress and for the goods, products, materials, equipment, systems, construction machinery, tools, devices and other items required, used or to be used for its scope of the Work.

ARTICLE 7 – DOCUMENTS AND INFORMATION

- 7.1 **Information From Owner.** The Owner shall provide the Builder with information reasonably necessary to assist the Builder in performing its services including, if applicable and available:
- (i) the Site legal description and any required survey;
 - (ii) all written and tangible material of which it informs Builder concerning conditions below ground at the Site;
 - (iii) if the Project involves an existing structure, all as-built drawings, record drawings, plans, specifications and structure system information with respect to such structure of which Owner makes Builder aware; and
 - (iv) the Owner's pertinent Project dates and key milestone dates.
- 7.2 **Resolution Of Questions.** The Builder shall resolve all questions concerning the Construction Documents with the Professional(s) who prepared the documents.
- 7.3 **Processing Of Documents.** When requested to do so by the Owner, the Builder shall process documents, and provide other reasonably required drawings, services and certifications, necessary to enable the Owner to (i) obtain permits or other approvals not otherwise required to be obtained by Builder; and (ii) represent that the Work complies with requirements of governmental agencies having jurisdiction over the Project.
- 7.4 **Sufficiency Of Owner Information.** The furnishing of information by the Owner to the Builder shall not relieve the Builder of responsibilities contained elsewhere in the Contract for Construction to evaluate information and documents provided by the Owner. The Builder shall timely notify the Owner in writing of any additional information needed or services required from the Owner in order for the Builder to perform the Work.

ARTICLE 8 – SUBMITTALS

- 8.1 **Submittal Schedule**
The Builder shall timely prepare and transmit to the Professional a schedule for provision of all anticipated submittals and shop drawings. The schedule shall (i) include submittals required by the specifications; (ii) be in a format acceptable to the Professional; (iii) be coordinated with the construction schedule; and (iv) set forth specific dates for submission of the listed submittals.
- 8.2 **Processing Of Submittals**
The Builder shall in timely fashion review, approve or reject as necessary, and forward approved submittals to the Professional for review and approval along with such detail and information as the Professional requires. No part of the Work dealt with by a submittal shall be fabricated or performed until such approval has been given.
- 8.2.1 Submittals and shop drawings shall be provided in electronic format – searchable PDF for product data and other submittals; DWG or RVT for shop drawings.

- 8.2.2 The Professional is responsible to the Owner, but not to the Builder, to verify that the submittals conform to the design concept and functional requirements of the plans and specifications, that the detailed design portrayed in shop drawings and proposed equipment and materials shown in submittals are of the quality specified and will function properly, and that the submittals comply with the Contract for Construction.
- 8.2.3 All Work shall be performed in accordance with approved submittals. Approval of submittals by the Professional shall not relieve the Builder from complying with the Contract for Construction, including all plans and specifications, addenda thereto, and approved Change Orders.
- 8.2.4 Re-submittals required to correct errors, omissions, or invalid substitutions by the Builder or its subcontractors shall not constitute an excusable or compensable delay.

8.3 Record Documents

The Builder shall provide final and complete electronic copies of all submittals and shop drawings, updated and annotated as needed to illustrate the products, equipment, and materials actually installed.

ARTICLE 9 – BUILDER’S INSPECTION AND CORRECTION OF DEFECTIVE OR INCOMPLETE WORK

9.1 Rejection And Correction Of Work In Progress

During the course of Project, the Builder shall inspect and promptly reject any Work (i) which does not conform to the Construction Documents; or (ii) which does not comply with any applicable law, statute, building code, rule or regulation of any governmental, public and quasi-public authorities and agencies having jurisdiction over the Project.

9.1.1 The Builder shall promptly correct or require the correction of all rejected Work, whether observed before or after Substantial Completion and whether or not fabricated, installed or completed. The Builder shall bear all costs of correcting such Work, including additional testing and inspections and compensation for all services and expenses necessitated by such correction.

9.1.2 The Builder shall bear the cost of correcting destroyed or damaged Work, whether completed or partially completed, of the Owner or other trade contractors or subcontractors caused by the Builder's correction or removal of rejected Work.

9.2 Covered Or Concealed Work

If a portion of the Work has been covered, the Builder shall, if notified to do so by the Owner or the Professional, uncover the designated portion for observation and then replace it.

9.2.1 If the designated portion of the Work was covered contrary to the request of the Owner or the Professional, or to requirements specifically expressed in the Construction Documents, the Builder shall receive no additional compensation

for the costs of uncovering and replacement or modification of the Construction Schedule.

- 9.2.2 If the designated portion of the Work was covered prior to a specific request by the Owner or the Professional that it remain uncovered, the Builder shall receive additional compensation for the costs of uncovering and replacement or modification of the Construction Schedule(s) only if the designated portion of the Work was in conformance with the Construction Documents.

ARTICLE 10 – CHANGE ORDERS, CHANGES TO THE WORK, and CHANGED CONDITIONS

10.1 Change Order Proposals and Requests

Any party to the construction process may request changes to the Work, compensation or applicable schedules.

10.1.1 With respect to such requests for changes by the Builder, the Builder shall prepare and submit change order proposals to the Professional, together with appropriate back-up documentation.

10.1.2 With respect to requests for changes by parties other than the Builder, the Builder shall promptly review and respond to change order requests provided by the Owner or the Professional.

10.1.3 When requested to do so, the Builder shall prepare and submit to the Professional drawings, specifications, detailed cost estimates as prescribed below, or other data in support of a change order request.

10.1.4 Each change order proposal submitted by Builder shall include any and all time and monetary impacts of the change, whether the change order is considered alone or with all other changes during the course of the Project, together with substantiating back-up documentation.

10.2 Owner-Directed Changes

The Owner may unilaterally direct the Builder to implement changes in the Work so long as the Work the Owner is requiring is not outside of the general scope of the Contract for Construction, and the Builder, upon written direction from the Owner, shall proceed with such change.

10.3 Professional-Directed Changes

The Professional, without the Owner's prior approval, may authorize or direct the Builder to make minor changes in the Work that are consistent with the intent of the Construction Documents and which do not involve a change in Project cost, time for construction, scope, or approved design elements.. Any such minor changes shall be implemented by written field order or supplemental instruction from the Professional and executed promptly by the Builder.

10.4 Administration Of Changes

The Professional will administer and manage all change order requests and change order proposals and will prepare required drawings, specifications and other supporting

data as necessary in a timely fashion, in recognition of the Project schedule, in connection with minor changes, change order requests and proposals – including claims for additional compensation, time, or both – and change orders.

10.5 Compensation For Changes

With respect to all change order proposals involving credit to the Owner or additional compensation to the Builder, the Builder shall (i) obtain from subcontractors and suppliers the best possible price quotations; (ii) review such quotations to ascertain whether they are reasonable; (iii) prepare an itemized accounting together with appropriate supporting data, including reasonable expenditures by, and savings to, those performing the Work involved in the proposed change; and (iv) provide a reasonable and detailed price quotation to the Professional.

10.5.1 If price quotations for change order proposals are determined by the Professional to be unreasonable, the Builder shall, in writing, justify said quotations or provide additional back-up documentation. If after review of the additional information the Professional determines the quotation is unreasonable, the Owner may require the subject Work be performed on a time and material basis.

10.5.2 The Builder and its subcontractors and suppliers shall be allowed no additional compensation for any costs, fees or expenses incurred in performing services already required by the Contract for Construction, and shall not be entitled to additional reimbursement for home-office, other non-job-site or indirect overhead expenses, or tools necessary for construction.

10.5.3 It is the responsibility of the Builder to review and approve all pricing of additional work required of its subcontractors and suppliers.

10.6 Concealed and Unforeseen Conditions

If (i) the Builder encounters concealed and unforeseen conditions of an unusual nature which affect the performance of the Work; or (ii) the conditions vary from those indicated by the Construction Documents; and (iii) such conditions are not ordinarily found to exist or differ materially from those generally recognized as inherent in work of the character provided by the Builder, the Builder shall promptly, but in no event later than seven (7) calendar days after first observance of the conditions, notify the Professional and the Owner before conditions are disturbed and give the Professional or the Owner opportunity to observe the condition in its undisturbed state.

10.6.1 The conditions shall be promptly investigated and, if they differ substantially and cause a material increase or decrease in the Builder's cost of, or time required for, performance of the Work, compensation or time for performance or both will be equitably adjusted.

10.6.2 All adjustments in compensation or extensions of time shall be by change order. Change order proposals shall be submitted within fourteen (14) calendar days of the date of observation of the changed conditions.

10.6.3 The Builder's failure to notify the Professional and Owner as provided in this Article shall constitute a waiver of any claim arising out of or relating to such concealed or unknown condition.

10.7 Performance Of Changes

Upon receipt of an executed change order or approved change order proposal, changes in the Work shall be promptly performed. All changes in the Work shall be performed under applicable conditions of the Construction Documents.

10.8 Disputes Regarding Changes

10.8.1 Regardless if there is a dispute (i) that a change has occurred; (ii) whether a change in the Work will result in adjustment of compensation or applicable schedules; or (iii) as to the amount of any adjustment of compensation or applicable schedules, the change shall be carried out if the Owner so directs. No claim shall be prejudiced by performance of the Work so long as the Owner is notified of the claim in writing prior to performance of the Work which is the subject of the dispute and the party disputing the decision of the Owner recites the reasons for its dispute in the written notice. Failure to notify the Owner in writing shall constitute a waiver of any claim resulting from the change.

10.8.2 In the event a change order proposal is approved by the Owner in the absence of an agreement as to cost, time, or both, the Professional will (i) receive and maintain all documentation pertaining thereto; (ii) examine such documentation on the Owner's behalf; (iii) take such other action as may be reasonably necessary or as the Owner may request; and (iv) make a written recommendation to the Owner concerning any appropriate adjustment in the Construction Price or time.

10.9 Necessity For Signature Approval

No act, omission, or course of dealing shall alter the requirement that change orders shall be in writing and signed by the Owner, and that change orders are the exclusive method for effecting any adjustment to compensation or applicable schedules. The Builder understands and agrees, on behalf of itself and its subcontractors and suppliers, that neither compensation nor applicable schedules can be changed by implication, oral agreement, or unwritten change order.

ARTICLE 11 – OWNER’S CONSULTANT(S) AND CONSTRUCTION ADMINISTRATION

11.1 Owner’s Designated Professional Representative

Unless otherwise directed by the Owner, the Professional shall act as the Owner’s agent for design-related issues, interpretation of the construction documents, and other matters described in these General Terms & Conditions.

11.1.1 The Professional will be the Owner's design representative during performance of the Work and will consult with and advise the Owner on all design and technical matters.

11.1.2 The Professional will act as initial interpreter of the requirements of the Contract for Construction and as the Owner’s advisor on claims.

11.2 Professional Site Visits

The Professional will visit the Site with sufficient frequency for familiarization with the progress and quality of the Work and to inspect the Work to determine compliance of the Work with (i) the Contract for Construction, including approved shop drawings and other submittals; (ii) the Construction Schedule; and (iii) applicable laws, statutes, building codes, rules or regulations of all governmental, public and quasi-public authorities and agencies having or asserting jurisdiction over the Project.

11.3 Professional Rejection Of Work

The Professional may disapprove or reject Work which does not comply with (i) the Contract for Construction including approved shop drawings and other submittals; or (ii) applicable laws, statutes, building codes, rules or regulations of any governmental, public and quasi-public authorities and agencies having or asserting jurisdiction over the Project.

11.4 Professional Evaluations

11.4.1 The Professional will review and evaluate the results of all inspections, tests and written reports required by the Contract for Construction and by any governmental entity having or asserting jurisdiction over the Project. The Professional will take appropriate action stemming from such evaluations, including acceptance, rejection, requiring additional testing or corrective work, or such other action deemed appropriate by the Professional. The Professional will promptly reject Work which does not conform to and comply with testing requirements.

11.4.2 The Professional may require inspection or testing of any Work in addition to that required by the Contract for Construction or governmental entities having or asserting jurisdiction over the Project when such additional inspections and testing is necessary or advisable, whether or not such Work is then fabricated, installed or completed. The Professional will take appropriate action on all such special testing and inspection reports, including acceptance, rejection, requiring additional testing or corrective work, or such other action deemed appropriate by the Professional.

11.5 Professional Submittal Activities

The Professional will review and approve, reject, or take other appropriate action on submittals such as shop drawings, product data, samples and proposed equal materials or equipment and requested substitutions not more than fourteen (14) calendar days after receipt, and will not approve any submittals unless such submittals conform with the Construction Documents. The Professional's review of submittals shall not constitute final acceptance of materials or equipment furnished or installed if such materials or equipment prove to be defective or not as represented by approved submittals or as otherwise required by the Construction Documents. The Builder remains responsible for details and accuracy, for confirming and correlating all quantities and dimensions, for selecting fabrication processes, for techniques of assembly, and for performance of the Work.

11.6 Professional Interpretations

The Professional will, when requested to do so in writing by the Builder, promptly and so as to cause no unnecessary delay, render written or graphic interpretations and

decisions necessary for the proper execution of the Work. The Professional's interpretations and decisions relating to esthetic or artistic effect shall be final if not inconsistent with the Contract for Construction.

11.7 Professional Change Order Activities

The Professional will consult with and advise the Owner concerning, and will administer and manage, all change order requests, change order proposals, and change orders on behalf of the Owner.

11.8 Professional Pay Application Activities

The Professional will review applications for payment, including such accompanying data, information and schedules as the Professional requires, to verify the amounts due to the Builder and shall authorize payment by the Owner to the Builder in writing. After the Work is determined to be finally complete by the Professional, the Professional will certify to the Owner in writing that the Builder is entitled to final payment and submit the pay application to the Owner for final approval.

11.9 Professional Relationship To Builder

The duties, obligations and responsibilities of the Builder under the Contract for Construction shall not be changed, abridged, altered, discharged, released, or satisfied by any duty, obligation or responsibility of any Professional. The Builder shall not be a third-party beneficiary of any agreement by and between the Owner and any Professional. The duties of the Builder to the Owner shall be independent of, and shall not be diminished by, any duties or obligations of any Professional to the Owner.

11.10 Commissioning Consultant

The Owner may also employ an independent Commissioning entity to verify performance of certain building systems or components. The Builder shall coordinate its schedule and activities with the Commissioning entity and shall act upon the observations and recommendations of same, provided such action does not conflict with the Contract For Construction or specific direction by the Owner or the Professional.

ARTICLE 12 – SUBSTANTIAL AND FINAL COMPLETION

12.1 Substantial Completion

Substantial Completion of the Work shall be deemed to have occurred on the later of: (i) the dates that the Work passes a Substantial Completion inspection, (ii) the date the required Substantial Completion documentation and items have been produced, (iii) the date a Certificate of Occupancy is provided by Authorities Having Jurisdiction, or (iv) the date a certificate of occupancy is issued for the Work.

12.1.1 When the Builder believes that the Work is substantially complete, it shall notify the Owner and the Professional that its Work is ready for a Substantial Completion inspection. The Builder shall endeavor to give the Owner and Professional notice two (2) weeks prior to the predicted Substantial Completion inspection date.

12.1.2 Upon receipt of notification from the Builder, the Professional will coordinate with the Owner and the Builder date(s) for inspection(s) of the Work to determine whether the Work is substantially complete.

- 12.1.3 Prior to such inspections, the Builder shall develop a comprehensive list of known discrepancies, deficiencies, or incomplete work (the “punchlist”).
- 12.1.4 At inspection(s) to determine whether the Work is substantially complete, the Professional, the Owner, and other governing or concerned entities will:
- (i) inspect the Work;
 - (ii) list additional items to be completed or corrected; and
 - (iii) determine, in consultation with the Owner, whether Substantial Completion of the Work has occurred.
- 12.1.5 If the Work is determined not to be substantially complete, the Work shall be prosecuted until the Work is substantially complete and the inspection process shall be repeated at no additional cost to the Owner until the Work is determined to be substantially complete. Builder will be responsible for costs of the Professional associated with premature or failed inspections.
- 12.1.6 On or prior to the required date of Substantial Completion, the Builder shall deliver reports, extra materials, and other necessary documents and items for the Owner’s occupancy and use of the Work for its intended purpose. These documents and items are enumerated on the Owner’s website (www.facilities.ufl.edu). The Professional will review such documentation and items, and will inform the Owner and the Builder of any deficiencies.
- 12.1.7 When the Owner, the Builder, and the Professional agree that the Work has passed Substantial Completion inspection(s) and the Builder has produced the required Substantial Completion documentation and items, they shall each sign the Owner’s standard Certificate of Substantial Completion form, declaring the Work substantially complete and establishing the actual date of Substantial Completion. The Certificate of Substantial Completion shall also be accompanied by a final, consolidated list of deficient and incomplete work (the “punchlist”).
- 12.1.8 If the Work is commissioned through the services of a commissioning consultant, such commissioning – specifically, discrete functional performance tests – shall be completed as a pre-requisite to the Work being declared Substantially Complete, provided Builder shall not be responsible for delays in commissioning not the fault of Builder.
- 12.1.9 The Builder shall provide the Owner with operation and maintenance documents not less than forty-five (45) calendar days prior to the required date of Substantial Completion to allow adequate time for review, correction, and training of the Owner’s personnel prior to commissioning and the Owner’s occupancy of the Project.
- 12.1.10 The Builder shall meet with the Owner’s personnel prior to the required date of Substantial Completion to familiarize and train them with respect to maintenance

and use of the Project. All training sessions shall be recorded (audio and visual), with copies provided to the Owner.

12.1.11 The date of Substantial Completion shall fix the commencement date of warranties and guaranties and allocate between the Owner and the Builder responsibility for security, utilities, damage to the Work, and insurance.

12.2 Final Completion

Final Completion of the Work shall be deemed to have occurred on the later of: (i) the date that the Work passes a Final Completion inspection or (ii) the date that the Builder has produced all required Final Completion close-out documentation and items. Final Completion shall not be deemed to have occurred and no final payment shall be due the Builder or any of its subcontractors or suppliers until the Work has passed the Final Completion inspection and all required Final Completion close-out documentation and items have been produced to the Owner by the Builder.

12.2.1 When the Builder believes the Work is finally complete (including correction of all “punchlist” items), the Builder shall notify the Owner and the Professional that the Work is ready for Final Completion inspection.

12.2.2 Upon receipt of such notification from the Builder, the Professional will coordinate with the Owner and the Builder a date for inspection of the Work to determine whether the Work is finally complete.

12.2.3 At the Final Completion inspection to determine whether the Work is finally complete, the Owner and the Professional will:

- (i) inspect the Work;
- (ii) determine whether all “punchlist” items have been satisfactorily completed and corrected;
- (iii) determine whether the Work complies with (a) the Contract for Construction; (b) applicable laws, statutes, building codes, rules or regulations of all governmental, public and quasi-public authorities and agencies having jurisdiction over the Project; and (c) applicable installation and workmanship standards;
- (iv) determine whether required inspections and approvals by the official(s) having or asserting jurisdiction over the Project have been satisfactorily completed; and

12.2.4 If the Work is not finally complete, the Builder shall continue to prosecute the Work, and the inspection process shall be repeated at no additional cost to the Owner, until the Work is finally complete.

12.2.5 On or prior to the date of Final Completion, the Builder shall deliver to the Owner the following documentation and items:

- (i) Certificate of Final Completion – executed on Owner’s standard form;

- (ii) all operation and maintenance manuals not previously produced;
- (iii) one (1) set of as-built plans and specifications;
- (iv) record copies of Building Information Modeling (BIM) files as required by the project-specific BIM Execution Plan, if applicable;
- (v) certification and affidavit that all insurance required of the Builder beyond final payment, if any, is in effect and will not be canceled or allowed to expire without notice to the Owner;
- (vi) written consent of the surety(ies), if any, to final payment;
- (vii) full, final and unconditional waivers of mechanics or construction liens, from each contractor, subcontractor, supplier or other person or entity who has, or might have a claim;
- (viii) full, final and unconditional certification and affidavit that all of the Builder's obligations to contractors, subcontractors, suppliers and other third parties for payment for labor, materials or equipment related to the Project have been paid or otherwise satisfied;
- (ix) all written warranties and guarantees relating to the labor, goods, products, materials, equipment and systems incorporated into the Work, endorsed, countersigned, and assigned as necessary;
- (x) affidavits, releases, bonds, waivers, permits and other documents necessary for final close-out of Work;
- (xi) a list of any item(s) due but unable to be delivered and the reason for non-delivery; and
- (xii) any other documents reasonably and customarily required or expressly required herein for full and final close-out of the Work, including those items enumerated on the Owner's website (www.facilities.ufl.edu).

12.2.6 The Professional will review and determine the sufficiency of all such documentation and items and will immediately inform Owner and the Builder of any deficiencies and omissions.

ARTICLE 13 – BUILDER’S WARRANTIES AND GUARANTEES

13.1 One-Year Warranty

In addition to the warranties and guarantees set forth elsewhere in the Contract for Construction, the Builder, upon request by the Owner or the Professional, shall promptly correct all failures or defects in the Work for a period of one year after the actual date of Substantial Completion, or the date of acceptance by the Owner, whichever is later.

13.1.1 The Builder shall schedule, coordinate and participate in a walk-through inspection of the Work one month prior to the expiration of the one-year

correction period, and shall notify the Owner, the Professional, and any necessary subcontractors and suppliers of the date of, and request their participation in, the walk-through inspection. The purpose of the walk-through inspection is to determine if there are defects or failures requiring correction.

13.1.2 Should the Builder fail to promptly correct any failure or defect, the Owner may take whatever actions it deems necessary to remedy the failure or defect and the Builder shall promptly reimburse the Owner for any expenses or damages it incurs as a result of the Builder's failure to correct the failure or defect.

13.2 Post-Occupancy Commissioning Activities

The Builder and its subcontractors shall participate in post-occupancy Commissioning activities as prescribed in the construction documents, the purpose of which is to confirm and optimize performance of the commissioned systems. Such participation may include the need to perform corrective work if deficiencies in the work are revealed.

13.3 Express Warranties and Guarantees – Builder

In addition to the warranties and guarantees set forth elsewhere herein, the Builder expressly warrants and guarantees to the Owner:

- (i) that the Work complies with (a) the Construction Documents; and (b) all applicable laws, statutes, building codes, rules and regulations of all governmental, public and quasi-public authorities and agencies having jurisdiction over the Project.
- (ii) that all goods, products, materials, equipment and systems incorporated into the Work conform to applicable specifications, descriptions, instructions, drawings, data and samples and shall be and are (a) new (unless otherwise specified or permitted) and without apparent damage or defect; (b) of quality equal to or higher than that required by the Construction Documents; and (c) merchantable; and
- (iii) that all management, supervision, labor and services required for the Work shall comply with the Contract for Construction and shall be and are performed in a workmanlike manner.

13.4 Express Warranties and Guarantees – Subcontractors And Suppliers

The Builder shall require that all of its subcontractors and suppliers provide written warranties, guarantees and other undertakings to the Owner and the Builder in a form identical to the warranties, guarantees and other undertakings set forth in the Contract for Construction, including the warranties, guarantees and undertakings set forth in this Article, which warranties, guarantees and undertakings shall run to the benefit of the Owner as well as the Builder.

13.5 Non-Exclusivity and Survival

The warranties and guarantees set forth in this Article shall be in addition to all other warranties, express, implied or statutory, and shall survive the Owner's payment, acceptance, inspection of or failure to inspect the Work, and review of the Construction Documents.

13.6 Non-Limitation

Nothing contained in Paragraph 13.1 shall be construed to establish a period of limitation with respect to the Builder's obligations under the Contract for Construction. Paragraph 13.1 relates only to the Builder's specific obligations with respect to the Work, and has no relationship to the time within which the Builder's contractual obligations under the Contract for Construction may be enforced, nor to the time within which proceedings may be commenced to establish the Builder's liability with respect to any contractual obligations pursuant to Paragraph 13.1 or contained elsewhere herein.

13.7 Commencement of Obligations

Unless otherwise specified, all of the Builder's warranty and guaranty obligations, including the time period(s) for all written warranties and guarantees of specifically designated equipment required by the Construction Documents, shall begin on the actual date of Substantial Completion or the date of acceptance by the Owner, whichever is later.

ARTICLE 14 – OWNER'S DUTIES, OBLIGATIONS, AND RESPONSIBILITIES

14.1 Timely Compensation of Builder

The Owner shall, in a timely manner, compensate the Builder in accordance with the Contract for Construction.

14.2 Owner Review of Documents

The Owner shall review documents prepared by the Builder in a timely manner and in accordance with schedule requirements. Review by the Owner shall be solely for the purpose of determining whether such documents are generally consistent with the Owner's intent. No review of such documents shall relieve the Builder of any of its responsibilities. In addition, the Owner's review of documents for purposes of issuing a building permit shall not relieve the Builder of any of its responsibilities.

14.3 Status of Owner

The Owner shall not have control or charge of construction means, methods, techniques, sequences or procedures, or for safety precautions and programs in connection with the Work, nor shall the Builder, for any of the foregoing purposes, be deemed the agent of the Owner.

14.4 Owner's Utilities

The Builder shall be responsible to provide and pay for consumption of, and connections to, utilities required for temporary service and construction.

ARTICLE 15 – BUILDER'S COMPENSATION

15.1 Schedule of Values

15.1.1 Prior to submitting its first application for payment for the Work, the Builder shall prepare and present to the Owner and Professional for approval a schedule of values (SOV) using the Owner's form.

15.1.2 For construction management projects, this SOV shall be based on the draft schedule of values submitted with the GMP proposal, adjusted to account for the final subcontract award amounts.

15.1.3 An allowance for un-awarded trade subcontracts may be included in the SOV.

15.1.4 The Builder shall not imbalance or artificially inflate any element in the SOV.

15.1.5 Upon the Owner's acceptance, the SOV shall be used to process and pay the Builder's payment requests.

15.1.6 The SOV shall not be changed without approved written change order.

15.1.7 The Builder shall comply with the Trench Safety Act (Chapter 553, Part VI, Florida Statutes), which requires that builders delineate in their Schedules of Values the cost of compliance with applicable trench safety standards.

15.2 Unit Prices

If any portion of the Construction Price is determined by the application of unit prices, the number of units contained in the Schedule of Values is an estimate only, and compensation to the Builder shall be determined by the actual number of units incorporated in, or required by, the Work.

15.3 Invoicing Procedures

In accordance with the procedures and requirements set forth in the Owner's policies, the Builder shall invoice the Owner and the Owner shall pay the Builder the amount due subject to the following and the Contract For Construction.

15.3.1 The Builder shall submit invoices to the Professional requesting payment for labor and services rendered during the preceding thirty calendar days. Each invoice shall contain such detail and be backed up with whatever supporting information the Owner or the Professional requests and shall at a minimum state:

- (i) the total original Construction Price and total current Construction Price;
- (ii) the amount due for properly provided labor, materials and equipment properly incorporated into the Project; and with respect to amounts invoiced for materials or equipment necessary for the Project and properly stored at the Site (or elsewhere if offsite storage is approved in writing by the Owner), be accompanied by written proof that the Owner has title to such materials or equipment and that such material and equipment is fully insured against loss or damage;
- (iii) a breakdown of the various phases, bid packages, or parts of the Work as related to the Construction Price in accordance with standard Construction Specifications Institute (CSI) format;
- (iv) the value of the various phases, bid packages, or parts of the Work actually performed;

- (v) previously invoiced amounts and credit payments made;
- (vi) the total amount due, less any agreed retainage; and
- (vii) a summary of change orders to date.

Applications for payment shall also include such lien waivers and other documentation verifying the Builder's payment to subcontractors and suppliers as the Owner or Professional may request.

15.3.2 Goods and materials procured through the Owner Direct Purchase process shall be invoiced separately in accordance with Owner's policies.

15.4 Payment Procedures

15.4.1 Within seven (7) days of receipt, the Professional will review the Builder's applications for payment, including such accompanying data, information and schedules as the Professional requires, to determine the amounts due to the Builder and, based upon such review, together with its inspections of the Work, shall authorize payment by the Owner to the Builder in writing. Such authorization will constitute the Professional's certification to the Owner that:

- (i) the Work described in the Builder's invoice has progressed to the level indicated and has been performed in accordance with the Contract For Construction;
- (ii) all necessary and appropriate lien waivers have been submitted;
- (iii) the "as-built" record documents are current and up-to-date; and
- (iii) the amount requested is currently due and owing to the Builder.

15.4.2 In the case of unit price work, the Professional's recommendations for payment will constitute a final determination of quantities and classifications of such work.

15.5 Owner's Right To Refuse Payment

The Professional's approval of the Builder's invoice shall not preclude the Owner from exercising any of its remedies under the Contract for Construction. In the event of a dispute, payment shall be made within the timeframe(s) prescribed herein for amounts not in dispute, subject to any exceptions claimed by the Owner. The Owner shall have the right to refuse to make payment and, if necessary, may demand the return of all or a portion of the amount previously paid to the Builder due to:

- (i) the Builder's failure to perform the Work in compliance with the requirements of the Contract for Construction or any other agreement between the parties;
- (ii) the Builder's failure to correctly and accurately represent the Work performed in a payment request, or otherwise;

- (iii) the Builder's performance of the Work at a rate or in a manner that, in the Owner's opinion, is likely to result in the Project or any portion of the Project being inexcusably delayed;
- (iv) the Builder's failure to use funds previously paid the Builder by the Owner, to pay the Builder's Project-related obligations including, but not limited to, the Builder's subcontractors, materialmen, and suppliers;
- (v) claims made, or likely to be made, against the Owner;
- (vi) loss caused by the Builder or the Builder's subcontractors, or suppliers; or
- (vii) the Builder's failure or refusal to perform any of its obligations to the Owner.

15.6 Builder's Right To Refuse Performance For Non-Payment

If, within twenty (20) calendar days from the receipt of the Builder's application for payment properly prepared pursuant to Owner's policies and approved by the Professional, the Owner, without cause or basis hereunder, fails to pay the Builder any amounts then due and payable to the Builder, the Builder shall have the right, in addition to all other rights and remedies contained herein, to cease performance of the Work until receipt of proper payment after first providing fourteen (14) calendar days written notice to the Owner of its intent to cease work.

15.7 Correction Of Past Payments

All prior payments, whether based on estimates or otherwise, may be corrected and adjusted in any subsequent payment and shall be corrected and adjusted in the final payment. In the event that any invoice contains a defect or impropriety which would prevent payment by the date due, the Owner shall notify the Builder in writing of such defect or impropriety. Any disputed amounts determined by the Owner to be payable to the Builder shall be due thirty (30) calendar days from the date the dispute is resolved.

15.8 Invoice Warranties and Guarantees

The Builder expressly warrants and guarantees to the Owner that:

- (i) title to all goods, products, materials, equipment and systems covered by an invoice will pass to the Owner either by incorporation into the Work, or upon receipt of payment by the Builder, whichever occurs first;
- (ii) all goods, products, materials, equipment and systems covered by an invoice are free and clear of liens, claims, security interests or encumbrances; and
- (iii) no goods, products, materials, equipment or systems covered by an invoice have been acquired by the Builder, or its subcontractors or suppliers, subject to an agreement under which an interest therein or an encumbrance thereon is retained by the seller or otherwise imposed by the Builder, or its subcontractors or suppliers.

15.9 Builder's Signature

The signature of the Builder on any invoice constitutes the Builder's certification to the Owner that (i) the Builder's services listed in the invoice have progressed to the level indicated and have been performed as required by the Contract for Construction; (ii) the

Builder has paid its subcontractors and suppliers their proportional share of all previous payments received from the Owner; (iii) the amount requested is currently due and owing; and (iv) all subcontractors performing the Work for which payment is made hold all necessary State of Florida licenses.

15.10 Taxes and Direct Purchase Program

15.10.1 The Builder shall incorporate into the Construction Price, and pay, all sales, consumer, use, and similar taxes for goods, products, materials, equipment and systems incorporated into the Work that were legally required at the time of execution of the Contract for Construction, whether or not yet effective or merely scheduled to go into effect.

15.10.2 For construction management projects, the Owner may elect to implement a direct purchase program, whereby where eligible materials or equipment included in a subcontractor's bid are purchased by the Owner directly from the supplier in order to achieve sales tax savings.

15.10.3 Such direct purchases shall not relieve the Builder and/or its subcontractors of their responsibility to ensure the materials and equipment meet the specifications and requirements of the Contract For Construction.

15.10.4 The Builder shall obtain Builder's Risk insurance for such materials naming Owner as the insured or an additional insured and shall be responsible for safeguarding such materials on the project site on the Owner's behalf.

15.10.5 The Owner's written policy on direct purchases shall govern. See www.facilities.ufl.edu.

15.11 Compensation Of Builder's Subcontractors and Suppliers

Forty five (45) days after satisfactory completion of their portion of the Work, subcontractors may invoice Builder for remaining unpaid Work, including the full value of the retainage related to such Work less the value of any contested item(s), and provided each such subcontractor has provided Builder with all required close-out documentation. Builder shall include subcontractor pay requests in the Builder's application for payment. No later than ten days (10) after receipt of payment from the Owner, the Builder shall pay each of its subcontractors and suppliers out of the amount received by the Builder on account of such subcontractor's or supplier's portion of the Work, the amount to which each entity is entitled, reflecting percentages actually retained from payments to the Builder on account of such entity's portion of the Work, if any. The Owner shall have no obligation to pay, and shall not be responsible for payments to, the Builder's subcontractors or suppliers. However, the Owner reserves the right, but has no duty, to make payment jointly to the Builder and to any of its subcontractors or suppliers in the event that the Owner becomes aware that the Builder fails to pay or unreasonably withholds payment from one or more of those entities. Such joint check procedure, if employed by the Owner, shall create no rights in favor of any person or entity beyond the right of the named payees to payment of the check and shall not be deemed to commit the Owner to repeat the procedure in the future.

15.12 Retainage

Subject to other provisions herein, retainage shall be withheld from each payment, in an amount not to exceed ten percent (10%) of the approved payment amount. At such time as the Work is at least 75% complete, the Owner may, in its sole and absolute discretion, reduce the amount of retainage required below ten percent (10%) on subsequent applications for payment.

15.13 Final Payment

Prior to being entitled to receive final payment, and as a condition precedent thereto, the Builder must achieve Final Completion. The Owner shall, subject to its rights set forth above in this Article, make final payment of all sums due the Builder within fourteen (14) calendar days of the Professional's execution of the final application for payment.

ARTICLE 16 – SCHEDULE REQUIREMENTS

16.1 Construction Schedule

The Construction Schedule shall include all pertinent dates and periods for timely completion of the Work.

16.1.1 Unless otherwise directed and approved by the Owner, the Builder shall, within fourteen (14) calendar days of the Notice To Proceed, prepare a Critical Path Method schedule with separate divisions for each major portion of the Work or operations. The Construction Schedule shall include and properly coordinate dates for performance of all divisions of the Work, including completion of off-Site requirements and tasks, so that the Work can be completed in a timely and orderly fashion consistent with the required dates of Substantial Completion and Final Completion. When preparing the schedule Builder shall consider and account for Owner's operational needs on the site and adjacent thereto, particularly with regard to utility interruptions and access restrictions.

16.1.2 The Construction Schedule shall depict all activities necessary for, or incidental to, performance of the Work, showing the logic (sequence, dependency), duration, and "float" of each activity, with the critical path highlighted and shall include (i) the required Commencement Date, the required dates of Substantial Completion and Final Completion; (ii) any guideline and milestone dates required by the Owner; (iii) any applicable subcontractor and supplier sub-schedules; (iv) coordination with the submittal schedule which allows sufficient time for review of documents and submittals; (v) allowances for procurement, fabrication, and delivery of materials, especially "long lead" items; (vi) the complete sequence of construction by activity, with dates for beginning and completion of each element of construction; (vii) the time required for testing, inspections, and commissioning, if applicable; (viii) time for schedule constraints, such as holidays and events on Owner's property and adverse weather conditions which are normal and may be reasonably anticipated; and (ix) required decision dates.

16.1.3 By reviewing the Construction Schedule, the Owner and Professional do not assume any of the Builder's responsibility (i) that the Construction Schedule be coordinated or complete; or (ii) for timely and orderly completion by the required

dates of Substantial Completion, Final Completion and any milestone dates required by the Owner.

16.1.4 The Builder shall analyze, on a weekly or more frequent basis, the actual status of the Work against the Construction Schedule and communicate the conclusions of such analysis with the Owner and Professional.

16.1.5 The Builder shall periodically and in all instances when the Builder anticipates that performance of the Work will be delayed or in fact has been delayed, but not less frequently than monthly, prepare a revised Construction Schedule and show actual progress of the Work through the revision date, projected completion of each remaining activity, activities modified since previous submittal, major changes in scope, and other identifiable changes. The updated Construction Schedule shall be accompanied by a narrative report which (i) states and explains any modifications of the critical path schedule, including any changes in logic; (ii) defines problem areas and lists areas of anticipated delays; (iii) explains the anticipated impact the problems and delays will have on the schedule and scheduled activities; (iv) reports corrective action taken or proposed; and (v) states how problems anticipated by projections shown on the schedule will be resolved to avoid delay in delivering the Work by the required dates of Substantial Completion and Final Completion, and other milestone dates required by the Owner, if any.

16.2 Delay In Performance

If at any time the Builder anticipates that performance of the Work will be delayed or in fact has been delayed, the Builder shall (i) immediately notify the Professional of the probable cause of and effect from the delay, and possible alternatives to minimize the delay; and (ii) take all corrective actions reasonably necessary to deliver the Work by the required dates of Substantial Completion and Final Completion, and other milestone dates required by the Owner, if any.

16.3 Early Completion

The Builder may attempt to achieve Substantial Completion before the required date of Substantial Completion. However, such planned early completion shall be for the Builder's sole convenience and shall not create any additional Builder rights or Owner obligations under the Contract for Construction, nor shall it change the required dates of Substantial Completion or Final Completion. The Owner shall not pay the Builder any additional compensation for achievement of Substantial Completion or Final Completion prior to the required dates nor will the Owner owe the Builder any compensation should the Owner cause the Builder not to achieve Substantial Completion earlier than the required date of Substantial Completion or Final Completion earlier than the required date of Final Completion.

16.4 Document Review

The Builder shall provide documents to the Owner and Professional(s) for review in accordance with schedule requirements and with sufficient lead time to allow the Owner and Professional reasonable time for review.

ARTICLE 17 – TIME OF PERFORMANCE

17.1 Time Of The Essence

The parties hereto mutually understand and agree that time is of the essence in the performance of the Contract for Construction and that the Owner will incur damages if the Work is not completed on time. The Builder shall at all times carry out its duties and responsibilities as expeditiously as possible and shall begin, perform and complete its services so that (i) the Work progresses in accordance with the Construction Schedule; (ii) the Work is substantially completed by the required date of Substantial Completion; and (iii) the Work is finally complete by the date of Final Completion.

17.2 Modifications of Time For Performance

The Builder may submit delay claims or otherwise propose modifications to the dates for Substantial Completion, Final Completion, or other milestones required by the Owner, if any. However, such claims shall be submitted in writing and supported by evidence that the delay was excusable, critical, and, if applicable, compensable. The Builder shall determine and promptly notify the Owner and the Professional in writing when it believes such adjustments are necessary, but no such adjustments shall be effective unless approved in writing by the Owner and Professional.

17.2.1 Extensions of time will be granted only to the extent that equitable time adjustments for the effected activity or activities exceed the total float along the network paths involved. Such claims shall include an estimate of cost, if any, and substantiate the projected impact on the overall critical path schedule of the Project. In the case of a continuing delay, only one claim is necessary.

17.2.2 Modification(s) of the required dates of Substantial Completion or Final Completion shall be accomplished only by duly authorized and accepted change order stating the new date(s) with specificity and reciting that all references in the Contract For Construction to the required dates of Substantial Completion or Final Completion shall thereafter refer to the date(s) as modified, and all rights and obligations, including the Builder's liability for actual damages, delay damages and liquidated damages, shall be determined in relation to the date(s) as modified.

17.2.3 If adverse weather conditions are the basis for a delay claim, the claim shall be documented by data substantiating that: the weather conditions were abnormal for the given location and period of time; the weather conditions could not have been reasonably anticipated; and that the weather conditions had an adverse effect on the overall critical path of the schedule. Delays caused by adverse weather conditions are not compensable.

17.3 Compensable Delay

If the Builder is delayed at any time in the progress or performance of the Work by (i) acts or omissions of the Owner or Professional; (ii) major changes ordered by the Owner in the scope of Work; or (iii) any other cause which the Owner determines may justify the compensation of the Builder for the delay, the Builder's compensation shall be equitably adjusted to cover the Builder's actual and direct increased costs attributable to such delay.

17.4 Excusable Delay

If the Builder is delayed at any time in the progress or performance of the Work by (i) acts or omissions of the Owner or Professional; (ii) major changes ordered by the Owner in the scope of Work; (iii) fire; (iv) unusual delays in transportation; (v) adverse abnormal weather conditions not reasonably anticipated by the Builder; (vi) unavoidable casualties; (vii) causes beyond the Builder's control which the Owner agrees in writing are justifiable; or (viii) any other cause which the Owner determines may justify the delay, the time for performance may be extended to allow for a demonstrated increase in overall construction duration, which may or may not be equal to the length of such delay, but only if (a) such delay is not concurrent with other, inexcusable delay(s); (b) such delay impacts the critical path; (c) such delay is not in any way caused by default or collusion on the part of the Builder or by any cause which the Builder could reasonably control or circumvent; (d) the Builder would have otherwise been able to timely perform all of its obligations under the Contract for Construction but for such delay; and (e) immediately but not later than fourteen (14) calendar days after the beginning of any such delay the Builder gives notice of its delay claim to the Owner. Such delay claims shall be submitted as a change order proposal. All such claims will be reviewed by the Professional within seven (7) days of submission. Delay caused by labor disputes, picketing, employee boycotts, or the like which directly or indirectly involves employees of the Builder or its subcontractors and suppliers is not the responsibility of the Owner and will result in time extensions only if agreed to in writing by the Owner at the time such events arise.

17.5 Critical Delay

Additional work, unforeseen conditions, and other factors may result in one or more schedule activities being delayed. If, however, the critical path is not impacted and the overall construction duration and completion date(s) remain the same, the delay is not critical.

ARTICLE 18 – PROPRIETARY DOCUMENTS AND CONFIDENTIALITY

18.1 Nature and Use of Information

All information, documents, and electronic media furnished by the Owner to the Builder (i) belong to the Owner; (ii) are proprietary and confidential; (iii) are furnished solely for use on the Owner's Project; (iv), shall be kept confidential by the Builder; and (v) shall not be used by the Builder on any other project or in connection with any other person or entity, unless disclosure or use thereof in connection with any matter other than services rendered to the Owner hereunder is specifically authorized in writing by the Owner in advance or is required by law. The Owner hereby grants to the Builder a limited license to use and reproduce applicable portions of the Construction Documents necessary for execution of the Work. All copies made under this license shall bear the statutory copyright notice, if any, shown on the documents.

18.2 Ownership of Information

All information, documents, and electronic media prepared by or on behalf of the Builder for the Project are the sole property of the Owner free of any retention rights of the Builder. The Builder hereby grants to the Owner an unconditional right to use, for any purpose whatsoever, any information, documents or electronic media prepared by or on behalf of the Builder for the Project, free of any copyright claims, trade secrets or other proprietary rights with respect to such documents.

18.3 Disclosure of Information

The Builder shall not disclose any information it receives from the Owner to any other person or entity except to the extent necessary to allow it to perform its duties under the Contract for Construction or as required by law.

18.4 Instructions To Employees

Because it is difficult to separate proprietary and confidential information from that which is not, the Builder shall instruct its employees and agents to regard all information which is not in the public domain as information which is proprietary and confidential.

18.5 Non-Publication

Submission or distribution of documents to meet official regulatory requirements or for other required purposes in connection with the Project is not to be construed as publication in derogation of the Owner's common law copyrights or other reserved rights.

ARTICLE 19 – INSURANCE REQUIREMENTS

19.1 Basic Insurance Requirements

The Builder shall maintain the following insurances with a company or companies lawfully authorized to do business in Florida, and with an A.M. Best Rating of no less than A, XV. All insurance policies shall be issued and countersigned by duly authorized representatives of such companies and shall be written on ISO standard forms or their equivalents. The insurance policies shall require that the insurer shall provide at least thirty (30) days written notice to Owner if a policy is to be canceled or the coverage thereunder reduced before the expiration date thereof and Builder shall provide Owner with a copy of an endorsement to the policy evidencing the same. The insurance required hereunder shall be carried by Builder at least until the Project is finally completed and accepted by Owner. At the Owner's sole discretion, the Owner may require the Builder and/or its subcontractors to carry additional types and amounts of insurance it deems appropriate given the nature and size of a particular Project. In such case, Owner shall notify Builder within a reasonable period of time prior to the commencement of the Work of such additional requirements.

19.1.1 Liability Insurance

19.1.1.1 Commercial General Liability Insurance.

The Builder shall provide a commercial general liability insurance policy which has liability limits of at least \$1,000,000.00 per occurrence for bodily injury, death and property damage. The University of Florida Board of Trustees and the Board of Governors shall be named as additional insureds on such policy and the policy shall provide cross liability coverage. Such insurance policy shall protect Builder from claims which may arise whether such claims may arise out of the operations of the Builder or by anyone directly or indirectly employed by the Builder. In addition, the policy shall contain the following endorsements (i) "XCU" (explosion, collapse, underground damage) for those classifications excluded under the policy and (ii) contractual liability. If Builder is performing asbestos-related work, the policy shall also contain a pollution liability endorsement.

19.1.1.2 Automobile Liability Insurance.

Builder shall carry an automobile liability insurance which has liability limits of at least \$500,000.00. The University of Florida Board of Trustees and Board of Governors shall be named as additional insureds on such policy and the policy shall provide cross liability coverage.

19.1.1.3 Deductibles.

Deductibles under these liability policies shall not exceed \$10,000. Owner shall not be liable for amounts that may represent a deductible in any insurance policy. The payment of such deductible shall be the sole responsibility of the Builder and/or subcontractor providing such insurance.

19.1.2 Worker's Compensation

Builder shall maintain worker's compensation insurance which complies with the requirements of Chapter 440, Florida Statutes.

19.1.3 Builder's Risk Insurance

The Builder shall maintain builder's risk insurance, at replacement cost, covering the full value of the construction being performed, including where applicable, the existing structure. Such policy shall be written on a causes of loss special form policy, and shall include coverage for reasonable compensation for the Architect/Engineer's services and expenses required as a result of such insured loss. This insurance shall insure the interests of the Builder, subcontractors, and sub-subcontractors in the Work. Property covered by the insurance shall include temporary building(s) or structure(s) at the Project site, other than any of Builder's office trailer(s). In addition, such insurance shall cover portions of the Work stored off the site, after written approval of the Owner, at the value established in the approval, and portions of the Work in transit. The University of Florida Board of Trustees and Florida Board of Governors shall be named as additional insureds on such policy. The policy shall include a waiver of subrogation endorsement and a severability of interests endorsement.

The deductible under the policy shall not exceed \$10,000. Owner shall not be liable for amounts that may represent a deductible in any insurance policy. The payment of such deductible shall be the sole responsibility of the Builder.

When the Work includes the repair, removal, installation and/or testing of live steam boilers, valves, pipes or lines, then such insurance shall include boiler and machine coverage, written on an ISO form or its equivalent.

A loss or losses insured under this insurance policy shall be adjusted by the Builder and its insurance company. The Builder shall repair or replace the damaged property with the proceeds from the builder's risk policy. The Builder shall be responsible for all damages and necessary repairs whether or not the loss is covered by the builder's risk policy.

Alternatively, the Owner may elect to provide and directly pay for Builder's Risk insurance through Owner's statewide program.

19.2 Certificates of Insurance

Certificates of Insurance and/or evidence of insurance for all insurance required to be carried under this Article, together with certified copies of the insurance policies (including required endorsements), shall be filed with, and approved by, the Owner prior to commencement of the Work. The Certificates of Insurance shall be dated and show the name of the insurer, the number of the policy, its effective date, and its termination date. Owner will not issue a Notice to Proceed for the Work until Builder has complied with this Article. Builder shall not be entitled to an extension of time or to compensation which may result from delays in the issuance of a Notice to Proceed caused by its failure to provide the foregoing certificates and policies in a timely manner. Certificates of Insurance evidencing the renewal of all insurance required to be carried under this Article shall be provided to Owner at least thirty (30) days prior to the date each applicable insurance policy is scheduled to expire. Owner's review, inspection, or approval of Builder's insurance shall not relieve Builder of its responsibility for providing the insurance required hereby nor constitute a waiver of any such requirements.

19.3 Effect Of Insurance

Compliance with insurance requirements shall not relieve the Builder of any responsibility to indemnify the Owner for any liability to the Owner as specified in any other provision of the Contract for Construction, and the Owner shall be entitled to pursue any remedy in law or equity if the Builder fails to comply with the contractual provisions of the Contract for Construction. Indemnity obligations specified elsewhere in the Contract for Construction shall not be negated or reduced by virtue of any insurance carrier's (i) denial of insurance coverage for the occurrence or event which is the subject matter of the claim; or (ii) refusal to defend any named insured.

19.4 Waiver Of Subrogation

The Builder hereby releases and discharges the Owner and the Owner's Related Parties of and from all liability to the Builder, and to anyone claiming by, through or under the Builder, by subrogation or otherwise, on account of any loss or damage to tools, machinery, equipment or other property, however caused. The Builder shall cause its builder's risk property insurance company to issue a waiver of subrogation consistent with this provision.

ARTICLE 20 – GENERAL BOND REQUIREMENTS

20.1 General Bond Requirements

Recognizing the Project is a public project with a Construction Price which exceeds \$200,000, and as such is required to be bonded pursuant to 255.05, Florida Statutes, the Builder shall furnish Payment and Performance bonds on Owner's standard form covering the full and faithful performance of the Contract for Construction and the payment of obligations arising hereunder.

20.2 Requests for Copies of Bonds

Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract for Construction, the Builder shall promptly furnish a copy of the bonds or shall permit a copy to be made.

20.3 Delivery of Bonds

The Builder shall deliver required bonds and powers of attorney to the Owner prior to commencement of the Work.

ARTICLE 21 – OWNER’S RIGHT TO STOP WORK

21.1 Cease And Desist Order

If the Builder fails or refuses to perform or fails to correct defective Work as required, or persistently fails to carry out the Work in accordance with the Contract For Construction, the Owner may, by written notice, order the Builder to cease and desist in performing the Work or any portion of the Work until the cause for the order has been eliminated to the satisfaction of the Owner. Upon receipt of such instruction, the Builder shall immediately cease and desist as instructed by the Owner and shall not proceed further until the cause for the Owner’s order has been corrected, no longer exists, or the Owner instructs that the Work may resume.

21.1.1 The Builder shall not be entitled to an adjustment in the time for performance or the Construction Price under this clause since such stoppages are considered to be the fault of the Builder.

21.1.2 The right of the Owner to stop Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Builder or others.

21.1.3 In the event the Owner issues instructions to cease and desist, and in the further event that the Builder fails and refuses with seven calendar days to provide adequate assurance to the Owner that the cause of such instructions will be eliminated or corrected, then the Owner shall have the right, but not the obligation, to carry out the Work or any portion of the Work with its own forces, or with the forces of another builder, and the Builder shall be responsible for the cost of performing such Work by the Owner.

21.1.4 The rights set forth herein are in addition to, and without prejudice to, any other rights or remedies the Owner may have against the Builder.

ARTICLE 22 – TERMINATION OR SUSPENSION OF CONTRACT FOR CONSTRUCTION

22.1 Termination For Cause By Owner

22.1.1 The Owner may terminate the Contract for Construction for cause if the Builder materially breaches the Contract for Construction by:

- (i) refusing, failing or being unable to properly manage or perform on any Project;
- (ii) refusing, failing or being unable to supply the Project with sufficient numbers of workers, properly skilled workers, proper materials to maintain applicable schedules;

- (iii) refusing, failing or being unable to make prompt payment to subcontractors or suppliers;
- (iv) disregarding laws, ordinances, rules, regulations or orders of any public authority or quasi-public authority having jurisdiction over the Project;
- (v) refusing, failing or being unable to substantially perform in accordance with the terms of the Contract For Construction as determined by the Owner, or as otherwise defined elsewhere herein; or
- (vi) refusing, failing or being unable to substantially perform in accordance with the terms of any other agreement between the Owner and Builder.

22.1.2 Upon the occurrence of any of the events described in Paragraph 23.1.1, the Owner may give written notice to the Builder setting forth the nature of the default and requesting cure within seven calendar days from the date of notice. At any time thereafter, if the Builder fails to initiate the cure or if the Builder fails to expeditiously continue such cure until complete, the Owner may give written notice to the Builder of immediate termination, and the Owner, without prejudice to any other rights or remedies, may take any or all of the following actions:

- (i) complete all or any part of the Work, including supplying workers, material and equipment which the Owner deems expedient to complete the Work;
- (ii) contract with others to complete all or any part of the Work, including supplying workers, material and equipment which the Owner deems expedient to complete the Work;
- (iii) take such other action as is necessary to correct such failure;
- (vi) take possession of all materials, tools, construction equipment and machinery on the Site owned or leased by the Builder;
- (v) directly pay the Builder's subcontractors and suppliers compensation due to them from the Builder;
- (vi) finish the Work by whatever method the Owner may deem expedient; and
- (vii) require the Builder to assign the Builder's right, title and interest in any or all of Builder's subcontracts or orders to the Owner.

22.1.3 If the Owner terminates the Contract For Construction for cause, and the Owner takes possession of all materials, tools, construction equipment and machinery on the Site owned or leased by the Builder, the Builder's compensation shall be increased by fair payment, either by purchase or rental at the election of the Owner, for any materials, tools, construction equipment and machinery items retained, subject to the Owner's right to recover from the Builder the Owner's damages resulting from the termination.

22.1.4 If the Owner terminates the Contract for Construction for cause, and it is subsequently determined by a court of competent jurisdiction that such

termination was without cause, then in such event, said termination shall be deemed a termination for convenience as set forth in Paragraph 22.3.

22.2 Termination For Cause By Builder

22.2.1 The Builder may terminate the Contract for Construction for cause if the Owner materially breaches the Contract for Construction by:

- (i) refusing, failing or being unable to make prompt payment to the Builder without just cause;
- (ii) disregarding laws, ordinances, rules, regulations or orders of any public authority of quasi-public authority having jurisdiction over any Project; or refusing, failing or being unable to substantially perform in accordance with the terms of the Contract for Construction.

22.2.2 Upon the occurrence of any of the events described in Paragraph 22.2.1, the Builder may give written notice to the Owner setting forth the nature of the default and requesting cure within seven calendar days from the date of notice. If the Owner fails to cure the default within seven calendar days, the Builder, without prejudice to any rights or remedies, may give written notice to the Owner of immediate termination.

22.3 Termination Or Suspension For Convenience

The Owner may at any time give written notice to the Builder terminating the Contract for Construction or suspending the Project, in whole or in part, for the Owner's convenience and without cause. If the Owner suspends the Project for convenience, the Builder shall immediately reduce its staff, services and outstanding commitments in order to minimize the cost of suspension.

22.4 Builder's Compensation When Builder Terminates For Cause or Owner Terminates For Convenience

If the Contract for Construction is (i) terminated by the Builder pursuant to Paragraph 22.2; (ii) terminated by the Owner pursuant to Paragraph 22.3; or (iii) suspended more than three months by the Owner pursuant to Paragraph 22.3, the Owner shall pay the Builder specified amounts due for Work actually performed prior to the effective termination date and reasonable costs associated with termination. The Owner may agree to additional compensation, if any, due to the Builder. Absent agreement on the additional amount due the Builder, the Owner shall pay the Builder:

- (i) reasonable costs incurred in preparing to perform the terminated portion of the Work, and in terminating the Builder's performance, plus a fair and reasonable allowance for overhead and profit thereon (such profit shall not include anticipated profit or consequential damages); provided, however, that if it appears that the Builder would not have profited or would have sustained a loss if the Work had been completed, no profit shall be allowed or included, and the amount of compensation shall be reduced to reflect the anticipated rates of loss, if any; and

- (ii) reasonable costs of settling and paying claims arising out of the termination of subcontracts or supplier orders. These costs shall not include amounts paid in accordance with other provisions hereof.

22.5 Builder's Compensation When Owner Terminates For Cause

If the Contract for Construction is terminated by the Owner for cause pursuant to Paragraph 22.1, no further payment shall be made to the Builder until Final Completion of the Project. At such time, the Builder shall be paid the remainder of the Construction Price less all costs and damages incurred by the Owner as a result of the default of the Builder, including liquidated damages applicable thereto. The Builder shall additionally reimburse the Owner for any additional costs or expenses incurred.

22.6 Limitation On Termination Compensation

Irrespective of the reason for termination or the party terminating, the total sum paid to the Builder shall not exceed the Construction Price, as properly adjusted, reduced by the amount of payments previously made and penalties or deductions incurred pursuant to any other provision of the Contract for Construction, and shall in no event include duplication of payment.

22.7 Builder's Responsibility Upon Termination

Irrespective of the reason for termination or the party terminating, if the Contract for Construction is terminated, the Builder shall, unless notified otherwise by the Owner,

- (i) immediately stop work;
- (ii) terminate outstanding orders and subcontracts;
- (iii) settle the liabilities and claims arising out of the termination of subcontracts and orders; and
- (iv) transfer title and deliver to the Owner such completed or partially completed Work, and, if paid for by the Owner, materials, equipment, parts, fixtures, information and such contract rights as the Builder has.

22.8 Lack Of Duty To Terminate

The right to terminate or suspend the Work shall not give rise to a duty on the part of either the Owner or the Builder to exercise that right for the benefit of the Owner, the Builder or any other persons or entities.

22.9 Limitation On Termination Claim

If the Builder fails to file a claim within one year from the effective date of termination, the Owner shall pay the Builder only for services actually performed and expenses actually incurred prior to the effective termination date.

ARTICLE 23 – DISPUTE RESOLUTION

23.1 Mutual Discussion

In case of any dispute, claim, question or disagreement arising from or relating to the Project or arising out of the Contract for Construction or the breach thereof, the parties shall first attempt resolution through mutual discussion.

23.2 Facilitative Mediation

If the parties cannot resolve any dispute, claim, question, or disagreement arising from or relating to the Project or arising out of the Contract for Construction or the breach thereof through mutual discussion, as a condition precedent to any litigation or administrative action, the parties shall in good faith participate in private, non-binding facilitative mediation seeking a just and equitable solution satisfactory to all parties.

23.2.1 All parties to a mediation shall promptly provide all other parties to the mediation with copies of essential documentation relevant to the support or defense of the matter being mediated.

23.2.2 The parties shall not be required to mediate for a period greater than ninety-one calendar days unless otherwise agreed to in writing by the parties. The parties shall share equally any administrative costs and fees of such proceedings, but shall each be responsible for their own expenses otherwise incurred.

23.2.3 In the event that the statute of limitations would run during the required mediation period, either party may institute litigation so as to avoid the running of such statute upon the condition that such party immediately seek a stay of such litigation pending the conclusion of the mediation period.

23.2.4 During the course of mediation, any party to the mediation may apply for injunctive relief from any court of competent jurisdiction until the mediation period expires or the dispute is otherwise resolved.

23.2.5 The Owner, the Professional, the Builder, and any other parties involved in any way in the design or construction of the Project are bound, each to each other, by this requirement to mediate prior to commencement of any litigation or administrative action, provided that they have signed the Contract For Construction or an agreement that incorporates the Contract For Construction by reference or signed any other agreement which binds them to mediate. Each such party agrees that it may be joined as an additional party to a mediation involving other parties under any such agreement. In the case where more than one mediation is begun under any such agreement and any party contends that the mediations are substantially related, the mediations may be conducted by the mediator selected in the first mediation which was commenced.

23.2.6 The mediation shall be conducted in Alachua County, Florida, unless agreed otherwise by the parties.

23.3 Conflicting Dispute Resolution Provisions

Neither party to the Contract for Construction shall enter into any contract with regard to the Project which directly or indirectly gives the right to resolve any dispute with, involving, or affecting the other to any other person or legal entity which is in conflict with the dispute resolution procedures required by this Article.

23.4 Arbitration Preclusion

In case of a dispute relating to the Project, or arising out of the Contract for Construction, no party to the Contract for Construction shall be required to participate in or be bound by, any arbitration proceedings.

23.5 Performance During Dispute Resolution

The Owner and the Builder agree that pending the resolution of any dispute, controversy, or question, the Owner and the Builder shall each continue to perform their respective obligations without interruption or delay, and the Builder shall not stop or delay the performance of the Work.

23.6 Litigation/Administrative Action

Disputes, claims, questions or disagreements involving monetary claims of \$200,000.00 or less shall be conducted pursuant to, and under, the Administrative Procedures Act, Chapter 120 Florida Statutes. All other claims, disputes and other matters shall be determined under the judiciary system of the State of Florida.

ARTICLE 24 – DAMAGES AND REMEDIES

24.1 Builder's Repair

The Builder shall, at its expense, promptly correct, repair, or replace all goods, products, materials, systems, labor and services which do not comply with the warranties and guarantees set forth in the Contract for Construction, or any other applicable warranty or guarantee.

24.2 Builder's Reimbursement

The Builder shall promptly reimburse the Owner for any expenses or damages incurred by the Owner as a result of (i) the Builder's failure to substantially perform in accordance with the terms of the Contract for Construction; (ii) deficiencies or conflicts in the Construction Documents attributable to the Builder or of which the Builder was or should have been aware; (iii) breach of the warranties and guarantees set forth in the Contract for Construction or any other applicable warranty or guarantee; or (iv) other acts or omissions of the Builder.

24.3 General Indemnity

To the fullest extent permitted by law, the Builder shall secure, defend, protect, hold harmless, and indemnify the Owner and the Owner's Related Parties from and against any and all liability, loss, claims, demands, suits, costs, fees and expenses (including actual fees and expenses of attorneys, expert witnesses, and other consultants), by whomsoever brought or alleged, and regardless of the legal theories upon which premised, including, but not limited to, those actually or allegedly arising out of bodily injury to, or sickness or death of, any person, or property damage or destruction (including loss of use), which may be imposed upon, incurred by or asserted against the Owner allegedly or actually arising out of or resulting from the Builder's services, including without limitation any breach of contract or negligent act or omission (i) of the Builder; or (ii) of the Builder's subcontractors or suppliers, or (iii) of the agents, employees or servants of the Builder or its subcontractors or suppliers.

24.4 Intellectual Property Indemnity

To the fullest extent permitted by law, the Builder shall defend, protect, hold harmless, and indemnify the Owner and Owner's Related Parties from and against any and all liability, loss, claims, demands, suits, costs, fees and expenses (including actual fees and expenses of attorneys, expert witnesses, and other consultants), by whomsoever

brought or alleged, for infringement of patent rights, copyrights, or other intellectual property rights, except with respect to designs, processes or products of a particular manufacturer expressly required by the Owner or Professional(s) in writing. If the Builder has reason to believe the use of a required design, process or product is an infringement of a patent, the Builder shall be responsible for such loss unless such information is promptly given to the Owner.

24.5 Non-Exclusivity Of Owner's Remedies

The Owner's selection of one or more remedies for breach of the Contract for Construction contained herein shall not limit the Owner's right to invoke any other remedy available to the Owner under the Contract for Construction or by law.

24.6 Waiver Of Damages

The Builder shall not be entitled to, and hereby waives any monetary claims for or damages arising from or related to, lost profits, lost business opportunities, unabsorbed overhead or any indirect consequential damages.

ARTICLE 25 – MISCELLANEOUS PROVISIONS

25.1 Integration

The Contract For Construction represents the entire and integrated agreement between the Owner and the Builder, and supersedes all prior negotiations, representations or agreements, either written or oral, for the Project. The Contract for Construction may be amended only by written instruments signed by both the Owner and the Builder.

25.2 Severability

If any provision of the Contract For Construction, or the application thereof, is determined to be invalid or unenforceable, the remainder of that provision and all other provisions shall remain valid and enforceable.

25.3 Waiver

No provision of the Contract For Construction may be waived except by written agreement of the parties. A waiver of any provision on one occasion shall not be deemed a waiver of that provision on any subsequent occasion, unless specifically stated in writing. A waiver of any provision shall not affect or alter the remaining provisions of the Contract For Construction.

25.4 Strict Compliance

No failure of the Owner to insist upon strict compliance by the Builder with any provision of the Contract For Construction shall operate to release, discharge, modify, change or affect any of the Builder's obligations.

25.5 Third-Party Beneficiaries

The Contract For Construction shall inure solely to the benefit of the parties hereto and their successors and assigns, and, except as otherwise specifically provided in the Contract for Construction, nothing contained in the Contract for Construction is intended to or shall create a contractual relationship with, or any rights or cause of action in favor of, any third party against either the Owner or the Builder.

25.6 Assignment of Anti-Trust Claims

In consideration for the Contract for Construction, the Builder hereby conveys, sells, assigns and transfers to the Owner all of its right, title and interest in and to any and all causes of action it may now have or may hereafter acquire under the antitrust laws of the United States and the State of Florida for price fixing, relating to the goods or services purchased or acquired by the Owner under the Contract for Construction.

25.7 Drug Free and Tobacco-Free Workplace

If required pursuant to 440.102(15), Florida Statutes, Builder shall implement, and cause its applicable subcontractors to implement, a drug-free workplace program. Further, the Builder shall enforce the Owner's tobacco-free policy.

25.8 Survival

All provisions of the Contract For Construction which contain continuing obligations shall survive its expiration or termination.

25.9 Independent Contractor

Builder is an independent contractor to Owner.

SECTION 01 014
BUILDER'S USE OF THE PREMISES

PART 1 - GENERAL

1.1 RELATED SECTIONS

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

1.2 DESCRIPTION OF WORK INCLUDED

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

1.3 QUALITY ASSURANCE

- A. Promptly upon award of the Contract, notify all pertinent personnel regarding requirements of this Section.
- B. Require that all personnel who will enter upon the University's property certify their awareness of and familiarity with the requirements of this Section.
- C. Builder shall strictly enforce the University's **Tobacco Free** policy.

1.4 TRANSPORTATION FACILITIES

- A. See section 01500 for information on the maintenance of safe and accessible paths of travel in and around the job site.
- B. Builder's Vehicles:
 - 1. Require Builder's vehicles, vehicles belonging to employees of the Builder, and all other vehicles entering upon the Owner's property in performance of the Work of the Contract, to use only agreed upon Access Route.

2. 2. All vehicles parked on campus (including construction sites) must have a valid parking permit issued through Transportation and Parking Services in accordance with University of Florida Police Department (UFPD) requirements. Permits – both for offsite and approved onsite parking – shall be requested through the University Project Manager.
3. Within the University approved fenced-in construction site area, the Builder shall manage all site use, including parking by construction staff and employees (if approved). Do not permit vehicles to park on any street or other area of the Owner's property except in areas designated by the University.
4. Outside the designated construction site area, all University regulations regarding parking and accommodations for pedestrian use shall be strictly enforced.
5. Exceptions for temporary parking for construction delivery and construction access on curb side, walkways, vehicular parking, roadways and service drives that restricts or impedes normal traffic flow or use must be obtained from UF Transportation & Parking Services through the University Project Manager. This exception is granted only for construction vehicles, not for private passenger vehicles. Any temporary use of pedestrian pathways that exceeds 24 hours duration will require provision for equal alternate pathways around the impediments and UFPD review. In addition, any temporary use of the site (exceeding 24 hours duration) that impedes building occupant egress must be reviewed by UF Environmental Health & Safety (EH&S).
6. The University Project Managers shall not seek waivers of any sort for ticketed and towed vehicles in violation of the University parking regulations. Knowledge of the University Parking Regulations is the personal responsibility every individual who commutes to and works on campus.
7. Provide adequate protection for curbs and sidewalks over which trucks and equipment must pass to reach the job site.

1.5 INSPECTIONS and TESTS

- A. Physical Plant Division (PPD) inspections shall be requested 48 hours in advance through PPD Operations Engineering. The inspection request form and supporting checklists can be found on the “Forms & Standards” page of the Facilities Planning & Construction website (www.facilities.ufl.edu). Inspection checklists shall be tailored by the Owner and Builder to the specific requirements of the project.
- B. Environmental Health & Safety (EH&S) inspections shall be requested 24 hours in advance. Also see section 01060.
- C. Office of Information Technology (OIT): Contact Telecommunications and Infrastructure (TNI) 24-48 hours in advance to request inspections for all telecom, cabling, and network infrastructure work. The inspection checklist – with notification timeframes and contact information – can be found on the “Forms & Standards” page of the Facilities Planning & Construction website (www.facilities.ufl.edu).
- D. HealthNet: For Health Science Center projects only, contact HealthNet 24-48 hours in advance to request inspections for all telecom, cabling, and network infrastructure work. The inspection checklist – with notification timeframes and contact information – can be found on the “Forms & Standards” page of the Facilities Planning & Construction website (www.facilities.ufl.edu).

- E. Office of Academic Technology (OAT): Where applicable, contact OAT 48 hours or more in advance to request inspections for all work related to classroom audio/visual systems. The inspection checklist – with notification timeframes and contact information – can be found on the “Forms & Standards” page of the Facilities Planning & Construction website (www.facilities.ufl.edu).
- F. University of Florida Police Department (UPD): UPD must verify construction fencing, exterior lighting, landscaping, and other items during construction and closeout. The UPD checklist – with notification timeframes and contact information – can be found on the “Forms & Standards” page of the Facilities Planning & Construction website (www.facilities.ufl.edu).
- G. State Fire Marshal inspections – see section 01060.
- H. State Elevator Inspector inspections – see technical specifications.
- I. Tests
 - 1. The Builder shall notify PPD and EH&S of all scheduled tests at least 48 hours in advance.
 - 2. Properly completed test reports shall be provided at the conclusion of each test. It is the responsibility of the Builder to maintain such reports through Final Completion, at which point they shall be submitted with other closeout materials, such as Operation & Maintenance manuals.

1.6 SECURITY

- A. Restrict the access of all persons entering upon the Owner's property in connection with the Work to the access route and to the actual site of the Work.
- B. Restrict activities of employees to authorized areas. Employees shall not be allowed to mingle in student or public areas.
- C. The Builder shall at all times guard against damage or loss to the property of the University or other vendors or contractors and shall be held responsible for replacing or repairing any such loss or damage. The University may withhold payment or make such deductions as deemed necessary to insure reimbursement or replacement for loss or damaged property through negligence of the successful bidder or his agents. Replace any trees, shrubs, lawns, or plantings damaged by Builder or its subcontractors or vendors during work of this project within two (2) weeks of occurrence. Grassed areas generally have irrigation systems below grade; verify location of these systems and all underground utilities in work or staging areas prior to start of construction. Repair utilities damaged by work of this project.
- D. For renovations or additions to existing buildings, the Builder shall provide identification tags with photos for all personnel working on the site and shall require continuous use (wearing) of same at all times.

1.7 UNIVERSITY of FLORIDA POLICE DEPARTMENT (UFPD) REQUIREMENTS

- A. The following requirements are to be met by Builders and their subcontractors and vendors while engaged in construction projects at the University of Florida. Any construction site located on the University of Florida campus comes under the jurisdiction of the UFPD. Any incident requiring police service should be reported to the UFPD immediately (352-392-1111).
- B. All employers are prohibited from allowing employees to work on campus who have been convicted of violent crimes.
- C. Construction employers are required to take adequate measures to ensure that the employees they send to work on campus are not wanted for criminal offenses.
- D. All Builders who employ Work Release Program employees shall be listed with the UFPD.
- E. All Builders are to provide the UFPD with a list of the names and telephone numbers of supervisors in charge of construction at the site.
- F. Construction firms and employees are to park their business and personal vehicles in authorized areas only.
- G. Parking permits are required for all personal and business vehicles.
- H. When Builders are fencing allotted compounds the responsible person should contact the UFPD for special requirements prior to fencing completion. See Section 01500 for specific requirements related to signage and fencing.
- I. Employees are not permitted to enter University buildings unless it is directly related to their job duties and must remain on job sites.
- J. Builders and employees are to obey all laws as well as rules of the University of Florida when they are on University property.
- K. Students, Faculty, and Staff of the University of Florida are not to be disturbed or in any way disrupted in their lawful pursuits. Construction employees are to refrain from any unsavory or unwanted comments towards students, particularly female students.
- L. Builders and employees are requested to secure all property as much as feasible to reduce theft or damage to equipment or property. Builders are expected to work with the UFPD and participate in Crime Prevention efforts.
- M. Each Builder is to advise the UFPD if they cater food to be delivered to the construction site for employees. A copy of the contract shall be provided to the UFPD.
- N. Construction companies are required to submit the names and dates of birth of all employees – **including temporary “day laborers”** – to the University of Florida Police Department (c/o Special Events Coordinator), Building 27, UFPD, Museum Road, Gainesville, FL 32611 (fax 352-392-0539). Periodic updates are required as employees are employed or terminated.

1.8 WORK HOURS

- A. Regular work hours shall be between 7:00 AM and 5:00 PM, Monday through Friday, excluding holidays.
- B. Work outside these hours must be requested in writing and approved by the Owner.

1.9 HOME FOOTBALL GAME WEEKENDS

- A. Approximately 100,000 people converge upon the campus on each of 6-7 Fall weekends for Gator football games. To safeguard both the public and the Work, jobsites on campus shall be secured, left clean, and free of safety hazards by 4:00 PM Friday on such weekends, with no work taking place on or around the site until Monday morning.
- B. Likewise, remove all vehicles parked at the paved remote lot near the 34th Street Hilton by 4:00 PM Friday on such weekends and do not permit parking there again until Monday morning.
- C. See www.gatorzone.com for the football game schedule and incorporate these dates into the construction schedule.
- D. The Builder may request special exceptions to this policy with written justification at least one week in advance, but the Owner is under no obligation to approve such requests.

1.10 PRE-CONSTRUCTION MEETING

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

END OF SECTION

SECTION 01 016

UTILITIES OUTAGES AND DIG PERMITS

PART 1 - GENERAL

1.1 RELATED SECTIONS

- A. Documents affecting the work of this Section include other elements of the Contract for Construction, including the Owner/Builder Agreement or Owner/Design-Builder Agreement, the General Terms & Conditions, other sections of the Division 0 and Division 1 non-technical specifications, and the technical plans and specifications.
- B. Refer to Section 01310, Construction Schedule for related requirements regarding the coordination of utility outages with the University of Florida Schedule.

1.2 UTILITIES OUTAGES

- A. Planned utility outages are occasionally required for repairs, maintenance or construction. In order to avoid unexpected inconveniences, property damage, safety hazards, or loss of information or research, the Physical Plant Division (PPD) has instituted a utility outage notification system.
- B. When the Work requires an outage, the Builder shall submit – at least seven (7) work days in advance – a written request to PPD via the University Project Manager on an Owner-furnished form. Outages shall not proceed until authorized by PPD.
- C. Utility outages will be performed by PPD Systems personnel, at no cost to the Builder. The project will pay the applicable costs. However, the costs associated with an outage that becomes necessary to correct deficient work performed during a previous outage will be back-charged to the Builder. Contact PPD Operations Engineering (Telephone: 392-5050) as necessary to determine these costs.
- D. Unplanned utility outages occur on occasion as the unwelcome result of repair, maintenance, or construction activities. Report all unplanned utility outages immediately to the PPD Work Management Center (Telephone: 392-1121) and the University Project Manager.
- E. Advance notification of between 14 and 30 calendar days must be provided to the Health Science Center, Department of Housing, and IFAS for significant outages effecting facilities operated by those entities.

1.3 DIG PERMITS

- A. All trenching, excavation, digging operations, or other penetration of the ground within the confines of the University campus or in any area for which the University has

responsibility, requires the Builder to obtain a Dig Permit, PPD Form 611, which can be retrieved from the PPD website at www.ppd.ufl.edu.

- B. The person, Builder, agency, or organization that will be performing the trenching, excavation, digging, or other ground-penetrating activity is responsible for requesting and obtaining permission to perform that activity.
- C. All Dig Permits shall be applied for 72 hours prior to the start of any work that penetrates the ground. Dig Permit applications shall be completed at PPD, Building 702.
- D. Sunshine State One-Call (800-432-4770) shall be utilized for utilities owned by others, including BellSouth, Cox Cable, and Gainesville Regional Utilities (GRU).

END OF SECTION

SECTION 01 060

REGULATORY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED SECTIONS

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

1.2 BUILDING CODE ENFORCEMENT PROGRAM

- A. Florida statutes (240.209 and 553.80(6) F.S.) and associated regulations (Rule 6C-14020(2) F.A.C.) assign responsibility to the State University System for building code enforcement during building construction and renovation at State universities. At the University of Florida, the Environmental Health and Safety Division (EH&S) has been assigned the responsibility to implement and administer the Building Code Permit and Inspection Program. Program compliance requires that construction plans and specifications be submitted for review by the Building Code Administrator (EH&S) and that construction not begin on the project until a building permit has been issued.
- B. A more complete description of the University of Florida's Building Code Enforcement Program may be obtained from the University's Building Code Administrator. EH&S Building Code Enforcement Building 179, P.O. Box 112200, Gainesville, FL, 32611-2200 Phone: (352) 392-1904; Fax (352) 392-6367 Internet: www.ehs.ufl.edu
- C. **RESPONSIBILITIES**
 - 1. The Builder shall apply to the UF Division of Environmental Health & Safety for a building permit. At the time of application for a permit, the Builder shall provide two sets of signed and sealed construction documents and specifications, a list of all subcontractors with appropriate license numbers, and the "letter of code compliance" indicating the plans have been reviewed by EH&S and all outstanding items have been resolved. If a "letter of code compliance" has not been issued by EH&S, two copies of the final bid construction documents and specifications must accompany the application. A building permit will be issued after these items have been reviewed and approved by the Building Code Administrator. One of the submitted sets of plans and specifications will be returned with the building permit and shall be stamped by EH&S stating "Reviewed for Code Compliance." This set of documents shall be kept on site for use by the inspectors.
 - 2. When the Builder believes the project is complete, the Builder shall request that a certificate of completion or certificate of occupancy be issued.

1.3 STATE FIRE MARSHAL (SFM) INSPECTIONS

- A. In keeping State law (F.S. 633.085), the Division of State Fire Marshal will inspect UF projects during construction, renovation, or alteration – and prior to occupancy – to ascertain compliance with the uniform fire-safety standards.
- B. Underground Fire Main Visit. If applicable, this site visit is required before backfilling the open trench and covering the supply piping. The inspector will verify the underground installation is in compliance and witness the required pressure and flush test(s). Requests for these inspections go directly from the Builder to the onsite SFM inspector at least two work days prior to the desired date of inspection.
- C. Most projects will require two major SFM inspections, each of which shall be requested by the Builder at least two weeks prior to the desired date of inspection. The Builder shall make such request to the University Project Manager, who coordinates with EH&S to schedule the SFM inspections.
- D. The first inspection shall occur prior to the placement of any hard surface finishes, such as drywall, plaster, or hard ceilings, which would obscure any fire sprinkler piping and related products.
- E. A final inspection is required prior to building occupancy. In order for a final inspection to occur the following items must be complete:
 - 1. The fire alarm system is completely installed, tested, tagged, and certified in accordance with NFPA 72 requirements.
 - 2. The fire sprinkler system is complete and has been hydrostatically tested, flushed and tagged in accordance with NFPA 13.
 - 3. The fire pump installation is complete and the pump has been certified in accordance with NFPA 20 requirements.
 - 4. All emergency and exit lights have been installed and tested.
 - 5. All fire doors, required exit hardware, magnetic door locks, and latching hardware has been installed and is in proper working order.
 - 6. All required emergency signage shall be installed.
 - 7. All portable fire extinguishers, pre-engineered fire suppression systems, and kitchen hoods have been installed and inspected by the installing subcontractor.
- F. See the **State Fire Marshal Services Guide** under “Forms & Standards” on the Facilities Planning & Construction website (www.facilities.ufl.edu) for more information.

1.4 FLORIDA PRODUCT APPROVAL

As required by Florida Statutes, the Builder shall provide information on certain structural and building envelope products and components. See “Florida Product Approval Info Sheet” on the “Forms” page of the EH&S Building Code Enforcement website (www.ehs.ufl.edu/buildcode)

END OF SECTION

SECTION 01 310

CONSTRUCTION SCHEDULES

PART 1 - GENERAL

1.1 RELATED SECTIONS

- A. Documents affecting the work of this Section include other elements of the Contract for Construction, including the Owner/Builder Agreement or Owner/Design-Builder Agreement, the General Terms & Conditions, other sections of the Division 0 and Division 1 non-technical specifications, and the technical plans and specifications.
- B. Refer to Section 01016, Utility Outages, for related requirements regarding the preplanning of utility outages.
- C. Comply with pertinent provisions of Section.

1.2 QUALITY ASSURANCE

- A. Employ, if necessary, a scheduler who is thoroughly trained and experienced in compiling construction schedules, and in preparing and issuing periodic reports as required.

PART 2 - PRODUCTS

2.1 CONSTRUCTION ANALYSIS

- A. Graphically show by bar chart the order and interdependence of all activities necessary to complete the Work, and the sequence in which each activity is to be accomplished, as planned by the Builder in coordination with all subcontractors whose work is shown on the diagram.
- B. Highlight the "critical path" through the schedule to illustrate those inter-dependent activities that cannot be delayed without impacting the overall completion time.
- C. Builder shall coordinate the Work with the University of Florida schedule. The Work shall be scheduled and carried out such that the normal operations of the University are given first priority. This applies particularly to outages of utilities and restrictions of access. The University may require such construction operations to be executed outside of normal working hours and by overtime, weekend, and holiday working. It shall be the Builder's responsibility to provide for this in the Cost of Work.
- D. See Section 01014 for information on home football game restrictions, and account for same in the construction schedule.

- E. Incorporate commissioning requirements and milestones.
- F. Provide amplifying information as needed, such as reports on “float,” or as requested by the Owner or Professional.

END OF SECTION

SECTION 01 340

SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.
- B. Related Requirements:
 - 1. Section 013200 "Construction Progress Documentation" for submitting schedules and reports, including Contractor's construction schedule.
 - 2. Section 017823 "Operation and Maintenance Data" for submitting operation and maintenance manuals.
 - 3. Section 017839 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
 - 4. Section 017900 "Demonstration and Training" for submitting video recordings of demonstration of equipment and training of Owner's personnel.

1.2 DEFINITIONS

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

1.3 ACTION SUBMITTALS

- A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect and Construction Manager and additional time for handling and reviewing submittals required by those corrections.

1.4 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

- A. Architect's Digital Data Files: Electronic copies of digital data files of the Contract Drawings will be provided by Architect for Contractor's use in preparing submittals.

1. Architect will furnish Contractor one set of digital data drawing files of the Contract Drawings for use in preparing Shop Drawings and Project record drawings.
 - a. Architect makes no representations as to the accuracy or completeness of digital data drawing files as they relate to the Contract Drawings.
 - b. Contractor shall execute a data licensing agreement in the form of AIA Document C106, Digital Data Licensing Agreement.
- B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a. Architect and Construction Manager reserve the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
 1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Construction Manager will advise Contractor when a submittal being processed must be delayed for coordination.
 2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
 3. Resubmittal Review: Allow 15 days for review of each resubmittal.
- D. Paper Submittals: Place a permanent label or title block on each submittal item for identification.
 1. Indicate name of firm or entity that prepared each submittal on label or title block.
 2. Provide a space approximately 6 by 8 inches on label or beside title block to record Contractor's review and approval markings and action taken by Architect and Construction Manager.
 3. Include the following information for processing and recording action taken:
 - a. Project name.
 - b. Date.
 - c. Name of Architect.
 - d. Name of Construction Manager.
 - e. Name of Contractor.
 - f. Name of subcontractor.
 - g. Name of supplier.

- h. Name of manufacturer.
 - i. Submittal number or other unique identifier, including revision identifier.
 - 1) Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 061000.01.A).
 - j. Number and title of appropriate Specification Section.
 - k. Drawing number and detail references, as appropriate.
 - l. Location(s) where product is to be installed, as appropriate.
 - m. Other necessary identification.
4. Additional Paper Copies: Unless additional copies are required for final submittal, and unless Architect or Construction Manager observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.
- a. Submit one copy of submittal to concurrent reviewer in addition to specified number of copies to Architect and Construction Manager.
5. Transmittal for Paper Submittals: Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect and Construction Manager will discard submittals received from sources other than Contractor.
- a. Transmittal Form for Paper Submittals: Use CSI Form 12.1A.
 - b. Transmittal Form for Paper Submittals: Provide locations on form for the following information:
 - 1) Project name.
 - 2) Date.
 - 3) Destination (To:).
 - 4) Source (From:).
 - 5) Name and address of Architect.
 - 6) Name of Construction Manager.
 - 7) Name of Contractor.
 - 8) Name of firm or entity that prepared submittal.
 - 9) Names of subcontractor, manufacturer, and supplier.
 - 10) Category and type of submittal.
 - 11) Submittal purpose and description.
 - 12) Specification Section number and title.
 - 13) Specification paragraph number or drawing designation and generic name for each of multiple items.
 - 14) Drawing number and detail references, as appropriate.
 - 15) Indication of full or partial submittal.
 - 16) Transmittal number, numbered consecutively.
 - 17) Submittal and transmittal distribution record.
 - 18) Remarks.
 - 19) Signature of transmitter.

E. Electronic Submittals: Identify and incorporate information in each electronic submittal file as follows:

1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
2. Name file with submittal number or other unique identifier, including revision identifier.
 - a. File name shall use project identifier and Specification Section number followed by a decimal point and then a sequential number (e.g., LNHS-061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., LNHS-061000.01.A).
3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Architect and Construction Manager.
4. Transmittal Form for Electronic Submittals: Use software-generated form from electronic project management software acceptable to Owner, containing the following information:
 - a. Project name.
 - b. Date.
 - c. Name and address of Architect.
 - d. Name of Construction Manager.
 - e. Name of Contractor.
 - f. Name of firm or entity that prepared submittal.
 - g. Names of subcontractor, manufacturer, and supplier.
 - h. Category and type of submittal.
 - i. Submittal purpose and description.
 - j. Specification Section number and title.
 - k. Specification paragraph number or drawing designation and generic name for each of multiple items.
 - l. Drawing number and detail references, as appropriate.
 - m. Location(s) where product is to be installed, as appropriate.
 - n. Related physical samples submitted directly.
 - o. Indication of full or partial submittal.
 - p. Transmittal number, numbered consecutively.
 - q. Submittal and transmittal distribution record.
 - r. Other necessary identification.
 - s. Remarks.
5. Metadata: Include the following information as keywords in the electronic submittal file metadata:
 - a. Project name.
 - b. Number and title of appropriate Specification Section.
 - c. Manufacturer name.
 - d. Product name.

F. Options: Identify options requiring selection by Architect.

- G. Deviations: Identify deviations from the Contract Documents on submittals.
- H. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
 - 1. Note date and content of previous submittal.
 - 2. Note date and content of revision in label or title block and clearly indicate extent of revision.
 - 3. Resubmit submittals until they are marked with approval notation from Architect's and Construction Manager's action stamp.
- I. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- J. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's and Construction Manager's action stamp.

PART 2 - PRODUCTS

2.1 SUBMITTAL PROCEDURES

- A. General Submittal Procedure Requirements:
 - 1. Post electronic submittals as PDF electronic files directly to Project Web site specifically established for Project.
 - a. Architect, through Construction Manager, will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.
 - 2. Action Submittals: Submit 6 paper copies of each submittal unless otherwise indicated. Architect, through Construction Manager, will return two copies.
 - 3. Informational Submittals: Submit four paper copies of each submittal unless otherwise indicated. Architect and Construction Manager will not return copies.
 - 4. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
 - a. Provide a digital signature with digital certificate on electronically-submitted certificates and certifications where indicated.
 - b. Provide a notarized statement on original paper copy certificates and certifications where indicated.
- B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.

1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
 2. Mark each copy of each submittal to show which products and options are applicable.
 3. Include the following information, as applicable:
 - a. Manufacturer's catalog cuts.
 - b. Manufacturer's product specifications.
 - c. Standard color charts.
 - d. Statement of compliance with specified referenced standards.
 - e. Testing by recognized testing agency.
 - f. Application of testing agency labels and seals.
 - g. Notation of coordination requirements.
 - h. Availability and delivery time information.
 4. For equipment, include the following in addition to the above, as applicable:
 - a. Wiring diagrams showing factory-installed wiring.
 - b. Printed performance curves.
 - c. Operational range diagrams.
 - d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
 5. Submit Product Data before or concurrent with Samples.
 6. Submit Product Data in the following format:
 - a. PDF electronic file.
- C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
 - a. Identification of products.
 - b. Schedules.
 - c. Compliance with specified standards.
 - d. Notation of coordination requirements.
 - e. Notation of dimensions established by field measurement.
 - f. Relationship and attachment to adjoining construction clearly indicated.
 - g. Seal and signature of professional engineer if specified.
 2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches, but no larger than 30 by 42 inches.
 3. Submit Shop Drawings in the following format:
 - a. PDF electronic file.

- D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.
1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
 2. Identification: Attach label on unexposed side of Samples that includes the following:
 - a. Generic description of Sample.
 - b. Product name and name of manufacturer.
 - c. Sample source.
 - d. Number and title of applicable Specification Section.
 3. For projects where electronic submittals are required, provide corresponding electronic submittal of Sample transmittal, digital image file illustrating Sample characteristics, and identification information for record.
 4. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
 - a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
 - b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
 5. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
 - a. Number of Samples: Submit one full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect, through Construction Manager, will return submittal with options selected.
 6. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
 - a. Number of Samples: Submit three sets of Samples. Architect and Construction Manager will retain two Sample sets; remainder will be returned. Mark up and retain one returned Sample set as a project record sample.

- 1) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.
- E. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
1. Submit product schedule in the following format:
 - a. PDF electronic file.
- F. Coordination Drawings Submittals: Comply with requirements specified in Section 013100 "Project Management and Coordination."
- G. Contractor's Construction Schedule: Comply with requirements specified in Section 013200 "Construction Progress Documentation."
- H. Application for Payment and Schedule of Values: Comply with requirements specified in Section 012900 "Payment Procedures."
- I. Test and Inspection Reports and Schedule of Tests and Inspections Submittals: Comply with requirements specified in Section 014000 "Quality Requirements."
- J. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Section 017700 "Closeout Procedures."
- K. Maintenance Data: Comply with requirements specified in Section 017823 "Operation and Maintenance Data."
- L. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.
- M. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.
- N. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
- O. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
- P. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.

- Q. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
- R. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
- S. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
- T. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project.
- U. Schedule of Tests and Inspections: Comply with requirements specified in Section 014000 "Quality Requirements."
- V. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
- W. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
- X. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
- Y. Design Data: Prepare and submit written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

2.2 DELEGATED-DESIGN SERVICES

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
 - 1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.

- B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF electronic file and three paper copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
 - 1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

- A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect and Construction Manager.
- B. Project Closeout and Maintenance Material Submittals: See requirements in Section 017700 "Closeout Procedures."
- C. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 ARCHITECT'S AND CONSTRUCTION MANAGER'S ACTION

- A. General: Architect and Construction Manager will not review submittals that do not bear Contractor's approval stamp and will return them without action.
- B. Action Submittals: Architect, and Construction Manager will review each submittal, make marks to indicate corrections or revisions required, and return it. Architect, and Construction Manager will stamp each submittal with an action stamp and will mark stamp appropriately to indicate:
 - 1. Approved
 - 2. Approved as noted
 - 3. Revise and Resubmit
- C. Informational Submittals: Architect, and Construction Manager will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect and Construction Manager will forward each submittal to appropriate party.
- D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.

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

END OF SECTION

SECTION 01 500

TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED SECTIONS

- A. Documents affecting the work of this Section include other elements of the Contract for Construction, including the Owner/Builder Agreement or Owner/Design-Builder Agreement, the General Terms & Conditions, other sections of the Division 0 and Division 1 non-technical specifications, and the technical plans and specifications.
- B. Utility outages and dig permits are covered in Section 01016. Permanent installation and hookup of the utility lines are described in other sections.

1.2 DESCRIPTION

A. WORK INCLUDED

Provide temporary facilities and controls needed for the Work, including, but not necessarily limited to:

- 1. Temporary utilities such as water, electricity, and telephone;
- 2. Field offices and sanitary facilities for the Builder's personnel;
- 3. Enclosures such as tarpaulins, barricades, and canopies; traffic control and pedestrian control devices;
- 4. Erosion control measures; and
- 5. Directional and informational signage.

B. WORK NOT INCLUDED

- 1. Except for the requirement that equipment furnished by subcontractors shall comply with pertinent safety regulations, such equipment as normally furnished by the individual trades in execution of their own portions of the Work, is not part of this Section.
- 2. The permanent installation and hookup of utility lines are described in other sections and are not part of this Section except as related to the metered cost of such utilities once established.

1.3 PRODUCT HANDLING

Maintain temporary facilities and controls in proper and safe condition throughout progress of the Work.

1.4 SUBMITTALS

- A. The Builder shall present a jobsite management plan in the form of a scaled, marked-up site plan for the Owner's review at or prior to the Pre-Construction Conference. This drawing shall identify, at a minimum:
 - 1. Temporary fencing with gated point(s) of access
 - 2. Materials delivery & storage areas
 - 3. Field office or storage trailers
 - 4. Temporary accessibility features including paved or unpaved roads, sidewalks, bicycle paths, ramps, curb cuts, canopies, barricades, or other means of maintaining safe and ADA-accessible routes through or around the site
 - 5. Waste collection (dumpsters)
 - 6. Signage and striping
 - 7. Paths for emergency egress
 - 8. Onsite staff parking
 - 9. Tree protection
 - 10. Restricted access routes for vehicles and equipment belonging to the Builder and its subcontractors, vendors, and employees entering upon the UF Campus
- B. As construction progresses, the Builder shall identify any required disruptions or restrictions of roads, sidewalks, bicycle lanes, or other means of access. Approval for such disruptions shall be secured prior to scheduling related work by submitting a written request to the University project manager. This request shall be accompanied by a site sketch, start and end dates, an explanation of the reasons(s) for the request, and an illustration or description of the temporary controls to be used to maintain safe access. **THE FULL CLOSING OF VEHICULAR ROADS (i.e., all lanes) ON THE UF CAMPUS SHALL NOT BE PERMITTED.**
- C. A formal traffic control plan – including credentials of plan developer – shall be submitted for review when lane closures are anticipated. See paragraph 3.1 of this section.

PART 2 - PRODUCTS

2.1 TEMPORARY UTILITIES

- A. USAGE, ESTABLISHMENT, and COST
 - 1. The Builder shall include in the Cost of Work both the installation of any temporary utilities and the (monthly) usage fees for same. This includes, but is not limited to: potable water for drinking and/or construction trailers; water for cleaning, construction, flushing, commissioning, and testing of plumbing and mechanical systems; convenience power for tools, lighting, and/or construction

trailers; temporary power for construction and testing; telecommunications lines for phone, fax, or Internet service. Current PPD utility rates can be viewed at www.ppd.ufl.edu/currentrates.htm.

2. For use of University-owned utilities, the Builder shall establish a work order with billing account information, with PPD Work Management (392-1121).
3. Prior to beginning work that involves connections to the University's utilities systems, the Builder shall submit – at least 48 hours in advance – a work request to PPD Work Management (392-1121) for installation of temporary meter(s) by PPD Utility Services.

B. WATER

1. The point(s) of connection shall be designated by PPD.
2. A temporary potable water meter will be furnished and installed by PPD Utility Services. Allow 14 days lead time for the Owner-furnished meter. The Builder shall furnish and install all necessary related accessories.
3. Builder shall furnish and install all necessary temporary piping and water supply and, upon completion of the Work, remove same.

C. ELECTRICITY

1. The point(s) of connection shall be designated by PPD.
2. A temporary electric meter will be furnished and installed by PPD Utility Services, which shall also energize service. Allow 14 days lead time for the Owner-furnished meter. The Builder shall furnish and install all necessary related accessories (CTs, compatible meter socket/can, etc.).
3. Builder shall furnish and install all necessary temporary wiring and, upon completion of the Work, remove same.
 - a. All temporary wiring provided by the Builder must conform to the requirements of the National Electric Code (NEC), the Industrial Safety Commission, and local requirements. In addition, all wire used shall be fused to adequately protect that wire according to the NEC.
 - b. The Builder shall have an adequate number of outlets and each outlet shall be properly and clearly labeled with the maximum voltage and fuse protection.
 - c. Where temporary lighting is used, outlets shall consist of a weatherproof socket properly insulated and provided with a locking type wire guard.
 - d. All devices shall be properly grounded.
4. Provide area distribution boxes located such that the individual trades may furnish and use extension cords 100 feet in length (maximum) to obtain power and lighting at points where needed for work, inspection, and safety.
5. Temporary electric facilities shall be inspected and approved by PPD and EH&S prior to energizing by PPD Utility Services.
6. In keeping with UF sustainability policies, and to minimize the cost of utility services, the Builder shall minimize the use of temporary or permanent lighting, particularly when the jobsite is inactive. The use of energy efficient lamps is encouraged if the energy savings justifies any additional expense.

D. TELEPHONE and INTERNET

1. The Builder shall make arrangements with the Office of Information Technology (OIT) or HealthNet – as applicable – or the local utility for temporary phone, fax, and/or Internet service lines.

E. SANITARY FACILITIES

1. Furnish and install temporary sanitary facilities for use by all construction personnel.
2. The Builder shall provide and maintain in a neat and sanitary condition such accommodations for the use of employees and subcontractors as may be necessary to comply with the regulations of the State Board of Health.
3. Unless expressly allowed by the Owner, existing sanitary facilities may not be used by construction personnel, subcontractors, or vendors.

2.2 PERMANENT (BUILDING) UTILITIES

Once permanent power, chilled water, and other permanent metered utilities are established, the cost of such utilities shall be borne by the Builder as a cost of the Work. Utility services will not be provided until new meters are installed and certified to be operating properly by PPD Utility Services.

2.3 FIELD OFFICES AND SHEDS

- A. TRAILERS – Office and Storage
1. Provide stairs and railings as required by OSHA.

2.4 ENCLOSURES

- A. GENERAL: Provide and maintain for the duration of construction all scaffolds, tarpaulins, canopies, steps, platforms, bridges, and other temporary construction necessary for proper completion of the Work in compliance with pertinent safety and other regulations.
- B. DUMPSTER ENCLOSURES: For all projects requiring dumpsters, where the dumpster is located within the geographical area of campus bounded by SW 13th Street, West University Avenue, Gale Lemerand Drive, and Stadium Road, the dumpster shall be enclosed by a solid wooden fence installed around the entire perimeter. This fence shall be a minimum of 6' high and shall be constructed of vertical 1 x 6's on a 2 x 4 frame. Pre-fabricated sections are acceptable.
- C. TREE PROTECTION: See tree protection guidelines, Appendix I, University of Florida Construction Standards, Volume 1.

2.5 TEMPORARY FENCING

- A. Provide and maintain for the duration of construction a temporary fence to prevent entry of the public into the jobsite. Fencing shall be six-foot high sealed wood or chain link fencing with dark-colored inlaid fabric mounted on fixed posts of metal or wood for temporary parking and work area. Open trenches and other hazards shall be enclosed in a fixed wire fence or wooden barricades with flashing lights.
- B. Maintain the security and appearance of fencing throughout construction.

2.6 EROSION and SEDIMENTATION CONTROL

- A. The Builder shall develop a "Sedimentation and Erosion Control Plan" per the UF Design & Construction Standards (Appendix C).
- B. This plan shall be submitted for review and approval prior to beginning any onsite work or applying for dig permits.
- C. The Builder shall erect and maintain control measures as outlined in the plan throughout construction. Such measures may include gravel "wash-down stations" at jobsite entry and exit points, silt fencing, and temporary grass seeding.

2.7 SIGNAGE

- A. Install and maintain the appearance of the standard University of Florida Board of Trustees Project Sign in a location directed by the University Project Manager.
- B. Florida Statutes 812.014 and 810.09 require that construction fences be adorned with the following sign: "**WARNING** (*red on white*) - **This area is a designated construction site. Anyone trespassing on this property shall, upon conviction, be guilty of a felony.**" (*black on white*) Signs shall be approximately 14" x 18".
- C. The University of Florida Police Department (UFPD) requires the following antiharassment notification be posted on each leg of the construction fence: "**In case of harassment from anyone at this construction site, telephone 392- 1111 to notify the University of Florida Police Department.**"
- D. Provide way-finding, directional, and other informational signage as needed to safely accommodate the public's need to pass around or through the Work. This shall include, as needed, directional assistance for ADA-compliant paths of travel throughout the duration of construction.
- E. No other signs or advertisements are permitted.

2.8 CLEANLINESS

- A. The Builder shall keep the premises free from accumulation of waste material and rubbish, and shall remove from the premises all rubbish, implements, surplus materials, and temporary facilities provided during the course of the Work, leaving spaces broom clean.

2.9 OTHER

- A. Erect and maintain erosion control measures throughout construction.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. The Builder shall not mobilize and/or erect temporary facilities until the jobsite management plan has been reviewed and approved by the Owner.
- B. Prior to erection of fencing, the Builder shall review the proposed fencing plan onsite with the University Project Manager and representatives of EH&S, UFPD, and the Americans with Disabilities Act Office.
- C. Directional signage shall be installed simultaneously with fencing and/or temporary roads or paths.
- D. Traffic maintenance devices and procedures (signage, barricades and cones, flagmen, etc.) shall be per Florida Department of Transportation (FDOT) standards (2003 Edition, Manual on Uniform Traffic Control Devices (MUTCD), with Revision No. 1 Incorporated, dated November 2004). Work zone traffic control schemes and devices shall only be implemented or installed in the field by or under the direct supervision of a person who has satisfactorily completed the training requirements prescribed by FDOT Topic No: 625-010-010-f, "MAINTENANCE OF TRAFFIC TRAINING," Work Zone Traffic Control and Maintenance of Traffic Intermediate or Advanced Level as appropriate for the project. All flagmen shall have successfully completed the Work Zone Traffic Control and Maintenance of Traffic - Basic Level.

3.2 WEATHER PROTECTION

- A. Take necessary precautions to ensure that roof openings and other critical openings in the building are secured. Take immediate actions required to seal off such openings when rain or other detrimental weather is imminent, and at the end of each workday. Ensure that the openings are completely sealed off to protect materials and equipment in the building from damage.
- B. When a warning of gale force (or higher) winds is issued, take precautions to minimize danger to persons, and protect the work and nearby Owner property. Precautions shall include, but are not limited to, closing openings; removing loose materials, tools, and equipment from exposed locations; removing or securing scaffolding and other temporary work; and arranging for all dumpsters to be emptied.

3.3 MAINTENANCE AND REMOVAL

- A. Maintain temporary facilities and controls as long as needed for safe, compliant, and proper completion of the Work.
- B. Remove temporary facilities and controls as rapidly as progress of the Work will permit, or as directed by the Owner.

END OF SECTION

SECTION 01 505

CONSTRUCTION WASTE MANAGEMENT

PART 1 - GENERAL

1.1 RELATED SECTIONS

- A. Documents affecting the work of this Section include other elements of the Contract for Construction, including the Owner/Builder Agreement or Owner/Design-Builder Agreement, the General Terms & Conditions, other sections of the Division 0 and Division 1 non-technical specifications, and the technical plans and specifications.
- B. Comply with LEED requirements, if applicable. See specification section 01352.
- C. See the Physical Plant Division Solid Waste Management website at www.ppd.ufl.edu/grounds-refuse.html.

1.2 HAZARDOUS SUBSTANCES

- A. The builder is responsible for proper management of hazardous substances used, stored, handled, generated, or disposed of by his own construction activities (e.g., excess or unwanted hazardous construction-related materials, including, but not limited to: equipment lubricants, used oil filters, aerosols, paints, activators, adhesives, caulks, and other hazardous wastes). In no case shall such construction hazardous waste be commingled with demolition hazardous waste. In no case shall such construction hazardous waste be commingled with non-hazardous construction or demolition waste.
- B. For renovation or demolition projects, hazardous wastes shall be segregated, collected, labeled, and disposed of via UF Environmental Health & Safety (EH&S). These include light fixture ballasts (PCB and non-PCB), mercury thermostats, and batteries. See www.ehs.ufl.edu/HMM.
- C. Evaluation, on-site storage, transportation, disposal and other aspects of Hazardous Waste Management shall comply with applicable Federal, State, and local laws.
- D. Refer to the General Terms & Conditions for requirements related to the discovery of environmental contamination, including, but not limited to, Hazardous Substances.

1.3 SOLID WASTE MANAGEMENT PLAN, REPORTS, and LOGS

The University of Florida requires that its builders limit, to the extent practical, the disposal of construction site waste in landfills. Beyond the provisions for such work in either the basic scope of work or bid alternates, the builder shall salvage materials for reuse, resale, or recycling to the maximum extent possible. Faculty and students from the UF School of Building Construction and the College of Design, Construction, and

Planning may interact with the builder to facilitate, coordinate, and document such efforts and/or to conduct research. Additionally, each builder will:

- A. Provide for the management of construction and demolition waste through reuse, recycling and reduction methods. Typical designated waste streams include land clearing debris, concrete and masonry, metals and appliances, dimensional wood & lumber, wooden pallets, gypsum wallboard (unpainted), paper and cardboard, packaging, and asphalt roofing shingles. Depending on the project, other large volume wastes may be included (e.g., bricks, asphalt, carpeting and pad, plastic, glass, beverage containers).
- B. In accordance with LEED Credits MR 2.1 and MR 2.2, establish goals for the percentage of waste to be specially collected, segregated and sent for recycling or reuse. A minimum of 50% is required; greater than 75% is encouraged.
- C. Builder shall designate an on-site party responsible for implementing the plan and instructing workers, distributing plan to site foremen and each subcontractor, including the plan in worker orientation and safety meetings, and providing site instruction and supervision on separation, handling, and recovery methods.
- D. Builder shall submit a Construction Solid Waste Management Plan to the University Project Manager prior to mobilization. The plan shall be reviewed by the University Solid Waste Coordinator and shall include the following elements:
 - 1. Whether construction waste will be recycled or reused by source separation, time-based separation, or commingled for delivery to an off-site separation facility.
 - 2. The types of materials to be targeted for recycling and reuse, the projected volumes and fate of the materials. Identify materials that are recyclable or otherwise recoverable that must be disposed of in a landfill.
 - 3. The diversion goal indicating the percentage of waste to be diverted from land-filling or incineration.
 - 4. The facilities to be used, both landfills and recycling facilities, indicating which of the targeted wastes are to be received, projected volumes, and documentation of their permit status.
 - 5. Maintenance of a Construction Waste Log (dates, facility, transporter, weights) and a file of waste receipts for all wastes shipped off-site.
- E. Submit monthly progress reports that quantify the amount of material landfilled, the location/identity of the landfill, the amount of recycled and salvaged material, the date(s) removed from the job site, receiving party, cost, and final disposition of the material. Materials may be quantified by weight (tons) or volume (cubic feet), but quantification and reporting shall remain consistent throughout construction.
- F. Maintain onsite logs, including manifests, weight tickets, and receipts. Manifests shall be from recycling and disposal site operators who can legally accept the materials for the purpose of reuse, recycling, or disposal.

END OF SECTION

SECTION 01 505

CONSTRUCTION WASTE MANAGEMENT

PART 1 - GENERAL

1.1 RELATED SECTIONS

- A. Documents affecting the work of this Section include other elements of the Contract for Construction, including the Owner/Builder Agreement or Owner/Design-Builder Agreement, the General Terms & Conditions, other sections of the Division 0 and Division 1 non-technical specifications, and the technical plans and specifications.
- B. Comply with LEED requirements, if applicable. See specification section 01352.
- C. See the Physical Plant Division Solid Waste Management website at www.ppd.ufl.edu/grounds-refuse.html.

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- B. For renovation or demolition projects, hazardous wastes shall be segregated, collected, labeled, and disposed of via UF Environmental Health & Safety (EH&S). These include light fixture ballasts (PCB and non-PCB), mercury thermostats, and batteries. See www.ehs.ufl.edu/HMM.
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Planning may interact with the builder to facilitate, coordinate, and document such efforts and/or to conduct research. Additionally, each builder will:

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- B. In accordance with LEED Credits MR 2.1 and MR 2.2, establish goals for the percentage of waste to be specially collected, segregated and sent for recycling or reuse. A minimum of 50% is required; greater than 75% is encouraged.
- C. Builder shall designate an on-site party responsible for implementing the plan and instructing workers, distributing plan to site foremen and each subcontractor, including the plan in worker orientation and safety meetings, and providing site instruction and supervision on separation, handling, and recovery methods.
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 - 1. Whether construction waste will be recycled or reused by source separation, time-based separation, or commingled for delivery to an off-site separation facility.
 - 2. The types of materials to be targeted for recycling and reuse, the projected volumes and fate of the materials. Identify materials that are recyclable or otherwise recoverable that must be disposed of in a landfill.
 - 3. The diversion goal indicating the percentage of waste to be diverted from land-filling or incineration.
 - 4. The facilities to be used, both landfills and recycling facilities, indicating which of the targeted wastes are to be received, projected volumes, and documentation of their permit status.
 - 5. Maintenance of a Construction Waste Log (dates, facility, transporter, weights) and a file of waste receipts for all wastes shipped off-site.
- E. Submit monthly progress reports that quantify the amount of material landfilled, the location/identity of the landfill, the amount of recycled and salvaged material, the date(s) removed from the job site, receiving party, cost, and final disposition of the material. Materials may be quantified by weight (tons) or volume (cubic feet), but quantification and reporting shall remain consistent throughout construction.
- F. Maintain onsite logs, including manifests, weight tickets, and receipts. Manifests shall be from recycling and disposal site operators who can legally accept the materials for the purpose of reuse, recycling, or disposal.

END OF SECTION

SECTION 01 700

PROJECT CLOSEOUT

PART 1 - GENERAL

1.1 RELATED SECTIONS

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

1.2 CERTIFICATE OF OCCUPANCY

Prior to occupancy of a new building, the Division of Environmental Health & Safety (EH&S) shall issue a Certificate of Occupancy. The certificate of occupancy will state the building is complete, constructed in accordance with the plans and specifications, and meets the minimum code requirements at the time of issuance of the building permit. The State Fire Marshal and other University entities must inspect and certify the building is substantially complete prior to occupancy of the structure.

1.3 SUBSTANTIAL COMPLETION

Separate and distinct from completion requirements related to life safety and building codes is the contractual obligation to achieve Substantial Completion on or before the specified date. Refer to the "Construction Inspection and Closeout" link under "Forms & Standards" on the Facilities Planning & Construction website (www.facilities.ufl.edu). Checklists and forms related to closeout shall be tailored by the Owner and design professional (A/E) to the specific needs of the project.

1.4 O&M MANUALS

- A. Builder shall provide draft operation and maintenance (O&M) manuals and other documents for review by UF, the A/E, and the CxA prior to manufacturer startups, Cx Functional Performance Testing, and Owner training.
- B. Builder shall tailor the O&M documents to the project, excluding or striking through models/types not installed and otherwise including only information pertinent to the products, materials, equipment, or components actually installed. Builder shall clearly identify each item, with references to the construction documents as needed.

- C. Builder shall augment O&M documents with the final approved versions of any submittals, shop drawings, or other system/product data not already included.
- D. Builder shall finalize turnover/closeout documents (including O&Ms) by addressing review comments and incorporating missing or finalized documents, test reports, and other relevant information.
- E. See 1.9 below for content and format requirements.

1.5 UTILITY VIDEOS

When required by the technical specifications, television camera videos of underground utility lines shall be provided to the engineer of record and the Owner in MPEG or AVI format.

1.6 OWNER TRAINING

- A. Training on building systems, equipment, and materials, the specific requirements for which are outlined in the technical specifications, shall be completed prior to Substantial Completion, at which point the Owner assumes the responsibility for operation and maintenance of the facility.
- B. Builder shall coordinate the schedule for training with UF and provide a comprehensive schedule for all training sessions at least 30 calendar days prior to the first scheduled session.
- C. Builder shall provide – at least two weeks in advance of each scheduled session – a syllabus, outline, or agenda for each training session for review by UF, the A/E, and (for commissioned systems) the CxA.
- D. Training shall be conducted with the (draft) O&M manuals in hand – preferably in conjunction with commissioning activities – and shall be videotaped and turned over to the Owner in MPEG format.

1.7 ATTIC STOCK

Coordination of the physical storage location of “attic stock” items shall be made with the building operation & maintenance entity prior to Substantial Completion, and the items and quantities of same (as outlined in the technical specifications) shall be on hand as a requirement of Substantial Completion. The Builder shall develop a spreadsheet itemization of attic stock and other items to be turned over to the Owner, tracking the type and quantity of material, date(s) of turnover, and other relevant information.

1.8 ENERGY REBATE PROGRAM

Builder shall gather product data and other information as needed to assist Owner with its application for energy rebates based on the materials and products installed in the facility.

1.9 CLOSEOUT DOCUMENTS and OTHER DELIVERABLES

- A. The final version of all O&M manuals and other turnover/closeout documents shall be provided in electronic (searchable PDF) form prior to Final Completion, including a Table of Contents for each discreet manual. Provide these to UF, the A/E, and the CxA on CD-ROM or through a file-sharing platform (e.g., Sharepoint), assembled and organized in electronic folders as follows:

00 – General Information

Table of Contents

Complete list of subcontractors with contact information

Final list/inventory of all colors & finishes

All documents related to Owner training, organized in sub-folders by system/trade, including the final (as-conducted) training schedule, agendas/syllabi, sign-in sheets, and videos

Pre-Concealment photos (if applicable)

Attic stock list/inventory

02 – Sitework and Water/Stormwater

02 – Landscaping & Irrigation

03 – Concrete

04 – Masonry

05 – Steel (including structural, miscellaneous, and ornamental; handrails & guardrails)

06 – Casework and Millwork

07 – Roofing

07 – Waterproofing, Dampproofing, Fireproofing, and Sealants

08 – Glazing, Storefront, and Curtainwall Systems

08 – Doors and Frames

08 – Door Hardware

09 – Flooring – carpet, VCT, tile, wood, others

09 – Ceiling Systems/Products

09 – Paints

- 10 – Misc. Specialties (lockers, window treatment, acoustic wall panels, operable partitions, toilet accessories, fire extinguisher cabinets, mobile storage systems, etc.)
- 12 – CFCI Furnishings (fixed tables/seating, lab casework, marker boards, foot grilles, etc.)
- 14 – Elevators / Lifts
- 15 – Plumbing
- 15 – Fire Protection
- 15 – HVAC
- 15 – Building Automation System / EMCS
- 16 – Electrical (including lightning protection and grounding systems)
- 16 – Lighting and Lighting Controls
- 16 – Fire Alarm
- 17 – Telecommunications and CATV
- 17 – Audio/Visual Systems
- 17 – Security / Access Control

- B. Each folder listed above, where applicable, shall include the following:
1. Submittals and shop drawings (final approved versions)
 2. LEED-related documents/information
 3. Meter data sheets
 4. Test data & reports, such as materials tests (soils, concrete, masonry, steel, etc.), structured telecomm cabling tests, and glazing/envelope air & water intrusion tests
 5. 3rd party certifications or inspections, including backflow preventer certifications, threshold inspection reports, infrared roof scans, water line treatment and “Bac-T” reports, and Test & Balance reports
 6. Underground utility videos
 7. Subcontractor as-builts
 8. O&M, care, and installation information and instructions
 9. Special documentation, such as the Master UL label for lightning protection Systems
 10. General and product/system-specific warranties

END OF SECTION

SECTION 06 4116

PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Plastic-laminate-faced architectural cabinets.
2. Wood furring, blocking, shims, and hanging strips for installing plastic-laminate-faced architectural cabinets unless concealed within other construction before cabinet installation.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product including high-pressure decorative laminate, adhesive for bonding plastic laminate, fire-retardant-treated materials, and cabinet hardware and accessories.
- B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.
- C. Samples:
 1. Plastic laminates, for each color, pattern, and surface finish.
 2. Hardware and accessory samples.

1.3 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install cabinets until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

PART 2 - PRODUCTS

2.1 PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS

- A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades of architectural plastic-laminate cabinets indicated for construction, finishes, installation, and other requirements.
- B. Grade: Custom.

- C. Type of Construction: Frameless.
- D. Cabinet, Door, and Drawer Front Interface Style: Flush overlay.
- E. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or if not indicated, as required by woodwork quality standard.
 - 1. Formica or equal.
- F. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:
 - 1. PL-1: Vertical Surfaces: Wilsonart, Mangalore Mango 7984-38
 - 2. PL-2: Horizontal Surfaces: Wilsonart, Sable Soapstone 4883-38

2.2 WOOD MATERIALS

- A. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of woodwork and quality grade specified unless otherwise indicated.
- B. Composite Wood and Agrifiber Products: Provide materials that comply with requirements of referenced quality standard for each type of woodwork and quality grade specified unless otherwise indicated.

2.3 FIRE-RETARDANT-TREATED MATERIALS

- A. Fire-Retardant-Treated Materials, General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article that are acceptable to authorities having jurisdiction and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.
 - 1. Identify fire-retardant-treated materials with appropriate classification marking of qualified testing agency in the form of removable paper label or imprint on surfaces that will be concealed from view after installation.
- B. Fire-Retardant-Treated Lumber and Plywood: Products with a flame-spread index of 25 or less when tested according to ASTM E 84, with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.
 - 1. Kiln dry lumber and plywood after treatment to a maximum moisture content of 19 and 15 percent, respectively.

2.4 CABINET HARDWARE AND ACCESSORIES

- A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets except for items specified in Section 087111 "Door Hardware."
- B. Frameless Concealed Hinges (European Type): BHMA A156.9, B01602, 170 degrees of opening, self-closing.
- C. Wire Pulls: Back mounted, solid metal, 4 inches long, 5/16 inch in diameter.
- D. Catches: Push-in magnetic catches, BHMA A156.9, B03131.
- E. Adjustable Shelf Standards and Supports: BHMA A156.9, B04071; with shelf rests, B04081.
- F. Shelf Rests: BHMA A156.9, B04013; metal.
- G. Drawer Slides: BHMA A156.9.
 - 1. Draw slides shall be side-mounted type rated for intended use but in no case carrying less than a 100 lb. load rating.
 - 2. File drawer slides shall carry a minimum 150 lb. load rating.
- H. Door Locks: BHMA A156.11, E07121.
- I. Drawer Locks: BHMA A156.11, E07041.
- J. Door and Drawer Silencers: BHMA A156.16, L03011.
- K. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.
 - 1. Brushed Aluminum or Satin Nickel.

2.5 MISCELLANEOUS MATERIALS

- A. Furring, Blocking, Shims, and Hanging Strips: Fire-retardant-treated softwood lumber, kiln dried to less than 15 percent moisture content.
- B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.
- C. Adhesive for Bonding Plastic Laminate: Unpigmented contact cement.
 - 1. Adhesive for Bonding Edges: Hot-melt adhesive or adhesive specified above for faces.

2.6 FABRICATION

- A. Complete fabrication, including assembly and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
- B. Shop-cut openings to maximum extent possible to receive hardware, appliances, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.
- C. Install glass to comply with applicable requirements in Section 088000 "Glazing" and in GANA's "Glazing Manual." For glass in wood frames, secure glass with removable stops.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Before installation, condition cabinets to average prevailing humidity conditions in installation areas.

3.2 INSTALLATION

- A. Grade: Install cabinets to comply with same grade as item to be installed.
- B. Install cabinets level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches.
- C. Scribe and cut cabinets to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
- D. Anchor cabinets to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with woodwork.
- E. Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.
 - 1. Install cabinets with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
 - 2. Fasten wall cabinets through back, near top and bottom, and at ends not more than 16 inches o.c. with No. 10 wafer-head sheet metal screws through metal backing or metal framing behind wall finish.

END OF SECTION

SECTION 07 9200

JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Silicone joint sealants.

1.2 ACTION SUBMITTALS

- A. Product Data: For each joint-sealant product.
- B. Samples: For each kind and color of joint sealant required.

1.3 INFORMATIONAL SUBMITTALS

- A. Product test reports.
- B. Sample warranties.

1.4 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM C 1021 to conduct the testing indicated.

1.5 WARRANTY

- A. Special Installer's Warranty: Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period: One (1) year from date of Substantial Completion.
- B. Special Manufacturer's Warranty: Manufacturer agrees to furnish joint sealants to repair or replace those joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period: Five (5) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 JOINT SEALANTS, GENERAL

- A. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.2 SILICONE JOINT SEALANTS

- A. Silicone, S, NS, 50, NT: Single-component, nonsag, plus 50 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 50, Use NT.
 - 1. Dow Corning: 791 Silicone Weatherproofing Sealant.

2.3 JOINT-SEALANT BACKING

- A. Cylindrical Sealant Backings: ASTM C 1330, Type O (open-cell material) or Non-Gassing Polyolefin, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
 - 1. Dow Corning, SOF Rod.
- B. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer.

2.4 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials.
- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:

1. Remove laitance and form-release agents from concrete.
 2. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion.
- B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces.

3.2 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with ASTM C 1193 and joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
- C. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- D. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
1. Place sealants so they directly contact and fully wet joint substrates.
 2. Completely fill recesses in each joint configuration.
 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- E. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
1. Provide concave joint profile per Figure 8A in ASTM C 1193 unless otherwise indicated.

END OF SECTION

SECTION 08 1213
HOLLOW METAL FRAMES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes hollow-metal frames.
- B. Related Requirements:
 - 1. Section 081416 "Flush Wood Doors" for wood doors installed in hollow-metal frames.

1.2 DEFINITIONS

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

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Include elevations, frame profiles, metal thicknesses, preparations for hardware, and other details.
- C. Schedule: Prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings.

1.4 INFORMATIONAL SUBMITTALS

- A. Product test reports.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Ceco Door or Equal.

2.2 INTERIOR FRAMES

- A. Standard-Duty Frames: SDI A250.8, Level 1. At locations indicated in the Door and Frame Schedule.
 - 1. Materials: 16 Gage Hot-Dipped Galvanized Steel conforming to ASTM A924 and A653
 - 2. Construction: Full profile welded.
 - 3. Exposed Finish: Prime.

2.3 MATERIALS

- A. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B.
- B. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.
- C. Grout: ASTM C 476, except with a maximum slump of 4 inches, as measured according to ASTM C 143/C 143M.
- D. Bituminous Coating: Cold-applied asphalt mastic, compounded for 15-mil dry film thickness per coat.

2.4 FABRICATION

- A. Fabricate hollow-metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for metal thickness. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.
- B. Hollow-Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
 - 1. Jamb Anchors: Provide number and spacing of anchors as follows:
 - a. Stud-Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c.
 - 2. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers.
- C. Hardware Preparation: Factory prepare hollow-metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to SDI A250.6, the Door Hardware Schedule, and templates.
 - 1. Reinforce frames to receive nontemplated, mortised, and surface-mounted hardware.
 - 2. Comply with applicable requirements in SDI A250.6 and BHMA A156.115 for preparation of hollow-metal work for hardware.

2.5 STEEL FINISHES

A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.

1. Shop Primer: SDI A250.10.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Hollow-Metal Frames: Install hollow-metal frames for doors, transoms, sidelites, borrowed lites, and other openings, of size and profile indicated. Comply with SDI A250.11 or NAAMM-HMMA 840 as required by standards specified.

1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
 - a. At fire-rated openings, install frames according to NFPA 80.
 - b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
 - c. Install frames with removable stops located on secure side of opening.
 - d. Install door silencers in frames before grouting.
 - e. Remove temporary braces necessary for installation only after frames have been properly set and secured.
 - f. Check plumb, square, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
 - g. Field apply bituminous coating to backs of frames that will be filled with grout containing antifreezing agents.
2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.
 - a. Floor anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.
3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation inside frames.
4. In-Place Metal or Wood-Stud Partitions: Secure slip-on drywall frames in place according to manufacturer's written instructions.
5. Installation Tolerances: Adjust hollow-metal door frames for squareness, alignment, twist, and plumb to the following tolerances:
 - a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 - b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.

- c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
- d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.

3.2 ADJUSTING AND CLEANING

- A. Final Adjustments: Remove and replace defective work, including hollow-metal work that is warped, bowed, or otherwise unacceptable.
- B. Remove grout and other bonding material from hollow-metal work immediately after installation.
- C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.
- D. Metallic-Coated Surface Touchup: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.
- E. Touchup Painting: Cleaning and touchup painting of abraded areas of paint are specified in painting Sections.

END OF SECTION

SECTION 08 1416
FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Solid-core doors with wood-veneer.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of door.
- B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; and the following:
 - 1. Dimensions and locations of mortises and holes for hardware.
 - 2. Dimensions and locations of cutouts.
 - 3. Undercuts.
 - 4. Requirements for veneer matching.
 - 5. Doors to be factory finished and finish requirements.
 - 6. Fire-protection ratings for fire-rated doors.
- C. Samples: Full line of manufacturer's veneers.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Marshfield or equal.

2.2 FLUSH WOOD DOORS, GENERAL

- A. Quality Standard: In addition to requirements specified, comply with AWI's and WI's "Architectural Woodwork Standards."
- B. WDMA I.S.1-A Performance Grade:
 - 1. Heavy Duty unless otherwise indicated.
- C. Fire-Rated Wood Doors: Doors complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.

1. Cores: Provide core specified or mineral core as needed to provide fire-protection rating indicated.
2. Edge Construction: Provide edge construction with intumescent seals concealed by outer stile. Comply with specified requirements for exposed edges.
3. Pairs: Provide fire-retardant stiles that are listed and labeled for applications indicated without formed-steel edges and astragals. Provide stiles with concealed intumescent seals. Comply with specified requirements for exposed edges.

D. Structural-Composite-Lumber-Core Doors:

1. Structural Composite Lumber: WDMA I.S.10.
 - a. Screw Withdrawal, Face: 700 lbf.
 - b. Screw Withdrawal, Edge: 400 lbf.

2.3 VENEER-FACED DOORS FOR TRANSPARENT FINISH

A. Interior Solid-Core Doors:

1. Grade: Premium, with Grade AA faces.
2. Species: Natural Birch
3. Color: Saffron 60-02.
4. Cut: Plain sliced (flat sliced).
5. Match between Veneer Leaves: Pleasing match.
6. Assembly of Veneer Leaves on Door Faces: Center-balance match.
7. Pair and Set Match: Provide for doors hung in same opening or separated only by mullions.
8. Core: Structural composite lumber.
9. Construction: Five plies. Stiles and rails are bonded to core, then entire unit is abrasive planed before veneering.

2.4 FABRICATION

- A. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.
1. Comply with NFPA 80 requirements for fire-rated doors.
- B. Factory machine doors for hardware that is not surface applied.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Hardware: For installation, see Section 087100 "Door Hardware."
- B. Installation Instructions: Install doors to comply with manufacturer's written instructions and referenced quality standard, and as indicated.

- C. Job-Fitted Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted for fire-rated doors. Machine doors for hardware. Seal edges of doors, edges of cutouts, and mortises after fitting and machining.
1. Clearances: Provide 1/8 inch at heads, jambs, and between pairs of doors. Provide 1/8 inch from bottom of door to top of decorative floor finish or covering unless otherwise indicated. Where threshold is shown or scheduled, provide 1/4 inch from bottom of door to top of threshold unless otherwise indicated.

END OF SECTION

SECTION 08 7100
DOOR HARDWARE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Mechanical door hardware for the following:
 - a. Swinging doors.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each exposed product in each finish specified.
- C. Door hardware schedule.

1.3 INFORMATIONAL SUBMITTALS

- A. Sample warranty.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.5 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Ten years from date of Substantial Completion unless otherwise indicated below:
 - a. Exit Devices: Three years from date of Substantial Completion.
 - b. Manual Closers: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Rated Door Assemblies: Where fire-rated doors are indicated, provide door hardware complying with NFPA 80 that is listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.
- B. Smoke- and Draft-Control Door Assemblies: Where smoke- and draft-control door assemblies are required, provide door hardware that complies with requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105.
 - 1. Air Leakage Rate: Maximum air leakage of 0.3 cfm/sq. ft. at the tested pressure differential of 0.3-inch wg of water.
- C. Electrified Door Hardware: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- D. Means of Egress Doors: Latches do not require more than 15 lbf to release the latch. Locks do not require use of a key, tool, or special knowledge for operation.
- E. Accessibility Requirements: For door hardware on doors in an accessible route, comply with FBC 2014, The Florida New Accessibility Code 2014 Edition.

2.2 SCHEDULED DOOR HARDWARE

- A. Provide products for each door that comply with requirements indicated in Part 2 and door hardware schedule.
 - 1. Door hardware is scheduled in Part 3.

2.3 HINGES

- A. Hinges: BHMA A156.1. Provide template-produced hinges for hinges installed on hollow-metal doors and hollow-metal frames.
 - 1. Hager, 4 1/2" x 4 1/2" Stainless Steel Ball-Bearing Hinge or equal. Exterior shall have non-removal pins.

2.4 MECHANICAL LOCKS AND LATCHES

- A. Lock Functions: As indicated in door hardware schedule.
- B. Lock Throw: Comply with testing requirements for length of bolts required for labeled fire doors, and as follows:
 - 1. Bored Locks: Minimum 1/2-inch latchbolt throw.

2. Mortise Locks: Minimum 3/4-inch latchbolt throw.
 3. Deadbolts: Minimum 1-inch bolt throw.
- C. Lock Backset: 2-3/4 inches unless otherwise indicated.
- D. Lock Trim:
1. Description: Corbin Russwin ML2000 Series with NSN Trim
 2. Levers: Cast.
 3. Escutcheons (Roses): Wrought.
 4. Dummy Trim: Match lever lock trim and escutcheons.
- E. Strikes: Provide manufacturer's standard strike for each lock bolt or latchbolt complying with requirements indicated for applicable lock or latch and with strike box and curved lip extended to protect frame; finished to match lock or latch.
1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
 2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
 3. Aluminum-Frame Strike Box: Manufacturer's special strike box fabricated for aluminum framing.
 4. Rabbet Front and Strike: Provide on locksets for rabbeted meeting stiles.

2.5 MANUAL FLUSH BOLTS

- A. Manual Flush Bolts: BHMA A156.16; minimum 3/4-inch throw; designed for mortising into door edge.

2.6 EXIT DEVICES AND AUXILIARY ITEMS

- A. Exit Devices and Auxiliary Items: BHMA A156.3.
1. Von Duprin 98 Series with L Trim or equal.

2.7 LOCK CYLINDERS

- A. Lock Cylinders: Shall be ordered by the Project Manager from the UF PPD Keyshop.

2.8 KEYING

- A. Keys: Shall be provided to the user by the UF PPD Keyshop.

2.9 SURFACE CLOSERS

- A. Surface Closers: BHMA A156.4; rack-and-pinion hydraulic type with adjustable sweep and latch speeds controlled by key-operated valves and forged-steel main arm. Comply with manufacturer's written instructions for size of door closers depending on

size of door, exposure to weather, and anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force. All closers shall be supplied with hex nuts and shoulder bolts on labeled wood doors. Mount closers on room side of door. Do not provide hold-open feature.

1. LCN Model 4041 or 1461 or equal.

2.10 MECHANICAL STOPS AND HOLDERS

- A. Wall- and Floor-Mounted Stops: BHMA A156.16.

1. Hager or equal.

2.11 DOOR GASKETING

- A. Door Gasketing: BHMA A156.22; with resilient or flexible seal strips that are easily replaceable and readily available from stocks maintained by manufacturer.

1. Hager or equal.

- B. Maximum Air Leakage: When tested according to ASTM E 283 with tested pressure differential of 0.3-inch wg, as follows:

1. Smoke-Rated Gasketing: 0.3 cfm/sq. ft. of door opening.
2. Gasketing on Single Doors: 0.3 cfm/sq. ft. of door opening.
3. Gasketing on Double Doors: 0.50 cfm per foot of door opening.

2.12 THRESHOLDS

- A. Thresholds: BHMA A156.21; fabricated to full width of opening indicated. Provide no more than ½" rise. All exterior thresholds shall be set in a continuous bed of sealant.

1. Pemko, 254X5_FG or equal.

2.13 METAL PROTECTIVE TRIM UNITS

- A. Metal Protective Trim Units: BHMA A156.6; fabricated from 0.050-inch-thick stainless steel; with manufacturer's standard machine or self-tapping screw fasteners.

1. Allegion or equal.

2.14 FINISHES

- A. Provide US26D/630 complying with BHMA A156.18.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Mounting Heights: Mount door hardware units at heights to comply with the following unless otherwise indicated or required to comply with governing regulations.
 - 1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
 - 2. Custom Steel Doors and Frames: HMMA 831.
 - 3. Wood Doors: DHI's "Recommended Locations for Architectural Hardware for Wood Flush Doors."
- B. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work. Do not install surface-mounted items until finishes have been completed on substrates involved.
- C. Hinges: Install types and in quantities indicated in door hardware schedule, but not fewer than the number recommended by manufacturer for application indicated or one hinge for every 30 inches of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.
- D. Intermediate Offset Pivots: Where offset pivots are indicated, provide intermediate offset pivots in quantities indicated in door hardware schedule, but not fewer than one intermediate offset pivot per door and one additional intermediate offset pivot for every 30 inches of door height greater than 90 inches.
- E. Lock Cylinders: Install construction cores to secure building and areas during construction period.
 - 1. Replace construction cores with permanent cores as directed by Owner.
- F. Boxed Power Supplies: Locate power supplies as indicated or, if not indicated, above accessible ceilings. Verify location with Architect.
 - 1. Configuration: Provide one power supply for each door opening with electrified door hardware.
- G. Thresholds: Set thresholds for exterior doors and other doors indicated in full bed of sealant complying with requirements specified in Section 079200 "Joint Sealants."
- H. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they will impede traffic.
- I. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
 - 1. Do not notch perimeter gasketing to install other surface-applied hardware.
- J. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.

- K. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.

3.2 ADJUSTING

- A. Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

3.3 DOOR HARDWARE SCHEDULE

Hardware Group 01:

Doors: 101.1, 102.1, 130.1

3 ea Hinges

1 ea Lockset - (Classroom Function)

1 ea Closer

1 ea Floor Stop

Sound Seal

Hardware Group 02:

Doors: 131.1, 132.1

3 ea Hinges

1 ea Lockset - (Office Function)

1 ea Wall Stop

Frame Silencers

Hardware Group 03:

Doors: 105.1, 106.1

3 ea Hinges

2 ea Push/Pulls

1 ea Closer

1 ea Wall Stop

Frame Silencers

Hardware Group 04:

Doors: 095.1, TR1.1

3 ea Hinges

1 ea Lockset (Storage Function) (Provide Tactile Levers at Mechanical and TR Rooms)

1 ea Closer

1 ea Wall Stop (TR1.1 only)

Frame Silencers

Hardware Group 05:

Doors: 107.1

6 ea Hinges

1 ea Lockset - (Storage Function) (Active Leaf)

2 ea Surface Bolts (Inactive Leaf)

Frame Silencers

END OF SECTION

SECTION 08 8000

GLAZING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes:
 - 1. Glass for storefront framing.
 - 2. Glazing sealants and accessories.

1.2 COORDINATION

- A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Glass Samples: For each type of glass product other than clear monolithic vision glass; 12 inches square.
- C. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.
- D. Delegated-Design Submittal: For glass indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.4 WARRANTY

- A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer agrees to replace coated-glass units that deteriorate within specified warranty period. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in coating.
 - 1. Warranty Period: 10 years from date of Substantial Completion.
- B. Manufacturer's Special Warranty for Insulating Glass: Manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of

insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. PPG or equal.

2.2 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Glazing shall withstand the following design loads within limits and under conditions indicated determined according to the Florida Building Code and ASTM E 1300.
 1. Design Wind Pressures: As indicated on Drawings.
 2. Thickness of Patterned Glass: Base design of patterned glass on thickness at thinnest part of the glass.
 3. Differential Shading: Design glass to resist thermal stresses induced by differential shading within individual glass lites.
- B. Safety Glazing: Where safety glazing is indicated, provide glazing that complies with 16 CFR 1201, Category II.
- C. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:
 1. U-Factors: Center-of-glazing values, according to NFRC 100 and based on LBL's WINDOW 5.2 computer program, expressed as Btu/sq. ft. x h x deg F.
 2. Solar Heat-Gain Coefficient and Visible Transmittance: Center-of-glazing values, according to NFRC 200 and based on LBL's WINDOW 5.2 computer program.
 3. Visible Reflectance: Center-of-glazing values, according to NFRC 300.

2.3 GLASS PRODUCTS, GENERAL

- A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below unless more stringent requirements are indicated. See these publications for glazing terms not otherwise defined in this Section or in referenced standards.
 1. GANA Publications: Laminated Glazing Reference Manual and "Glazing Manual."
 2. AAMA Publications: AAMA GDSG-1, "Glass Design for Sloped Glazing," and AAMA TIR A7, "Sloped Glazing Guidelines."

3. IGMA Publication for Sloped Glazing: IGMA TB-3001, "Guidelines for Sloped Glazing."
 4. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."
- B. Safety Glazing Labeling: Where safety glazing is indicated, permanently mark glazing with certification label of the SGCC. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.

2.4 GLASS PRODUCTS

- A. Fully Tempered Float Glass: ASTM C 1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.

2.5 GLAZING SEALANTS

- A. General:
1. Compatibility: Compatible with one another and with other materials they contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
 2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
 3. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.
- B. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 50, Use NT.
1. Dow Corning 791, Silicone Weatherproofing Sealant
 2. Applications: Use at all exterior storefront openings.

2.6 GLAZING TAPES

- A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C 1281 and AAMA 800 for products indicated below:
1. AAMA 804.3 tape, where indicated.
 2. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.

3. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.
- B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:
 1. AAMA 810.1, Type 1, for glazing applications in which tape acts as the primary sealant.
 2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.7 MISCELLANEOUS GLAZING MATERIALS

- A. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
- B. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.
- C. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
- D. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).
- E. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

PART 3 - EXECUTION

3.1 GLAZING, GENERAL

- A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.
- B. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass includes glass with edge damage or other imperfections that, when installed, could weaken glass, impair performance, or impair appearance.
- C. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.
- D. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

- E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- F. Provide spacers for glass lites where length plus width is larger than 50 inches.
- G. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.

3.2 TAPE GLAZING

- A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.
- B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.
- C. Cover vertical framing joints by applying tapes to heads and sills first, then to jambs. Cover horizontal framing joints by applying tapes to jambs, then to heads and sills.
- D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.
- E. Apply heel bead of elastomeric sealant.
- F. Center glass lites in openings on setting blocks, and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.
- G. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.3 GASKET GLAZING (DRY)

- A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.
- B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.
- C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression

gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

- E. Install gaskets so they protrude past face of glazing stops.

3.4 SEALANT GLAZING (WET)

- A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.
- B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.
- C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.5 CLEANING AND PROTECTION

- A. Immediately after installation remove nonpermanent labels and clean surfaces.
- B. Protect glass from contact with contaminating substances resulting from construction operations. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains.
 - 1. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer. Remove and replace glass that cannot be cleaned without damage to coatings.
- C. Remove and replace glass that is damaged during construction period.

3.6 MONOLITHIC GLASS SCHEDULE

- A. Glass Type GL-1: Clear fully tempered float glass.
 - 1. Minimum Thickness: 1/4".
 - 2. Safety glazing required.

END OF SECTION

SECTION 09 2216
NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Non-load-bearing steel framing systems for interior partitions.
2. Suspension systems for interior ceilings and soffits.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS

A. Evaluation reports for firestop tracks.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated, according to ASTM E 119 by an independent testing agency.
- B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated, according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

2.2 FRAMING SYSTEMS

A. Framing Members, General: Comply with ASTM C 754 for conditions indicated.

1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal unless otherwise indicated.
2. Protective Coating: ASTM A 653/A 653M, G40, hot-dip galvanized unless otherwise indicated.

B. Studs and Runners: ASTM C 645.

1. Steel Studs and Runners:
 - a. ClarkDietrich Building Systems or Equal.
 - b. Minimum Base-Metal Thickness: 20 gauge at wall, 14 gauge at head, jamb, and sill.
- C. Slip-Type Head Joints: Where indicated, provide the following:
 1. Deflection Track: Steel sheet top runner manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.
 - a. ClarkDietrich Building Systems or Equal.
- D. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.
 1. ClarkDietrich Building Systems or Equal.
 2. Minimum Base-Metal Thickness: 20 gauge.
- E. Cold-Rolled Channel Bridging: Steel, 0.0538-inch minimum base-metal thickness, with minimum 1/2-inch wide flanges.
 1. ClarkDietrich Building Systems or Equal.
 2. Depth: 1-1/2 inches.
 3. Clip Angle: Not less than 1-1/2 by 1-1/2 inches, 20 gauge galvanized steel.
- F. Hat-Shaped, Rigid Furring Channels: ASTM C 645.
 1. ClarkDietrich Building Systems or Equal.
 2. Minimum Base-Metal Thickness: 20 gauge.
 3. Depth: 7/8 inch and 1-1/2 inches as required.

2.3 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards.
 1. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.
- B. Isolation Strip at Exterior Walls: Provide one of the following:
 1. Asphalt-Saturated Organic Felt: ASTM D 226/D 226M, Type I (No. 15 asphalt felt), nonperforated.
 2. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch thick, in width to suit steel stud size.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Installation Standard: ASTM C 754.
 - 1. Gypsum Plaster Assemblies: Also comply with requirements in ASTM C 841 that apply to framing installation.
 - 2. Portland Cement Plaster Assemblies: Also comply with requirements in ASTM C 1063 that apply to framing installation.
 - 3. Gypsum Veneer Plaster Assemblies: Also comply with requirements in ASTM C 844 that apply to framing installation.
 - 4. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing installation.
- B. Install framing and accessories plumb, square, and true to line, with connections securely fastened.
- C. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.
- D. Install bracing at terminations in assemblies.
- E. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

3.2 INSTALLING FRAMED ASSEMBLIES

- A. Install framing system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.
- B. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.
- C. Install studs so flanges within framing system point in same direction.
- D. Install tracks (runners) at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts that penetrate partitions above ceiling.
 - 1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
 - 2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.
 - a. Install two studs at each jamb unless otherwise indicated.

- b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch clearance from jamb stud to allow for installation of control joint in finished assembly.
 - c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.
- 3. Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
- E. Direct Furring:
 - 1. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.
- F. Z-Shaped Furring Members:
 - 1. Erect insulation, specified in Section 072100 "Thermal Insulation," vertically and hold in place with Z-shaped furring members spaced 24 inches.
 - 2. Except at exterior corners, securely attach narrow flanges of furring members to wall with concrete stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.
 - 3. At exterior corners, attach wide flange of furring members to wall with short flange extending beyond corner; on adjacent wall surface, screw-attach short flange of furring channel to web of attached channel. At interior corners, space second member no more than 12 inches from corner and cut insulation to fit.
- G. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

END OF SECTION

SECTION 09 2900

GYPSUM BOARD

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Interior gypsum board.

1.2 ACTION SUBMITTALS

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

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.
- B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

2.2 GYPSUM BOARD, GENERAL

- A. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.3 INTERIOR GYPSUM BOARD

- A. Gypsum Board, Type X: ASTM C 1396/C 1396M.
 - 1. Equal to National Gypsum Company.
 - 2. Thickness: 5/8 inch.
 - 3. Long Edges: Tapered.

2.4 TRIM ACCESSORIES

A. Interior Trim: ASTM C 1047.

1. Material: Galvanized or aluminum-coated steel sheet.
 - a. Cornerbead.
 - b. Bullnose bead.
 - c. LC-Bead: J-shaped; exposed long flange receives joint compound.
 - d. L-Bead: L-shaped; exposed long flange receives joint compound.
 - e. U-Bead: J-shaped; exposed short flange does not receive joint compound.
 - f. Expansion (control) joint.
 - g. Curved-Edge Cornerbead: With notched or flexible flanges.

2.5 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C 475/C 475M.

B. Joint Tape:

1. Interior Gypsum Board: Paper.
2. Exterior Gypsum Soffit Board: Paper.
3. Glass-Mat Gypsum Sheathing Board: 10-by-10 glass mesh.
4. Tile Backing Panels: As recommended by panel manufacturer.

C. Joint Compound for Interior Gypsum Board: For each coat, use formulation that is compatible with other compounds applied on previous or for successive coats.

1. Prefilling: At open joints and damaged surface areas, use setting-type taping compound.
2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping compound.
 - a. Use setting-type compound for installing paper-faced metal trim accessories.
3. Fill Coat: For second coat, use sandable topping compound.
4. Finish Coat: For third coat, use sandable topping compound.

D. Joint Compound for Tile Backing Panels:

1. Cementitious Backer Units: As recommended by backer unit manufacturer.

2.6 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written instructions.

B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.

- C. Steel Drill Screws: ASTM C 1002 unless otherwise indicated.
 - 1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch thick.
 - 2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.
- D. Sound-Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.
 - 1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.
- E. Acoustical Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
 - 1. Equal to USG Corporation.

PART 3 - EXECUTION

3.1 APPLYING AND FINISHING PANELS

- A. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- B. Comply with ASTM C 840.
- C. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments. Provide 1/4 inch wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
- D. For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.
- E. Prefill open joints and damaged surface areas.
- F. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.
- G. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:
 - 1. Level 4: at all locations below ceiling.
 - a. Primer and its application to surfaces are specified in Section 099123 "Interior Painting."

- H. Cementitious Backer Units: Finish according to manufacturer's written instructions.

3.2 PROTECTION

- A. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- B. Remove and replace panels that are wet, moisture damaged, and mold damaged.

END OF SECTION

SECTION 09 3013

CERAMIC TILING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Porcelain tile.
 - 2. Tile backing panels.
 - 3. Crack isolation membrane.
 - 4. Metal edge strips.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples:
 - 1. Each type and composition of tile and for each color and finish required.

1.3 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.

1.4 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match and are from same production runs as products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed for each type, composition, color, pattern, and size indicated.

PART 2 - PRODUCTS

2.1 PRODUCTS, GENERAL

- A. ANSI Ceramic Tile Standard: Provide Standard-grade tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.
- B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.02, ANSI standards referenced in other Part 2 articles, ANSI standards

referenced by TCNA installation methods specified in tile installation schedules, and other requirements specified.

2.2 TILE PRODUCTS

A. Ceramic Tile Type CT-1: Floor Tile.

1. Trinity Tile or equal.
2. Composition: Porcelain Tile
3. Module Size: 12" x 24"
4. Surface: Matte
5. Dynamic Coefficient of Friction: >0.67
6. Tile Color and Pattern: Cheyenne, Noce
7. Grout Color: As selected by Architect from manufacturer's full range.

B. Ceramic Tile Type CT-2: Accent Wall Tile.

1. Trinity Tile or equal.
2. Composition: Porcelain Tile
3. Module Size: 12" x 24"
4. Face: Matte
5. Dynamic Coefficient of Friction: >0.67
6. Tile Color and Pattern: Cheyenne, Beige
7. Grout Color: As selected by Architect from manufacturer's full range.

2.3 TILE BACKING PANELS

A. Cementitious Backer Units: ANSI A118.9 or ASTM C 1325, Type A.

1. USG Corporation or equal.
2. Thickness: 5/8 inch.

2.4 CRACK ISOLATION MEMBRANE

A. General: Manufacturer's standard product that complies with ANSI A118.12 for standard performance and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.

B. Fabric-Reinforced, Fluid-Applied Membrane: System consisting of liquid-latex rubber or elastomeric polymer and fabric reinforcement.

1. Laticrete International or equal.

2.5 SETTING MATERIALS

A. Standard Dry-Set Mortar (Thinset): ANSI A118.1.

1. MAPEI Corporation or equal.

2. For wall applications, provide nonsagging mortar.

2.6 GROUT MATERIALS

- A. Sand-Portland Cement Grout: ANSI A108.10, consisting of white or gray cement and white or colored aggregate as required to produce color indicated.
- B. Standard Cement Grout: ANSI A118.6.
 1. MAPEI Corporation or equal.
- C. Water-Cleanable Epoxy Grout: ANSI A118.3, with a VOC content of 65 g/L or less.
 1. MAPEI Corporation or equal.

2.7 MISCELLANEOUS MATERIALS

- A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.
- B. Metal Edge Strips: Angle or L-shape, height to match tile and setting-bed thickness, metallic or combination of metal and PVC or neoprene base, designed specifically for flooring applications; stainless-steel, ASTM A 666, 300 Series exposed-edge material.
 1. Schluter Systems or equal.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
 1. Verify that substrates for setting tile are firm; dry; clean; free of coatings that are incompatible with tile-setting materials, including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.
 2. Verify that concrete substrates for tile floors installed with thinset mortar comply with surface finish requirements in ANSI A108.01 for installations indicated.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with thinset mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.
- B. Where indicated, prepare substrates to receive waterproofing by applying a reinforced mortar bed that complies with ANSI A108.1A and is sloped 1/4 inch per foot toward drains.
- C. Blending: For tile exhibiting color variations, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

3.3 CERAMIC TILE INSTALLATION

- A. Comply with TCNA's "Handbook for Ceramic, Glass, and Stone Tile Installation" for TCNA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 series "Specifications for Installation of Ceramic Tile" that are referenced in TCNA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.
 - 1. For the following installations, follow procedures in the ANSI A108 series of tile installation standards for providing 95 percent mortar coverage:
 - a. Tile floors in wet areas.
 - b. Tile floors consisting of tiles 8 by 8 inches or larger.
- B. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
- C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.
- D. Provide manufacturer's standard trim shapes where necessary to eliminate exposed tile edges.
- E. Where accent tile differs in thickness from field tile, vary setting bed thickness so that tiles are flush.
- F. Jointing Pattern: Lay tile in grid pattern unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.
- G. Joint Widths: Unless otherwise indicated, install tile with the following joint widths:

1. Porcelain Tile: 1/8 inch.
- H. Lay out tile wainscots to dimensions indicated or to next full tile beyond dimensions indicated.
 - I. Expansion Joints: Provide expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated. Form joints during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.
 1. Where joints occur in concrete substrates, locate joints in tile surfaces directly above them.
 - J. Metal Edge Strips: Install where exposed edge of tile flooring meets carpet, wood, or other flooring that finishes flush with top of tile.
 - K. Install tile backing panels and treat joints according to ANSI A108.11 and manufacturer's written instructions for type of application indicated.
 - L. Install waterproofing to comply with ANSI A108.13 and manufacturer's written instructions to produce waterproof membrane of uniform thickness that is bonded securely to substrate.
 - M. Install crack isolation membrane to comply with ANSI A108.17 and manufacturer's written instructions to produce membrane of uniform thickness that is bonded securely to substrate.

END OF SECTION

SECTION 09 5123
ACOUSTICAL TILE CEILINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Acoustical tiles for interior ceilings.
2. Fully concealed, direct-hung, suspension systems.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each exposed product and for each color and texture specified.

1.3 INFORMATIONAL SUBMITTALS

- A. Product test reports.
- B. Field quality-control reports.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance data.

PART 2 - PRODUCTS

2.1 ACOUSTICAL TILES

- A. Armstrong or equal.
- B. Acoustical Tile Standard: Manufacturer's standard tiles of configuration indicated that comply with ASTM E 1264.
- C. Classification: Ultima Beveled Tegular, 1894.
- D. Color: White.
- E. Light Reflectance (LR): .90.

- F. Ceiling Attenuation Class (CAC): 40.
- G. Noise Reduction Coefficient (NRC): .60.
- H. Fire Resist/Flame Spread: Fire Resistive.
- I. Material: Mineral Fiber, Wet-formed.
- J. Texture: Fine.
- K. Edge/Joint Detail: Beveled Tegal.
- L. Thickness: 3/4 inch.
- M. Modular Size: 24 by 24 inches.

2.2 METAL SUSPENSION SYSTEM

- A. Armstrong or equal.
- B. Metal Suspension-System Standard: Manufacturer's standard, direct-hung, fully concealed, metal suspension system that complies with applicable requirements in ASTM C 635/C 635M.
- C. Grid System: Prelude XL Fire Guard 15/16" Exposed Tee.

2.3 ACCESSORIES

- A. Attachment Devices: Size for five times the design load indicated in ASTM C 635/C 635M, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.
- B. Seismic Clips: Manufacturer's standard seismic clips designed to secure acoustical tiles in-place during a seismic event.

2.4 METAL EDGE MOLDINGS AND TRIM

- A. Armstrong or equal.
- B. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations complying with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for of suspension-system runners.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Measure each ceiling area and establish layout of acoustical tiles to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width tiles at borders unless otherwise indicated.
- B. Layout openings for penetrations centered on the penetrating items.

3.2 INSTALLATION OF SUSPENDED ACOUSTICAL TILE CEILINGS

- A. Install suspended acoustical tile ceilings according to ASTM C 636/C 636M and manufacturer's written instructions.
- B. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical tiles.
 - 1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
 - 2. Do not use exposed fasteners, including pop rivets, on moldings and trim.
- C. Arrange directionally patterned acoustical tiles as indicated on reflected ceiling plans.

END OF SECTION

SECTION 09 6513
RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Resilient base.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each exposed product and for each color and texture specified.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

2.2 THERMOSET-RUBBER BASE

- A. Johnsonite or equal.
- B. Product Standard: ASTM F 1861, Type TV (vinyl, thermoplastic).
- C. Thickness: 0.125 inch.
- D. Height: 4 inches.
- E. Profile: Standard Cove
- F. Lengths: Cut lengths 48 inches long.
- G. Outside Corners: Job formed or preformed.
- H. Inside Corners: Job formed or preformed.
- I. Color: Fudge, 167.

2.3 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by resilient-product manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by resilient-product manufacturer for resilient products and substrate conditions indicated.
- C. Stair-Tread Nose Filler: Two-part epoxy compound recommended by resilient stair-tread manufacturer to fill nosing substrates that do not conform to tread contours.
- D. Floor Polish: Provide protective, liquid floor-polish products recommended by resilient stair-tread manufacturer.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.
- B. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.
- C. Do not install resilient products until they are the same temperature as the space where they are to be installed.
- D. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient products.

3.2 RESILIENT BASE INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient base.
- B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.
- C. Install resilient base in lengths as long as practical without gaps at seams and with tops of adjacent pieces aligned.
- D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
- E. Do not stretch resilient base during installation.
- F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.

- G. Preformed Corners: Install preformed corners before installing straight pieces.
- H. Job-Formed Corners:
 - 1. Outside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches in length.
 - a. Form without producing discoloration (whitening) at bends.
 - 2. Inside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches in length.
 - a. Miter or cope corners to minimize open joints.

3.3 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protecting resilient products.
- B. Floor Polish: Remove soil, visible adhesive, and surface blemishes from resilient stair treads before applying liquid floor polish.
- C. Cover resilient products subject to wear and foot traffic until Substantial Completion.

END OF SECTION

SECTION 09 6519
RESILIENT TILE FLOORING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Vinyl composition floor tile.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: Full-size units of each color and pattern of floor tile required.

1.3 CLOSEOUT SUBMITTALS

- A. Maintenance data.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: For resilient tile flooring, as determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.
 - 1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

2.2 VINYL COMPOSITION FLOOR TILE

- A. Armstrong or equal.
- B. Tile Standard: ASTM F 1066, Class 2, through-pattern tile.
- C. Wearing Surface: Smooth.
- D. Thickness: 0.125 inch.
- E. Size: 12 by 12 inches.
- F. Colors and Patterns: Standard Excelon, Earthstone Greige 51804.

2.3 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by floor tile manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by floor tile and adhesive manufacturers to suit floor tile and substrate conditions indicated.
- C. Floor Polish: Provide protective, liquid floor-polish products recommended by floor tile manufacturer.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Prepare substrates according to floor tile manufacturer's written instructions to ensure adhesion of resilient products.
- B. Concrete Substrates: Prepare according to ASTM F 710.
 - 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
 - 2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by floor tile manufacturer. Do not use solvents.
 - 3. Alkalinity and Adhesion Testing: Perform tests recommended by floor tile manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing.
 - 4. Moisture Testing: Proceed with installation only after substrates pass testing according to floor tile manufacturer's written recommendations.
- C. Access Flooring Panels: Remove protective film of oil or other coating using method recommended by access flooring manufacturer.
- D. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.
- E. Do not install floor tiles until they are the same temperature as the space where they are to be installed.
- F. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient floor tile.

3.2 FLOOR TILE INSTALLATION

- A. Comply with manufacturer's written instructions for installing floor tile.

- B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.
 - 1. Lay tiles square with room axis.
- C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.
 - 1. Lay tiles with grain running in one direction.
- D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.
- E. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.
- F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent marking device.
- G. Install floor tiles on covers for telephone and electrical ducts, building expansion-joint covers, and similar items in finished floor areas. Maintain overall continuity of color and pattern between pieces of tile installed on covers and adjoining tiles. Tightly adhere tile edges to substrates that abut covers and to cover perimeters.
- H. Adhere floor tiles to flooring substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

3.3 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protecting floor tile.
- B. Floor Polish: Remove soil, adhesive, and blemishes from floor tile surfaces before applying liquid floor polish.
 - 1. Apply floor polish as recommended by manufacturer.
- C. Cover floor tile until Substantial Completion.

END OF SECTION

SECTION 09 6813

TILE CARPETING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes modular carpet tile.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each exposed product and for each color and texture required.

1.3 INFORMATIONAL SUBMITTALS

- A. Product test reports.
- B. Sample warranty.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.5 WARRANTY

- A. Special Warranty for Carpet Tiles: Manufacturer agrees to repair or replace components of carpet tile installation that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 CARPET TILE

- A. Shaw Contract or equal.
- B. Pattern: Altered 5T128.

- C. Color: Scan 26595.
- D. Fiber Type: Eco Solution q nylon.
- E. Stitches per inch: 10.0.
- F. Tufted Weight: 18.00 oz/yd².
- G. Pile Thickness: 0.09 in.
- H. Pile Characteristic: Multi-level Pattern Loop.
- I. Dye Method: 100% Solution Dyed.
- J. Backing: Synthetic.
- K. Size: 9.0" x 36.0".
- L. Install: Herringbone.
- M. Applied Treatments:
 - 1. Soil-Resistance Treatment: Manufacturer's standard treatment.
- N. Performance Characteristics:
 - 1. Radiant Panel Test (ASTM E-648-78): Average results shall exceed 0.22 Watts/cm².
 - 2. Methenamine Pill Test shall have been performed on both carpet surfaces (top pile face and under or backside): Compliance with ASTM D-2859-76.
 - 3. Appearance Retention Rating: Severe traffic, 3.5 minimum according to ASTM D 7330.
 - 4. Electrostatic Propensity: The maximum acceptable static-build when tested in compliance with test standards AATCC-134 shall be maximum 3.5 kilovolts at 70 degree F and 20% relative humidity.

2.2 INSTALLATION ACCESSORIES

- A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer.
- B. Adhesives: Water-resistant, mildew-resistant, nonstaining, pressure-sensitive type to suit products and subfloor conditions indicated, that comply with flammability requirements for installed carpet tile, and are recommended by carpet tile manufacturer for releasable installation.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Concrete Slabs:

1. Moisture Testing: Perform tests so that each test area does not exceed 200 sq. ft., and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
 - a. Anhydrous Calcium Chloride Test: ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
 - b. Relative Humidity Test: Using in situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.
 - c. Perform additional moisture tests recommended in writing by adhesive and carpet tile manufacturers. Proceed with installation only after substrates pass testing.

3.2 PREPARATION

- A. General: Comply with CRI's "CRI Carpet Installation Standards" and with carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile.
- B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions 1/8 inch wide or wider, and protrusions more than 1/32 inch unless more stringent requirements are required by manufacturer's written instructions.
- C. Concrete Substrates: Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by adhesive and carpet tile manufacturers.
- D. Metal Substrates: Clean grease, oil, soil and rust, and prime if recommended in writing by adhesive manufacturer. Rough sand painted metal surfaces and remove loose paint. Sand aluminum surfaces, to remove metal oxides, immediately before applying adhesive.
- E. Broom and vacuum clean substrates to be covered immediately before installing carpet tile.

3.3 INSTALLATION

- A. General: Comply with CRI's "CRI Carpet Installation Standard," Section 18, "Modular Carpet" and with carpet tile manufacturer's written installation instructions.
- B. Installation Method: Glue down; install every tile with full-spread, releasable, pressure-sensitive adhesive. Carpet adhesives shall be of low odor/solvent content.
- C. Maintain dye-lot integrity. Do not mix dye lots in same area.
- D. Maintain pile-direction patterns recommended in writing by carpet tile manufacturer.
- E. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet tile manufacturer.
- F. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
- G. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on carpet tile as marked on subfloor. Use nonpermanent, nonstaining marking device.
- H. Install pattern parallel to walls and borders.
- I. Access Flooring: Stagger joints of carpet tiles so carpet tile grid is offset from access flooring panel grid. Do not fill seams of access flooring panels with carpet adhesive; keep seams free of adhesive.
- J. Protect carpet tile against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet tile manufacturer.

END OF SECTION

SECTION 09 9123

INTERIOR PAINTING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes surface preparation and the application of paint systems on interior substrates.

1.2 DEFINITIONS

- A. MPI Gloss Level 1: Not more than five units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.
- B. MPI Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
- C. MPI Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
- D. MPI Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.
- E. MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.
- F. MPI Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.
- G. MPI Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
- B. Samples: For each type of paint system and in each color and gloss of topcoat.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Sherwin Williams or equal.

- B. Products: Subject to compliance with requirements, provide product listed in the Interior Painting Schedule for the paint category indicated.

2.2 PAINT, GENERAL

- A. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products Lists."
- B. Material Compatibility:
 - 1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 - 2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.
- C. Colors:
 - 1. Wall Paint (PT-1): Pure White SW 7005.
 - 2. Wall Paint, Accent Paint (PT-2): Primavera SW 9031.
 - 3. Door Frame Paint (PT-3): Black Fox SW 7020.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 - 1. Concrete: 12 percent.
 - 2. Fiber-Cement Board: 12 percent.
 - 3. Masonry (Clay and CMUs): 12 percent.
 - 4. Wood: 15 percent.
 - 5. Gypsum Board: 12 percent.
 - 6. Plaster: 12 percent.
- C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- D. Proceed with coating application only after unsatisfactory conditions have been corrected.
 - 1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual."
- B. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
- C. Where a constructor would prefer to utilize a roller on doors, a sample of the finished product shall be submitted for approval, prior to proceeding with the work.
- D. Do not paint door hinges or hardware.
- E. New material surfaces shall be conditioned with metal preparations, and then primes. Primed surfaces are to be sanded prior to finish painting.
- F. Rusty, or corroded metal surfaces shall be sandblasted or wire brushed free of corrosion, then wiped clean with a cloth. Prime and paint with a metal conditioning product that prevents corrosion.

3.4 INTERIOR PAINTING SCHEDULE

- A. Gypsum Board
 - 1. Latex Eggshell Finish- Low Odor, Low VOC
 - a. 1st Coat: PPG Pure Performance Interior Latex Primer 9-900 Series.
 - b. 2nd Coat: PPG Pure Performance Interior Eggshell Latex 9-300 Series.
 - c. 3rd Coat: PPG Pure Performance Interior Eggshell Latex 9-300 Series. (4.0 mils wet, 1.5 mils dry per coat).
- B. Wood: Doors, Trim, Cabinet Work
 - 1. Latex Semi-Gloss Finish- Low Odor, Low VOC

- a. 1st Coat: PPG Pure Performance Interior Latex Primer 9-900 Series.
 - b. 2nd Coat: PPG Pure Performance Interior Semi-Gloss Latex 9-500 Series.
 - c. 3rd Coat: PPG Pure Performance Interior Semi-Gloss Latex 9-500 Series.
(4.6 mils wet, 1.7 mils dry per coat).
- C. Metal Galvanized
- 1. Latex Semi-Gloss Finish- Low Odor, Low VOC
 - a. 1st Coat: PPG Pitt-Tech Int/Ext Industrial DTM Primer/Finish Enamel 90-712 Series. (7.7 mils wet, 3.0 mils dry).
 - b. 2nd Coat: PPG Pure Performance Interior Semi-Gloss Latex 9-500 Series.
 - c. 3rd Coat: PPG Pure Performance Interior Semi-Gloss Latex 9-500 Series.
(4.6 mils wet, 1.7 mils dry per coat).

END OF SECTION

SECTION 10 2113.17
PHENOLIC-CORE TOILET COMPARTMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Phenolic-core toilet compartments configured as toilet enclosures and urinal screens.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For toilet compartments. Include plans, elevations, sections, details, and attachment details.
- C. Samples for each type of toilet compartment material indicated.

1.3 INFORMATIONAL SUBMITTALS

- A. Product certificates.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance data.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities for toilet compartments designated as accessible.

2.2 PHENOLIC-CORE TOILET COMPARTMENTS

- A. Scranton Products or equal.
- B. Toilet-Enclosure Style: Floor and wall anchored.

- C. Urinal-Screen Style: Wall hung.
- D. Door, Panel, Screen, and Pilaster Construction: High density polyethylene (HDPE), fabricated from polymer resins compounded under high pressure, forming single thickness panel. Provide minimum 1: thick toilet partition and urinal screen.
- E. Waterproof and nonabsorbent, with self-lubricating surface, resistant to marks by pens, pencils, markers, and other writing instruments.
- F. Pilaster Shoes and Sleeves: Formed from stainless-steel sheet, not less than 0.031-inch nominal thickness and 3 inches high, finished to match hardware.
- G. Brackets (Fittings):
 - 1. Stirrup Type: Ear or U-brackets, stainless steel.
 - 2. Full-Height (Continuous) Type: Manufacturer's standard design; stainless steel.
 - 3. Brackets shall be fastened to the pilaster with stainless steel tamper resistant torx head screw and fastened to the panels with stainless steel tamper resistant torx head sex bolts.
- H. High density polyethylene (HDPE) Finish:
 - 1. Facing Sheet Finish: One color and pattern in each room.
 - 2. Color and Pattern: Architect to select from Manufacturer's full line.

2.3 HARDWARE AND ACCESSORIES

- A. Hardware and Accessories: Manufacturer's standard operating hardware and accessories.
 - 1. Material: Stainless steel.
 - 2. Provide units that comply with regulatory requirements for accessibility at compartments designated as accessible.
- B. Hardware and Accessories: Manufacturer's heavy-duty stainless steel operating hardware and accessories.
 - 1. Provide units that comply with regulatory requirements for accessibility at compartments designated as accessible.
 - 2. Hinges shall be integral, fabricated from the door and pilaster with no exposed metal parts.
 - 3. Door/strike/keeper shall be made of heavy-duty extruded aluminum.
 - 4. Latch and housing shall be made of heavy-duty extruded aluminum.
- C. Overhead Bracing: Manufacturer's standard continuous, extruded-aluminum head rail with antigrip profile and in manufacturer's standard finish.

- D. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel, finished to match the items they are securing, with theft-resistant-type heads. Provide sex-type bolts for through-bolt applications. For concealed anchors, use stainless-steel, hot-dip galvanized-steel, or other rust-resistant, protective-coated steel compatible with related materials.

2.4 FABRICATION

- A. Fabrication, General: Fabricate toilet compartment components to sizes indicated. Coordinate requirements and provide cutouts for through-partition toilet accessories where required for attachment of toilet accessories.
- B. Floor-and-Wall-Anchored Units: Provide manufacturer's standard corrosion-resistant anchoring assemblies with leveling adjustment nuts at tops and bottoms of pilasters. Provide shoes and sleeves (caps) at pilasters to conceal anchorage.
- C. Door Size and Swings: Unless otherwise indicated, provide 24-inch-wide in-swinging doors for standard toilet compartments and 36-inch-wide out-swinging doors with a minimum 32-inch-wide clear opening for compartments designated as accessible.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, level, and plumb. Secure units in position with manufacturer's recommended anchoring devices.
 - 1. Maximum Clearances:
 - a. Pilasters and Panels: 1/2 inch.
 - b. Panels and Walls: 1 inch.
 - 2. Stirrup Brackets: Secure panels to walls and to pilasters with no fewer than three brackets attached at midpoint and near top and bottom of panel.
 - a. Locate wall brackets so holes for wall anchors occur in masonry or tile joints.
 - b. Align brackets at pilasters with brackets at walls.
 - 3. Full-Height (Continuous) Brackets: Secure panels to walls and to pilasters with full-height brackets.
 - a. Locate bracket fasteners so holes for wall anchors occur in masonry or tile joints.
 - b. Align brackets at pilasters with brackets at walls.

3.2 ADJUSTING

- A. Hardware Adjustment: Adjust and lubricate hardware according to hardware manufacturer's written instructions for proper operation. Set hinges on in-swinging doors to hold doors open approximately 30 degrees from closed position when unlatched. Set hinges on out-swinging doors to return doors to fully closed position.

END OF SECTION

SECTION 10 4413
FIRE PROTECTION CABINETS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes fire-protection cabinets for portable fire extinguishers.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For fire-protection cabinets.

1.3 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.4 COORDINATION

- A. Coordinate size of fire-protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.
- B. Coordinate sizes and locations of fire-protection cabinets with wall depths.

1.5 SEQUENCING

- A. Apply vinyl lettering on field-painted fire-protection cabinets after painting is complete.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Rated Fire-Protection Cabinets: Listed and labeled to comply with requirements in ASTM E 814 for fire-resistance rating of walls where they are installed.

2.2 FIRE-PROTECTION CABINET

- A. Cabinet Type: Suitable for fire extinguisher.

1. Larsen or equal.
- B. Cabinet Construction: Nonrated.
- C. Cabinet Material: Aluminum sheet.
- D. Semirecessed Cabinet: One-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend).
 1. Square-Edge Trim: 1-1/4- to 1-1/2-inch backbend depth.
- E. Cabinet Trim Material: Aluminum sheet.
- F. Door Material: Aluminum sheet.
- G. Door Style: Fully glazed panel with frame.
- H. Door Glazing: Tempered float glass (clear).
- I. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.
- J. Accessories:
 1. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as directed by Architect.
 - a. Identify fire extinguisher in fire-protection cabinet with the words "FIRE EXTINGUISHER."
 - 1) Location: Applied to cabinet door.
 - 2) Application Process: Vinyl lettering.
 - 3) Lettering Color: White.
 - 4) Orientation: Vertical.
- K. Materials:
 1. Aluminum: ASTM B 221, with strength and durability characteristics of not less than Alloy 6063-T5 for aluminum sheet. ASTM B 221 for extruded shapes.
 - a. Finish: Clear anodic.
 - b. Color: As selected by Architect from full range of industry colors and color densities.
 2. Clear Float Glass: ASTM C 1036, Type I, Class 1, Quality q3, 3mm thick.

2.3 FABRICATION

- A. Fire-Protection Cabinets: Provide manufacturer's standard box (tub) with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Prepare recesses for semirecessed fire-protection cabinets as required by type and size of cabinet and trim style.
- B. Install fire-protection cabinets in locations and at mounting heights indicated or, if not indicated, at heights acceptable to authorities having jurisdiction.
- C. Fire-Protection Cabinets: Fasten cabinets to structure, square and plumb.
- D. Identification: Apply vinyl lettering at locations indicated.
- E. Adjust fire-protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.

END OF SECTION

SECTION 12 2413
ROLLER WINDOW SHADES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Manually operated roller shades with single rollers.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Show fabrication and installation details for roller shades, including shadeband materials, their orientation to rollers, and their seam and batten locations.
- C. Samples: For each exposed product and for each color and texture specified.

1.3 INFORMATIONAL SUBMITTALS

- A. Product certificates.
- B. Product test reports.

1.4 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Fabricator of products.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain roller shades from single source from single manufacturer.

2.2 MANUALLY OPERATED SHADES WITH SINGLE ROLLERS

- A. Hunter Douglas or Equal.
- B. Chain-and-Clutch Operating Mechanisms: With continuous-loop bead chain and clutch that stops shade movement when bead chain is released; permanently adjusted and lubricated.
 - 1. Chain-Retainer Type: Clip, jamb mount.
 - 2. Spring Lift-Assist Mechanisms: Provide for shadebands that weigh more than 10 lb or for shades as recommended by manufacturer, whichever criterion is more stringent.
- C. Crank-and-Gear Operating Mechanisms: Sealed gearbox drive system controlled by detachable crank handle.
- D. Rollers: Corrosion-resistant steel or extruded-aluminum tubes of diameters and wall thicknesses required to accommodate operating mechanisms and weights and widths of shadebands indicated without deflection. Provide with permanently lubricated drive-end assemblies and idle-end assemblies designed to facilitate removal of shadebands for service.
 - 1. Roller Drive-End Location: Right side of interior face of shade, left side of interior face of shade, as required per opening.
 - 2. Direction of Shadeband Roll: Regular, from back (exterior face) of roller.
- E. Mounting Hardware: Brackets or endcaps, corrosion resistant and compatible with roller assembly, operating mechanism, installation accessories, and mounting location and conditions indicated.
- F. Roller-Coupling Assemblies: Coordinated with operating mechanism and designed to join up to three inline rollers into a multiband shade that is operated by one roller drive-end assembly.
- G. Shadebands:
 - 1. Shadeband Material: Light-filtering fabric, Light-blocking fabric shall be located in the conference room.
 - 2. Shadeband Bottom (Hem) Bar: Steel or extruded aluminum.
 - a. Type: Enclosed in sealed pocket of shadeband material.
 - b. Color and Finish: As selected by Architect from manufacturer's full range.
- H. Installation Accessories:
 - 1. Front Fascia: Aluminum extrusion that conceals front and underside of roller and operating mechanism and attaches to roller endcaps without exposed fasteners.
 - 2. Exposed Headbox: Rectangular, extruded-aluminum enclosure including front fascia, top and back covers, endcaps, and removable bottom closure.
 - 3. Endcap Covers: To cover exposed endcaps.

4. Recessed Shade Pocket: Rectangular, extruded-aluminum enclosure designed for recessed ceiling installation; with front, top, and back formed as one piece, end plates, and removable bottom closure panel.
5. Closure Panel and Wall Clip: Removable aluminum panel designed for installation at bottom of site-constructed ceiling recess or pocket and for snap-in attachment to wall clip without fasteners.
6. Side Channels: With light seals and designed to eliminate light gaps at sides of shades as shades are drawn down. Provide side channels with shadeband guides or other means of aligning shadebands with channels at tops.
7. Bottom (Sill) Channel or Angle: With light seals and designed to eliminate light gaps at bottoms of shades when shades are closed.
8. Installation Accessories Color and Finish: As selected from manufacturer's full range.

2.3 ROLLER SHADE FABRICATION

- A. Product Safety Standard: Fabricate roller shades to comply with WCMA A 100.1
- B. Unit Sizes: Fabricate units in sizes to fill window and other openings as follows, measured at 74 deg F:
 1. Between (Inside) Jamb Installation: Width equal to jamb-to-jamb dimension of opening in which shade is installed less 1/4 inch per side or 1/2-inch total, plus or minus 1/8 inch. Length equal to head-to-sill or -floor dimension of opening in which shade is installed less 1/4 inch, plus or minus 1/8 inch.
 2. Outside of Jamb Installation: Width and length as indicated, with terminations between shades of end-to-end installations at centerlines of mullion or other defined vertical separations between openings.
- C. Shadeband Fabrication: Fabricate shadebands without battens or seams to extent possible, except as follows:
 1. Vertical Shades: Where width-to-length ratio of shadeband is equal to or greater than 1:4, provide battens and seams at uniform spacings along shadeband length to ensure shadeband tracking and alignment through its full range of movement without distortion of the material.
 2. Skylight Shades: Provide battens and seams at uniform spacings along shadeband as required to ensure shadeband tracking and alignment through its full range of movement without distortion or sag of material.
 3. Railroaded Materials: Railroad material where material roll width is less than the required width of shadeband and where indicated. Provide battens and seams as required by railroaded material to produce shadebands with full roll-width panel(s) plus, if required, one partial roll-width panel located at top of shadeband.

PART 3 - EXECUTION

3.1 ROLLER SHADE INSTALLATION

- A. Install roller shades level, plumb, and aligned with adjacent units according to manufacturer's written instructions.
 - 1. Opaque Shadebands: Located so shadeband is not closer than 2 inches to interior face of glass. Allow clearances for window operation hardware.
- B. Electrical Connections: Connect motor-operated roller shades to building electrical system.
- C. Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.
- D. Clean roller shade surfaces, after installation, according to manufacturer's written instructions.
- E. Replace damaged roller shades that cannot be repaired, in a manner approved by Architect, before time of Substantial Completion.

END OF SECTION

SECTION 12 3661.16
SOLID SURFACING COUNTERTOPS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Solid surface material countertops.
 - 2. Solid surface material backsplashes.
 - 3. Solid surface material end splashes.

1.2 ACTION SUBMITTALS

- A. Product Data: For countertop materials.
- B. Shop Drawings: For countertops. Show materials, finishes, edge and backsplash profiles, methods of joining, and cutouts for plumbing fixtures.
- C. Samples: For each type of material exposed to view.

PART 2 - PRODUCTS

2.1 SOLID SURFACE COUNTERTOP MATERIALS

- A. Solid Surface Material: Homogeneous-filled plastic resin complying with ICPA SS-1.
 - 1. Wilsonart or equal.
 - 2. Type: Provide Standard type unless Special Purpose type is indicated.
 - 3. Colors and Patterns: Hot Stone 9201GS.
- B. Plywood: Exterior softwood plywood complying with DOC PS 1, Grade C-C Plugged, touch sanded.

2.2 COUNTERTOP FABRICATION

- A. Fabricate countertops according to solid surface material manufacturer's written instructions and to the AWI/AWMAC/WI's "Architectural Woodwork Standards."
 - 1. Grade: Custom.
- B. Configuration:

1. Front: Straight, slightly eased at top.
 2. Backsplash: Straight, slightly eased at corner.
 3. End Splash: Matching backsplash.
- C. Countertops: 1 1/2-inch thick, solid surface material with front edge built up with same material.
- D. Countertops: 1/4-inch thick, solid surface material laminated to 3/4-inch thick plywood with built up 1/2-inch thick, solid surface material exposed edge.
- E. Backsplashes: 1/2-inch thick, solid surface material.
- F. Joints: Fabricate countertops without joints.
- G. Cutouts and Holes:
1. Undercounter Plumbing Fixtures: Make cutouts for fixtures in shop using template or pattern furnished by fixture manufacturer. Form cutouts to smooth, even curves.

2.3 INSTALLATION MATERIALS

- A. Adhesive: Product recommended by solid surface material manufacturer.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Fasten countertops by screwing through corner blocks of base units into underside of countertop. Pre-drill holes for screws as recommended by manufacturer.
- B. Fasten subtops to cabinets by screwing through subtops into cornerblocks of base cabinets. Shim as needed to align subtops in a level plane.
- C. Secure countertops to subtops with adhesive according to solid surface material manufacturer's written instructions.
- D. Bond joints with adhesive and draw tight as countertops are set. Mask areas of countertops adjacent to joints to prevent adhesive smears.
- E. Install backsplashes and end splashes by adhering to wall and countertops with adhesive.
- F. Install aprons to backing and countertops with adhesive.
- G. Complete cutouts not finished in shop. Mask areas of countertops adjacent to cutouts to prevent damage while cutting. Make cutouts to accurately fit items to be installed, and at right angles to finished surfaces unless beveling is required for clearance. Ease edges slightly to prevent snipping.

H. Apply sealant to gaps at walls; comply with Section 079200 "Joint Sealants."

END OF SECTION

SECTION 220005 / PLUMBING GENERAL1 GENERAL

- 1.1 The work covered by this division consists of providing all labor, equipment and materials and performing all operations necessary for the installation of the plumbing work as herein called for and shown on the drawings.
- 1.2 Related Documents:
- 1.2.1 Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.
- 1.2.2 This is a Basic Plumbing Requirements Section. Provisions of this section apply to work of all Division 22 sections.
- 1.2.3 Review all other contract documents to be aware of conditions affecting work herein.
- 1.2.4 Definitions:
- 1.2.4.1 Provide: Furnish and install, complete and ready for intended use.
- 1.2.4.2 Furnish: Supply and deliver to project site, ready for subsequent requirements.
- 1.2.4.3 Install: Operations at project site, including unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar requirements.
- 1.3 Permits and Fees: Contractor shall obtain all necessary permits, meters, and inspections required for his work and pay all fees and charges incidental thereto.
- 1.4 Verification of Owner's Data: Prior to commencing any work the Contractor shall satisfy himself as to the accuracy of all data as indicated in these plans and specifications and/or as provided by the Owner. Should the Contractor discover any inaccuracies, errors, or omissions in the data, he shall immediately notify the Architect/Engineer in order that proper adjustments can be anticipated and ordered. Commencement by the Contractor of any work shall be held as an acceptance of the data by him after which time the Contractor has no claim against the Owner resulting from alleged errors, omissions or inaccuracies of the said data.
- 1.5 Delivery and Storage of Materials: Materials delivered to site shall be inspected for damage, unloaded, and stored with a minimum of handling. All material shall be stored to provide protection from the weather and accidental damage.
- 1.6 Extent of work is indicated by the drawings, schedules, and the requirements of the specifications. Singular references shall not be constructed as requiring only one device if multiple devices are shown on the drawings or are required for proper system operation.

PLUMBING GENERAL

1.7 Field Measurements and Coordination:

- 1.7.1 The intent of the drawings and specifications is to obtain a complete and satisfactory installation. Separate divisional drawings and specifications shall not relieve the Contractor or subcontractors from full compliance of work of his trade indicated on any of the drawings or in any section of the specifications.
- 1.7.2 Verify all field dimensions and locations of equipment to insure close, neat fit with other trades' work. Make use of all contract documents and approved shop drawings to verify exact dimension and locations.
- 1.7.3 Coordinate work in this division with all other trades in proper sequence to insure that the total work is completed within contract time schedule and with a minimum cutting and patching.
- 1.7.4 Locate all apparatus symmetrical with architectural elements. Install to exact height and locations when shown on architectural drawings. When locations are shown only on plumbing drawings, be guided by architectural details and conditions existing at job and correlate this work with that of others.
- 1.7.5 Install work as required to fit structure, avoid obstructions, and retain clearance, headroom, openings and passageways. Cut no structural members without written approval. Provide sleeves at all concrete penetrations.
- 1.7.6 Carefully examine any existing conditions, piping, and premises. Compare drawings with existing conditions. Report any observed discrepancies. It shall be the Contractor's responsibility to properly coordinate the work and to identify problems in a timely manner. Written instructions will be issued to resolve discrepancies.
- 1.7.7 Because of the small scale of the drawings, it is not possible to indicate all offsets and fittings or to locate every accessory. Drawings are essentially diagrammatic. Study carefully the sizes and locations of structural members, wall and partition locations, trusses, and room dimensions and take actual measurements on the job. Locate piping, ductwork, equipment and accessories with sufficient space for installing and servicing. Contractor is responsible for accuracy of his measurements and for coordination with all trades. Contractor shall not order materials or perform work without such verification. No extra compensation will be allowed because field measurements vary from the dimensions on the drawings. If field measurements show that equipment or piping cannot be fitted, the Architect/Engineer shall be consulted. Remove and relocate, without additional compensation, any item that is installed and is later found to encroach on space assigned to another use.

1.8 Guarantee:

- 1.8.1 The Contractor shall guarantee labor, materials and equipment for a period of one (1) year from Substantial Completion, or from Owner's occupancy, whichever is earlier. Contractor shall make good any defects and shall include all necessary adjustments to and replacement of defective items without expense to the Owner.

- 1.8.2 Owner reserves right to make emergency repairs as required to keep equipment in operation without voiding Contractor's Guarantee Bond nor relieving Contractor of his responsibilities during guarantee period.
- 1.9 Approval Submittals:
- 1.9.1 When approved, the submittal control log and submittals shall be an addition to the specifications herewith, and shall be of equal force in that no deviation will be permitted except with the approval of the Architect/Engineer.
- 1.9.1.1 Shop drawings, product literature, and other approval submittals will only be reviewed if they are submitted in full accordance with the General and Supplementary Conditions and Division 1 Specification sections and the following.
- 1.9.1.1.1 Submittals shall be properly organized in accordance with the approved submittal control log.
- 1.9.1.1.2 Submittals shall not include items from more than one specification section in the same submittal package.
- 1.9.1.1.3 Submittals shall be properly identified by a cover sheet showing the project name, Architect and Engineer names, submittal control number, specification section, a list of products or item names with model numbers in the order they appear in the package, and spaces for approval stamps. A sample cover sheet is included at the end of this section.
- 1.9.1.1.4 Submittals shall have been reviewed and approved by the General Contractor (or Prime Contractor). Evidence of this review and approval shall be an "Approved" stamp with a signature and date.
- 1.9.1.1.5 Submittals that include a series of fixtures or devices (such as plumbing fixtures or valves) shall be organized by the fixture number or valve type and be marked accordingly. Each fixture must include all items associated with that fixture regardless of whether or not those items are used on other fixtures.
- 1.9.1.1.6 The electrical design shown on the drawings supports the plumbing equipment basis of design specifications at the time of design. If plumbing equipment is submitted with different electrical requirements, it is the responsibility of the plumbing contractor to resolve all required electrical design changes (wire and conduit size, type of disconnect or overload protection, point(s) of connection, etc.) and clearly show the new electrical design on the plumbing submittal with a written statement that this change will be provided at no additional cost. Plumbing submittals made with no written reference to the electrical design will be presumed to work with the electrical design. Any corrections required will be at no additional cost.
- 1.9.2 If the shop drawings show variation from the requirements of contract because of standard shop practice or other reasons, the Contractor shall make specific mention of such variation in writing in his letter of transmittal and on the submittal cover sheet in

PLUMBING GENERAL

order that, if acceptable, Contractor will not be relieved of the responsibility for executing the work in accordance with the contract.

- 1.9.3 Review of submittals, product literature, catalog data, or schedules by the Engineer shall not relieve the Contractor from responsibility for deviations from contract drawings or specifications, unless he has in writing called to the attention of the Architect/Engineer each such deviation in writing at the time of submission, nor shall it relieve him from responsibility for errors of any sort in shop drawings, product literature, catalog data, or schedules. Any feature or function specified but not mentioned in the submittal shall be assumed to be included per the specification.
- 1.9.4 Submit shop drawings and any other drawings specifically called for in other sections after award of the contract and before any material is ordered or fabricated. Shop drawings shall consist of plans, sections, elevations and details to scale (not smaller than 1/4" per foot), with dimensions clearly showing the installation. Direct copies of small scale project drawings issued to the Contractor are not acceptable. Drawings shall take into account equipment furnished under other sections and shall show space allotted for it. Include construction details and materials.
- 1.10 Test Reports and Verification Submittals: Submit test reports, certifications and verification letters as called for in other sections. Contractor shall coordinate the required testing and documentation of system performance such that sufficient time exists to prepare the reports, submit the reports, review the reports and take corrective action within the scheduled contract time.
- 1.11 O&M Data Submittals: Submit Operation and Maintenance (O&M) data as called for in other sections. Submit a draft of the O&M manuals at the 50% construction requisition. When a copy of approval submittals is included in the O&M Manual, only the final "Approved" or "Approved as Noted" copy shall be used. Contractor shall organize these data in the O&M Manuals tabbed by specification number. Prepare O&M Manuals as required by Division 1 and as described herein.. Submit manuals at the Substantial Completion inspection. Submit O&M manuals in electronic format on a disk separate from the "As-Built" drawings.

2 PRODUCTS

- 2.1 All materials shall be new or Owner-supplied reused as shown on the drawings, the best of their respective kinds, suitable for the conditions and duties imposed on them at the building and shall be of reputable manufacturers. The description, characteristics, and requirements of materials to be used shall be in accordance with qualifying conditions established in the following sections.
- 2.2 Equipment and Materials:
- 2.2.1 Shall be new and the most suitable grade for the purpose intended. Products installed shall be approved by Engineer and Owner's representative. Equipment furnished under this division shall be the product of a manufacturer regularly engaged in the manufacture of such items for a period of three years. Where practical, all of the components shall be products of a single manufacturer in order to provide proper coordination and

- responsibility. Where required, Contractor shall furnish proof of installation of similar units or equipment.
- 2.2.2 Each item of equipment shall bear a name plate showing the manufacturer's name, trade name, model number, serial number, ratings and other information necessary to fully identify it. This plate shall be permanently mounted in a prominent location and shall not be concealed, insulated or painted.
- 2.2.3 The label of the approving agency, such as UL, IBR, ASME, ARI, AMCA, by which a standard has been established for the particular item shall be in full view.
- 2.2.4 The equipment shall be essentially the standard product of a manufacturer regularly engaged in the production of such equipment and shall be a product of the manufacturer's latest design.
- 2.2.5 A service organization with personnel and spare parts shall be available within two hours for each type of equipment furnished.
- 2.2.6 Install in accordance with manufacturer's recommendations. Place in service by a factory trained representative where required.
- 2.2.7 Materials and equipment are specified herein by a single or by multiple manufacturers to indicate quality, material and type of construction desired. Manufacturer's products shown on the drawings have been used as basis for design; it shall be the Contractor's responsibility to ascertain that alternate manufacturer's products, or the particular products of named manufacturers, meet the detailed specifications and that size and arrangement of equipment are suitable for installation.
- 2.2.8 Model Numbers: Catalog numbers and model numbers indicated in the drawings and specifications are used as a guide in the selection of the equipment and are only listed for the contractor's convenience. The contractor shall determine the actual model numbers for ordering materials in accordance with the written description of each item and with the intent of the drawings and specifications.
- 2.3 Requests for Substitution:
- 2.3.1 Where a particular system, product or material is specified by name, consider it as standard basis for bidding, and base proposal on the particular system, product or material specified.
- 2.3.2 Requests by Contractor for substitution will be considered only when reasonable, timely, fully documented, and qualifying under one or more of the following circumstances.
- 2.3.2.1 Required product cannot be supplied in time for compliance with Contract time requirements.
- 2.3.2.2 Required product is not acceptable to governing authority, or determined to be non-compatible, or cannot be properly coordinated, warranted or insured, or has other recognized disability as certified by Contractor.

2.3.2.3 Substantial cost advantage is offered Owner after deducting offsetting disadvantages including delays, additional compensation for redesign, investigation, evaluation and other necessary services and similar considerations.

2.3.3 All requests for substitution shall contain a "Comparison Schedule" and clearly and specifically indicate any and all differences or omissions between the product specified as the basis of design and the product proposed for substitution. Differences shall include but shall not be limited to data as follows for both the specified and substituted products:

Principal of operation.

Materials of construction or finishes.

Thickness of gauge of materials.

Weight of item.

Deleted features or items.

Added features or items.

Changes in other work caused by the substitution.

Performance curves.

If the approved substitution contains differences or omissions not specifically called to the attention of the Architect/Engineer, the Owner reserves the right to require equal or similar features to be added to the substituted products (or to have the substituted products replaced) at the Contractor's expense.

3 EXECUTION

3.1 Workmanship: All materials and equipment shall be installed and completed in a first-class workmanlike manner and in accordance with the best modern methods and practice. Any materials installed which do not present an orderly and reasonably neat and/or workmanlike appearance, or do not allow adequate space for maintenance, shall be removed and replaced when so directed by the Architect/Engineer.

3.2 Coordination:

3.2.1 The Contractor shall be responsible for full coordination of the plumbing systems with shop drawings of the building construction so the proper openings and sleeves or supports are provided for piping, ductwork, or other equipment passing through slabs or walls. Contractor shall be responsible for coordination with the Commissioning Agent for submittal review, plumbing installation verification, and functional performance testing.

3.2.2 Any additional steel supports required for the installation of any plumbing equipment, piping, or ductwork shall be furnished and installed under the section of the specifications requiring the additional supports.

3.2.3 It shall be the Contractor's responsibility to see that all equipment such as valves, water hammer arresters, trap primer valves, and such other apparatus or equipment that may

- require maintenance and operation are made easily accessible, regardless of the diagrammatic location shown on the drawings.
- 3.2.4 All connections to fixtures and equipment shown on the drawings shall be considered diagrammatic unless otherwise indicated by detail. The actual connections shall be made to fully suit the requirements of each case and adequately provide for expansion and servicing.
- 3.2.5 The contractor shall protect equipment, material, and fixtures at all times. He shall replace all equipment, material, and fixtures which are damaged as a result of inadequate protection.
- 3.2.6 Prior to starting and during progress of work, examine work and materials installed by others as they apply to work in this division. Report conditions which will prevent satisfactory installation.
- 3.2.7 Start of work will be construed as acceptance of suitability of work of others.
- 3.3 Interruption of Service: Before any equipment is shut down for disconnecting or tie-ins, arrangements shall be made with the Architect/Engineer and this work shall be done at the time best suited to the Owner. This will typically be on weekends and/or holidays and/or after normal working hours. Services shall be restored the same day unless prior arrangements are made. All overtime or premium costs associated with this work shall be included in the base bid.
- 3.4 Phasing: Provide all required temporary valves, piping, ductwork, equipment and devices as required. Maintain temporary services to areas as required. Remove all temporary material and equipment on completion of work unless Engineer concurs that such material and equipment would be beneficial to the Owner on a permanent basis.
- 3.5 Cutting and Patching: Notify General Contractor to do all cutting and patching of all holes, chases, sleeves, and other openings required for installation of equipment furnished and installed under this section. Utilize experienced trades for cutting and patching. Obtain permission from Architect/Engineer before cutting any structural items.
- 3.6 Equipment Setting: Bolt equipment directly to concrete pads or vibration isolators as required, using hot-dipped galvanized anchor bolts, nuts and washers. Level equipment.
- 3.7 Painting: Touch-up factory finishes on equipment located inside and outside shall be done under Division 22. Obtain matched color coatings from the manufacturer and apply as directed. If corrosion is found during inspection on the surface of any equipment, clean, prime, and paint, as required.
- 3.8 Clean-up: Thoroughly clean all exposed parts of apparatus and equipment of cement, plaster, and other materials and remove all oil and grease spots. Repaint or touch up as required to look like new. During progress of work, contractor is to carefully clean up and leave premises and all portions of building free from debris and in a clean and safe condition.

PLUMBING GENERAL

- 3.9 Start-up and Operational Test: Start each item of equipment in strict accordance with the manufacturer's instructions; or where noted under equipment specification, start-up shall be done by a qualified representative of the manufacturer. Alignment, lubrication, safety, and operating control shall be included in start-up check.
- 3.10 Record Drawings:
- 3.10.1 During the progress of the work the Contractor shall record on their field set of drawings the exact location, as installed, of all piping, ductwork, equipment, and other systems which are not installed exactly as shown on the contract drawings.
- 3.10.2 Upon completion of the work, record drawings shall be prepared as described in the General Conditions, Supplementary Conditions, and Division 1 sections.
- 3.11 Acceptance:
- 3.11.1 Punch List: Submit written confirmation that all punch lists have been checked and the required work completed.
- 3.11.2 Instructions: At completion of the work, provide a competent and experienced person who is thoroughly familiar with project, for one day to instruct permanent operating personnel in operation of equipment and control systems. This is in addition to any specific equipment operation and maintenance training.
- 3.11.3 Operation and Maintenance Manuals: Furnish four complete manuals bound in ring binders with Table of Contents, organized, and tabbed by specification section. Manuals shall contain:
- Detailed operating instructions and instructions for making minor adjustments.
Complete wiring and control diagrams.
Routine maintenance operations.
Manufacturer's catalog data, service instructions, and parts lists for each piece of operating equipment.
Copies of approved submittals.
Copies of all manufacturer's warranties.
Copies of test reports and verification submittals.
- 3.11.4 Record Drawings: Submit record drawings.
- 3.11.5 Acceptance will be made on the basis of tests and inspections of job. A representative of firm that performed test and balance work shall be in attendance to assist. Contractor shall furnish necessary mechanics to operate system, make any necessary adjustments and assist with final inspection.

PROJECT NAME
PROJECT NUMBER

ARCHITECT/ENGINEER: Campbell Spellicy Engineering, Inc.

CONTRACTOR: XYZ Construction

SUBCONTRACTOR: ABC Plumbing Contractor

Use whatever standard
headings you want here

SUPPLIER: Jones Supply Co.

MANUFACTURER: Various

DATE: 2/15/15

SAMPLE

SECTION: 23545/Hydronic Specialties

1. Vent valves - Hoffman No. 62

List each item separately

2. In-line air separators - Bell & Gossett RL-4

Typical - list mfr name &
model number

3. Diaphragm type compression tanks - Bell & Gossett B-200

4. Pump suction diffusers - Bell & Gossett ED-3

5. Triple duty valves - Bell & Gossett 3D-4S

CSEI will list all
comments on
this sheet and
will only stamp
approvals on
this sheet

6. Shot feeders - J. Woods No. 2

Leave space after each individual item for CSEI comments

7. Pressure relief valves - Watts No. 6

8. Pressure reducing valves - Bell & Gossett No. 7
END OF SECTION

General Contractor's
APPROVAL stamp must
be on this sheet.

PLUMBING GENERAL

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PLUMBING GENERAL

220005.10

SECTION 220020 / CODES AND STANDARDS

1 GENERAL

- 1.1 The work covered by this division consists of providing all labor, equipment and materials and performing all operations necessary for the installation of the plumbing work as herein called for and shown on the drawings.
- 1.2 This is a Basic Plumbing Requirements section. Provisions of this section apply to work of all Division 22 sections.

2 CODES

- 2.1 All work under Division 22 shall be constructed in accordance with the codes listed herein. The design has been based on the requirements of these codes; and while it is not the responsibility of the Contractor to verify that all work called for complies with these codes, he shall be responsible for calling to the Architect/Engineer's attention any drawings or specifications that are not in conformance with these or other codes prior to ordering equipment or installing work.
- 2.2 Comply with regulations and codes of utility suppliers.
- 2.3 Where no specific method or form of construction is called for in the contract documents, the Contractor shall comply with code requirements when carrying out such work.
- 2.4 Where code conflict exists, generally the most restrictive requirement applies. Comply with current code edition, unless noted.
- 2.5 Additional codes or standards applying to a specific part of the work may be included in that section.
- 2.6 The following codes govern the work
 - 2.6.1 Florida Building Code, 2014 with all Supplements.

3 STANDARDS

- All plumbing materials, installation and systems shall meet the requirements of the following standards, including the latest addenda and amendments, to the extent referenced:
- 3.1 Underwriters' Laboratories (UL)
 - 3.2 American National Standards Institution (ANSI)
 - 3.3 American Society of Testing Materials (ASTM)
 - 3.4 National Fire Protection Association (NFPA)
 - 3.5 National Electrical Manufacturers Association (NEMA)

CODES AND STANDARDS

- 3.6 National Sanitation Foundation (NSF)
- 3.7 Cast Iron Soil Pipe Institute (CISPI)
- 3.8 University of Florida Design & Construction Standards

END OF SECTION

CODES AND STANDARDS

220020.2

SECTION 220030 / PLUMBING RELATED WORK1 DIVISION 1 - GENERAL REQUIREMENTS

- 1.1 Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.
- 1.2 This is a Basic Plumbing Requirements section. Provisions of this section apply to work of all Division 22 sections.
- 1.3 Coordinate with the General Contractor for all cutting and patching. Contractors performing Division 22 work shall inform the General Contractor of all cutting and patching required prior to bidding and shall coordinate installation.

2 DIVISION 3 - CONCRETE

- 2.1 Refer to Division 3, Concrete for:
 - 2.1.1 Rough grouting in and around Plumbing work.
 - 2.1.2 Patching concrete cut to accommodate Plumbing work.

2.2 DIVISION 5 - METALS

- 2.3 Refer to Division 5, Metals for:
 - 2.3.1 Framing openings for Plumbing equipment.
- 2.4 The following is part of Division 22 work.
 - 2.4.1 Supports for Plumbing work.

3 DIVISION 6 - WOOD AND PLASTIC

- 3.1 Refer to Division 6, Wood for:
 - 3.1.1 Framing openings for Plumbing equipment

4 DIVISION 9 - FINISHES

- 4.1 Refer to Division 9, Finishes for:
 - 4.1.1 Painting exposed piping and equipment.
 - 4.1.2 Painting structural metal and concrete for Plumbing work.
 - 4.1.3 Painting access panels.
 - 4.1.4 Painting color-coded Plumbing work indicated for continuous painting. See color

PLUMBING RELATED WORK

schedule in Division 22 section, "Plumbing Identification".

4.1.5 Installation of access doors in gypsum drywall.

4.2 Colors shall be selected by the Architect for all painting of exposed plumbing work in occupied spaces, unless specified herein. Do not paint insulated or jacketed surfaces.

4.3 Perform the following as part of Division 22 work:

4.3.1 Touch up painting of factory finishes.

4.3.2 Painting of all hangers.

5 DIVISION 26 - ELECTRICAL

5.1 Plumbing contractor shall coordinate the exact electrical requirements of all plumbing equipment being provided with the electrical contractor. Where approval submittals are required, this coordination shall be accomplished prior to making the submittals. The electrical design shown on the drawings supports the plumbing equipment basis of design. If plumbing equipment is submitted with different electrical requirements, it is the responsibility of the plumbing contractor to resolve all required electrical design changes (wire and conduit size, type of disconnect or overload protection, point(s) of connection, etc.) and clearly show the new electrical design on the plumbing submittal with a written statement that this design will be provided at no additional cost. Plumbing submittals made with no written reference to the electrical design will be presumed to work with the electrical design. Any corrections required will be at no additional cost.

5.2 Electrical contractor shall provide disconnect switches, starters, and contactors for plumbing equipment unless specifically noted as being furnished as part of plumbing equipment.

5.3 Electrical contractor shall provide all power wiring, raceway and devices, and make final electrical connections to all plumbing equipment, switches, starters, contactors, controllers, and similar equipment.

END OF SECTION

PLUMBING RELATED WORK

220030.2

SECTION 220105 / PIPES AND PIPE FITTINGS

1 GENERAL

- 1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
- 1.2 This section is a Division-22 Basic Plumbing Materials and Methods section, and is part of each Division-22 section making reference to pipes and pipe fittings specified herein.
- 1.3 Extent of pipes and pipe fittings required by this section is indicated on drawings and/or specified in other Division-22 sections.
- 1.4 Codes and Standards:
 - 1.4.1 Brazing: Certify brazing procedures, brazers, and operators in accordance with ASME Boiler and Pressure Vessel Code, Section IX, for shop and job-site brazing of piping work.
 - 1.4.2 NSF Labels: Where plastic piping is indicated to transport potable water, provide pipes and pipe fittings bearing approval label by National Sanitation Foundations (NSF).
- 1.5 Test Report and Verification Submittals:
 - 1.5.1 Submit brazing certification for all brazing installers.

2 PRODUCTS

- 2.1 Piping Materials: Provide pipe and tube of type, joint type, grade, size and weight (wall thickness or Class) indicated for each service. Where type, grade or class is not indicated, provide proper selection as determined by Installer for installation requirements, and comply with governing regulations and industry standards.
- 2.2 Pipe/Tube Fittings: Provide factory-fabricated fittings of type, materials, grade, class and pressure rating indicated for each service and pipe size. Provide sizes and types matching pipe, tube, valve or equipment connection in each case. Where not otherwise indicated, comply with governing regulations and industry standards for selections, and with pipe manufacturer's recommendations where applicable.
- 2.3 Piping Materials/Products:
 - 2.3.1 Soldering Materials: Solders for domestic water service shall be NSF approved or tested to contain no impurities of lead.
 - 2.3.1.1 Domestic water pipe solder materials shall comply with Section 22405.
 - 2.3.2 Pipe Thread Tape: Teflon tape.
 - 2.3.3 Protective Coating: Koppers Bitumastic No. 505 or equal.

PIPES AND PIPE FITTINGS

- 2.3.4 Brazing Materials: B cup with silver content of not less than 5%. ASTM B-32, Grade 96TS. Materials shall be determined by installer to comply with installation requirements.
- 2.4 Copper Tube and Fittings:
 - 2.4.1 Copper Tube: All copper tubing shall be manufactured in the United States.
 - 2.4.1.1 Copper Tube: ASTM B88; Type K or L as indicated for each service; hard-drawn temper unless specifically noted as annealed.
 - 2.4.2 Fittings:
 - 2.4.2.1 Wrought-Copper Solder-Joint Fittings: ANSI B16.22.
 - 2.4.2.2 Copper Tube Unions: Provide standard products recommended by manufacturer for use in service indicated.
- 2.5 Plastic Pipes and Fittings:
 - 2.5.1 Pipes:
 - 2.5.1.1 PVC DWV Pipe: ASTM D-2665, Schedule 40 (cellular foam core PVC pipe is prohibited).
 - 2.5.2 Fittings:
 - 2.5.2.1 PVC Solvent Cement: ASTM D-2564.
 - 2.5.2.2 PVC DWV Socket: ASTM D-2665.
- 3 EXECUTION
 - 3.1 Installation
 - 3.1.1 General: Install pipes and pipe fittings in accordance with recognized industry practices which will achieve permanently-leakproof piping systems, capable of performing each indicated service without piping failure. Install each run with minimum joints and couplings, but with adequate and accessible unions for disassembly and maintenance or replacement of valves and equipment. Reduce sizes (where indicated) by use of reducing fittings, not bushings. Align piping accurately at connections, within 1/16" misalignment tolerance.
 - 3.1.2 Comply with ANSI B31 Code for Pressure Piping.
 - 3.1.3 Locate piping runs, except as otherwise indicated, vertically and horizontally (pitched to drain) and avoid diagonal runs wherever possible. Orient horizontal runs parallel with walls and column lines. Locate runs as shown or described by diagrams, details and notations or, if not otherwise indicated, run piping in shortest route which does not obstruct usable space or block access for servicing building and its equipment. Hold piping close to walls, overhead construction, columns and other structural and

PIPES AND PIPE FITTINGS

- permanent-enclosure elements of building; limit clearance to ½" where furring is shown for enclosure or concealment of piping, but allow for insulation thickness, if any. Where possible, locate insulated piping for 1" clearance outside insulation.
- 3.1.4 Concealed Piping: Unless specifically noted as "Exposed" on the drawings, conceal piping from view in finished and occupied spaces, by locating in column enclosures, chases, in hollow wall construction or above suspended ceilings; do not encase horizontal runs in solid partitions, except as indicated.
- 3.1.5 Electrical Equipment Spaces: Do not run piping through transformer vaults and other electrical, communications, or data equipment spaces and enclosures unless shown. Install drip pan under piping that must run through electrical spaces.
- 3.1.5.1 Cut pipe from measurements taken at the site, not from drawings. Keep pipes free of contact with building construction and installed work. Isolate all metal piping from contact with concrete.
- 3.2 Piping System Joints: Provide joints of the type indicated in each piping system.
- 3.2.1 Solder copper tube-and-fitting joints where indicated, in accordance with recognized industry practice. Cut tube ends squarely, ream to full inside diameter, and clean outside of tube ends and inside of fittings. Apply non-acid water base type solder flux to joint areas of both tubes and fittings. Insert tube full depth into fitting, and solder in manner which will draw solder full depth and circumference of joint. Solder pipes using ASTM B828 methods.
- 3.2.2 Thread pipe in accordance with ANSI B2.1; cut threads full and clean using sharp dies. Ream threaded ends to remove burrs and restore full inside diameter. Apply pipe joint compound, or pipe joint tape (Teflon) where recommended by pipe/fitting manufacturer, on male threads at each joint and tighten joint to leave not more than 3 threads exposed. Paint exposed threads to retard rusting.
- 3.2.3 Plastic Pipe Joints: Comply with manufacturer's instructions and recommendations, and with applicable industry standards.
- 3.2.3.1 Solvent-cemented joints shall be made in accordance with ASTM D-2235 and ASTM F-402.
- 3.2.4 Braze copper tube-and-fitting joints where indicated, in accordance with ANSI B.31.
- 3.2.5 Piping Installation:
- 3.2.6 Install piping to allow for expansion and contraction.
- 3.2.7 Isolate all copper tubing from steel and concrete by wrapping the pipe at the contact point, and for one inch on each side, with at least two layers of plastic electrical tape. Isolate all copper tubing installed in block walls with a continuous plastic sleeve.

END OF SECTION

PIPES AND PIPE FITTINGS

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PIPES AND PIPE FITTINGS

220105.4

SECTION 220110 / VALVES

1 GENERAL

- 1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to the work of this section.
- 1.2 This section is a Division-22 Basic Materials and Methods section, and is part of each Division-22 section making reference to or requiring valves specified herein.
- 1.3 Extent of valves required by this section is indicated on drawings and/or specified in other Division-22 sections.
- 1.4 Quality Assurance:
 - 1.4.1 Valve Dimensions: For face-to-face and end-to-end dimensions of flanged or welding-end valve bodies, comply with ANSI B16.10.
 - 1.4.2 Valve Types: Provide valves of same type by same manufacturer.
 - 1.4.3 Valve Listing: For valves on fire protection piping, provide UL listing. Provide approval by Factory Mutual Fire Insurance Companies.
- 1.5 Approval Submittals: When required by other Division-22 sections, submit product data, catalog cuts, specifications, and dimensioned drawings for each type of valve. Include pressure drop curve or chart for each type and size of valve. Submit valves with Division-22 section using the valves, not as a separate submittal. For each valve, identify systems where the valve is intended for use.
 - 1.5.1 Ball Valves. Type BA.
- 1.6 O&M Data Submittals: Submit a copy of approval submittals. Submit installation instructions, maintenance data and spare parts lists for each type of valve. Include this data in the O&M Manual.

2 PRODUCTS

- 2.1 General: Provide factory-fabricated valves recommended by manufacturer for use in service indicated. Provide valves of types and pressure ratings indicated; provide proper selection as determined by Installer to comply with specifications and installation requirements. Provide sizes as indicated, and connections which properly mate with pipe, tube, and equipment connections.
- 2.2 Acceptable Manufacturers: Subject to compliance with requirements, provide valves of one of the producers listed for each valve type. The model numbers are listed for contractor's convenience only. In the case of a model number discrepancy, the written description shall govern.

VALVES

220110.1

2.3 Ball Valves:

2.3.1 General: Select with port area equal to or greater than connecting pipe area, include seat ring designed to hold sealing material.

2.3.2 Construction: Ball valves shall be rated for 150 psi saturated steam and 600 psi non-shock cold water. Pressure containing parts shall be constructed of ASTM B-584 alloy 844, or ASTM B-124 alloy 377. Valves shall be furnished with blow-out proof bottom loaded stem constructed of ASTM B-371 alloy 694 or other approved low zinc material. Provide TFE packing, TFE thrust washer, chrome-plated ball and reinforced teflon seats. Valves 1" and smaller shall be full port design. Valves 1¼" and larger shall be conventional port design. Stem extensions shall be furnished for use in insulated piping where insulation exceeds ½" thickness.

2.3.3 Comply with the following standards:

MSS SP-72. Ball Valves with Flanged or Butt Welding Ends for General Service.
MSS SP-110. Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends.

2.3.4 Types of Ball (BA) valves:

2.3.4.1 Threaded Ends 2" and Smaller (BA1): Bronze two-piece full port body with adjustable stem packing and stainless steel ball and trim. Nibco T-585-70. Stockham S216-BR-R-T. Milwaukee BA125. Apollo 77-100.

2.3.4.2 Soldered Ends 2" and Smaller (BA2): Bronze two-piece full port body with adjustable stem packing and stainless steel ball and trim. Nibco S-585-70.

2.3.4.3 Threaded Ends 1" and Smaller (BA3): Bronze two-piece full port body, UL listed (UL 842) for use with flammable liquids and LP gas with lockout rings. Nibco T-585-70-UL. Milwaukee BA400NSF, Apollo 70LF-200, Jomar 175-LWN.

2.4 Valve Features:

2.4.1 General: Provide valves with features indicated and, where not otherwise indicated, provide proper valve features as determined by Installer for installation requirements. Comply with ANSI B31.1

2.4.2 Valve features specified or required shall comply with the following:

2.4.2.1 Threaded: Provide valve ends complying with ANSI B2.1.

2.4.2.2 Solder-Joint: Provide valve ends complying with ANSI B16.18.

2.4.2.3 Trim: Fabricate pressure-containing components of valve, including stems (shafts) and seats from brass or bronze materials, of standard alloy recognized in valve manufacturing industry unless otherwise specified.

VALVES

2.4.2.4 Non-Metallic Disc: Provide non-metallic material selected for service indicated in accordance with manufacturer's published literature.

2.4.2.5 Renewable Seat: Design seat of valve with removable disc, and assemble valve so disc can be replaced when worn.

3 EXECUTION

3.1 Installation:

3.1.1 General: Install valves where required for proper operation of piping and equipment, including valves in branch lines to isolate sections of piping. Locate valves so as to be accessible and so that separate support can be provided when necessary. Install valves with stems pointed up, in vertical position where possible, but in no case with stems pointed downward below horizontal plane.

3.1.2 Insulation: Where insulation is indicated, install extended-stem valves, arranged in proper manner to receive insulation.

3.1.3 Applications Subject to Corrosion: Do not install bronze valves and valve components in direct contact with steel, unless bronze and steel are separated by dielectric insulator.

3.2 Selection of Valve Ends (Pipe Connections): Except as otherwise indicated, select and install valves with the following ends or types of pipe/tube connections:

3.2.1 Tube Size 2" and Smaller: Threaded valves. Soldered-joint valves may also be used. (Exception: Do not install solder joint valves with silver solder.)

3.3 Non-Metallic Disc: Limit selection and installation of valves with non-metallic disc to locations indicated and where foreign material in piping system can be expected to prevent tight shutoff of metal seated valves.

3.4 Renewable Seats: Select and install valves with renewable seats, except where otherwise indicated.

END OF SECTION

VALVES

220110.3

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VALVES

220110.4

SECTION 220180 / TESTING, CLEANING, AND STERILIZATION OF PIPING SYSTEMS1 GENERAL

- 1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
- 1.2 This section is a Division-22 Basic Plumbing Materials and Methods section, and is part of each Division-22 section making reference to or requiring the testing and other procedures specified herein.
- 1.3 Notify the Architect/Engineer when system tests are ready to be witnessed at least 24 hours prior to the test.
- 1.4 All materials, test equipment, and devices required for cleaning, testing, sterilizing or purging shall be provided by the Contractor.

2 PRESSURE TESTS

- 2.1 General: Provide temporary equipment for testing, including pump and gauges. Test piping systems before insulation is installed wherever feasible, and remove control devices before testing. Test each natural section of each piping system independently but do not use piping system valves to isolate sections where test pressure exceeds valve pressure rating. Fill each section with indicated medium and pressurize for indicated pressure and time.
- 2.2 Required test period is twenty-four hours.
- 2.3 No piping, fixtures, or equipment shall be concealed or covered until they have been tested. The contractor shall apply each test and ensure that it is satisfactory for the period specified before calling the Architect/Engineer to observe the test. Test shall be repeated upon request to the satisfaction of those making the inspection.
- 2.4 Temperature of water shall be accounted for at time of start of test and at end of test. Record fluid temperatures during start of test and re-check.
- 2.5 Observe each test section for leakage at the end of the test period. Test fails if leakage is observed or if pressure drop exceeds 5% of the test pressure.
- 2.6 Check of systems during application of test pressures should include visual check for water leakage and soap bubble or similar check for air and nitrogen leakage.
- 2.7 During heating and cooling cycles, linear expansion shall be checked at all elbows and expansion joints for proper clearance.
- 2.8 Repair piping systems sections which fail required piping test. Disassemble and re-install using new materials to extent required to overcome leakage. Do not use chemicals, stop-leak compounds, mastics, or other temporary repair methods.

TESTING, CLEANING, AND STERILIZATION OF PIPING SYSTEMS

2.9 Pressure Test Requirements:

- 2.9.1 Soil, Waste, and Vent: Test all piping within the building with a 10 foot head of water. Test piping in sections so that all joints are tested. Provide test tees as required.
- 2.9.2 Domestic Water: Perform hydrostatic test on all piping within the building at twice the normal static pressure at service point, but not less than 100 psig. Once tested, flush out piping and leave under pressure of the supply main or 40 psig for the balance of the construction period.
- 2.9.3 Pressure Testing: All new piping should be hydrostatically tested before being put into service. Test pressure should be 150 psig, 24 hour duration. Pressure gauges used for testing should have 0-300 psig range, 3%-2%-3% accuracy minimum; gauges should be installed with a gauge cock to facilitate removal; gauge must return to 0 psig upon completion of test. Contact PPD Operations Engineering at Phone: (352) 392-5050 to witness the beginning and ending (24-hour) pressures for approval. PPD Operations Engineering reserves the right to require additional pressure tests as necessary until the system is approved, at no cost to the Owner/project.

3 CLEANING AND STERILIZATION

- 3.1 General: Clean exterior surfaces of installed piping systems of superfluous materials, and prepare for application of specified coatings (if any). Flush out piping systems with clean water or blowdown with air before proceeding with required tests. Inspect each run of each system for completion of joints, supports and accessory items.
- 3.2 Flush and drain all water systems at least three times. Reverse flush systems from smallest piping to largest piping. Replace startup strainers with operating strainers.
- 3.3 Sterilization of Domestic Water Systems:
 - 3.3.1 Prerequisites: All new cold water piping installed (complete), all fixtures connected, system flushed out, and system filled with water.
 - 3.3.2 The shut off valve at the point of connection shall be closed, all fixture outlets opened slightly, and a sterilizing solution shall be introduced at a manifold connection installed by the Contractor at the point of connection.
 - 3.3.3 The solution shall contain 50 parts per million of available chlorine. The chlorinating material shall be either liquid chlorine or calcium hypochlorite. The solution shall be allowed to stand in the system for at least eight hours after which the entire system shall be flushed.
 - 3.3.4 After final flushing, all aerators shall be removed, cleaned, and reinstalled. After final flush the residual chlorine shall not exceed 0.2 parts per million.
 - 3.3.5 The Architect/Engineer shall be notified 24 hours prior to the procedure so that it can be witnessed.

TESTING, CLEANING, AND STERILIZATION OF PIPING SYSTEMS

- 3.3.6 Provide sampling and certified report by an independent testing lab. Provide written Health Department approval of disinfection samples.

END OF SECTION

TESTING, CLEANING, AND STERILIZATION OF PIPING SYSTEMS

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TESTING, CLEANING, AND STERILIZATION OF PIPING SYSTEMS

220180.4

SECTION 220205 / INSULATION FOR PLUMBING EQUIPMENT AND PIPING1 GENERAL

- 1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
- 1.2 Division-22 Basic Plumbing Materials and Methods Sections apply to work of this section.
- 1.3 Approval Submittals:
 - 1.3.1 Product Data: Submit a producer's data sheets and installation instructions on each insulation system including insulation, coverings, adhesives, sealers, protective finishes, and other material recommended by the manufacturer for applications indicated. Submit for:
 - 1.3.1.1 Fiberglass pipe insulation
 - 1.3.1.2 Cellular glass pipe below ground insulation
 - 1.3.1.3 Flexible unicellular piping insulation
- 1.4 O&M Data Submittals: Submit a copy of all approval submittals. Include in O&M Manual.

2 PRODUCTS

- 2.1 Acceptable Manufacturers: Subject to compliance with requirements, provide insulation products by Armstrong, Schuller, Knauf, Owens Corning, Pittsburgh Corning, U.S. Rubber, or approved equal. All products shall be asbestos-free.
- 2.2 Flame/Smoke Ratings: Provide composite plumbing insulation (insulation, jackets, coverings, sealers, mastics, and adhesive) with a flame-spread rating of 25 or less, and a smoke-developed rating of 50 or less, as tested by ANSI/ASTM E84.
- 2.3 Pipe Insulation Materials:
 - 2.3.1 Fiberglass Pipe Insulation: ASTM C547, Class 1 unless otherwise indicated. (Preformed sleeving with white all-service jacket, suitable for temperatures up to 450°F)
 - 2.3.2 Cellular Glass Pipe Insulation: ASTM C552, Type II, Class 1. (Uncovered.)
 - 2.3.3 Flexible Unicellular Pipe Insulation: ASTM C534, Type I. (Tubular, suitable for use to 200°F.)
 - 2.3.4 Staples, Bands, Wires, and Cement: As recommended by the insulation manufacturer for applications indicated.
 - 2.3.5 Adhesives, Sealers, Protective Finishes: Products recommended by the insulation

INSULATION FOR PLUMBING EQUIPMENT AND PIPING

manufacturer for the application indicated.

- 2.3.6 Jackets: ASTM C921, Type I (vapor barrier) for piping below ambient temperature, Type II (vapor permeable) for piping above ambient temperature. Type I may be used for all piping at Installer's option.

3 EXECUTION

3.1 General:

- 3.1.1 Install thermal insulation products in accordance with manufacturer's written instructions, and in compliance with recognized industry practices to ensure that insulation serves intended purpose.
- 3.1.2 Install insulation materials with smooth and even surfaces and on clean and dry surfaces. Redo poorly fitted joints. Do not use mastic or joint sealer as filler for gapping joints and excessive voids resulting from poor workmanship.
- 3.1.3 Maintain integrity of vapor-barrier on insulation and protect it to prevent puncture and other damage. Label all insulation "ASBESTOS FREE".
- 3.1.4 Do not apply insulation to surfaces while they are hot or wet.
- 3.1.5 Do not install insulation until systems have been checked and found free of leaks. Surfaces shall be clean and dry before attempting to apply insulation. A professional insulator with adequate experience and ability shall install insulation.
- 3.1.6 Do not install insulation on pipe systems until acceptance tests have been completed except for flexible unicellular insulation. Do not install insulation until the building is "dried-in".

3.2 Fiberglass Pipe Insulation:

- 3.2.1 Insulate the following piping systems (indoor locations):
- 3.2.1.1 Domestic hot water, 180° F: up to 2" pipe - 1½" thick, over 2" pipe 2" thick.
- 3.2.1.2 Domestic hot water, 140° F: up to 3" pipe - 1½" thick, over 3" pipe - 2" thick.
- 3.2.1.3 Storm water piping above ceilings including roof drain body - 1" thick.
- 3.2.1.4 Cold water pipe: ½" thick outside insulated envelope of the building.
- 3.2.2 Apply insulation to pipe with all side and end joints butted tightly. Seal longitudinal lap by pressurizing with plastic sealing tool. Apply 3 inch wide self sealing butt strips to joints between insulation sections. Insulate all fittings, flanges, valves and strainers with premolded insulation. Apply coat of insulating cement to fittings and wrap with glass cloth overlapping each wrap 1" and adjacent pipe 2". Finish with heavy coat of general purpose mastic. Premolded PVC covers may also be used, but no flexible inserts are

allowed.

- 3.2.3 Provide hanger or pipe support shields of 16 gauge (minimum) galvanized steel over the insulation which extends halfway up the pipe insulation cover and at least 6" on each side of the hanger.

- 3.2.4 Omit insulation on exposed plumbing fixture runouts from faces of wall or floor to fixture; on unions, flanges, strainer blowoffs, flexible connections and expansion joints.

3.3 Cellular Glass Pipe Insulation (Underground):

- 3.3.1 Insulate the following piping systems:

- 3.3.1.1 Domestic hot water: smaller than 6" pipe -1½" thick, 6" and larger pipe -2" thick.

- 3.3.2 Cut insulation in sections at fittings and carefully fit to the pipe and fittings. No stovepipe or single miter insulation is allowed. Apply vapor barrier mastic to all edges of the cellular insulation and between joints in the insulation. Wire the cellular glass in place with stainless steel wire 9 inches on center. Finish with a prefabricated water barrier self-sealing jacket similar to Pittsburg Corning "Pittwrap SSII", 70 mils thickness. Insulate all anchors, guides, wall penetrations, expansion joints, loops and ells in accordance with the manufacturer's recommendations. Use rubber spacers at all expansion fittings.

3.4 Flexible Unicellular Pipe Insulation:

- 3.4.1 Insulate the following piping systems:

- 3.4.1.1 Horizontal above-grade waste piping receiving condensate from air conditioning units to points of connection receiving waste from 4 or more fixtures - ½" thick.

- 3.4.1.2 Horizontal above grade waste piping receiving discharge from ice machines, coolers, freezers or similar units to points of connection receiving waste from 4 or more fixtures - ½" thick.

- 3.4.1.3 Air compressor after-cooler piping - ¾" thick.

- 3.4.2 Apply insulation in accordance with the manufacturer's recommendations and instructions. Mitre cut insulation to fit pipe fittings. Use approved cement to seal all joints and ends in the insulation.

END OF SECTION

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INSULATION FOR PLUMBING EQUIPMENT AND PIPING

220205.4

SECTION 220405 / POTABLE WATER SYSTEM1 GENERAL

- 1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
- 1.2 Division-22 Basic Plumbing Requirements and Basic Plumbing Materials and Methods sections apply to work of this section.
- 1.3 Extent of potable water systems work, is indicated on drawings and schedules, and by requirements of this section.
- 1.4 Code Compliance: Comply with applicable portions of current Florida Building Code, current edition with supplements, pertaining to selection and installation of plumbing materials and products. Comply with local utility requirements.
- 1.5 Approval Submittals:
 - 1.5.1 All Product Supplied: Purchase products, pipe, pipe fittings, etc. meeting Federal Guidelines for "Low Lead." Items not meeting the NSF/ANSI 372 "Low Lead Content" Guidelines shall not be installed on this project.
 - 1.5.2 Product Data: Submit manufacturer's technical product data and installation instructions for:
 - 1.5.2.1 Valves
- 1.6 Test Reports and Verification Submittals:
 - 1.6.1 Disinfection: Submit report by Health Department.
- 1.7 O&M Data Submittals: Submit a copy of all approval submittals. Submit maintenance data and parts lists for valves. Include these data in O&M manual.

2 PRODUCTS

- 2.1 General: Provide piping materials and factory-fabricated piping products of sizes, types, pressure ratings, temperature ratings, and capacities as indicated. Where not indicated, provide proper selection as determined by Installer to comply with installation requirements. Provide materials and products complying with Florida Plumbing Code where applicable. Provide sizes and types matching pipe materials used in potable water systems. Where more than one type of materials or products is indicated, selection is Installer's option. All domestic water products shall meet NSF 61 requirements for low lead/no lead content.
- 2.2 Acceptable Manufacturers: Subject to compliance with requirements, provide products of one of the following listed for each item.

POTABLE WATER SYSTEM

- 2.3 Identification: Provide identification complying with Division-22 Basic Plumbing Materials and Methods section "Plumbing Identification".
- 2.4 Pipes and Fittings: Provide pipes and pipe fittings complying with Division-22 Basic Plumbing Materials and Methods section "Pipes and Pipe Fittings", in accordance with the following listing:
- 2.4.1 Interior Water Piping:
- 2.4.1.1 Above Grade: Copper tube; Type L, hard-drawn temper; wrought-copper fittings, solder-joints.
- 2.4.2 Soldering Materials: Solders for domestic water service shall be NSF approved and tested to contain no impurities of lead.
- 2.4.2.1 Solder joints will be provided with a lead free filler material approved by NSF (National Sanitation Foundation) and in compliance with ANSI 61 suitable for domestic water systems. Selection of solder may be made from the following list.
- J.W. Harris Company, Inc.
Phone: 513-754-6142
Stay Brite, Stay Brite 8, Bridgit, NICK, and with limited use per manufacturers directions Stay-Silv 6HP.
- Taracorp, Inc.
Phone 770-955-1445
Taramet Sterling, Tarasil 964, Tarasil 946, Soldersafe, Soldersafe with silver, or Dutchboy.
- Solder paste will be non-toxic water based approved by NSF for use in domestic water systems. Solder paste shall comply with ASTM B813. Solder paste shall be suitable for solder filler material used. Acid flux is prohibited. Use of solder materials not approved by NSF and not in compliance with ANSI 61 are prohibited.
- 2.4.2.2 Tin-Copper Silver Solder: ASTM B-32, Grade 95TA.
- 2.5 Piping Specialties: Provide piping specialties complying with Division-22 Basic Plumbing Materials and Methods section "Piping Specialties".
- 2.6 Supports and Anchors: Provide supports and anchors complying with Division-22 Basic Plumbing Materials and Methods section "Supports and Anchors".
- 2.7 Interior Valves: Provide valves complying with Division-22 Basic Plumbing Materials and Methods section "Valves", in accordance with the following listing:
- 2.7.1 Sectional and Shutoff Valves: BA1, BA2.
- 3 EXECUTION

- 3.1 General: Examine areas and conditions under which potable water systems are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.
- 3.2 Install plumbing identification in accordance with Division-22 Basic Plumbing Materials and Methods section "Plumbing Identification".
- 3.3 Install water distribution piping in accordance with Division-22 Basic Plumbing Materials and Methods section "Pipes and Pipe Fittings".
 - 3.3.1 Install piping with 1/32" per foot (1/4%) downward slope towards drain point.
 - 3.3.2 Locate groups of pipes parallel to each other, spaced to permit applying full insulation and servicing of valves.
- 3.4 Install piping specialties in accordance with Division-22 Basic Plumbing Materials and Methods section "Piping Specialties".
- 3.5 Install supports and anchors in accordance with Division-22 Basic Plumbing Materials and Methods section "Supports and Anchors".
- 3.6 Install valves in accordance with Division-22 Basic Plumbing Materials and Methods section "Valves".
 - 3.6.1 Shutoff Valves: Install on inlet of each plumbing equipment item, and on inlet of each plumbing fixture, and elsewhere as indicated.
- 3.7 Piping Runouts to Fixtures: Provide hot and cold water piping runouts to fixtures of sizes indicated, but in no case smaller than required by Florida Building Code.
- 3.8 Plumbing Equipment Connections: Connect hot and cold water piping system to plumbing equipment as indicated, and comply with equipment manufacturer's installation instructions. Provide shutoff valve and union for each connection, provide drain valve on drain connection.
- 3.9 Piping Tests: Test, clean, and sterilize potable water piping in accordance with testing requirements of Division-22 Basic Plumbing Materials and Methods section "Testing, Cleaning, and Sterilization of Piping Systems".

END OF SECTION

POTABLE WATER SYSTEM

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POTABLE WATER SYSTEM

220405.4

SECTION 220410 / SOIL, WASTE AND VENT SYSTEM1 GENERAL

- 1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
- 1.2 Division-22 Basic Plumbing Requirements and Basic Plumbing Materials and Methods sections apply to work of this section.
- 1.3 Extent of soil waste and vent systems work is indicated on drawings and schedules, and by requirements of this section.
- 1.4 Code Compliance: Comply with applicable portions of Florida Building Code (Plumbing), current edition with supplements, pertaining to plumbing materials, construction and installation of products. Comply with local utility requirements.
- 1.5 Approval Submittals:
 - 1.5.1 Product Data: Submit manufacturer's technical product data for:
 - 1.5.1.1 Cleanouts

2 PRODUCTS

- 2.1 General: Provide piping materials and factory-fabricated piping products of sizes, types, pressure ratings, and capacities as indicated. Where not indicated, provide proper selection as determined by Installer to comply with installation requirements. Provide sizes and types matching piping and equipment connections; provide fittings of materials which match pipe materials used in soil and waste systems. Where more than one type of materials or products is indicated, selection is Installer's option.
- 2.2 Acceptable Manufacturers: Subject to compliance with requirements, provide products of one of the following listed for each item.
- 2.3 Pipes and Fittings: Provide pipes and pipe fittings complying with Division-22 Basic Plumbing Materials and Methods section "Pipes and Pipe Fittings", in accordance with the following listing:
 - 2.3.1 Above Ground Soil, Waste, and Vent Piping:
 - 2.3.1.1 Polyvinyl chloride plastic pipe (PVC); Type DWV; PVC plastic type DWV socket-type fitting, solvent cement joints. Do not use in fire-rated assemblies or return air plenums.
- 2.4 Pipe Specialties: Provide piping specialties complying with Division-22 Basic Materials and Methods section "Piping Specialties".
- 2.5 Supports and Anchors: Provide supports and anchors complying with Division-22 Basic Plumbing Materials and Methods section "Supports and Anchors".

SOIL, WASTE AND VENT SYSTEM

- 2.6 Cleanouts: Provide factory-fabricated drainage piping products of size and type indicated. Drains and cleanout body style: Select appropriate body style for system installed. Preference is for push-on style connection. Where not indicated, provide proper selection as determined by Installer to comply with installation requirements and governing regulations. Josam, Jay R. Smith, Wade. Basis of Design is Mifab. Equal by alternate manufacturer is acceptable.
- 2.6.1 Cleanout Plugs: Cast-bronze or brass, threads complying with ANSI B2.1 countersunk head. MiFab C1430 or equal.
- 2.6.2 Cleanout for PVC Systems:
- 2.6.2.1 Cleanouts in Piping: PVC cleanout adaptor with threaded PVC plug.
- 2.6.2.2 Wall Cleanouts: PVC cleanout adaptor with tapped, countersunk, threaded brass plug and round stainless steel access cover with screw. Cover MiFab C1400RD.
- 3 EXECUTION
- 3.1 Examine substrates and conditions under which soil and waste systems are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected.
- 3.2 Piping Installation:
- 3.2.1 Install above grade soil and waste piping in accordance with Division-22 Basic Plumbing Materials and Methods section "Pipes and Pipe Fittings", and with Florida Plumbing Code.
- 3.2.2 Install building soil and vent piping pitched to drain at minimum slope of ¼" per foot (2%) for piping 3" and smaller, and 1/8" per foot (1%) for piping 4" and larger.
- 3.3 Install piping specialties in accordance with Division-22 Basic Plumbing Materials and Methods section "Piping Specialties".
- 3.4 Install supports and anchors in accordance with Division-22 Basic Plumbing Materials and Methods section "Supports and Anchors".
- 3.5 Installation of Cleanouts: Install in above ground piping and building drain piping as indicated, as required by Florida Plumbing Code; and at each change in direction of piping greater than 45°; at minimum intervals of 50' for piping 4" and smaller and 100' for larger piping; and at base of each vertical soil or waste stack. Install floor and wall cleanout covers flush with adjoining surface for concealed piping, select type to match adjacent building finish.
- 3.5.1 Size: Cleanouts shall be full size up to 4". Piping over 4" shall have a reducing fitting to accommodate a 4" cleanout unless indicated otherwise on drawings.
- 3.5.2 Install cleanouts to allow adequate clearance for rodding.

SOIL, WASTE AND VENT SYSTEM

- 3.5.3 Protect all finished surfaces of cleanouts with a suitable adhesive covering until construction is completed.
- 3.6 Piping Runouts to Fixtures: Provide soil and waste piping runouts to plumbing fixtures and drains, with approved trap, of sizes indicated, but in no case smaller than required by Standard Plumbing Code.
- 3.7 Test, clean, flush, and inspect soil and waste piping in accordance with requirements of Division-22 Basic Plumbing Materials and Methods section "Testing, Cleaning and Sterilization of Piping Systems".

END OF SECTION

SOIL, WASTE AND VENT SYSTEM

220410.3

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SOIL, WASTE AND VENT SYSTEM

220410.4

SECTION 220430 / PLUMBING FIXTURES, EQUIPMENT, TRIM & SCHEDULE

1 GENERAL

- 1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
- 1.2 Division-22 Basic Plumbing Requirements and Basic Plumbing Materials and Methods sections apply to work of this section.
- 1.3 Extent of plumbing fixtures work required by this section is indicated on drawings and schedules, and by requirements of this section.
- 1.4 Refer to Division-26 sections for field-installed electrical wiring required for plumbing fixtures; not work of this section.
- 1.5 Codes and Standards:
 - 1.5.1 Plumbing Fixture Standards: Comply with applicable portions of Florida Building Code, current edition with supplements, pertaining to materials and installation of plumbing fixtures.
 - 1.5.2 ANSI Standards: Comply with applicable ANSI standards pertaining to plumbing fixtures and systems.
 - 1.5.3 PDI Compliance: Comply with standards established by PDI pertaining to plumbing fixture supports.
 - 1.5.4 UL Listing: Construct plumbing fixtures requiring electrical power in accordance with UL standards and provide UL-listing and label.
 - 1.5.5 ARI Compliance: Construct and install water coolers in accordance with ARI Standard 1010 "Drinking-Fountains and Self-Contained Mechanically-Refrigerated Drinking-Water Coolers", and provide Certification Symbol.
 - 1.5.6 ANSI Compliance: Construct and install barrier-free plumbing fixtures in accordance with ANSI Standard A117.1 "Specifications for Making Buildings and Facilities Accessible To and Usable By Physically Handicapped People".
- 1.6 Approval Submittals:
 - 1.6.1 Product Data: Submit manufacturer's technical product data, including rated capacities of selected model clearly indicated, furnished specialties and accessories; and installation instructions. Submit manufacturer's assembly-type drawings indicating dimensions, roughing-in requirements, required clearances, and methods of assembly of components and anchorages. The submittal shall be organized by "fixture number" and each fixture package shall be so identified. Each fixture package shall include all of the required fitting and trim, even if such devices are used for more than one fixture.

PLUMBING FIXTURES, EQUIPMENT, TRIM & SCHEDULE

- 1.7 O&M Data Submittals: Submit a copy of approval submittals. Submit maintenance data and parts lists for each type of plumbing fixture and accessory; including "trouble-shooting" maintenance guide. Include these data in O&M manual.
- 1.8 Handle plumbing fixtures carefully to prevent breakage, chipping and scoring fixture finish. Do not install damaged plumbing fixtures; replace and return damaged units to equipment manufacturer.
- 2 PRODUCTS
- 2.1 General: Provide factory-fabricated fixtures of type, style and material indicated. For each type fixture, provide trim, carrier, seats, and valves as specified. Where not specified, provide products as recommended by manufacturer, and as required for complete installation. Where more than one type is indicated, selection is Installer's option; but, all fixtures of same type must be furnished by single manufacturer. Where type is not otherwise indicated, provide fixtures complying with governing regulations.
- 2.2 Model Numbers: Basis of design model numbers of a particular manufacturer are listed in the fixture schedule as an aid to contractors. Where conflicts between the model number and the written description occur, the written description shall govern. Where acceptable manufacturers are listed, products are subject to compliance with requirements.
- 2.3 Materials:
- 2.3.1 Provide materials which have been selected for their surface flatness and smoothness. Exposed surfaces which exhibit pitting seam marks, roller marks, foundry sand holes, stains, decoloration, or other surface imperfections on finished units are not acceptable.
- 2.3.2 All fixtures shall be white vitreous china unless otherwise specifically noted. Where enameled iron fixtures are specified, they shall be furnished with acid resisting enamel.
- 2.3.3 Where fittings, trim and accessories are exposed or semi-exposed provide bright chrome-plated or polished stainless steel units. Provide copper or brass where not exposed.
- 2.3.4 Stainless Steel Sheets: ASTM A 167, Type 302/304, hardest workable temper. Finish shall be No. 4, bright, directional polish on exposed surfaces.
- 2.3.5 Vitreous China: High quality, free from fire cracks, spots, blisters, pinholes and specks; glaze exposed surfaces, and test for crazing resistance in accordance with ASTM C 554.
- 2.3.6 Synthetic Stone: High quality, free from defects, glaze on exposed surfaces, stain resistant.
- 2.4 Plumbing Fittings, Trim and Accessories:
- 2.4.1 Faucets: At locations where water is supplied (by manual, automatic or remote control), provide commercial quality chrome-plated, cast-brass faucets, valves, or other

- dispensing devices, of type and size indicated, and as required to operate as indicated.
- 2.4.1.1 Automatic Faucets: Provide electronic sensor-operated faucets with 0.5 gpm vandal-resistant spray head. Set volume adjustment at 0.25 gallons per operation. Provide box-mounted, hard-wired transformer (120 VAC primary - 24 VAC secondary) with each faucet. All wiring and electrical connections shall be provided by Division - 26.
 - 2.4.1.2 Aerators: Provide aerators of types approved by Health Department having jurisdiction.
 - 2.4.1.3 Acceptable Manufacturers: Subject to compliance with requirements, provide products of one of the following for each item. American Standard, Chicago Faucet Co., Symmons, Eljer Co., Kohler Co., Speakman Co., T & S Brass and Bronze Works, Water Saver Faucet Co.
 - 2.4.2 Stops: Provide chrome-plated brass, angle type, manual shutoff valves and $\frac{3}{8}$ " chrome-plated flexible supply pipes to permit fixture servicing without shutdown of water supply piping systems for all fixtures. Coordinate with fixture requirements.
 - 2.4.2.1 Provide loose key / metal-handled, chrome-plated stops. All stems shall be metal.
 - 2.4.2.2 Provide standard stops.
 - 2.4.2.3 Acceptable Manufacturers: Subject to compliance with requirements, provide products of one of the following for each item. McGuire, or approved equal.
 - 2.4.3 Waste Outlets: Provide removable P-traps, drains, waste arms, tailpieces and wastes-to-wall where drains are indicated for direct connection to drainage system for all fixtures unless otherwise noted. Provide drains, tailpieces and waste arms where indirect drains are indicated. Waste outlets shall be full size of fixture drain connection.
 - 2.4.3.1 Provide chrome-plated cast-brass P-traps and drains with cleanout.
 - 2.4.3.2 P-traps, wastes and drains of all types shall be 17-gauge.
 - 2.4.3.3 Acceptable Manufacturers: Subject to compliance with requirements, provide products of one of the following for each item. McGuire, or approved equal.
 - 2.4.4 Flush Valves: Provide quiet-flush, chrome-plated, cast-brass flush valves with vacuum breaker and screwdriver stop. Where handicap service is indicated, provide ADA compliant handles with the handle on the wide side of the stall.
 - 2.4.4.1 Automatic Flush Valves: Provide self-adaptive, electronic, infrared-sensor operated flush valves with 24 volt solenoid operator and override button. Provide a box-mounted, hard-wired transformer (120 VAC primary - 24 VAC secondary) with each flush valve. Provide matching wall cover plates each with four vandal-resistant screws. All wiring and electrical connections shall be provided by Division - 26.
 - 2.4.4.2 Acceptable Manufacturers: Subject to compliance with requirements, provide products of one of the following for each item. Sloan Valve Co., Delany Co., Zurn.

PLUMBING FIXTURES, EQUIPMENT, TRIM & SCHEDULE

- 2.4.5 Carriers: Provide cast-iron supports for fixtures of either graphitic gray iron, ductile iron, or malleable iron or steel as indicated. Coordinate with specific fixture requirements and conditions of the project.
- 2.4.5.1 Acceptable Manufacturers: Subject to compliance with requirements, provide products of one of the following for each item. Josam, Wade, Zurn, J.R. Smith.
- 2.4.6 Fixture Bolt Caps: Provide manufacturer's standard exposed fixture bolt caps finished to match fixture finish.
- 2.4.7 Escutcheons: Where fixture supplies and drains penetrate walls in exposed locations, provide chrome-plated brass sheet steel escutcheons with friction clips.
- 2.4.8 Comply with additional fixture requirements listed for each fixture and as required for a complete and functional system.

3 PLUMBING FIXTURES, TRIM & ACCESSORIES SCHEDULE:

- 3.1 P-1 Water Closet, Floor-Mounted (ADA Compliant): right height, vitreous china, elongated, siphon jet, quiet action, 1.28 gallon per flush. Provide handle to wide side of toilet. Heavy molded plastic, white elongated, open front seat less cover, with stainless steel, self-sustaining check hinges. Rim height 17.0".

Water Closet	American Standard 2859.111 - 1.28gpf
Seat	Sperzel 50-EWSSCH
Flush Valve	Royal 111 - 1.28

- 3.2 P-2 Vanity Lavatory (Handicap): ADA compliant, lavatory bowl provided with countertop. Provide lever actuated faucet with 0.5 gpm vandal proof aerator. Provide hot and cold water to faucet. Chrome plated quarter turn angle stops to the wall with stainless metal braided flexible supplies with fitted ends. Polished chrome plated cast brass 1-1/4" grid drain and offset tailpiece.

Lavatory	Provided w/ vanity
Faucet	Symmons S-61-G
Drain	McGuire 155 - WC offset
Supply with stop	Dahl ECO 611-33-31-31 dual outlet
Trap	McGuire 8872

- 3.3 P-3 Wall-hung Lavatory (Handicap): ADA compliant, lavatory bowl provided with countertop. Provide lever actuated faucet with 0.5 gpm vandal proof aerator. Provide hot and cold water to faucet. Chrome plated quarter turn angle stops to the wall with stainless metal braided flexible supplies with fitted ends. Polished chrome plated cast brass 1-1/4" grid drain and offset tailpiece.

Lavatory	American Standard 0355.012
Faucet	Chicago 2200-E2805ABCP
Drain	McGuire 155 -

PLUMBING FIXTURES, EQUIPMENT, TRIM & SCHEDULE

W C
offset

- | | | |
|--|--------------------------|---|
| | Supply with stop
Trap | Dahl ECO 611-33-31-31 dual outlet
McGuire 8872 |
|--|--------------------------|---|
- 3.4 P-4 Electric Water Heater (20-gallon): Point-of-use, commercial, tank-type with glass-lined tank suitable for 150 psi working pressure 300 psi test. Finish of a durable, high-gloss baked enamel. Blanket fiberglass insulation over entire tank. ASME pressure and temperature relief valve. Provide five (5) year warranty, snap action automatic surface-mounted thermostat, dual immersion type heating elements and magnesium anode rod. Provide inlet shut-off valve, vacuum breaker (Watts 36A) on inlet water supply, and galvanized steel drip pan. Set water heater temperature to >126°F. Provide tempering valve at each lavatory.
- | | | |
|--|---|--|
| | Water Heater
Expansion Tank
Re-circulation Pump | A.O. Smith DEL-20, 2-3kW Elements
Amtrol Therm-X-trol ST-6
TACO Delta-T 00 |
|--|---|--|
- 3.5 P-5 Handicap Urinal: Provide handicap urinal with automatic flush valve.
- | | | |
|--|-----------------------|---|
| | Urinal
Flush Valve | American Standard 6541.132
Sloan Regal 186-1 |
|--|-----------------------|---|
- 4 P-6 Electric Water Cooler: ADA compliant, Dual Height, wall-hung self-contained stainless steel finish electric water cooler. Unit to be complete with hermetic air cooled refrigeration system, cooler, pre-cooler, thermostat, safety controls, condenser fan motor, vermin-proof insulation, stainless steel cabinet, quiet operation. Top of cooler shall be No. 4 finish stainless steel cooler capacity 5 gph, cooling 80°F to 50°F, HFC-134a refrigerant, vandal resistant, and one year warranty on entire cooler. Provide flexible guard anti-microbial safety bubbler. Provide chrome-plated stop to wall with chrome-plated d" flexible supply. Provide pre-insulated 1¼" chrome-plated 17-gauge cast-brass P-trap with cleanout. Submittal must indicate that fountain and bubbler meet requirements of ADA. Provide short foot carrier for water cooler.
- | | | |
|--|---|---|
| | Electric Water Cooler
P-Trap with Prewrap Insulation
Supply w/Stop
Carrier | Elkay EZS8 (x2)
McGuire 8872 w/ Prowrap
McGuire 165 LK
Wade W-400 Series |
|--|---|---|
- 4.1 P-7 Standard Floor Drain: Cast iron 3" floor drain body. Provide super flow nickel bronze top with satin finish. Provide with trap primer connection. Connect to trap primer valve installed on cold water line in the same space as the floor drain. Set these drains as indicated on the architectural drawings. Set rim elevation the same as the floor. There shall be no trip hazard present. Correct as required to provide proper elevation. Provide deep seal trap.
- | | | |
|--|-------------|---------------------------|
| | Floor Drain | Josam 30003 – 5A, 3" pipe |
|--|-------------|---------------------------|

PLUMBING FIXTURES, EQUIPMENT, TRIM & SCHEDULE

5 EXECUTION

- 5.1 Examine roughing-in work of potable water and waste piping systems to verify actual locations of piping connections prior to installing fixtures. Also examine floors and substrates, and conditions under which fixture work is to be accomplished. Correct any incorrect locations of piping, and other unsatisfactory conditions for installation of plumbing fixtures. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.
- 5.2 Install plumbing fixtures of types indicated where shown and at indicated heights. Install in accordance with fixture manufacturer's written instructions, roughing-in drawings, and with recognized industry practices. Install in accordance with ADA and applicable handicap code requirements. Ensure that plumbing fixtures comply with requirements and serve intended purposes. Comply with applicable requirements of Standard Plumbing Code pertaining to installation of plumbing fixtures. Furnish templates for cut-outs in countertops. Coordinate exact fixture locations with countertop shop drawings.
- 5.3 Fasten plumbing fixtures securely to indicated supports or building structure; and ensure that fixtures are level and plumb. Secure plumbing supplies behind or within wall construction so as to be rigid, and not subject to pull or push movement. Mount at heights shown on the drawings. Fixture heights are floor-to-rim distance. Fitting heights are to centerline.
- 5.4 Install stop valve in water supply to each fixture.
- 5.5 After fixtures are set, the crack between the fixture and wall shall be caulked with DAP silicone-based caulking, or approved equal.
- 5.6 Protect installed fixtures from damage during remainder of construction period.
- 5.7 Upon completion of installation of plumbing fixtures and after units are water pressurized, test fixtures to demonstrate capability and compliance with requirements. When possible, correct malfunctioning units at site, then retest to demonstrate compliance; otherwise, remove and replace with new units and proceed with retesting.
- 5.8 Inspect each installed unit for damage to finish. If feasible, restore and match finish to original at site; otherwise, remove fixture and replace with new unit. Feasibility and match to be judged by Architect/Engineer. Remove cracked or dented units and replace with new units.
- 5.9 Clean plumbing fixtures, trim, aerators, and strainers of dirt and debris upon completion of installation.

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- 5.10 Adjust water pressure at drinking fountains to provide proper flow stream and specified gpm.
- 5.11 Adjust or replace washers to prevent leaks at faucets and stops.

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PLUMBING FIXTURES, EQUIPMENT, TRIM & SCHEDULE

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SECTION 230005 / MECHANICAL GENERAL1 GENERAL

- 1.1 The work covered by this division consists of providing all labor, equipment and materials and performing all operations necessary for the installation of the mechanical work as herein called for and shown on the drawings.
- 1.2 Related Documents:
- 1.2.1 Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.
- 1.2.2 This is a Basic Mechanical Requirements Section. Provisions of this section apply to work of all Division 23 sections.
- 1.2.3 Review all other contract documents to be aware of conditions affecting work herein.
- 1.2.4 Definitions:
- 1.2.4.1 Provide: Furnish and install, complete and ready for intended use.
- 1.2.4.2 Furnish: Supply and deliver to project site, ready for subsequent requirements.
- 1.2.4.3 Install: Operations at project site, including unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar requirements.
- 1.3 Permits and Fees: Contractor shall obtain all necessary permits, meters, and inspections required for his work and pay all fees and charges incidental thereto.
- 1.4 Verification of Owner's Data: Prior to commencing any work the Contractor shall satisfy himself as to the accuracy of all data as indicated in these plans and specifications and/or as provided by the Owner. Should the Contractor discover any inaccuracies, errors, or omissions in the data, he shall immediately notify the Architect/Engineer in order that proper adjustments can be anticipated and ordered. Commencement by the Contractor of any work shall be held as an acceptance of the data by him after which time the Contractor has no claim against the Owner resulting from alleged errors, omissions or inaccuracies of the said data.
- 1.5 Delivery and Storage of Materials: Materials delivered to site shall be inspected for damage, unloaded, and stored with a minimum of handling. All material shall be stored to provide protection from the weather and accidental damage.
- 1.6 Extent of work is indicated by the drawings, schedules, and the requirements of the specifications. Singular references shall not be constructed as requiring only one device if multiple devices are shown on the drawings or are required for proper system operation.

MECHANICAL GENERAL

1.7 Field Measurements and Coordination:

- 1.7.1 The intent of the drawings and specifications is to obtain a complete and satisfactory installation. Separate divisional drawings and specifications shall not relieve the Contractor or subcontractors from full compliance of work of his trade indicated on any of the drawings or in any section of the specifications.
- 1.7.2 Verify all field dimensions and locations of equipment to insure close, neat fit with other trades' work. Make use of all contract documents and approved shop drawings to verify exact dimension and locations.
- 1.7.3 Coordinate work in this division with all other trades in proper sequence to insure that the total work is completed within contract time schedule and with a minimum cutting and patching.
- 1.7.4 Locate all apparatus symmetrical with architectural elements. Install to exact height and locations when shown on architectural drawings. When locations are shown only on mechanical drawings, be guided by architectural details and conditions existing at job and correlate this work with that of others.
- 1.7.5 Install work as required to fit structure, avoid obstructions, and retain clearance, headroom, openings and passageways. Cut no structural members without written approval. Provide sleeves at all concrete penetrations.
- 1.7.6 Carefully examine any existing conditions, piping, and premises. Compare drawings with existing conditions. Report any observed discrepancies. It shall be the Contractor's responsibility to properly coordinate the work and to identify problems in a timely manner. Written instructions will be issued to resolve discrepancies.
- 1.7.7 Because of the small scale of the drawings, it is not possible to indicate all offsets and fittings or to locate every accessory. Drawings are essentially diagrammatic. Study carefully the sizes and locations of structural members, wall and partition locations, trusses, and room dimensions and take actual measurements on the job. Locate piping, ductwork, equipment and accessories with sufficient space for installing and servicing. Contractor is responsible for accuracy of his measurements and for coordination with all trades. Contractor shall not order materials or perform work without such verification. No extra compensation will be allowed because field measurements vary from the dimensions on the drawings. If field measurements show that equipment or piping cannot be fitted, the Architect/Engineer shall be consulted. Remove and relocate, without additional compensation, any item that is installed and is later found to encroach on space assigned to another use.

1.8 Guarantee:

- 1.8.1 The Contractor shall guarantee labor, materials and equipment for a period of one (1) year from Substantial Completion, or from Owner's occupancy, whichever is earlier. Contractor shall make good any defects and shall include all necessary adjustments to and replacement of defective items without expense to the Owner.

- 1.8.2 Owner reserves right to make emergency repairs as required to keep equipment in operation without voiding Contractor's Guarantee Bond nor relieving Contractor of his responsibilities during guarantee period.
- 1.9 Approval Submittals:
- 1.9.1 When approved, the submittal control log and submittals shall be an addition to the specifications herewith, and shall be of equal force in that no deviation will be permitted except with the approval of the Architect/Engineer.
- 1.9.1.1 Shop drawings, product literature, and other approval submittals will only be reviewed if they are submitted in full accordance with the General and Supplementary Conditions and Division 1 Specification sections and the following.
- 1.9.1.1.1 Submittals shall be properly organized in accordance with the approved submittal control log.
- 1.9.1.1.2 Submittals shall not include items from more than one specification section in the same submittal package.
- 1.9.1.1.3 Submittals shall be properly identified by a cover sheet showing the project name, Architect and Engineer names, submittal control number, specification section, a list of products or item names with model numbers in the order they appear in the package, and spaces for approval stamps. A sample cover sheet is included at the end of this section.
- 1.9.1.1.4 Submittals shall have been reviewed and approved by the General Contractor (or Prime Contractor). Evidence of this review and approval shall be an "Approved" stamp with a signature and date.
- 1.9.1.1.5 Submittals that include a series of fixtures or devices (such as HVAC units or valves) shall be organized by the fixture number or valve type and be marked accordingly. Each fixture must include all items associated with that fixture regardless of whether or not those items are used on other fixtures.
- 1.9.1.1.6 The electrical design shown on the drawings supports the mechanical equipment basis of design specifications at the time of design. If mechanical equipment is submitted with different electrical requirements, it is the responsibility of the mechanical contractor to resolve all required electrical design changes (wire and conduit size, type of disconnect or overload protection, point(s) of connection, etc.) and clearly show the new electrical design on the mechanical submittal with a written statement that this change will be provided at no additional cost. Mechanical submittals made with no written reference to the electrical design will be presumed to work with the electrical design. Any corrections required will be at no additional cost.
- 1.9.2 If the shop drawings show variation from the requirements of contract because of standard shop practice or other reasons, the Contractor shall make specific mention of such variation in writing in his letter of transmittal and on the submittal cover sheet in

MECHANICAL GENERAL

order that, if acceptable, Contractor will not be relieved of the responsibility for executing the work in accordance with the contract.

- 1.9.3 Review of submittals, product literature, catalog data, or schedules by the Engineer shall not relieve the Contractor from responsibility for deviations from contract drawings or specifications, unless he has in writing called to the attention of the Architect/Engineer each such deviation in writing at the time of submission, nor shall it relieve him from responsibility for errors of any sort in shop drawings, product literature, catalog data, or schedules. Any feature or function specified but not mentioned in the submittal shall be assumed to be included per the specification.
- 1.9.4 Submit shop drawings and any other drawings specifically called for in other sections after award of the contract and before any material is ordered or fabricated. Shop drawings shall consist of plans, sections, elevations and details to scale (not smaller than 1/4" per foot), with dimensions clearly showing the installation. Direct copies of small scale project drawings issued to the Contractor are not acceptable. Drawings shall take into account equipment furnished under other sections and shall show space allotted for it. Include construction details and materials.
- 1.10 Test Reports and Verification Submittals: Submit test reports, certifications and verification letters as called for in other sections. Contractor shall coordinate the required testing and documentation of system performance such that sufficient time exists to prepare the reports, submit the reports, review the reports and take corrective action within the scheduled contract time.
- 1.11 O&M Data Submittals: Submit Operation and Maintenance (O&M) data as called for in other sections. When a copy of approval submittals is included in the O&M Manual, only the final "Approved" or "Approved as Noted" copy shall be used. Contractor shall organize these data in the O&M Manuals tabbed by specification number. Prepare O&M Manuals as required by Division 1 and as described herein.. Submit manuals at the Substantial Completion inspection.

2 PRODUCTS

- 2.1 All materials shall be new or Owner-supplied reused as shown on the drawings, the best of their respective kinds, suitable for the conditions and duties imposed on them at the building and shall be of reputable manufacturers. The description, characteristics, and requirements of materials to be used shall be in accordance with qualifying conditions established in the following sections.
- 2.2 Equipment and Materials:
- 2.2.1 Shall be new and the most suitable grade for the purpose intended. Products installed shall be approved by Engineer and Owner's representative. Equipment furnished under this division shall be the product of a manufacturer regularly engaged in the manufacture of such items for a period of three years. Where practical, all of the components shall be products of a single manufacturer in order to provide proper coordination and responsibility. Where required, Contractor shall furnish proof of installation of similar units or equipment.

- 2.2.2 Each item of equipment shall bear a name plate showing the manufacturer's name, trade name, model number, serial number, ratings and other information necessary to fully identify it. This plate shall be permanently mounted in a prominent location and shall not be concealed, insulated or painted.
- 2.2.3 The label of the approving agency, such as UL, IBR, ASME, ARI, AMCA, by which a standard has been established for the particular item shall be in full view.
- 2.2.4 The equipment shall be essentially the standard product of a manufacturer regularly engaged in the production of such equipment and shall be a product of the manufacturer's latest design.
- 2.2.5 A service organization with personnel and spare parts shall be available within two hours for each type of equipment furnished.
- 2.2.6 Install in accordance with manufacturer's recommendations. Place in service by a factory trained representative where required.
- 2.2.7 Materials and equipment are specified herein by a single or by multiple manufacturers to indicate quality, material and type of construction desired. Manufacturer's products shown on the drawings have been used as basis for design; it shall be the Contractor's responsibility to ascertain that alternate manufacturer's products, or the particular products of named manufacturers, meet the detailed specifications and that size and arrangement of equipment are suitable for installation.
- 2.2.8 Model Numbers: Catalog numbers and model numbers indicated in the drawings and specifications are used as a guide in the selection of the equipment and are only listed for the contractor's convenience. The contractor shall determine the actual model numbers for ordering materials in accordance with the written description of each item and with the intent of the drawings and specifications.
- 2.3 Requests for Substitution:
 - 2.3.1 Where a particular system, product or material is specified by name, consider it as standard basis for bidding, and base proposal on the particular system, product or material specified.
 - 2.3.2 Requests by Contractor for substitution will be considered only when reasonable, timely, fully documented, and qualifying under one or more of the following circumstances.
 - 2.3.2.1 Required product cannot be supplied in time for compliance with Contract time requirements.
 - 2.3.2.2 Required product is not acceptable to governing authority, or determined to be non-compatible, or cannot be properly coordinated, warranted or insured, or has other recognized disability as certified by Contractor.

2.3.2.3 Substantial cost advantage is offered Owner after deducting offsetting disadvantages including delays, additional compensation for redesign, investigation, evaluation and other necessary services and similar considerations.

2.3.3 All requests for substitution shall contain a "Comparison Schedule" and clearly and specifically indicate any and all differences or omissions between the product specified as the basis of design and the product proposed for substitution. Differences shall include but shall not be limited to data as follows for both the specified and substituted products:

Principal of operation.

Materials of construction or finishes.

Thickness of gauge of materials.

Weight of item.

Deleted features or items.

Added features or items.

Changes in other work caused by the substitution.

Performance curves.

If the approved substitution contains differences or omissions not specifically called to the attention of the Architect/Engineer, the Owner reserves the right to require equal or similar features to be added to the substituted products (or to have the substituted products replaced) at the Contractor's expense.

3 EXECUTION

3.1 Workmanship: All materials and equipment shall be installed and completed in a first-class workmanlike manner and in accordance with the best modern methods and practice. Any materials installed which do not present an orderly and reasonably neat and/or workmanlike appearance, or do not allow adequate space for maintenance, shall be removed and replaced when so directed by the Architect/Engineer.

3.2 Coordination:

3.2.1 The Contractor shall be responsible for full coordination of the mechanical systems with shop drawings of the building construction so the proper openings and sleeves or supports are provided for piping, ductwork, or other equipment passing through slabs or walls. Contractor shall be responsible for coordination with the Commissioning Agent for submittal review, mechanical installation verification, and functional performance testing.

3.2.2 Any additional steel supports required for the installation of any mechanical equipment, piping, or ductwork shall be furnished and installed under the section of the specifications requiring the additional supports.

3.2.3 It shall be the Contractor's responsibility to see that all equipment such as valves, dampers, filters and such other apparatus or equipment that may require maintenance and operation are made easily accessible, regardless of the diagrammatic location shown on the drawings.

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- 3.2.4 All connections to fixtures and equipment shown on the drawings shall be considered diagrammatic unless otherwise indicated by detail. The actual connections shall be made to fully suit the requirements of each case and adequately provide for expansion and servicing.
- 3.2.5 The contractor shall protect equipment, material, and fixtures at all times. He shall replace all equipment, material, and fixtures which are damaged as a result of inadequate protection.
- 3.2.6 Prior to starting and during progress of work, examine work and materials installed by others as they apply to work in this division. Report conditions which will prevent satisfactory installation.
- 3.2.7 Start of work will be construed as acceptance of suitability of work of others.
- 3.3 Interruption of Service: Before any equipment is shut down for disconnecting or tie-ins, arrangements shall be made with the Architect/Engineer and this work shall be done at the time best suited to the Owner. This will typically be on weekends and/or holidays and/or after normal working hours. Services shall be restored the same day unless prior arrangements are made. All overtime or premium costs associated with this work shall be included in the base bid.
- 3.4 Phasing: Provide all required temporary valves, piping, ductwork, equipment and devices as required. Maintain temporary services to areas as required. Remove all temporary material and equipment on completion of work unless Engineer concurs that such material and equipment would be beneficial to the Owner on a permanent basis.
- 3.5 Cutting and Patching: Notify General Contractor to do all cutting and patching of all holes, chases, sleeves, and other openings required for installation of equipment furnished and installed under this section. Utilize experienced trades for cutting and patching. Obtain permission from Architect/Engineer before cutting any structural items.
- 3.6 Equipment Setting: Bolt equipment directly to concrete pads or vibration isolators as required, using hot-dipped galvanized anchor bolts, nuts and washers. Level equipment.
- 3.7 Painting: Touch-up factory finishes on equipment located inside and outside shall be done under Division 23. Obtain matched color coatings from the manufacturer and apply as directed. If corrosion is found during inspection on the surface of any equipment, clean, prime, and paint, as required.
- 3.8 Clean-up: Thoroughly clean all exposed parts of apparatus and equipment of cement, plaster, and other materials and remove all oil and grease spots. Repaint or touch up as required to look like new. During progress of work, contractor is to carefully clean up and leave premises and all portions of building free from debris and in a clean and safe condition.
- 3.9 Start-up and Operational Test: Start each item of equipment in strict accordance with the manufacturer's instructions; or where noted under equipment specification, start-up

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- shall be done by a qualified representative of the manufacturer. Alignment, lubrication, safety, and operating control shall be included in start-up check.
- 3.10 Climate Control: Operate heating and cooling systems as required after initial startup to maintain temperature and humidity conditions to avoid freeze damage and warping or sagging of ceilings and carpet.
- 3.11 Record Drawings:
- 3.11.1 During the progress of the work the Contractor shall record on their field set of drawings the exact location, as installed, of all piping, ductwork, equipment, and other systems which are not installed exactly as shown on the contract drawings.
- 3.11.2 Upon completion of the work, record drawings shall be prepared as described in the General Conditions, Supplementary Conditions, and Division 1 sections.
- 3.12 Acceptance:
- 3.12.1 Punch List: Submit written confirmation that all punch lists have been checked and the required work completed.
- 3.12.2 Instructions: At completion of the work, provide a competent and experienced person who is thoroughly familiar with project, for one day to instruct permanent operating personnel in operation of equipment and control systems. This is in addition to any specific equipment operation and maintenance training.
- 3.12.3 Operation and Maintenance Manuals: Furnish four complete manuals bound in ring binders with Table of Contents, organized, and tabbed by specification section. Manuals shall contain:
- Detailed operating instructions and instructions for making minor adjustments.
 - Complete wiring and control diagrams, including point-to-point diagrams and addresses.
 - Routine maintenance operations.
 - Manufacturer's catalog data, service instructions, and parts lists for each piece of operating equipment.
 - Copies of approved submittals.
 - Copies of all manufacturer's start-up reports and warranties.
 - Copies of test reports and verification submittals.
- 3.12.4 Record Drawings: Submit record drawings.
- 3.12.5 Test and Balance Report: Submit four certified copies. The Report shall be submitted for review prior to the Substantial Completion Inspection unless otherwise required by Division 1.
- 3.12.6 Acceptance will be made on the basis of tests and inspections of job. A representative of firm that performed test and balance work shall be in attendance to assist. Contractor shall furnish necessary mechanics to operate system, make any necessary adjustments and assist with final inspection.

MECHANICAL GENERAL

PROJECT NAME
PROJECT NUMBER

ARCHITECT/ENGINEER: Campbell Spellicy Engineering, Inc.

CONTRACTOR: XYZ Construction

SUBCONTRACTOR: ABC Mechanical Contractor

Use whatever standard
headings you want here

SUPPLIER: Jones Supply Co.

MANUFACTURER: Various

DATE: 2/15/15

SAMPLE

SECTION: 23545/Hydronic Specialties

1. Vent valves - Hoffman No. 62

List each item separately

2. In-line air separators - Bell & Gossett RL-4

Typical - list mfr name &
model number

3. Diaphragm type compression tanks - Bell & Gossett B-200

4. Pump suction diffusers - Bell & Gossett ED-3

5. Triple duty valves - Bell & Gossett 3D-4S

CSEI will list all
comments on
this sheet and
will only stamp
approvals on
this sheet

6. Shot feeders - J. Woods No. 2

Leave space after each individual item for CENF comments

7. Pressure relief valves - Watts No. 6

8. Pressure reducing valves - Bell & Gossett No. 7

General Contractor's
APPROVAL stamp must
be on this sheet.

END OF SECTION

MECHANICAL GENERAL

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MECHANICAL GENERAL

230005.10

SECTION 230020 / CODES AND STANDARDS

1 GENERAL

- 1.1 The work covered by this division consists of providing all labor, equipment and materials and performing all operations necessary for the installation of the mechanical work as herein called for and shown on the drawings.
- 1.2 This is a Basic Mechanical Requirements section. Provisions of this section apply to work of all Division 23 sections.

2 CODES

- 2.1 All work under Division 23 shall be constructed in accordance with the codes listed herein. The design has been based on the requirements of these codes; and while it is not the responsibility of the Contractor to verify that all work called for complies with these codes, he shall be responsible for calling to the Architect/Engineer's attention any drawings or specifications that are not in conformance with these or other codes prior to ordering equipment or installing work.
- 2.2 Comply with regulations and codes of utility suppliers.
- 2.3 Where no specific method or form of construction is called for in the contract documents, the Contractor shall comply with code requirements when carrying out such work.
- 2.4 Where code conflict exists, generally the most restrictive requirement applies. Comply with current code edition, unless noted.
- 2.5 Additional codes or standards applying to a specific part of the work may be included in that section.
- 2.6 The following codes govern the work
 - 2.6.1 Florida Building Code, 2010 with all Supplements.
 - 2.6.2 National Electrical Code (NFPA 70). See Section 26020 for edition.
 - 2.6.3 Installation of Air Conditioning and Ventilation Systems (NFPA 90A), 2009 edition.

3 STANDARDS

- All mechanical materials, installation and systems shall meet the requirements of the following standards, including the latest addenda and amendments, to the extent referenced:
- 3.1 Underwriters' Laboratories (UL)
 - 3.2 American National Standards Institution (ANSI)
 - 3.3 American Society of Testing Materials (ASTM)

CODES AND STANDARDS

- 3.4 National Fire Protection Association (NFPA)
- 3.5 National Electrical Manufacturers Association (NEMA)
- 3.6 Air Conditioning and Refrigeration Institute (ARI)
- 3.7 Sheet Metal and Air Conditioning Contractors' National Association (SMACNA)
- 3.8 American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE)
- 3.9 Air Movement and Control Association (AMCA)

END OF SECTION

SECTION 230030 / MECHANICAL RELATED WORK1 DIVISION 1 - GENERAL REQUIREMENTS

- 1.1 Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.
- 1.2 This is a Basic Mechanical Requirements section. Provisions of this section apply to work of all Division 23 sections.
- 1.3 Coordinate with the General Contractor for all cutting and patching. Contractors performing Division 23 work shall inform the General Contractor of all cutting and patching required prior to bidding and shall coordinate installation.

2 DIVISION 5 - METALS

- 2.1 Refer to Division 5, Metals for:
 - 2.1.1 Framing openings for mechanical equipment.
- 2.2 The following is part of Division 23 work.
 - 2.2.1 Supports for mechanical work.

3 DIVISION 6 - WOOD AND PLASTIC

- 3.1 Refer to Division 6, Wood for:
 - 3.1.1 Framing openings for mechanical equipment

4 DIVISION 7 - THERMAL AND MOISTURE PROTECTION

- 4.1 Refer to Division 7, Thermal and Moisture Protection for:
 - 4.1.1 Installation of all roof curbs and roof supports for mechanical work.
 - 4.1.2 Caulking and waterproofing of all wall and roof mounted mechanical work.
 - 4.1.3 Providing all roof curbs and all vent flashing for metal roofs.
- 4.2 The following is part of Division 23 work, complying with the requirements of Division 7.
 - 4.2.1 Fire barrier penetration seals.

5 DIVISION 8 - DOORS AND WINDOWS

- 5.1 Refer to Division 8, Doors & Windows for:
 - 5.1.1 Providing all undercuts

MECHANICAL RELATED WORK

6 DIVISION 9 - FINISHES

6.1 Refer to Division 9, Finishes for:

- 6.1.1 Painting exposed ductwork, piping, and equipment.
- 6.1.2 Painting structural metal and concrete for mechanical work.
- 6.1.3 Painting access panels.
- 6.1.4 Painting color-coded mechanical work indicated for continuous painting. See color schedule in Division 23 section, "Mechanical Identification".
- 6.1.5 Installation of access doors in gypsum drywall.

6.2 Colors shall be selected by the Architect for all painting of exposed mechanical work in occupied spaces, unless specified herein. Do not paint insulated or jacketed surfaces.

6.3 Perform the following as part of Division 23 work:

- 6.3.1 Touch up painting of factory finishes.
- 6.3.2 Painting of all hangers.

7 DIVISION 26 - ELECTRICAL

- 7.1 Mechanical contractor shall coordinate the exact electrical requirements of all mechanical equipment being provided with the electrical contractor. Where approval submittals are required, this coordination shall be accomplished prior to making the submittals. The electrical design shown on the drawings supports the mechanical equipment basis of design. If mechanical equipment is submitted with different electrical requirements, it is the responsibility of the mechanical contractor to resolve all required electrical design changes (wire and conduit size, type of disconnect or overload protection, point(s) of connection, etc.) and clearly show the new electrical design on the mechanical submittal with a written statement that this design will be provided at no additional cost. Mechanical submittals made with no written reference to the electrical design will be presumed to work with the electrical design. Any corrections required will be at no additional cost.
- 7.2 Mechanical contractor shall provide all HVAC control wiring including the Building Automation system sensors, alarms, and input/output signals and all relays, interlocks, warning lights, and control devices, complying with the requirements of Division 26. The intent is for the mechanical contractor to be responsible for the entire HVAC control system, including point-to-point wiring. All control wiring shall be in conduit unless otherwise noted.
- 7.3 Electrical contractor shall provide disconnect switches, starters, and contactors for mechanical equipment unless specifically noted as being furnished as part of mechanical

MECHANICAL RELATED WORK

equipment.

- 7.4 Electrical contractor shall provide all power wiring, raceway and devices, and make final electrical connections to all mechanical equipment, switches, starters, contactors, controllers, and similar equipment.

END OF SECTION

MECHANICAL RELATED WORK

230030.3

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MECHANICAL RELATED WORK

230030.4

SECTION 230105 / PIPES AND PIPE FITTINGS

1 GENERAL

- 1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
- 1.2 This section is a Division-23 Basic Mechanical Materials and Methods section, and is part of each Division-23 section making reference to pipes and pipe fittings specified herein.
- 1.3 Extent of pipes and pipe fittings required by this section is indicated on drawings and/or specified in other Division-23 sections.
- 1.4 Codes and Standards:
- 1.4.1 Brazing: Certify brazing procedures, brazers, and operators in accordance with ASME Boiler and Pressure Vessel Code, Section IX, for shop and job-site brazing of piping work.
- 1.5 Test Report and Verification Submittals:
- 1.5.1 Submit brazing certification for all brazing installers.

2 PRODUCTS

- 2.1 Piping Materials: Provide pipe and tube of type, joint type, grade, size and weight (wall thickness or Class) indicated for each service. Where type, grade or class is not indicated, provide proper selection as determined by Installer for installation requirements, and comply with governing regulations and industry standards.
- 2.2 Pipe/Tube Fittings: Provide factory-fabricated fittings of type, materials, grade, class and pressure rating indicated for each service and pipe size. Provide sizes and types matching pipe, tube, valve or equipment connection in each case. Where not otherwise indicated, comply with governing regulations and industry standards for selections, and with pipe manufacturer's recommendations where applicable.
- 2.3 Piping Materials/Products:
- 2.3.1 Soldering Materials: Solders for domestic water service shall be NSF approved or tested to contain no impurities of lead.
- 2.3.2 Pipe Thread Tape: Teflon tape.
- 2.3.3 Protective Coating: Koppers Bitumastic No. 505 or equal.
- 2.3.4 Brazing Materials: B cup with silver content of not less than 5%. ASTM B-32, Grade 96TS. Materials shall be determined by installer to comply with installation requirements.
- 2.4 Copper Tube and Fittings:

PIPES AND PIPE FITTINGS

- 2.4.1 Copper Tube: All copper tubing shall be manufactured in the United States.
- 2.4.1.1 Copper Tube: ASTM B88; Type K or L as indicated for each service; hard-drawn temper unless specifically noted as annealed.
- 2.4.1.2 ACR Copper Tube: ASTM B280.
- 2.4.2 Fittings:
 - 2.4.2.1 Wrought-Copper Solder-Joint Fittings: ANSI B16.22.
 - 2.4.2.2 Copper Tube Unions: Provide standard products recommended by manufacturer for use in service indicated.
 - 2.4.2.3 Cast-Copper Flared Tube Fittings: ANSI B16.26.
- 3 EXECUTION
 - 3.1 Installation
 - 3.1.1 General: Install pipes and pipe fittings in accordance with recognized industry practices which will achieve permanently-leakproof piping systems, capable of performing each indicated service without piping failure. Install each run with minimum joints and couplings, but with adequate and accessible unions for disassembly and maintenance or replacement of valves and equipment. Reduce sizes (where indicated) by use of reducing fittings, not bushings. Align piping accurately at connections, within 1/16" misalignment tolerance.
 - 3.1.2 Comply with ANSI B31 Code for Pressure Piping.
 - 3.1.3 Locate piping runs, except as otherwise indicated, vertically and horizontally (pitched to drain) and avoid diagonal runs wherever possible. Orient horizontal runs parallel with walls and column lines. Locate runs as shown or described by diagrams, details and notations or, if not otherwise indicated, run piping in shortest route which does not obstruct usable space or block access for servicing building and its equipment. Hold piping close to walls, overhead construction, columns and other structural and permanent-enclosure elements of building; limit clearance to ½" where furring is shown for enclosure or concealment of piping, but allow for insulation thickness, if any. Where possible, locate insulated piping for 1" clearance outside insulation.
 - 3.1.4 Concealed Piping: Unless specifically noted as "Exposed" on the drawings, conceal piping from view in finished and occupied spaces, by locating in column enclosures, chases, in hollow wall construction or above suspended ceilings; do not encase horizontal runs in solid partitions, except as indicated.
 - 3.1.5 Electrical Equipment Spaces: Do not run piping through transformer vaults and other electrical, communications, or data equipment spaces and enclosures unless shown. Install drip pan under piping that must run through electrical spaces.

PIPES AND PIPE FITTINGS

- 3.1.5.1 Cut pipe from measurements taken at the site, not from drawings. Keep pipes free of contact with building construction and installed work.
- 3.2 Piping System Joints: Provide joints of the type indicated in each piping system.
 - 3.2.1 Solder copper tube-and-fitting joints where indicated, in accordance with recognized industry practice. Cut tube ends squarely, ream to full inside diameter, and clean outside of tube ends and inside of fittings. Apply non-acid water base type solder flux to joint areas of both tubes and fittings. Insert tube full depth into fitting, and solder in manner which will draw solder full depth and circumference of joint. Solder pipes using ASTM B828 methods.
 - 3.2.2 Braze copper tube-and-fitting joints where indicated, in accordance with ANSI B.31.
- 3.3 Piping Installation:
 - 3.3.1 Install piping to allow for expansion and contraction.
 - 3.3.2 Isolate all copper tubing from steel and concrete by wrapping the pipe at the contact point, and for one inch on each side, with at least two layers of plastic electrical tape. Isolate all copper tubing installed in block walls with a continuous plastic sleeve.

END OF SECTION

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PIPES AND PIPE FITTINGS

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SECTION 230110 / VALVES

1 GENERAL

- 1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to the work of this section.
- 1.2 This section is a Division-23 Basic Materials and Methods section, and is part of each Division-23 section making reference to or requiring valves specified herein.
- 1.3 Extent of valves required by this section is indicated on drawings and/or specified in other Division-23 sections.
- 1.4 Quality Assurance:
 - 1.4.1 Valve Dimensions: For face-to-face and end-to-end dimensions of flanged or welding-end valve bodies, comply with ANSI B16.10.
 - 1.4.2 Valve Types: Provide valves of same type by same manufacturer.
 - 1.4.3 Valve Listing: For valves on fire protection piping, provide UL listing.
 - 1.4.4 Valves Installed in Boiler Rooms: Comply with ASME Boiler and Pressure Vessel Code.
- 1.5 Approval Submittals: When required by other Division-23 sections, submit product data, catalog cuts, specifications, and dimensioned drawings for each type of valve. Include pressure drop curve or chart for each type and size of valve. Submit valves with Division-23 section using the valves, not as a separate submittal. Submit valve comparison chart with applicable valves clearly marked if valves other than basis-of-design are to be used. For each valve, identify systems where the valve is intended for use.
 - 1.5.1 Ball Valves. Type BA.
- 1.6 O&M Data Submittals: Submit a copy of approval submittals. Submit installation instructions, maintenance data and spare parts lists for each type of valve. Include this data in the O&M Manual.

2 PRODUCTS

- 2.1 General: Provide factory-fabricated valves recommended by manufacturer for use in service indicated. Provide valves of types and pressure ratings indicated; provide proper selection as determined by Installer to comply with specifications and installation requirements. Provide sizes as indicated, and connections which properly mate with pipe, tube, and equipment connections.
- 2.2 Acceptable Manufacturers: Subject to compliance with requirements, provide valves of one of the producers listed for each valve type. The model numbers are listed for

VALVES

230110.1

contractor's convenience only. In the case of a model number discrepancy, the written description shall govern.

2.3 Ball Valves:

2.3.1 General: Select with port area equal to or greater than connecting pipe area, include seat ring designed to hold sealing material.

2.3.2 Construction: Ball valves shall be rated for 600 psi. Pressure containing parts shall be constructed of ASTM B-584 alloy 844, or ASTM B-124 alloy 377. Valves shall be furnished with blow-out proof bottom loaded stem constructed of ASTM B-371 alloy 694 or other approved low zinc material. Provide TFE packing, TFE thrust washer, chrome-plated ball and reinforced teflon seats. Valves 1" and smaller shall be full port design. Valves 1¼" and larger shall be conventional port design. Stem extensions shall be furnished for use in insulated piping where insulation exceeds ½" thickness.

2.3.3 Comply with the following standards:

MSS SP-110. Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends.

2.3.4 Types of Ball (BA) valves:

2.3.4.1 Soldered Ends 2" and Smaller (BA2): Bronze two-piece full port body with adjustable stem packing and stainless steel ball and trim. Nibco S-585-70.

2.3.4.2 Threaded Ends 1" and Smaller (BA3): Bronze two-piece full port body, UL listed (UL 842) for use with flammable liquids and LP gas with lockout rings. Nibco T-585-70-UL. Milwaukee BA400NSF, Apollo 70LF-200, Jomar 175-LWN.

2.4 Valve Features:

2.4.1 General: Provide valves with features indicated and, where not otherwise indicated, provide proper valve features as determined by Installer for installation requirements. Comply with ANSI B31.1

2.4.2 Valve features specified or required shall comply with the following:

2.4.2.1 Solder-Joint: Provide valve ends complying with ANSI B16.18.

2.4.2.2 Trim: Fabricate pressure-containing components of valve, including stems (shafts) and seats from brass or bronze materials, of standard alloy recognized in valve manufacturing industry unless otherwise specified.

2.4.2.3 Non-Metallic Disc: Provide non-metallic material selected for service indicated in accordance with manufacturer's published literature.

2.4.2.4 Renewable Seat: Design seat of valve with removable disc, and assemble valve so disc can be replaced when worn.

VALVES

- 2.4.2.5 Extended Stem: Increase stem length by 2" minimum, to accommodate insulation applied over valve.

3 EXECUTION

3.1 Installation:

- 3.1.1 General: Install valves where required for proper operation of piping and equipment, including valves in branch lines to isolate sections of piping. Locate valves so as to be accessible and so that separate support can be provided when necessary. Install valves with stems pointed up, in vertical position where possible, but in no case with stems pointed downward below horizontal plane.

- 3.1.2 Insulation: Where insulation is indicated, install extended-stem valves, arranged in proper manner to receive insulation.

- 3.1.3 Applications Subject to Corrosion: Do not install bronze valves and valve components in direct contact with steel, unless bronze and steel are separated by dielectric insulator.

- 3.2 Selection of Valve Ends (Pipe Connections): Except as otherwise indicated, select and install valves with the following ends or types of pipe/tube connections:

- 3.2.1 Tube Size 2" and Smaller: Threaded valves. Soldered-joint valves may also be used. (Exception: Do not install solder joint valves with silver solder.)

- 3.3 Non-Metallic Disc: Limit selection and installation of valves with non-metallic disc to locations indicated and where foreign material in piping system can be expected to prevent tight shutoff of metal seated valves.

- 3.4 Renewable Seats: Select and install valves with renewable seats, except where otherwise indicated.

END OF SECTION

VALVES

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VALVES

230110.4

SECTION 230115 / ELECTRIC MOTORS1 GENERAL

- 1.1 Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specifications Section apply to work of this Section.
- 1.2 This section is a Division 23 Basic Mechanical Materials and Methods section, and is part of each Division 23 section making reference to motors specified herein.
- 1.3 Extent of motors required by this section is indicated on drawings and/or specified in other Division-23 sections.
- 1.4 Comply with the requirements of Division 26.
- 1.5 UL Compliance: Comply with applicable UL standards pertaining to motors.
- 1.6 Approval Submittals:
 - 1.6.1 Product Data: When required by other Division-23 sections, submit manufacturers standard product data sheets for each type of motor provided. Submit with Division-23 section using the motors, not as a separate submittal. Mark data sheet with arrows indicating product being supplied and list by unique descriptive name all motors to which each data sheet applies. Clearly indicate type, service factor, rpm, duty cycle, voltage, phase, nominal full load efficiency, power factor and insulation class. Field verify and coordinate mounting and frame requirements for matching the drive.
- 1.7 O&M Data Submittals: Submit a copy of approval submittals. Submit operation and maintenance data for each type of motor. Include these data in O&M Manual. Submit two copies of nameplate data sheet for each motor. One copy shall be included with the O&M Manual and a second copy shall be inserted in a waterproof pouch or bag and attached to the motor. Nameplate data sheets shall be typed or neatly printed and shall include all data on the motor nameplate plus a unique motor description such as "AHU-3 Fan Motor", "Distribution Pump #1" or similar description.

2 PRODUCTS

- 2.1 Acceptable Manufacturers: Subject to compliance with requirements, General Electric, Baldor, US Electric, or approved equal.
- 2.2 General:
 - 2.2.1 Motors shall conform to applicable portions of NEMA Standard MG-1, Motors and Generators.
 - 2.2.2 Motors shall be sized for the application such that when the driven equipment is operated at rated capacity the motor current will not exceed the full-load nameplate current. Service factor shall not be used in normal operation.
- 2.3 Motor Design:

ELECTRIC MOTORS

2.3.1 Integral Horsepower Motors:

- 2.3.1.1 Motors shall be open drip-proof or totally enclosed fan cooled as shown on the drawings or listed in the Division 23 section requiring motors.
- 2.3.1.2 Motors shall be three phase, 60 hertz, nominal 1800 rpm, rated at 200 volts for 208 volt systems, 230 volts for 240 volt systems and 460 volts for 480 volt systems. 230/208 volt motors shall not be permitted on 208 volt systems.
- 2.3.1.3 Motors shall be NEMA Design B and shall have 1.15 service factor or greater at 60 hertz.
- 2.3.1.4 Insulation Systems
- 2.3.1.4.1 In fixed speed applications, motors shall have Class B insulation with 80°C rise over 40°C ambient.
- 2.3.1.4.2 For variable frequency drive (VFD) applications, motors shall have Class F insulation with 105°C rise over 40°C ambient. Motor manufacturer shall identify motors being used for VFD applications by marking the motor with a stainless steel name-plate "Inverter Duty". Motors shall be provided with one set of thermostatic sensors. Motors to be premium efficiency. Motor nameplate shall be marked "Suitable for Variable Frequency Drive". Motors 3-horsepower or larger utilizing a VFD shall be provided with bearing protection rings to prevent shaft grounding.
- 2.3.1.5 Motor efficiencies shall be based on IEEE-112, Test Method B, as specified in NEMA Standard MG1-12.53. NEMA motor efficiency and power factor shall be clearly shown on the motor nameplate. Inverter duty motors shall have a CIV rating based on NEMA.
- 2.3.1.6 Motors shall be premium efficiency type and shall meet or exceed the following minimum nominal efficiencies at rated voltage.

HORSEPOWER RANGE	MINIMUM NOMINAL EFFICIENCY	MINIMUM ACCEPTABLE POWER FACTOR
1 hp	85.5. pct.	78.0 pct
1.5 hp	86.5 pct.	78.0 pct
2 hp	86.5 pct.	83.0 pct
3 hp	89.5 pct.	80.0 pct
5 hp	89.5 pct.	80.0 pct

2.3.2 Fractional Horsepower Motors one-half hp and above:

- 2.3.2.1 Motors shall be open drip-proof or totally enclosed fan cooled ECM high efficiency type as shown on the drawings or listed in the Division 23 section requiring motors.
- 2.3.2.2 Motors shall be three phase, 60 hertz, nominal 1800 rpm, rated at 200, 230 or 460 volts as shown on the drawings.
- 2.3.2.3 Motors shall be NEMA Design B with class B insulation, unless used with variable frequency drives.

ELECTRIC MOTORS

2.3.3 Fractional Horsepower Motors less than one-half hp:

2.3.3.1 Motors shall be single phase, ECM high efficiency type, 60 hertz, rated at 120 volts with integral thermal protection.

2.4 Overload Protection: Properly sized overload protection shall be provided for each motor. This protection shall be an integral part of the motor. Provide three phase protection for all three phase motors. Provide solid state overloads for poly phase motors. Contractors shall set overloads at start-up and be recorded on start up sheets.

3 EXECUTION

3.1 Motor Size and Location:

3.1.1 Size and location of motors shown on the drawings are based on a particular design and may change with a different manufacturer. Submittal of shop drawings or product literature indicating motor sizes or locations different from that designed indicates that Contractor has fully coordinated any required changes to the electrical system with other trades. Approval (if made) is on this basis and no additional cost will be allowed for any changes.

3.1.2 Contractor shall verify and make any necessary adjustments to electrical service, branch circuit wiring, branch circuit protection, overload protection, disconnect and controller (starter), or VFD based on actual nameplate data of the motors supplied prior to installation. Where applicable, connect motor winding thermostat to VFD.

3.2 Motor Voltages: Contractor shall field verify system voltage prior to ordering or installing any motors. Submittal of shop drawings or product literature indicating motor voltages indicates that Contractor has fully coordinated the motor with the electrical system and that any discrepancies have been resolved. Approval (if made) is on this basis and no additional cost will be allowed for any changes.

3.3 Motor Mounting: Adjust motor mounting as required to adjust the drive train for proper belt operation and to accommodate sheave changes or other requirements of the test and balance work.

3.4 Motor Nameplate: All motors shall have a nameplate with voltage, phase, full load amps, service rating, serial number, manufacturer's model number, date of manufacture.

END OF SECTION

ELECTRIC MOTORS

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ELECTRIC MOTORS

230115.4

SECTION 230160 / MECHANICAL IDENTIFICATION

1 GENERAL

- 1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
- 1.2 This section is a Division-23 Basic Mechanical Materials and Methods section, and is part of each Division-23 section making reference to or requiring identification devices specified herein.
- 1.3 Extent of mechanical identification work required by this section is indicated on drawings and/or specified in other Division-23 sections.
- 1.4 Refer to Division-16 sections for identification requirements of electrical work; not work of this section. Refer to other Division-23 sections for identification requirements for controls; not work of this section.
- 1.5 Codes and Standards: Comply with ANSI A13.1 for lettering size, length of color field, colors, and viewing angles of identification devices.

2 PRODUCTS

- 2.1 General: Provide manufacturer's standard products of categories and types required for each application as referenced in other Division-23 sections. Where more than single type is specified for application, selection is Installer's option, but provide single selection for each product category.
- 2.2 Painted Identification Materials
 - 2.2.1 Stencils: Standard fiberboard stencils, prepared for required applications with letter sizes generally complying with recommendations of ANSI A13.1 for piping and similar applications, but not less than 1-¼" high letters for ductwork and not less than ¾" high letters for access door signs and similar operational instructions.
 - 2.2.2 Stencil Paint: Standard exterior type stenciling enamel; black, except as otherwise indicated; either brushing grade or pressurized spray-can form and grade.
 - 2.2.3 Identification Paint: Standard identification enamel.
- 2.3 Plastic Pipe Markers
 - 2.3.1 Pressure-Sensitive Type: Provide manufacturer's standard pre-printed, permanent adhesive, color-coded, pressure-sensitive vinyl pipe markers.
 - 2.3.1.1 Lettering: Manufacturer's standard pre-printed nomenclature which best describes piping system in each instance, as selected by Architect/Engineer in cases of variance with name as shown or specified.

MECHANICAL IDENTIFICATION

- 2.3.1.2 Arrows: Print each pipe marker with arrows indicating direction of flow, either integrally with piping system service lettering (to accommodate both directions), or as separate unit of plastic.
- 2.4 Valve Tags:
- 2.4.1 Brass Valve Tags: Provide 19-gauge polished brass valve tags with stamp-engraved piping system abbreviation in ¼" high letters and sequenced valve numbers ½" high, and with 5/32" hole for fastener. Provide 1-½" diameter tags, except as otherwise indicated.
- 2.4.2 Plastic Laminate Valve Tags: Provide manufacturer's standard 3/32" thick engraved plastic laminate valve tags, with piping system abbreviation in ¼" high letters and sequenced valve numbers ½" high, and with 5/32" hole for fastener. Provide 1-½" square black tags with white lettering, except as otherwise indicated.
- 2.5 Engraved Plastic-Laminate Signs:
- 2.5.1 General: Provide engraving stock melamine plastic laminate, in the sizes and thicknesses indicated, engraved with engraver's standard letter style of the sizes and wording indicated, punched for mechanical fastening except where adhesive mounting is necessary because of substrate.
- 2.5.2 Thickness: 1/16" for units up to 20 sq. in. or 8" length; ⅛" for larger units.
- 2.5.3 Fasteners: Self-tapping stainless steel screws, except contact-type permanent adhesive where screws cannot or should not penetrate the substrate.
- 2.6 Stamped Nameplates: Provide equipment manufacturer's standard stamped nameplates for motors, AHUs, Cus, etc.

3 EXECUTION

- 3.1 Coordination: Where identification is to be applied to surfaces which require insulation, painting or other covering or finish, including valve tags in finished mechanical spaces, install identification after completion of covering and painting. Install identification prior to installation of acoustical ceilings and similar removable concealment.
- 3.2 Ductwork Identification:
- 3.2.1 General: Identify air supply, return, exhaust, intake and relief ductwork with stenciled signs and arrows, showing ductwork service and direction of flow, in black or white.
- 3.2.2 Location: In each space where ductwork is exposed, or concealed only by removable ceiling system, locate signs near points where ductwork originates or continues into concealed enclosures, and at 50' spacings along exposed runs.
- 3.2.3 Access Doors: Provide stenciled signs on each access door in ductwork and housings, indicating purpose of access (to what equipment) and other maintenance and operating instructions, and appropriate and procedural information.

MECHANICAL IDENTIFICATION

3.3 Piping System Identification:

3.3.1 General: Install pipe markers of one of the following types on each system indicated to receive identification, and include arrows to show normal direction of flow:

3.3.1.1 Plastic pipe markers.

3.3.1.2 Stenciled markers, black or white for best contrast.

3.3.2 Locate pipe markers as follows wherever piping is exposed to view in occupied spaces, machine rooms, accessible maintenance spaces and exterior non-concealed locations.

3.3.2.1 Near each valve and control device.

3.3.2.2 Near each branch, excluding short take-offs for fixtures and terminal units; mark each pipe at branch, where there could be question of flow pattern.

3.3.2.3 Near locations where pipes pass through walls, ceilings, or enter non-accessible enclosures.

3.3.2.4 At access doors, manholes and similar access points which permit view of concealed piping.

3.3.2.5 Near major equipment items and other points of origination and termination.

3.3.2.6 Spaced intermediately at maximum spacing of 50' along each piping run, except reduce spacing to 25' in congested areas of piping and equipment.

3.3.2.7 On piping above removable acoustical ceilings, except omit intermediately spaced markers.

3.4 Valve Identification: Provide coded valve tag on every valve, cock and control device in each piping system; exclude check valves, valves within factory-fabricated equipment units, HVAC terminal devices and similar rough-in connections of end-use fixtures and units. Coordinate code with operating instructions.

3.5 Mechanical Equipment Identification: Install engraved plastic laminate sign on or near each major item of mechanical equipment and each operational device. Label shall indicate type of system and area served by zone(s) or room numbers. Provide signs for the following general categories of equipment and operational devices:

3.5.1 Main control and operating valves, including safety devices.

3.5.2 Fans, blowers, primary balancing dampers and VAV boxes.

3.5.3 Air conditioning indoor and outdoor units. Label shall indicate the room (fish) number of the major rooms served by the AC unit.

MECHANICAL IDENTIFICATION

- 3.5.4 VFDs, transmitters and control boxes.
- 3.5.5 Other items as required.
- 3.6 Stamped Nameplates: Equipment manufacturers to provide standard stamped nameplates on all major equipment items such as motors, pumps, AHUs, etc. Where motors are hidden from view (within equipment casing, or otherwise not easily accessible, etc.), the equipment supplier shall furnish a duplicate motor data nameplate to be affixed to the equipment casing in an easily visible location, unless data is already included on the equipment nameplate.
- 3.7 Ceiling Identifiers: Provide typed label (peel and stick) on ceiling grid below each piece of mechanical equipment concealed above ceilings (branch controller, ac unit, etc) and all main control dampers and piping isolation valves with unit name or equipment description. Provide blue circle dots at grid below all existing and new water shutoff valves to match existing which will be removed when ceilings are demolished.
- 3.8 Adjusting and Cleaning:
 - 3.8.1 Adjusting: Relocate any mechanical identification device which has become visually blocked by work of this division or other divisions.

END OF SECTION

MECHANICAL IDENTIFICATION

SECTION 230210 / INSULATION FOR HVAC EQUIPMENT AND PIPING

1 GENERAL

- 1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
- 1.2 Division-23 Basic Mechanical Materials and Methods Sections apply to work of this section.
- 1.3 Approval Submittals:
 - 1.3.1 Product Data: Submit producer's data sheets and installation instructions on each insulation system including insulation, coverings, adhesives, sealers, protective finishes, and other material recommended by the manufacturer for applications indicated. Submit for:
 - 1.3.1.1 Flexible unicellular piping insulation
- 1.4 O&M Data Submittals: Submit a copy of all approval submittals. Include in O&M Manual.

2 PRODUCTS

- 2.1 Acceptable Manufacturers: Subject to compliance with requirements, provide insulation products by Armstrong, Schuller, Knauf, Owens Corning, Pittsburgh Corning, U.S. Rubber, or approved equal. All products shall be asbestos-free.
- 2.2 Flame/Smoke Ratings: Provide composite mechanical insulation (insulation, jackets, coverings, sealers, mastics, and adhesive) with a flame-spread rating of 25 or less, and a smoke-developed rating of 50 or less, as tested by ANSI/ASTM E84.
- 2.3 Pipe Insulation Materials:
 - 2.3.1 Flexible Unicellular Pipe Insulation: ASTM C534, Type I. (Tubular, suitable for use to 200°F.)
 - 2.3.2 Staples, Bands, Wires, and Cement: As recommended by the insulation manufacturer for applications indicated.
 - 2.3.3 Adhesives, Sealers, Protective Finishes: Products recommended by the insulation manufacturer for the application indicated. Marathon Industries "V1-AC Product No. 550" or other products with similar composition are not allowed.
 - 2.3.4 Jackets: ASTM C921, Type I (vapor barrier) for piping below ambient temperature, Type II (vapor permeable) for piping above ambient temperature. Type I may be used for all piping at Installer's option.

3 EXECUTION

INSULATION FOR HVAC EQUIPMENT AND PIPING

3.1 General:

- 3.1.1 Install thermal insulation products in accordance with manufacturer's written instructions, and in compliance with recognized industry practices to ensure that insulation serves intended purpose.
- 3.1.2 Install insulation materials with smooth and even surfaces and on clean and dry surfaces. Redo poorly fitted joints. Do not use mastic or joint sealer as filler for gapping joints and excessive voids resulting from poor workmanship.
- 3.1.3 Maintain integrity of vapor-barrier on insulation and protect it to prevent puncture and other damage. Label all insulation "ASBESTOS FREE".
- 3.1.4 Do not apply insulation to surfaces while they are hot or wet.
- 3.1.5 Do not install insulation until systems have been checked and found free of leaks. Surfaces shall be clean and dry before attempting to apply insulation. A professional insulator with adequate experience and ability shall install insulation.
- 3.1.6 Do not install insulation on pipe systems until acceptance tests have been completed except for flexible unicellular insulation. Do not install insulation until the building is "dried-in".

3.2 Flexible Unicellular Pipe Insulation:

- 3.2.1 Insulate the following piping systems:
 - 3.2.1.1 Condensate drains from air conditioning units - $\frac{3}{4}$ " thick.
 - 3.2.1.2 Refrigerant piping - $\frac{3}{4}$ " thick.
- 3.2.2 Apply insulation in accordance with the manufacturer's recommendations and instructions. Mitre cut insulation to fit pipe fittings. Use approved cement to seal all joints and ends in the insulation.
- 3.2.3 Insulation outside the building shall be protected by a 0.016" thickness aluminum jacket with aluminum bands on 12" centers.

END OF SECTION

SECTION 230230 / EXTERIOR INSULATION FOR DUCTWORK1 GENERAL

- 1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
- 1.2 Division-23 Basic Mechanical Materials and Methods sections apply to work of this section.
- 1.3 Approval Submittals:
 - 1.3.1 Product Data: Submit producer's data sheets and installation instructions on each insulation system including insulation, coverings, adhesives, sealers, protective finishes, and other material recommended by the manufacturer for applications indicated. Submit for:
 - 1.3.1.1 Flexible duct insulation
- 1.4 O&M Data Submittals: Submit a copy of all approval submittals. Include in O&M Manual.

2 PRODUCTS

- 2.1 Acceptable Manufacturers: Subject to compliance with requirements, provide insulation products by Knauf, Owens-Corning, Schuller, Certainteed.
- 2.2 Flame/Smoke Ratings: Provide composite mechanical insulation (insulation, coverings, sealers, mastic, and adhesive) with a flame spread rating of 25 or less, and a smoke-developed rating of 50 or less as tested by ANSI/ASTM 84.
- 2.3 Flexible Fiberglass Insulation: ASTM C553, Type I, Class B-3 (temperature less than 350°F). Duct wrap shall be 1 pcf density R-6 with UL rated aluminum foil vapor barrier (FSK).
- 2.4 Duct Cement (General Purpose Mastic): Duct cement shall be non-hardening, fiber-reinforced and recommended specifically for cementing fittings, components, and longitudinal seams in ductwork insulation. Duct Cement shall be flexible, water based, designed for use in pressure duct systems listed as SMACNA classes A, B, & C. Cement shall seal water and air and provide a vapor barrier. Product shall be suitable for both interior and exterior use with UV inhibitors. Product shall be non-flammable ASTM E-84 tested with a flame spread of less than 5 and smoke spread of less than 5. Product shall be UL listed 181A-M and 181-B. Product shall have less than 80 grams/liter volatile organic compounds (VOC). Insulation Contractor shall select product for specific application.

Carlisle hardcast	181
Childers	CP-148,181
Ductmate	Fiberseal

EXTERIOR INSULATION FOR DUCTWORK

Fosters

95-90

- 2.5 Duct Sealant (Vapor Barrier Mastic): Duct sealer shall be flexible, water based, designed for use in pressure duct systems listed as SMACNA classes A, B, & C. Sealer shall seal water and air and provide a vapor barrier. Product shall be suitable for both interior and exterior use with UV inhibitors. Product shall be non-flammable ASTM E-84 tested with a flame spread of less than 5 and smoke spread of less than 5. Product shall be UL listed 181A-M and 181-B. Product shall have less than 80 grams/liter volatile organic compounds (VOC). Insulation Contractor shall select product for specific application.

Carlisle hardcast	102,550
Childers	CP-146,148
Ductmate	Pro Seal
Fosters	32-17, 32-19

- 2.6 Adhesives: Adhesive shall be water based and designed for adhering insulation to ductwork. Product shall be suitable for both interior and exterior use with UV inhibitors. Product shall be non-flammable ASTM E-84 tested with a flame spread of less than 5 and smoke spread of less than 5. Product shall meet the requirements of NFPA 90-A & 90-B. Product shall have less than 80 grams/liter volatile organic compounds (VOC). Insulation Contractor shall select product for specific application.

Carlisle hardcast	
Childers	CP-148
Ductmate	
Fosters	85-00,60,62 & 65

- 2.7 Fiber-Glas Mesh: 10x10 Mesh. Foster Mastafab or equal.

3 EXECUTION

- 3.1 Insulate all supply, return and outdoor air ductwork concealed above ceilings, in chases, or elsewhere, and the backs of all ceiling supply outlets with 2" thick fiberglass blanket insulation with vapor barrier.

3.2 Installation of Flexible Insulation:

- 3.2.1 Insulate round elbows and fittings with wrap such that thickness is equal to adjoining duct covering. Clean and dry ductwork prior to insulating.
- 3.2.2 Adhere insulation to duct with 50 percent coverage using approved insulation adhesive applied in 6-inch wide swaths with 6-inch spaces between swaths. Additionally secure insulation with perforated pins and Tuff-Bond or by self-sticking pins with a 3/8" self-tapping screw or by welded cup head pins. Space on 12-inch centers and 3 inches from all edges. Ducts up through 24" wide only require one row of pins. Ducts over 24" wide shall have pins spaced as described herein.
- 3.2.3 Lap all joints 2 inches and seal joints with 4-inch wide strips of open mesh glass fabric embedded in two coats of general purpose mastic.

EXTERIOR INSULATION FOR DUCTWORK

- 3.2.4 Seal all punctures and breaks in aluminum vapor barrier with open mesh glass fabric and vapor barrier sealant.

END OF SECTION

EXTERIOR INSULATION FOR DUCTWORK

230230.3

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EXTERIOR INSULATION FOR DUCTWORK

230230.4

SECTION 230716 / VARIABLE REFRIGERANT FLOW AIR CONDITIONING SYSTEMS1 GENERAL

- 1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
- 1.2 Basic Mechanical Materials and Methods sections apply to work of this section.
- 1.3 Refer to other sections for testing, adjusting, and balancing of units; not work of this section.
- 1.4 Approval Submittals:
 - 1.4.1 Product Data: Submit manufacturer's technical product data, including dimensions, ratings, electrical characteristics, weight, capacities, materials of construction, and installation instructions. Submit assembly-type drawings showing all piping and electrical connections and all mounting requirements. Show methods of fastening and assembly of components. Provide wiring diagrams.
- 1.5 O&M Data Submittals: Submit manufacturer's maintenance data including parts lists. Include these data, product data, and a copy of approval submittals in O&M manual.

2 PRODUCTS

- 2.1 Quality Assurance:
 - 2.1.1 Test and rate split system air conditioning units in accordance with ARI Standard 210, 240 or 360 as applicable, and provide certified rating seal.
 - 2.1.2 Construct refrigeration system of split system air conditioning units in accordance with ASHRAE 15 (ANSI B 9.1) "Safety Code for Mechanical Refrigeration".
 - 2.1.3 Provide split system air conditioning units with EER/IEER that meets the Florida Energy Conservation Code and the schedule on the drawings.
 - 2.1.4 Provide split system air conditioning units that are designed, manufactured, and tested in accordance with UL or ETL requirements.
 - 2.1.5 Warranty: Provide 5-year parts, 10-year compressor (labor 1st year only - by Manufacturer) warranty.
 - 2.1.6 Acceptable Manufacturers: Submit to compliance with requirements, provide units by Mitsubishi, Daikin, L.G., or approved equal. Systems not per design basis must be designed and calculated by manufacturer to meet heating/cooling capacities and air-flows for each unit/system.
- 2.2 General:

VARIABLE REFRIGERANT FLOW AIR CONDITIONING SYSTEMS

- 2.2.1 Casings: Construct of painted mill galvanized steel (or aluminum) formed panels rigidly reinforced and braced. Each unit shall be provided with removable panels to permit the unit (including fans and compressors) to be properly maintained and serviced.
- 2.3 Condensing Unit:
 - 2.3.1 Condenser Fans and Drives: Fan shall be of rustproof construction, hot dipped galvanized steel, stainless steel or aluminum. Unit shall have weather protected totally enclosed motor. Provide a close fretwork galvanized steel or non-ferrous fan guard. Motors shall be the permanently lubricated type, resiliently mounted.
 - 2.3.2 Condenser Coil: Construct of non-ferrous tubes and aluminum fins. Provide inlet guard to protect condenser fins. Provide salt-spray coating.
 - 2.3.3 Compressor: Shall be inverter scroll variable drive design with vibration isolation. Compressor shall not produce objectionable noise or vibration inside the building. Compressors shall have ten (10) year warranty.
 - 2.3.4 Service Valves: Provide for high and low pressure readings.
- 2.4 Evaporator Unit:
 - 2.4.1 Interior of unit shall be thermally and acoustically insulated with 1 inch fiberglass duct liner insulation. Provide removable panels to permit the unit to be properly serviced and maintained.
 - 2.4.2 The evaporator section shall include centrifugal fan, two-speed fan motor, and direct drive. Provide cooling coil, snap out washable filters, refrigerant drier, controls and other necessary devices for a completely automatic unit. Coils shall have copper tubes and aluminum fins. Provide automatic oscillating louver action to facilitate air distribution for cassette and wall-mounted units.
- 2.5 Controls:
 - 2.5.1 All safety and operational controls shall be factory wired.
 - 2.5.2 Provide microprocessor-based controller and room thermostat (equal to Mitsubishi Simple MA), capable of providing occupancy schedule setbacks, fan speed adjustment, and vane adjustment as applicable. Setpoint dead band shall be reset from the factory default to be 2.8°F.
 - 2.5.3 All ducted indoor units shall have unit controller capable of providing the VRF sequencing as well as additional contacts for reading zone CO2 sensor as an input and controlling 2-position outside air damper position as an output. Controller shall open damper to maximum airflow if CO2 level is above 1200 ppm and retain that position until CO2 level falls below 800 ppm. If CO2 level is below 800 ppm, damper shall remain closed to minimum airflow position.
 - 2.5.4 Provide central building level controller (equal to Mitsubishi AE-200) for on-site

VARIABLE REFRIGERANT FLOW AIR CONDITIONING SYSTEMS

monitoring and adjustment of all VRF equipment. Central controller shall be located in the new TR room.

- 2.5.5 Provide BacNet interface gateway from the VRF central controller for integration to the Owner's existing BAS.

2.6 Refrigerant Piping:

- 2.6.1 Copper tubing 3/4" and smaller: Type ACR, soft annealed temper; cast copper-alloy fittings for flared copper tubes; flared joints.

- 2.6.2 Brazing material: Silver solder bearing at least 15% silver; Sil Fos.

- 2.6.3 Hangers: Provide steel hangers lined with PVC for protection of piping insulation. Provide hangers with spacing as appropriate for each pipe size and material.

- 2.7 Supports: Provide hurricane tie-down kits for outside units.

3 EXECUTION

- 3.1 Installation: Install in accordance with producer's printed instructions. System shall be installed by properly-trained mechanical contractor having variable refrigerant flow system manufacturer's certification. Certification of installing mechanical contractor shall be acquired by attending and completing manufacturer's service training course for a minimum of three days at the manufacturer's training facility. Manufacturer's training facility shall be equipped with fully functioning variable refrigerant flow equipment, including outdoor units, indoor units, branch controllers, controls and any other pertinent devices, necessary to provide the installing contractor with hands-on training of said equipment, controls, etc. After attending and completing the the three-day service training course, and if deemed appropriate by course instructor, manufacturer shall issue certification of attending mechanical contractor. Note: As certification shall be issued by name to the attending mechanical contractor personnel, the project design mechanical consulting engineer shall reserve the right to be provided with proof of certification of installing mechanical contractor's personnel. This is to verify that installing mechanical contractor has maintained the employ of at least one (1) certified installer.

- 3.2 Support: Anchor units to curbs with cadmium-plated self-tapping screws, lag screws, or bolts, as directed by slab construction. Secure outdoor unit to withstand FBC wind velocity.

- 3.3 Refrigerant Piping: Comply with ANSI B31.5, "Refrigerant Piping," (extend lower pressure limits below 15 psig), and ASHRAE 15 (ANSI B9.1). Make all joints carefully and neatly. Clean pipe and fittings before fluxing. Remove burrs. Braze by the sweat method using Sil Fos. Manufacturer shall provide installing mechanical contractor with computer-generated refrigerant piping diagram (ie: Mitsubishi Design Tool), including line sizes, associated fittings and refrigerant charge. Prior to fabrication, contractor shall provide shop drawings (field coordinated with existing conditions) to reflect the exact piping routing and lengths. Any revisions in pipe equivalent length shall be re-modeled using the manufacturer's design tool to provide revised capacities and required

VARIABLE REFRIGERANT FLOW AIR CONDITIONING SYSTEMS

- refrigerant charge. The updated refrigerant piping diagram shall be used for all piping fabrication and charge. All piping shall be updated on the as-built set to be as accurate to field conditions as possible. Provide shutoff service valves for each branch.
- 3.4 Pipe sections shall be preinsulated and capped at ends prior to installation. Once installed/hung, sections and/or fittings can be uncapped and connected after nitrogen purging.
- 3.5 No piping work shall be performed concurrent with any dust-producing work such as ceiling or drywall work.
- 3.6 Testing: Refrigeration piping shall not be accepted unless it is gas tight.
- 3.6.1 Nitrogen Gas Pressurization: Pressure test to 600 psi using dry nitrogen gas, allowing to stand for a minimum of 24 hours. If the pressure drops, perform bubble test as follows: After pressurization as described, spray the flare connection parts, brazed parts, flanges, and other parts that may leak with a bubbling agent (Kyuboflex, etc.) and visually check for bubbles. After the airtight test, wipe off bubbling agent.
- 3.7 Evacuation: After completing the successful pressure test, multiple-evacuate the system. Leave the compressor isolation valves shut and connect the vacuum pump to both the high and low sides. Evacuate the system to an absolute pressure of 1,500 microns. Then break vacuum to 2 psig with dry nitrogen. Repeat this process. Install the proper biflow drier in the liquid line and evacuate the system to 500 microns. Leave vacuum pump running for at least two hours without interruption. Break vacuum with the refrigerant to be used and raise pressure to 2 psig. Do not operate compressors during the evacuation procedure.
- 3.8 Charging: After completing the successful evacuation procedure, charge refrigerant directly to the system from the original containers through a filter drier. Charge to the manufacturer's stated conditions of pressure for required temperature. Weigh the refrigerant added and record on the startup report.
- 3.9 Insulation: Insulate refrigerant suction and liquid lines with 1" flexible unicellular with aluminum jacket. Provide 1" flexible unicellular insulation (field applied) for all branch controllers, valves, and piping connections. The manufacturer-provided insulation kit shall not be used for these locations.
- 3.10 Cleaning: Clean tar and all other soil from housing exterior. Leave ready for Division 7, Caulking Work. Caulk around pipe sleeves.
- 3.11 Condensate Drain: Pipe trapped copper condensate drain to outside the building or to a point of disposal as shown on the drawings. Pipe shall be full size of unit outlet. Refer to section "Insulation" for pipe insulation.
- 3.12 Startup: Check entire assembly for correctness of installation, alignment, and control sequencing. Start all component parts in proper sequence. Make all adjustments required to insure proper smooth quiet operation.

END OF SECTION

VARIABLE REFRIGERANT FLOW AIR CONDITIONING SYSTEMS

SECTION 230770 / PACKAGED ENERGY RECOVERY UNITS1 GENERAL

- 1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specifications sections, apply to work of this section.
- 1.2 Division-23 Basic Mechanical Materials and Methods sections apply to work of this section.
- 1.3 Refer to other Division-23 sections for testing, adjusting, and balancing of heat recovery units, not work of this section.
- 1.4 Approval Submittals:
 - 1.4.1 Product Data: Submit manufacturer's technical product data, including dimensions, ratings, electrical characteristics, weight, capacities, materials of construction, and installation instructions.
 - 1.4.1.1 Energy recovery units
 - 1.4.1.2 Vibration isolation
 - 1.4.2 Shop Drawings: Submit manufacturer's assembly-type shop drawings showing all duct and electrical connections and all mounting requirements. Show methods of fastening and assembly of components. Provide wiring diagrams.
- 1.5 O&M Data Submittals: Submit manufacturer's maintenance data including parts lists. Include these data, a copy of approval submittals, and wiring diagrams in O&M manual.

2 PRODUCTS

- 2.1 Quality Assurance:
 - 2.1.1 Unit shall be constructed in accordance with CSA C22.2 and UL 1812 and shall carry the C/UL or (C)ETL label of approval.
 - 2.1.2 Insulation shall comply with NFPA 90A requirements for flame spread and smoke generation.
 - 2.1.3 Airflow data shall comply with AMCA 210 method of testing.
 - 2.1.4 Energy effectiveness values shall be tested in accordance with ASHRAE 84 and ARI Standard 1060.
 - 2.1.5 Acceptable Manufacturers: Subject to compliance with requirements provide units by: Mitsubishi, Lossnay, Semco, American Energy Exchange (AEX) or approved equal.
- 2.2 General:

PACKAGED ENERGY RECOVERY UNITS

- 2.2.1 Description: Provide packaged indoor energy recovery unit consisting of enthalpy wheel, wheel drive system, ventilation air fan, exhaust air fan, temperature sensors, and microprocessor controls.
- 2.2.2 Units shall be factory-assembled, wired, and tested. Units shall be wired for a single point power connection. All controls shall be factory-adjusted and preset to the design conditions.
- 2.2.3 Cabinet: The cabinet shall be double wall constructed of 20 gauge G-90 galvanized steel. The entire casing shall be painted with factory-applied finish. Units shall have fully removable access panels to permit the enthalpy wheel and fans to be maintained and removed.
- 2.3 Enthalpy Wheel:
- 2.3.1 The enthalpy wheel shall be constructed of aluminum, coated with a non-migrating adsorbent desiccant specifically developed for the selective transfer of water vapor. The internal pore diameter distribution inherent in the dessicant shall limit absorption to materials with a critical diameter no larger than 4.0 angstroms.
- 2.3.2 The enthalpy wheel drive belt shall be Kevlar with 0% stretch after initial tension. Pulley shall be aluminum.
- 2.3.3 The enthalpy wheel shall be installed in a removable cassette. The cassette shall be complete with face and perimeter seals to prevent cross leakage. Cassette support beams shall be a minimum of 12-gauge galvanized steel minimum to insure wheel integrity.
- 2.3.4 The enthalpy wheel shall come complete with an adjustable purge section to eliminate carry over of exhaust air contaminates from wheel rotation.
- 2.3.5 The enthalpy wheel, drive belt, and bearings shall have a minimum (5) five year warranty.
- 2.3.6 Operating Characteristics: The unit shall be capable of providing a constant volume of air at the specified external static pressure at all fan operating speeds.
- 2.4 Fans:
- 2.4.1 Fans shall be double inlet with forward curve type blades. Fan blades shall be of rustproof construction: hot-dipped galvanized steel, stainless steel, or aluminum.
- 2.4.2 Fan blades shall be statically and dynamically balanced and tested prior to shipment.
- 2.4.3 Fans shall have sealed ball bearings with L10 life expectancy.
- 2.5 Motors: Motors shall be high efficiency type and comply with Division-23 section "Electric Motors".

PACKAGED ENERGY RECOVERY UNITS

- 2.6 Filtration: Provide 30% filters for both supply and exhaust airstreams.
- 2.7 Controls:
 - 2.7.1 Provide microprocessor based control.
 - 2.7.2 Provide auxiliary contacts so that unit can be interlocked with separate air conditioning units.
 - 2.7.3 Basic Vibration Isolation: Provide vibration isolation products complying with the Division-23 section "Vibration Isolation" and the following list.
 - 2.7.4 Equipment Mounting: Spring isolation hangers.
- 3 EXECUTION
 - 3.1 Installation: Install in accordance with producer's printed instructions. Provide necessary supports and hangers.
 - 3.2 Cleaning: Clean tar and all other soil from housing exterior. Touch up unit as necessary.
 - 3.3 Flexible Duct Connections: Provide flexible duct connections for all ductwork connections.
 - 3.4 Install rooftop air handling units on curbs and secure to withstand 125 mph wind velocity. Furnish curbs to roofing Installer. Roofing, curb installation, and framing of openings are not work of this section.
 - 3.5 Construction Filters: Provide MERV 8 filters in units during construction. After construction and prior to the test and balance being performed, install clean final filters. Maintain filters during construction.
 - 3.6 Startup: Check entire assembly for correctness of installation, alignment, and control sequencing. Start all component parts in proper sequence. Make all adjustments required to insure proper smooth quiet operation.

END OF SECTION

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PACKAGED ENERGY RECOVERY UNITS

230770.4

SECTION 230840 / HVAC METAL DUCTWORK1 GENERAL

- 1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
- 1.2 Division-23 Basic Mechanical Materials and Methods Sections apply to work of this section.
- 1.3 Extent of HVAC metal ductwork is indicated on drawings and in schedules, and by requirements of this section.
- 1.4 Refer to other Division-23 sections for exterior insulation of metal ductwork.
- 1.5 Refer to other Division-23 sections for ductwork accessories.
- 1.6 Codes and Standards:
 - 1.6.1 SMACNA Standards: Comply with SMACNA's "HVAC Duct Construction Standards, Metal and Flexible" 1985 Edition for fabrication and installation of metal ductwork, unless otherwise noted.
 - 1.6.2 NFPA 90A Compliance: Comply with NFPA 90A "Standard for the Installation of Air Conditioning and Ventilating Systems".
- 1.7 Approval Submittals:
 - 1.7.1 Product Data: Submit manufacturer's technical product data and installation instructions for the following.
 - 1.7.1.1 Factory-fabricated ductwork
 - 1.7.1.2 Sealants
 - 1.7.1.3 Flexible duct
 - 1.7.2 Shop Drawings: Submit scaled layout drawings of HVAC metal ductwork and fittings including, but not limited to, duct sizes, locations, elevations, and slopes of horizontal runs, wall and floor penetrations, and connections. Show interface and spatial relationship between ductwork and proximate equipment. Show modifications of indicated requirements, made to conform to local shop practice, and how those modifications ensure that free area, materials, and rigidity are not reduced.
- 2 PRODUCTS
 - 2.1 Ductwork Materials:
 - 2.1.1 Exposed Ductwork Materials: Where ductwork is indicated to be exposed to view in occupied spaces, provide materials which are free from visual imperfections including

HVAC METAL DUCTWORK

pitting, seam marks, roller marks, stains and discolorations, and other imperfections, including those which would impair painting.

- 2.1.2 Galvanized Sheet Metal: Except as otherwise indicated, fabricate ductwork from galvanized sheet steel complying with ASTM A 527, lockforming quality; with G 90 zinc coating in accordance with ASTM A 525; and mill phosphatized for exposed locations. Stamp gauge and manufacturer's identification on each sheet. Break sheets so that identification is exposed.

2.2 Miscellaneous Ductwork Materials:

- 2.2.1 General: Provide miscellaneous materials and products of types and sizes indicated and, where not otherwise indicated, provide type and size required to comply with ductwork system requirements including proper connection of ductwork and equipment.

- 2.2.2 Duct Sealant (Vapor Barrier Mastic): Duct sealer shall be flexible, water based, designed for use in pressure duct systems listed as SMACNA classes A, B, & C. Sealer shall seal water and air and provide a vapor barrier. Product shall be suitable for both interior and exterior use with UV inhibitors. Product shall be non-flammable ASTM E-84 tested with a flame spread of less than 5 and smoke spread of less than 5. Product shall be UL listed 181A-M and 181-B. Product shall be listed suitable for LEED projects and have less than 80 grams/liter volatile organic compounds (VOC). Insulation Contractor shall select product for specific application.

Carlisle hardcast	102,550
Childers	CP-146,148
Ductmate	Pro Seal
Fosters	32-17, 32-19

- 2.2.3 Ductwork Support Materials: Except as otherwise indicated, provide hot-dipped galvanized steel fasteners, anchors, rods, straps, trim and angles for support of ductwork.

- 2.2.4 Flexible Ducts: Provide CPE inner liner with galvanized steel helix with factory applied 2" thick external insulation (R-6) and vapor barrier. Provide fire retardant reinforced metalized polyester jacket, complying with UL 181. Provide conical fittings with damper and without scoop for all flexible duct take offs. Provide 1" standoff for damper. Use flexible ducts only where shown on the drawings. Flexmaster 8MR6 or Thermaflex MKF R-6, ATCO 36, Gemflex SR-6A.

2.2.5 Connections:

- 2.2.5.1 Return air grille connections shall be straight sided with damper and one inch high insulation standoff equipment to Crown 724-D5 or Flexmaster FLD-BO.
- 2.2.5.2 Exhaust air grille connections shall be straight sided with damper equal to Crown 724 or Flexmaster FLD.
- 2.2.5.3 Where duct height does not permit the use of conical spin-in fittings, use low profile side take-off fittings equal to Crown 3300-DS or Flexmaster STOD-BO.

HVAC METAL DUCTWORK

- 2.2.6 Spin-In and Side Take-Off Fittings: Provide round branch run-outs as follows.
- 2.2.6.1 Supply air diffuser connections shall be conical with damper and one inch high insulation stand-off equal to Crown 3200 DS or Flexmaster CBD-BO.
- 2.2.6.2 Fittings: Provide radius type fittings fabricated of multiple sections with maximum 15° change of direction per section. Unless specifically detailed otherwise, use 45° laterals and 45° elbows for branch takeoff connections. Where 90° branches are indicated, provide conical type tees.
- 2.3 Fabrication:
- 2.3.1 Shop fabricate ductwork in 4, 8, 10 or 12-ft lengths, unless otherwise indicated or required to complete runs. Preassemble work in shop to greatest extent possible, so as to minimize field assembly of systems. Disassemble systems only to extent necessary for shipping and handling. Match-mark sections for reassembly and coordinated installation.
- 2.3.2 Shop fabricate ductwork of gauges and reinforcement complying with SMACNA "HVAC Duct Construction Standards". Duct downstream of terminal units, supply duct from air conditioning units and all return and exhaust duct shall be minimum 2" pressure class unless otherwise noted.
- 2.3.3 Fabricate duct fittings to match adjoining ducts, and to comply with duct requirements as applicable to fittings. Except as otherwise indicated, fabricate elbows with center-line radius equal to 1½ times associated duct width; and fabricate to include turning vanes in elbows where shorter radius is necessary. Limit angular tapers to 30° for contracting tapers and 20° for expanding tapers.
- 2.3.4 Fabricate ductwork with accessories installed during fabrication to the greatest extent possible. Refer to Division-23 section "Ductwork Accessories" for accessory requirements.
- 2.4 Factory-Fabricated Low Pressure Ductwork (Maximum 2" W.G.):
- 2.4.1 Material: Galvanized sheet steel complying with ASTM A 527, lockforming quality, with ASTM A 525, G90 zinc coating, mill phosphatized.
- 2.4.2 Gauge: 28-gauge minimum for round ducts and fittings, 4" through 8" diameter. 26-gauge minimum 9" through 14", 24-gauge minimum 15" through 26".
- 2.4.3 Elbows: One piece construction for 90° and 45° elbows 14" and smaller. Provide multiple gore construction for larger diameters with standing seam circumferential joint. Provide turning vanes in all elbows.
- 2.4.4 Divided Flow Fittings: 90° tees, constructed with saddle tap spot welded and bonded to duct fitting body.
- 2.4.5 Acceptable Manufacturers: Subject to compliance with requirements, provide factory-

HVAC METAL DUCTWORK

fabricated ductwork by Semco Mfg., Inc. or United Sheet Metal Div., United McGill Corp, or approved equal.

3 EXECUTION

3.1 General: Examine areas and conditions under which HVAC metal ductwork is to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.2 Installation Of Metal Ductwork:

3.2.1 General: Assemble and install ductwork in accordance with recognized industry practices which will achieve air-tight (5% leakage for systems rated 3" and under; 1% for systems rated over 3") and noiseless (no objectionable noise) systems, capable of performing each indicated service. Install each run with minimum number of joints. Align ductwork accurately at connections, within 1/8" misalignment tolerance and with internal surfaces smooth. Support ducts rigidly with suitable ties, braces, hangers and anchors of type which will hold ducts true-to-shape and to prevent buckling. Support vertical ducts at every floor. Seal all duct joints and seams with sealant.

3.2.2 Supports: Install concrete inserts for support of ductwork in coordination with formwork, as required to avoid delays in work. Install self-drilling screw anchors in prestressed concrete or existing work.

3.2.3 Field Fabrication: Complete fabrication of work at project as necessary to match shop-fabricated work and accommodate installation requirements. Seal joints in round or oval ductwork with hard cast or shrink bands, and sheet metal screws, or by welding.

3.2.4 Routing: Locate ductwork runs, except as otherwise indicated, vertically and horizontally. Avoid diagonal runs wherever possible. Locate runs as indicated by diagrams, details and notations or, if not otherwise indicated, run ductwork in shortest route which does not obstruct useable space or block access for servicing building and its equipment. Hold ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building. Limit clearance to 1/2" where furring is shown for enclosure or concealment of ducts, but allow for insulation thickness, if any. Where possible, locate insulated ductwork for 1" clearance outside of insulation. In finished and occupied spaces, conceal ductwork from view by locating in mechanical shafts, hollow wall construction or above suspended ceilings, unless specifically noted as "Exposed". Do not encase horizontal runs in solid partitions, except as specifically shown. Coordinate layout with suspended ceiling and lighting layouts and similar finished work.

3.2.5 Electrical Equipment Spaces: Do not route ductwork through transformer vaults or other electrical equipment spaces and enclosures.

3.2.6 Penetrations: Where ducts pass through interior partitions and exterior walls, and are exposed to view, conceal space between construction opening and duct or duct insulation with sheet metal flanges of same gauge as duct. Overlap opening on 4 sides by at least 1 1/2". Fasten to duct and substrate. Where ducts pass through fire-rated floors, walls, or partitions, provide firestopping between duct and substrate.

HVAC METAL DUCTWORK

- 3.2.7 Coordination: Coordinate duct installations with installation of accessories, dampers, coil frames, equipment, controls and other associated work of ductwork system.
- 3.2.8 Installation: Install metal ductwork in accordance with SMACNA HVAC Duct Construction Standards. Fan discharge outlet ducts shall be installed correctly with regard to "system effect" per AMCA Publication 201.
- 3.3 Installation of Flexible Ducts:
- 3.3.1 Maximum Length: For any duct run using flexible ductwork, do not exceed 6'-0" extended length. Flexible duct shall only be allowed as detailed on the drawings.
- 3.3.2 Installation: Install in accordance with Section III of SMACNA's "HVAC Duct Construction Standards, Metal and Flexible". Support flexible ducts to eliminate pinching and kinking which would restrict flow with cloth or plastic hanging straps at least 1½" wide spaced not more than 5 feet apart.
- 3.3.3 Seal inside of flexible duct connections to sheet metal ducts, boots and terminals. Additionally secure connection with strap clamp. Provide outer coat of sealant and insulate joint with foamed rubber insulation to avoid condensation.
- 3.4 Leakage Tests: After each duct system is completed, test for duct leakage in accordance with Sections 3 and 5 of the SMACNA HVAC Air Duct Leakage Test Manual. Repair leaks and repeat tests until total leakage is less than 3% of system design air flow for low pressure systems and less than 1% for systems rated over 3".
- 3.5 Equipment Connections: Connect metal ductwork to equipment as indicated, provide flexible connection for each ductwork connection to equipment mounted on vibration isolators, and/or equipment containing rotating machinery. Provide access doors as indicated.
- 3.6 Clean ductwork internally free of dust and debris. Clean external surfaces of foreign substances which might cause corrosive deterioration of metal or, where ductwork is to be painted, might interfere with painting or cause paint deterioration. Keep ducts closed with poly during construction to prevent contamination by construction dust and debris.
- 3.7 Balancing: Refer to Division-23 section "Testing, Adjusting, and Balancing" for air distribution balancing of metal ductwork; not work of this section. Seal any leaks in ductwork that become apparent in balancing process.
- 3.8 System Adjustment: Adjust the system to provide functional operation to the extent possible, and leave ready for Testing and Balancing work. It is not the intent of this section to provide final testing and balancing, but to leave the system operational with a minimum of noise.

END OF SECTION

HVAC METAL DUCTWORK

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HVAC METAL DUCTWORK

230840.6

SECTION 230855 / DUCTWORK ACCESSORIES

1 GENERAL

- 1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
- 1.2 Division-23 Basic Mechanical Materials and Methods sections apply to work of this section.
- 1.3 Extent of ductwork accessories work is indicated on drawings and in schedules, and by requirements of this section.
- 1.4 Refer to other Division-23 sections for testing, adjusting, and balancing of ductwork accessories; not work of this section.
- 1.5 Codes and Standards:
 - 1.5.1 SMACNA Compliance: Comply with applicable portions of both SMACNA "HVAC Duct Construction Standards, Metal and Flexible" and "Fire, Smoke and Radiation Damper Installation Guide for HVAC Systems".
 - 1.5.2 UL Compliance: Construct, test, and label fire dampers in accordance with UL Standard 555 "Fire Dampers and Ceiling Dampers". Construct, test and label smoke dampers in accordance with UL Standard 555S "Leakage Rated Dampers for use in Smoke Control Systems."
 - 1.5.3 NFPA Compliance: Comply with applicable provisions of NFPA 90A "Air Conditioning and Ventilating Systems" pertaining to installation of ductwork accessories.
- 1.6 Approval Submittals:
 - 1.6.1 Product Data: Submit manufacturer's technical product data for each type of ductwork accessory, including dimensions, capacities, and materials of construction; and installation instructions as follows:
 - 1.6.1.1 Low pressure manual dampers
 - 1.6.1.2 Control dampers
 - 1.6.1.3 Flexible connections

2 PRODUCTS

- 2.1 Dampers:
 - 2.1.1 Low Pressure Manual Dampers: Provide 16 gauge dampers of single-blade type (12" maximum blade width) or multiblade type. Damper blades to be gang-operated from a single shaft with nylon or ball bearings on each end. Provide indexed locking quadrant.

DUCTWORK ACCESSORIES

Parallel or opposed blade style is acceptable. Provide 2" standoff on locking quadrant for externally insulated duct. Final damper settings shall be marked in indelible ink or paint.

- 2.1.2 Control Dampers: Provide dampers with parallel blades for 2-position control or opposed blades for modulating control. Construct blades of 16-ga. steel. Provide heavy-duty molded self-lubricating nylon bearings and 1/2" diameter steel axles spaced on 9" centers. Provide sponge rubber or felt blade edges. Construct frame of 2" x 1/2" x 1/8" steel channel for face areas 25 sq. ft. and under; 4" x 1-1/4" x 16-ga. channel for face areas over 25 sq. ft. Provide galvanized steel finish with aluminum touch-up. Actuators (motors) are provided by control contractor. Damper operators shall have travel stops for making fixed settings for test and balance and final settings shall be marked in indelible ink or paint.
- 2.1.3 Acceptable Manufacturers: Subject to compliance with requirements, provide dampers by Greenheck, American Warming & Ventilating, Arrow Louver and Damper, Penn Ventilator Co., or Ruskin Mfg. Co.
- 2.2 Turning Vanes: Provide manufactured or fabricated single wall turning vanes and vane runners, constructed in accordance with SMACNA "HVAC Duct Construction Standards".
- 2.3 Flexible Connections:
 - 2.3.1 General: Provide flexible duct connections wherever ductwork connects to vibration isolated equipment. Construct flexible connections of neoprene-coated flameproof fabric crimped into duct flanges for attachment to duct and equipment. Make airtight joint. Provide adequate joint flexibility to allow for thermal, axial, transverse, and torsional movement, and also capable of absorbing vibrations of connected equipment.
 - 2.3.2 Acceptable Manufacturers: Subject to compliance with requirements, provide products by one of the following: Duro Dyne Corp., Flexaust (The) Co., or Ventfabrics, Inc.

3 EXECUTION

- 3.1 Examine areas and conditions under which ductwork accessories will be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.
- 3.2 Installation of Ductwork Accessories:
 - 3.2.1 Install ductwork accessories in accordance with manufacturer's installation instructions, with applicable portions of details of construction as shown in SMACNA standards, and in accordance with recognized industry practices to ensure that products serve intended function.
 - 3.2.2 Install balancing dampers at all main ducts adjacent to units in return air, outside air and where indicated.
 - 3.2.3 Install control dampers in the outside air duct for each zone. Damper operator provided

DUCTWORK ACCESSORIES

- by control contractor.
- 3.2.4 Install turning vanes in square or rectangular 90° elbows in supply, return, and exhaust air systems, and elsewhere as indicated.
- 3.2.5 Install flexible connections in ductwork such that the clear length of the connector is approximately two inches. Provide thrust restraints as required. Flexible material shall not be so slack as to take a definite concave or convex shape during fan operation.
- 3.2.6 Coordinate with other work, including ductwork, as necessary to interface installation of ductwork accessories properly with other work.
- 3.3 Operate installed ductwork accessories to demonstrate compliance with requirements. Test for air leakage while system is operating. Repair or replace faulty accessories as required to obtain proper operation and leakproof performance.
- 3.4 Adjusting and Cleaning:
- 3.4.1 Adjusting: Adjust ductwork accessories for proper settings.
- 3.4.2 Final positioning of manual dampers is specified in Division-23 section "Testing, Adjusting, and Balancing". However, the system shall be left functional with all dampers open or throttled.
- 3.4.3 Cleaning: Clean factory-finished surfaces. Repair any marred or scratched surfaces with manufacturer's touch-up paint.

END OF SECTION

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DUCTWORK ACCESSORIES

230855.4

SECTION 230860 / GRILLES, REGISTERS AND CEILING DIFFUSERS1 GENERAL

- 1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
- 1.2 Division-23 Basic Mechanical Materials and Methods sections apply to work of this section.
- 1.3 Extent of air outlets and inlets work is indicated by drawings and schedules, and by requirements of this section.
- 1.4 Refer to other Division-23 sections for ductwork and duct accessories required in conjunction with air outlets and inlets and for balancing of air outlets and inlets; not work of this section.
- 1.5 Codes and Standards:
 - 1.5.1 ADC Compliance: Test and rate air outlets and inlets in certified laboratories under requirements of ADC 1062 "Certification, Rating and Test Manual". Provide air outlets and inlets bearing ADC Certified Rating Seal.
 - 1.5.2 NFPA Compliance: Install air outlets and inlets in accordance with NFPA 90A "Standard for the Installation of Air Conditioning and Ventilating Systems".
- 1.6 Approval Submittals:
 - 1.6.1 Product Data: Submit manufacturer's technical product data for air outlets and inlets indicating construction, finish, and mounting details.
 - 1.6.2 Performance Data: For each type of air outlet and inlet furnished, provide aspiration ability, temperature and velocity traverses, throw and drop, and noise criteria ratings. Indicate selections and data as required.
- 1.7 O&M Data Submittals: Submit cleaning instructions for finishes and spare parts lists. Include this data and a copy of approval submittals in O&M manual.

2 PRODUCTS

- 2.1 General:
 - 2.1.1 Except as otherwise indicated, provide manufacturer's standard grilles, registers, and ceiling diffusers where shown; of size, shape, capacity and type indicated; constructed of materials and components as indicated, and as required for complete installation.
 - 2.1.2 Manufacturers not listed in the following specification will not be considered for approval unless accepted by addendum prior to bid.

GRILLES, REGISTERS AND CEILING DIFFUSERS

- 2.1.3 Performance: Provide grilles, registers and ceiling diffusers that have, as minimum, temperature and velocity traverses, throw and drop, and noise criteria ratings for each size device equal to the basis of design.
- 2.1.4 Ceiling and Wall Compatibility: Provide grilles, registers and diffusers with border styles that are compatible with adjacent wall and ceiling systems, and that are specifically manufactured to fit into ceiling module or wall with accurate fit and adequate support. Refer to general construction drawings and specifications for types of ceiling systems and walls which will contain each type of ceiling diffuser, grille, or register. All ceiling and wall-mounted grilles, registers and diffusers shall be provided with gaskets to seal them with the building envelope.
- 2.1.5 Appearance: All grilles and registers shall be aluminum construction and all diffusers shall be aluminum construction, unless otherwise noted, with uniform matching appearance for each type of outlet. Ceiling mounted grilles and registers shall be set to be sight tight from the predominant exposure.
- 2.1.6 Finish: All ceiling mounted grilles, registers, and diffusers shall be finished with baked white enamel. Wall and door mounted grilles and registers shall be finished with baked white enamel.
- 2.2 Acceptable Manufacturers: Subject to compliance with requirements, provide products by Titus, Price, or Metal Aire.
- 2.3 Square Plaque Ceiling Diffusers (CD): Provide square face, adjustable, 360 degree pattern diffusers with one-piece stamped cones, no corner joints, round necks. Inner plaque assembly shall be fully removable. Provide lay-in panel as required. Provide trim ring for diffusers in hard ceilings to allow opening to be used for access. Provide square to round duct boot adaptors for ceiling-mounted air devices. Price Model SPD or equal.
- 2.4 Return Grilles (RG): Provide return grilles registers with one set of 45 degree fixed louvers, parallel to the long dimension. Titus 350 FL or Metalaire RHE. Provide square to round duct boot adaptors for ceiling-mounted air devices.
- 2.5 Exhaust Grilles (EG): Provide exhaust grilles with one set of 45 degree fixed louvers, parallel to the long dimension. Provide mounting frame for all wall and plaster ceiling installations. Titus 350 FL or Metalaire RHE.
- 2.6 Transfer Grilles (TG): Provide transfer grilles with one set of 45 degree fixed louvers, parallel to the long dimension. Titus 350 FL or Metalaire RHE.

3 EXECUTION

- 3.1 Coordinate installation with ceiling and light fixture installation. Locate ceiling outlets as indicated on architectural Reflected Ceiling Plans. Unless otherwise indicated, locate ceiling outlets in the center of acoustical ceiling modules with sides parallel to the grid.
- 3.2 Install air outlets and inlets in accordance with manufacturer's written instructions and in accordance with recognized industry practices to insure that products serve intended

GRILLES, REGISTERS AND CEILING DIFFUSERS

functions.

- 3.3 Coordinate with other work, including ductwork and duct accessories, as necessary to interface installation of air outlets and inlets with other work.
- 3.4 Set air volumes to values shown on the drawings so that the system is functional. Leave ready for test and balance contractor.
- 3.5 Furnish to Owner three operating keys for each type of outlet and inlet that require them; obtain receipt.

END OF SECTION

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GRILLES, REGISTERS AND CEILING DIFFUSERS

230860.4

SECTION 230885 / AIR CLEANING EQUIPMENT1 GENERAL

- 1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
- 1.2 Division-23 Basic Mechanical Materials and Methods sections apply to work of this section.
- 1.3 Extent of air cleaning work required by this section is indicated on drawings and schedules, and by requirements of this section.
- 1.4 Refer to Division-23 air handling units section for filter boxes associated with air handling units; not work of this section.
- 1.5 Refer to Division-23 duct accessories section for duct access door work required in conjunction with air filters; not work of this section.
- 1.6 Control wiring specified as work of Division 23 for Automatic Temperature Controls is work of that section.
- 1.7 Codes and Standards:
 - 1.7.1 NFPA Compliance: Comply with applicable portions of NFPA 90A pertaining to installation of air filters.
 - 1.7.2 UL Compliance: Comply with UL Standards pertaining to safety and performance of air filter units.
 - 1.7.3 ASHRAE Compliance: Comply with provisions of ASHRAE Standard 52 for method of testing, and for recording and calculating air flow rates.
- 1.8 Approval Submittals:
 - 1.8.1 Product Data: Submit manufacturer's technical product data including dimensions, weights, required clearances and access, flow capacity including initial and final pressure drop at rated air flow, efficiency and test method, fire classification, and installation instructions.
 - 1.8.1.1 Replaceable panel filters (throwaway)
 - 1.8.1.2 Extended surface panel filters (prefilters)
 - 1.8.2 Shop Drawings: Submit manufacturer's assembly-type shop drawings indicating dimensions, materials, and methods of assembly of components.
 - 1.8.2.1 Ultraviolet light coil cleaner.

AIR CLEANING EQUIPMENT

1.9 O&M Data Submittals:

- 1.9.1 Maintenance Data: Submit maintenance data and spare parts lists for each type of filter and rack required. Include this data, product data and a copy of approval submittals in O&M manual.

2 PRODUCTS

- 2.1 Acceptable Manufacturers: Subject to compliance with requirements, provide air cleaning equipment of one of the following: American Air Filter Co., Continental Air Filter Co., Cambridge Filter Corp., Farr Co., or approved equal.
- 2.2 Provide cabinet and framing suitable for equipment being installed. Cabinet shall be shipped in one piece but allow installation through a standard 3' door. Knock-down and reassembly is required.
- 2.3 Replaceable Panel Filters (Filter Grilles): Provide factory-fabricated, viscous-coated, flat panel type replaceable air filters with holding frames; as indicated, in sizes indicated, with 2" thick UL Class 2 throwaway media material; construct media of interlaced glass fibers, spray with non-flammable adhesive, frame in throwaway fiberboard casings, and sandwich between perforated metal grilles. Provide filters with rated face velocity of 500 fpm, initial resistance of not greater than 0.20" w.g., final rated resistance of 0.50" w.g., and average arrestance of 80%. Basis of design: American Air Filter 5700.
- 2.4 Extended Surface Panel Filters (OA Filters): Provide factory fabricated pleated, dry flat panel; replaceable air filters of sizes indicated, with 2" thick UL Class 2 material. The media shall be bonded to the fiberboard casings to prevent leakage. Provide filters with rated face velocity of 500 fpm, initial resistance of not greater than 0.30" w.g., final rated resistance of 1.0" w.g., average arrestance of 90%, and average dust spot efficiency of 60%. Basis of design: MERV-13.

3 EXECUTION

- 3.1 General: Comply with installation requirements as specified elsewhere in these specifications pertaining to air filters housing/casings, and associated supporting devices.
- 3.2 Install air filters and holding devices of types indicated, and where shown; in accordance with air filter manufacturer's written instructions and with recognized industry practices; to ensure that filters comply with requirements and serve intended purposes.
- 3.3 Locate each filter unit accurately in position indicated, in relation to other work. Position unit with sufficient clearances for normal service and maintenance. Anchor filter holding frames securely to substrate.
- 3.4 Coordinate with other work including ductwork and air handling unit work as necessary to interface installation of filters properly with other work.
- 3.5 Install filters in proper position to prevent passage of unfiltered air.

AIR CLEANING EQUIPMENT

- 3.6 Install air filter gauge pressure taps upstream and downstream of filters to indicate air pressure drop through air filter. Mount filter gauges on outside of filter housing or filter plenum, in accessible position. Adjust and level included gauges for proper readings.
- 3.7 Install Cosatron system as shown on the drawings and in accordance with manufacturer's printed instructions.
- 3.8 Install self-contained filter modules accordance with manufacturer's printed instructions.
- 3.9 Construction Filters: No systems that include filters shall be operated at any time unless the complete specified prefilters and final filters are installed. Maintain all filters during construction. Install clean prefilters and final filters just prior to test and balance work.
- 3.10 Extra Filters: Provide a complete spare set of filters for OA units. Filter grille filters will be supplied by Owner's vendor following construction. Obtain receipt from Owner that spare filters have been received.

END OF SECTION

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AIR CLEANING EQUIPMENT

230885.4

SECTION 230901 / HVAC CONTROLS PRICING

1. GENERAL

1.1 Refer to other Division 23 and Division 26 section and drawings for requirements concerning HVAC controls.

1.2 The only acceptable Controls System Subcontractor for the HVAC controls shall be Johnson Controls, Inc. All work including controls, shall be included by the Contractor in the Base Bid for this Project. The Contractor shall be responsible for verifying the Scope of Work for the Control System, which is to be provided by Johnson Controls, Inc. All control work, devices, and programing shall comply with the UF Standards. The Scope of Work for Johnson Controls, Inc. is as follows:

1.2.1 Included in the Scope of Work:

1.2.1.1 DDC integration of VRF system central controller via BACnet.

1.2.1.2 Remote start/stop, status, and time of day schedule for ERV-1.

1.2.1.3 Modifications and programing of the Metasys database.

1.2.1.4 Control wiring and control tubing. Power wiring to control panel.

1.2.1.5 1-year Warranty, 4 hours of Owner training, submittals, tax and freight.

1.2.2 Not Included in the Scope of Work:

1.2.2.1 Payment of performance bond.

1.2.2.2 Installation of valves, dampers or other in-line devices.

1.2.2.3 Permits.

1.2.2.4 Dampers of any kind.

1.2.2.5 Starters, disconnects, variable speed drives or their installation.

1.2.2.6 Access doors and/or panels.

1.2.2.7 Duct smoke detectors. Detectors are supplied and wired by the Division 26 Contractor.

1.2.2.8 Johnson Controls, Inc. Open book price for HVAC controls is _____. This price shall be included by the Contractor in the Base Bid of this Project.

END SECTION

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SECTION 230970 / START-UP REQUIREMENTS FOR HEATING, VENTILATING, & AIR CONDITIONING (HVAC) SYSTEMS1 GENERAL

1.1 Intent: It is the intent of this section to require that the startup requirements and report noted herein be performed prior to starting TAB work on each system. Work can be phased with permission of the Engineer.

1.2 Coordination:

1.2.1 The Contractor shall furnish to the TAB Contractor a complete set of plans, specifications, addenda, shop drawings, equipment performance data sheets, change orders, etc. as requested by the TAB Contractor.

1.2.2 The Contractor shall participate in a TAB coordination meeting to discuss interface requirements with the TAB Contractor and to establish a schedule for TAB work prior to start of TAB work.

2 PRODUCTS: None

3 EXECUTION:

3.1 The TAB work shall not commence until the Engineer has received written notice from the Contractor that HVAC systems are 100% complete and are fully operational. Submit Startup Report as described herein.

3.2 The Contractor shall place all HVAC systems and equipment into complete operation during each working day of TAB work.

3.3 The Contractor shall provide access to HVAC systems and equipment by supplying ladders and/or scaffolding, and opening access panels and equipment room doors.

3.4 The TAB Contractor will provide to the Contractor TAB punch lists of non-complying HVAC work as they are discovered. The Contractor shall replace or repair non-complying work as soon as possible in order not to delay completion of TAB work.

3.5 If the TAB Contractor is prevented from completing his work in a timely and continuous manner (according to the established TAB schedule) due to non-operable and/or incomplete HVAC systems, any additional fees for TAB work shall be the responsibility of the Contractor and shall be affected by change order reducing the Contract Amount.

3.6 The contract will not be closed out until all HVAC systems have been successfully TABed by the independent TAB contractor.

3.7 Airside Systems: The Contractor shall provide the following information to the Engineer to substantiate proper start-up and preliminary adjustments of air handler units, belt driven fans, and duct systems.

START-UP REQUIREMENTS FOR HEATING, VENTILATING,
& AIR CONDITIONING (HVAC) SYSTEMS

- 3.7.1 Verify that air grilles (supply, return, exhaust, transfer, outdoor, etc.) are installed and connected to the duct system.
- 3.7.2 Verify that duct systems are clean of debris.
- 3.7.3 Verify that ducts attached with flexible connectors are aligned within ½" and have a uniform gap between ducts of 1"-1.5". Flexible connectors shall not leak and shall be insulated.
- 3.7.4 Verify that filters are clean.
- 3.7.5 Verify that balancing dampers at grilles and branch ducts are operational and are fully opened.
- 3.7.6 Verify that fan discharges are appropriate for the outlet ductwork with regards to the "system effect" per AMCA Publication 201. Inappropriate fan discharges will not be accepted.
- 3.7.7 Verify proper fan rotation.
- 3.7.8 Verify fan motor overload elements are correctly sized.
- 3.7.9 Adjust fan speed until CFM is at or above design CFM. Verify that motor is not overloaded.
- 3.7.10 Verify that HVAC control systems are fully operational.
- 3.7.11 Verify outside air requirements have been met. Provide dual settings and readings for damper settings as noted on drawings.
- 3.8 Startup Report: The Contractor shall submit the startup information required by this section to the Engineer in a typed report organized as outlined herein. The Startup Report is required to meet the written notice described herein prior to starting TAB work. TAB work will not start until the Startup Report has been submitted and approved.
- 3.9 After the initial AC unit startup is completed by the AC unit manufacturer (with the Contractor's assistance) the Test and Balance shall be completed. After completion of the Test and Balance work the unit manufacturer shall return to the site and retest and operate the AC equipment and provide a Startup Report.

END OF SECTION

START-UP REQUIREMENTS FOR HEATING, VENTILATING,
& AIR CONDITIONING (HVAC) SYSTEMS

SECTION 230985 / TESTING AND BALANCING OF MECHANICAL SYSTEMS1 GENERAL

- 1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section. Division-23 Basic Mechanical Materials Sections apply to work of this section.
- 1.2 Description of Work:
- 1.2.1 Extent of testing, adjusting, and balancing work (TAB) is indicated by requirements of this section, and also by drawings and schedules, and is defined to include, but is not necessarily limited to, air distribution systems, hydronic distribution systems and associated equipment and apparatus of mechanical work. The work consists of setting speed and volume (flow) adjusting facilities provided for systems, recording data, conducting tests, preparing and submitting reports, and recommending modifications to work as required.
- 1.2.2 Coordination: Coordinate with the General Contractor and Mechanical Contractor responsible for the HVAC system installation as required to complete the TAB work.
- 1.3 The intent of this specification is to balance HVAC systems within the tolerances listed, maintaining the pressure relationships indicated, with a minimum of noise.
- 1.3.1 Airflow Tolerances:
- 1.3.1.1 Air Handling: The supply air, return air and outdoor air quantities shall be balanced within $\pm 5\%$ of design values.
- 1.3.1.2 Exhaust Fans: The exhaust fan quantities shall be set as required to maintain the design exhaust terminal flows within $\pm 5\%$ of design values. values.
- 1.3.1.3 Ceiling Diffusers, Supply Grilles, Return and Exhaust Inlets: Balance to an air quantity within $\pm 10\%$ of the design values.
- 1.3.2 Temperature Tolerances:
- 1.3.2.1 Air Handling Temperatures: The controlled temperatures at AHUs shall be verified to be under control within $\pm 1^\circ\text{F}$ of design values.
- 1.3.2.2 Room Temperatures: Balance systems and controls within $\pm 1^\circ\text{F}$ of indicated settings.
- 1.4 Quality Assurance: The TAB Contractor shall be certified as follows:
- 1.4.1 Tester: A firm certified by Associated Air Balance Council (AABC) in those testing and balancing disciplines required for this project. AABC-certified firms are independent by definition. Comply with AABC's Manual MN-1 "AABC National Standards", as applicable to this work.

TESTING AND BALANCING OF MECHANICAL SYSTEMS

- 1.4.2 Industry Standards: Comply with American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE) recommendations pertaining to measurements, instruments and testing, adjusting and balancing, except as otherwise indicated.
- 1.5 Job Conditions:
 - 1.5.1 Do not proceed with testing, adjusting, and balancing work until HVAC work (including Controls) has been completed and is operable. Ensure that there is no residual work still to be completed.
 - 1.5.2 Do not proceed until work scheduled for testing, adjusting, and balancing is clean and free from debris, dirt and discarded building materials.
 - 1.5.3 Do not proceed until architectural work that would affect balancing (walls, ceiling, windows, doors) have been installed.
 - 1.5.4 Testing may proceed system by system, but each HVAC system must be complete as describe herein.
 - 1.5.5 The mechanical contractor shall make any changes in pulleys, belts, and dampers, and/or add dampers as required for correct balancing.
- 1.6 Approval Submittals
 - 1.6.1 Submit the name of the proposed test and balance company for the Engineer's approval within thirty (30) days after awarding of contract.
- 1.7 Test Reports and Verification Submittals:
 - 1.7.1 Submit two (2) copies of a preliminary report two weeks prior to Substantial Completion listing all noted deficiencies. Submit four (4) copies of the dated test and balance report upon completion of TAB work and before the Final Completion Inspection. The report shall include a list of instruments used for the work. The report shall be signed by the supervisor who performed the TAB work.
- 2 PRODUCTS
 - 2.1 Patching Materials: Except as otherwise indicated, use same products as used by original Installer for patching holes in insulation, ductwork and housings which have been cut or drilled for test purposes, including access for test instruments, attaching jigs, and similar purposes.
 - 2.2 Test Instruments: Utilize test instruments and equipment of the type, precision, and capacity as recommended in the referenced standard. All instruments shall be in good condition and shall have been calibrated within the previous six (6) months (or more recently if required by standard).
- 3 EXECUTION

TESTING AND BALANCING OF MECHANICAL SYSTEMS

3.1 General:

- 3.1.1 Examine installed work and conditions under which testing is to be done to ensure that work has been completed, cleaned and is operable. Do not proceed with TAB work until unsatisfactory conditions have been corrected in manner acceptable to Tester.
- 3.1.2 Test, adjust and balance environmental systems and components, as indicated, in accordance with procedures outlined in applicable standards, and as modified or detailed herein. Test and balance shall be performed prior to installation of ceiling tiles.
- 3.1.3 Test, adjust and balance systems during summer season for air conditioning systems and during winter season for heating systems, including at least a period of operation at outside conditions within 5°F wet bulb temperature of maximum summer design condition, and within 10°F dry bulb temperature of minimum winter design condition. When seasonal operation does not permit measuring final temperatures, then take final temperature readings when seasonal operation does permit. The Contractor shall return for a change of seasons test at no additional cost to the Owner and submit the revised TAB report.
- 3.1.4 Punch List: Prepare a deficiency (punch)list for the Contractor with a copy of the Engineer that lists all items that are incorrectly installed or are functioning improperly. Provide a retest after all items are corrected.
- 3.1.5 Prepare TAB report of test results, including instrumentation calibration reports, in format recommended by applicable standards, modified as required to include all data listed herein.
- 3.1.6 Patch holes in insulation, ductwork and housings, which have been cut or drilled for test purposes, in manner recommended by original Installer.
- 3.1.7 Mark equipment settings, including damper control positions, valve indicators, fan speed control levers, and similar controls and devices, to show final settings at completion of TAB work. Provide markings with paint or other suitable permanent identification materials.
- 3.1.8 Include in the TAB report recommendations for correcting unsatisfactory mechanical performances when system cannot be successfully balanced.
- 3.1.9 Include an extended warranty of ninety (90) days after completion of test and balance work, during which time the Engineer, at his discretion, may request a recheck, or resetting of any component as listed in test report. The TAB company shall provide technicians and instruments and make any tests required by the Engineer during this time period.

3.2 Controls:

- 3.2.1 Check all HVAC controls for proper location, calibration and sequence of operation.
- 3.2.2 Check operation of all controllers and controlled devices to verify proper action and

TESTING AND BALANCING OF MECHANICAL SYSTEMS

direction. Check the operation of all interlocks.

3.3 Air Balancing:

3.3.1 Leakage tests on ductwork must have been completed before air balancing.

3.3.2 Set dampers, volume controls and fan speeds to obtain specified air delivery with minimum noise level. Rebalance as required to accomplish this.

3.3.3 Record air terminal velocity after completion of balance work.

3.3.4 Record all fan speeds.

3.3.5 Variable Volume Systems: Measure static pressure at all major branches. Adjust fan controllers for minimum required static pressure at the end of each branch. Report the value of the minimum static pressure that will provide proper air flow in the TAB Report and set the static pressure controller for this value. Balance outlets. Check at both maximum and minimum condition. Traverse main outside air (OA) ducts. Balance the return system. All branches must be above the minimum required static pressure. The supply fan must track and deliver the proper air quantity with no objectionable noise. The system must be stable and operate properly at 50% OA.

3.4 Data Collection:

3.4.1 In addition to the data required for any specified performance tests, measure and record the temperatures, pressures, flow rates, and nameplate data for all components listed herein.

3.4.2 It is the intent of this section to record data on balanced systems, under normal operating or design conditions.

3.4.3 Temperatures:

3.4.3.1 Outside dry and wet bulb temperatures.

3.4.3.2 Dry bulb temperature in each room and at least one wet bulb temperature in each zone.

3.4.3.3 Refrigerant liquid and suction temperatures.

3.4.3.4 Entering and leaving air temperatures (dry bulb and wet bulb) for each air handler.

3.4.4 Pressures:

3.4.4.1 Suction and discharge static pressure of each fan.

3.4.4.2 Each refrigerant suction and discharge pressure.

3.4.5 Flow rates:

TESTING AND BALANCING OF MECHANICAL SYSTEMS

3.4.5.1 Flow rate through each fan.

3.4.6 Nameplate Data:

3.4.6.1 Complete nameplate data for all equipment.

3.4.6.2 Motor data to include horsepower, phase, voltage, RPM, full load nameplate current, fuse rating in disconnect switch, number or manufacturer's size designation, and ampere rating of overcurrent and low voltage protection devices in starters.

END OF SECTION

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SECTION 260005 / ELECTRICAL GENERAL1 GENERAL

- 1.1 The work covered by this division consists of providing all labor, equipment and materials and performing all operations necessary for the installation of the electrical work as herein called for and shown on the Drawings.
- 1.2 Related Documents:
- 1.2.1 Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to work of this Section.
- 1.2.2 Provisions of this Section apply to work of all Division 26 Sections.
- 1.2.3 Review all project Drawings to be aware of conditions affecting work herein.
- 1.2.4 Definitions:
- 1.2.4.1 Provide: Furnish, install, and test, complete and ready for intended use.
- 1.2.4.2 Furnish: Supply and deliver to project site, ready for subsequent requirements.
- 1.2.4.3 Install: Operations at project site, including unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, test complete ready for intended use, and similar requirements.
- 1.3 Permits and Fees: Owner shall obtain all necessary permits, meters, and inspections required for his work and pay all fees and charges incidental thereto. The only exception to this shall be the fire alarm permit, which shall be obtained by the Contractor.
- 1.4 Verification of Owner's Data: Prior to commencing work the Contractor shall satisfy himself as to the accuracy of all data indicated on the Drawings and/or provided by the Owner. Should the Contractor discover any inaccuracies, inconsistencies, errors, omissions in the data, ambiguities, or other conditions which might prevent construction being provided as indicated, Contractor shall immediately notify the Engineer. Commencement of work by the Contractor shall be held as an acceptance of the data by him after which time the Contractor has no claim against the Owner resulting from alleged errors, omissions or inaccuracies of the said data. If any portions of the Contract Documents or any other such data provided by the Owner is inconsistent or otherwise ambiguous, Contractor shall provide materials and labor necessary in the Bid Amount to provide the most expensive of the possible interpretations of the requirements of this Contract for Construction. A credit to the Owner shall be provided by the Contractor if a less expensive interpretation is actually provided; no additional time or addition to the Contract Amount shall be provided if the Contractor fails to comply with this requirement of the Contract Documents. Contractor shall coordinate exact requirements of Division 26 with the requirements of other divisions of this Contract prior to Bid.
- 1.5 Delivery and Storage of Materials: Materials delivered to site shall be inspected for

damage, unloaded, and stored with a minimum of handling. All material shall be stored to provide protection from the weather and damage.

- 1.6 Extent of work is indicated in the Drawings, Schedules, and Specification. Singular references shall not be construed as requiring only one device if multiple devices are shown on the Drawings or are required for proper system operation.

1.7 Field Measurements and Coordination:

- 1.7.1 The intent of the Drawings and Specifications is to obtain a complete and satisfactory installation. Separate divisional Drawings and Specifications shall not relieve the Contractor or Subcontractors from full compliance of work of his trade indicated on any of the Drawings or in any Section of the Specifications. Report conflicts prior to start of work.
- 1.7.2 Verify all field dimensions and locations of equipment to insure close, neat fit with other trades' work. Make use of all Contract Documents and approved shop drawings to verify exact dimension and locations. Do not scale electrical drawings, rely on dimensions shown on architectural or structural drawings.
- 1.7.3 Coordinate work in this Division with all other trades in proper sequence to insure that the total work is completed within Contract time schedule and with minimum cutting and patching.
- 1.7.4 Locate all equipment, materials, and apparatus symmetrical with architectural elements. Install to exact height and locations when shown on architectural drawings. When locations are shown only on electrical drawings, be guided by architectural details and conditions existing at job and correlate this work with that of others.
- 1.7.5 Install work as required to fit structure, avoid obstructions, and retain clearance, headroom, openings and passageways. Cut no structural members without written approval from Engineer or Architect.
- 1.7.6 Carefully examine any existing conditions, piping, and premises. Compare Drawings with existing conditions. Report any observed discrepancies. Written instructions will be issued by the Engineer to resolve discrepancies.
- 1.7.7 Because of the small scale of the Drawings, it is not possible to indicate all offsets and fittings or to locate every accessory. Drawings are essentially diagrammatic. Study carefully the sizes and locations of structural members, wall and partition locations, trusses, and room dimensions and take actual measurements on the job. Locate material, equipment and accessories with sufficient space for installing and servicing. Contractor is responsible for accuracy of his measurements and shall not order materials or perform work without verification. No extra compensation will be allowed because field measurements vary from the dimensions on the Drawings. If field measurements show that equipment or material cannot be fitted, the Engineer shall be consulted. Remove and relocate, without additional compensation, any item that is installed and is later found to encroach on space assigned to another use.

- 1.8 Interpretation of the Contract Documents is sometimes necessary due to perceived ambiguities or conflicts in the contract requirements. Where ever more than one interpretation of the requirements of the Contract Documents can be made, the Contractor shall provide materials and labor necessary to accommodate providing the most expensive of the different interpretations. No change order shall be processed for a failure to comply with this requirement.
- 1.9 Guarantee and Service
- 1.9.1 Owner reserves the right to make emergency repairs as required to keep equipment in operation without voiding Contractor's Guarantee Bond nor relieving Contractor of his responsibilities during guarantee period.
- 1.10 Approval Submittals
- 1.10.1 Before ordering any materials or equipment, and within 30 days after the award of Contract the Contractor shall submit to the Engineer one complete submittal control log showing the make, type, manufacturer's name and trade designation of all equipment.
- 1.10.1.1 This log shall be accompanied by six (6) copies of the manufacturer's printed specifications and shop drawings for each piece of equipment or specialty and shall give dimensions, diagrams, descriptive literature, capacity or rating, kind of material, finish, guarantee, etc., and such other detailed information as the Engineer may require.
- 1.10.1.2 When approved, the submittal control log and submittals shall be an addition to the specifications herewith, and shall be of equal force in that no deviation will be permitted except with the approval of the Architect/Engineer.
- 1.10.1.3 Shop drawings, product literature, and other approval submittals will only be reviewed if they are submitted in full accordance with the General and Supplementary Conditions and Division 1 Specification sections and the following.
- 1.10.1.3.1 Submittals shall be properly organized in accordance with the approved submittal control log.
- 1.10.1.3.2 Submittals shall not include items from more than one specification section in the same submittal package.
- 1.10.1.3.3 Submittals shall be properly identified by a cover sheet showing the project name, Architect and Engineer names, submittal control number, specification section, a list of products or item names with model numbers in the order they appear in the package, and spaces for approval stamps. A sample cover sheet is included at the end of this section.
- 1.10.1.3.4 Submittals shall have been reviewed and approved by the General Contractor (or Prime Contractor). Evidence of this review and approval shall be an "Approved" stamp with a signature and date; or at a minimum, stamp shall indicate the exceptions taken by the Contractor and these exceptions shall not indicate substantial deviations from the requirements of the Contract Documents in the

judgement of the Engineers.

- 1.10.1.3.5 Submittals that include a series of fixtures or devices shall be organized by the fixture number or device type and be marked accordingly. Each fixture must include all items associated with that fixture regardless of whether or not those items are used on other fixtures.
- 1.10.1.3.6 The electrical design shown on the drawings supports the mechanical equipment basis of design specifications at the time of design. If mechanical equipment is submitted with different electrical requirements, it is the responsibility of the mechanical contractor to resolve all required electrical design changes (wire and conduit size, type of disconnect or overload protection, point(s) of connection, etc.) and clearly show the new electrical design on the mechanical submittal with a written statement that this change will be provided at no additional cost. Mechanical submittals made with no written reference to the electrical design will be presumed to work with the electrical design. Any corrections required will be at no additional cost.
- 1.10.2 If the shop drawings show variation from the requirements of contract because of standard shop practice or other reasons, the Contractor shall make specific mention of such variation in writing in his letter of transmittal and on the submittal cover sheet in order that, if acceptable, Contractor will not be relieved of the responsibility for executing the work in accordance with the contract.
- 1.10.3 Review of submittals, product literature, catalog data, or schedules by the Engineer shall not relieve the Contractor from responsibility for deviations from contract drawings or specifications, unless he has in writing called to the attention of the Architect/Engineer each such deviation in writing at the time of submission, nor shall it relieve him from responsibility for errors of any sort in shop drawings, product literature, catalog data, or schedules. Any feature or function specified but not mentioned in the submittal shall be assumed to be included per the specification.
- 1.10.4 Submit shop drawings and any other drawings specifically called for in other sections after award of the contract and before any material is ordered or fabricated. Shop drawings shall consist of plans, sections, elevations and details to scale (not smaller than 1/4" per foot), with dimensions clearly showing the installation. Direct copies of small scale project drawings issued to the Contractor are not acceptable. Drawings shall take into account equipment furnished under other sections and shall show space allotted for it. Include construction details and materials.
- 1.11 Independent Testing Agency: Where testing by an independent testing agency is required or selected by the Contractor, the requirements below shall be met.
 - 1.11.1 The testing firm shall be an independent testing organization which shall function as an unbiased testing authority, professionally independent of the manufacturers, suppliers, and installers of equipment or systems evaluated by the testing firm.
 - 1.11.2 The testing firm shall be regularly engaged in the testing of electrical equipment devices, installations, and systems.

1.11.3 The testing firm shall utilize technicians who are regularly employed by the firm for testing services.

1.11.4 The testing firm shall submit proof of the above qualifications with bid documents.

2 PRODUCTS

2.1 All materials shall be new and unused, the best of their respective kinds, suitable for the conditions and duties imposed on them. The description, characteristics, and requirements of materials to be used shall be in accordance with qualifying conditions established in the following Sections.

2.2 Equipment and Materials:

2.2.1 Equipment and materials furnished under this Division shall be the product of a manufacturer regularly engaged in the manufacture of such items for a period of three years. Where practical, all of the components shall be products of a single manufacturer in order to provide proper coordination and responsibility. Where required, Contractor shall furnish proof of installation of similar equipment or materials.

2.2.2 Each item of equipment shall bear a name plate showing the manufacturer's name, trade name, model number, serial number, ratings and other information necessary to fully identify it. This plate shall be permanently mounted in a prominent location and shall not be concealed, insulated or painted.

2.2.3 The label of the approving agency, such as UL or NEMA, by which a standard has been established for the particular item shall be in full view. Materials shall be UL-listed for the application specified or indicated on the Drawings or Specifications. All materials provided shall be installed in conformance with their UL-Listing requirements and with their manufacturer's installation instructions.

2.2.4 Materials and equipment are specified herein by a single or by multiple manufacturers to indicate quality, material and type of construction desired. Manufacturer's products shown on the Drawings have been used as basis for design; it shall be the Contractor's responsibility to ascertain that alternate manufacturer's products meet detailed specifications and that size and arrangement of equipment are suitable for installation.

2.2.5 Model Numbers: Catalog numbers and model numbers indicated in the Drawings and Specifications are used as a guide in the selection of the equipment and are only listed for the Contractor's convenience. The Contractor shall determine the actual model numbers for ordering equipment and materials in accordance with the written description of each item and with the intent of the Drawings and Specifications.

2.3 Requests for Substitution:

2.3.1 Where a particular system, product or material is specified by name, consider it as standard basis for bidding, and base proposal on the particular system, product or material specified. Other systems, products, equipment or materials may be accepted

only if in the opinion of the Engineer, they are equivalent in quality and workmanship and will perform satisfactorily its intended purpose. All such substitutions in materials or equipment shall be approved in writing by the Engineer.

- 2.3.2 In making requests for substitutions, the Contractor shall list the particular system, product, equipment or material he wishes to substitute and at bid time the Contractor shall state the amount he will add or deduct from his base bid if the substitution is approved by the Engineer. If no deduction or addition to the base bid is allowed by the Contractor for such substitution, it shall be so stated on the request.
- 2.3.3 Requests by Contractor for substitution will be considered only when reasonable, timely, fully documented, and qualifying under one or more of the following circumstances.
- 2.3.3.1 Required product cannot be supplied in time for compliance with Contract time requirements.
- 2.3.3.2 Required product is not acceptable to governing authority, or determined to be non-compatible, or cannot be properly coordinated, warranted or insured, or has other recognized disability as certified by Contractor.
- 2.3.3.3 Substantial cost advantage is offered Owner after deducting off-setting disadvantages including delays, additional compensation for redesign, investigation, evaluation and other necessary services and similar considerations.
- 2.3.4 All requests for substitution shall contain a "Comparison Schedule" and clearly and specifically indicate any and all differences or omissions between the product specified as the basis of design and the product proposed for substitution. Differences shall include but shall not be limited to data as follows for both the specified and substituted products:

Principle of operation.

Materials of construction or finishes.

Thickness of materials.

Weight of item.

Deleted features or items.

Added features or items.

Changes in other work caused by the substitution.

Performance and rating data.

If the approved substitution contains differences or omissions not specifically called to the attention of the Engineer, the Owner reserves the right to require equal or similar features to be added to the substituted products at the Contractor's expense.

3 EXECUTION

- 3.1 Workmanship: All materials, fixtures, and equipment shall be installed and completed in a first-class workmanlike manner and in accordance with the best modern methods and practice. Any materials installed which do not present an orderly and reasonably neat and/or workmanlike appearance, or do not allow adequate space for maintenance,

shall be removed and replaced when so directed by the Engineer.

3.2 Coordination:

- 3.2.1 The Contractor shall be responsible for full coordination of the electrical systems with shop drawings of the building construction so the proper openings and sleeves or supports etc., are provided for conduit, devices, or other equipment passing through slabs or walls.
- 3.2.2 Means of Support for all lighting fixtures, raceway, devices, or other items suspended from the ceiling (or otherwise from above) shall be fully coordinated with and in compliance with all requirements and recommendations of the manufacturer of equipment suspended.
- 3.2.3 Coordination with Other Divisions of this Contract shall be provided, prior to bid, as necessary to properly supply power to equipment in compliance with the UL Listings of this equipment. The division 26 design may provide a number of branch circuits, phases, ampacity, and overcurrent protection devices for design-basis equipment, provided by other divisions of this contract, conforming with the equipment manufacturer's specifications available at the time of design. Manufacturer's specifications available at the time of design often differ substantially from the specifications of the equipment actually provided under the contract for construction due to value engineering, due to the use of alternate approved equipment manufacturers, or due to periodic changes in the specifications of the equipment provided by other divisions of this contract. Prior to bid, Contractor shall coordinate with specifications, recommendations, and requirements of equipment to actually be provided under contract for construction. If requirements of equipment actually provided are different from electrical design, Contractor shall make all changes required without increase in contract amount or time schedule. Such changes may include – but shall not be limited to – changing the size, type, or quantity of conductors, conduits, circuit breakers, fuse protection, panelboards, switchboards, and disconnect switches. No changes in time schedule or contract amount shall be approved due to a failure to perform this required coordination.
- 3.2.4 It shall be the Contractor's responsibility to see that all equipment that may require maintenance and operation are made easily accessible, regardless of the diagrammatic location shown on the Drawings.
- 3.2.5 All Optional Color Selections which are made for any electrical materials shall be approved by the Architect and Owner prior to ordering any materials.
- 3.2.6 All connections to fixtures and equipment shown on the Drawings shall be considered diagrammatic unless otherwise indicated by a specific detail on the Drawings. The actual connections shall be made to fully suit the requirements of each case and adequately provide for servicing.
- 3.2.7 The Contractor shall protect equipment and fixtures at all times during storage and construction. He shall replace all equipment and fixtures which are damaged as a result of inadequate protection.

- 3.2.8 Prior to starting and during progress of work, examine work and materials installed by others as they apply to work in this division. Report conditions which will prevent satisfactory installation.
- 3.2.9 Start of work will be construed as acceptance of suitability of work of others.
- 3.3 Construction Electrical Utilities: Provide all temporary wiring for power and light required for construction purposes and remove such temporary wiring when use is no longer required.
- 3.4 Interruption of Service: Before any equipment is shut down for disconnecting or tie-ins, arrangements shall be made with the Engineer and Owner and this work shall be done at the time best suited to the Owner. Outages must be scheduled through the Engineer. Extent, length, and timing of outages shall be reviewed by the Engineer. Services shall be restored the same day. Provide temporary power or other services as required during outages.
- 3.5 Cutting and Patching: Contractor shall be responsible for cutting and patching of all holes, chases, sleeves, and other openings required for installation of equipment furnished and installed under these Specifications. Obtain permission from Engineer before cutting any structural items.
- 3.6 Equipment Setting: Bolt equipment directly to concrete pads or foundations, using hot-dipped galvanized anchor bolts, nuts and washers. Level equipment.
- 3.7 Additional Steel Support Hardware required for the installation of any electrical or other equipment provided shall be provided by the Contractor. Contractor shall provide materials and labor necessary to ensure that all products are rigidly secured to structure pursuant to applicable portions of NEC 300-11. This shall include – but shall not be limited to – providing additional threaded rods, metal framing, and other hardware required to minimize horizontal as well as vertical movement. Means of support shall be clearly indicated and fully described in the submittal for items suspended. Threaded rods shall not be used as sole means of support for suspended raceway unless approved in writing by engineer or unless assembly can be demonstrated to be substantially free from significant horizontal or vertical sway or movement as is required to comply with NEC. Threaded rods shall not be used as means of support for lighting fixtures unless approved in writing by engineer.
- 3.8 Painting: Touch-up factory finishes on equipment located inside and outside shall be done under Division 26. Obtain matched color coatings from the manufacturer and apply as directed by manufacturer. If corrosion is found during inspection on the surface of any equipment, clean, prime, and paint, as required.
- 3.9 Clean-up: Thoroughly clean all exposed parts of apparatus and equipment of cement, plaster, and other materials and remove all oil and grease spots. Repaint or touch up as required to look like new. During progress of work, Contractor is to carefully clean and leave premises free from debris and in a safe condition.

- 3.10 Start-up and Operational Test: Start each item of equipment in strict accordance with the manufacturer's instructions; or where noted under equipment specification, start-up shall be done by a qualified representative of the manufacturer. Alignment, lubrication, safety, and operating control shall be included in start-up check.
- 3.11 Record Drawings:
- 3.11.1 During the progress of the work the Contractor shall record on their field set of Drawings the corrections, variations, and deviations for systems which are not installed exactly as shown on the Contract Drawings.
- 3.11.2 Upon completion of the work, record drawings shall be prepared as described in the General Conditions, Supplementary Conditions, and Division 1 Sections.
- 3.12 Acceptance:
- 3.12.1 Request inspections as required under the Supplementary or General Conditions. Conceal no work until inspected.
- 3.12.2 Punch List: Submit written confirmation that all punch lists have been checked and the required work completed.
- 3.12.3 Instructions: At completion of the work, provide a competent and experienced person who is thoroughly familiar with the project, for a period deemed necessary by the Owner to instruct permanent operating personnel in the operation of equipment and control systems.
- 3.12.4 Operation and Maintenance Manuals: Furnish four complete manuals bound in ring binders and organized by system or section. Manuals shall contain:
- 3.12.4.1 Detailed operating instructions and instructions for making minor adjustments.
- 3.12.4.2 Complete wiring and control diagrams.
- 3.12.4.3 Routine maintenance operations.
- 3.12.4.4 Manufacturer's catalog data, service instructions, and parts lists for each piece of operating equipment.
- 3.12.5 Control Diagrams: Frame under glass and mount on equipment room wall.
- 3.12.6 Test together and separately to determine that:
- 3.12.6.1 System is free from short circuits and other faults.
- 3.12.6.2 Motor starter overload devices are sized correctly.
- 3.12.6.3 Motors rotate correctly.

- 3.12.6.4 All equipment operates correctly and as specified.
- 3.12.7 Warranties: Submit copies of all manufacturer's warranties.
- 3.12.8 Record Drawings: Submit "Record Drawings".
- 3.12.9 Install engraved metal or plastic nameplates or tags on controls, panels, switches, starters, timers, and similar operable equipment, keyed by number to operating instructions. Dymo type labels are not acceptable.
- 3.12.10 Controls Wiring and Alarm Wiring shall be labeled by tags at all junction boxes, device boxes, and all enclosures.
- 3.12.11 Labeling for Boxes and Electrical Devices – Provide box and device labeling as follows:
 - 3.12.11.1 Switches – Each light switch shall be marked by panel name and circuit number using numbered vinyl cloth adhesive markers, 1/4" minimum height. Locate marker behind device cover plate so it can be readily identified by removal of the cover plate. Thomas and Betts E-Z Code Markers are acceptable.
 - 3.12.11.2 Receptacles – Each receptacle shall be marked by panel name and circuit number using numbered vinyl cloth adhesive markers, 1/4" minimum height. Locate marker behind device cover plate so it can be readily identified by removal of the cover plate. Thomas and Betts E-Z Code Markers are acceptable.
 - 3.12.11.3 Boxes – All junction box covers in unfinished spaces shall be marked by panel name and circuit number using indelible ink, 3/4" minimum height. Locate marker so it can be readily identified (without) removal of the cover plate.
- 3.12.12 Acceptance will be on the basis of tests and inspections of the work. A representative of the firm which performed the testing shall be in attendance to assist during inspection. Contractor shall furnish necessary electricians to operate system, make any necessary adjustments and assist with final inspection.

This is a sample cover sheet. Use one for each shop drawing.

PROJECT NAME
PROJECT NUMBER

ARCHITECT/ENGINEER: Campbell Spellicy Engineering, Inc.

CONTRACTOR: XYZ Construction

SUBCONTRACTOR: ABC Mechanical Contractor

Use whatever standard headings you want here

SUPPLIER: MNO Supplier

MANUFACTURER: Various

DATE: 2/15/95

SAMPLE

SECTION: 26100/Basic Materials and Methods

1. Conduit – EMT – QRS Manufacturer, Part No. 2

List each category separately

2. Conduit – RGS – QRS Manufacturer, Part No. 1

3. Conduit – PVC – QRS Manufacturer, Part No. XYZ

4. Conduit Fittings – EMT – QRS Manufacturer, Part No. ABC

5. Conduit Fittings – RGS – QRS Manufacturer, Part No. DEF

6. Conduit Fittings – PVC – QRS Manufacturer, Part No. GHI

CSEI will only stamp approvals on this sheet and will only review submittals which have been reviewed with no substantial or prohibitive exceptions by the Contractor.

END OF SECTION

ELECTRICAL GENERAL

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SECTION 260020 / CODES AND STANDARDS1 GENERAL

- 1.1 All work under Division 26 shall be constructed in accordance with the codes and standards listed herein. The design has been based on the requirements of these codes and standards. While it is not the responsibility of the Contractor to verify that all work called for complies with these codes and standards, he shall be responsible for calling to the Engineer's attention any details on the Drawings and/or Specifications that are not in conformance with these or other codes and standards. Current issue of code applies unless specifically noted otherwise.
- 1.2 Comply with regulations and codes of suppliers of utilities.
- 1.3 Where no specific method or form of construction is called for in the Contract Documents, the Contractor shall comply with code requirements when carrying out such work.
- 1.4 Where code conflict exists, generally the most stringent requirement applies.
- 1.5 Codes or standards applying to a specific part of the work may be included in that section.

2 CODES

- 2.1 Florida Building Code (FBC) 2014, with all currently-adopted revisions, supplements, or other changes.
- 2.2 Florida Fire Prevention Code, 2014, with all currently-adopted revisions, supplements, or other changes.
- 2.3 National Electrical Code (NFPA 70 (National Fire Protection Association)), 2011
- 2.4 National Electrical Safety Code (NESC)
- 2.5 Life Safety Code (NFPA 101), 2012
- 2.6 Standard for Emergency and Standby Power Systems (NFPA 110)
- 2.7 Physically Handicapped (ANSI A117.1)
- 2.8 Florida Accessibility Code for Building Construction (Chapter 11 of FBC)
- 2.9 National Fire Alarm Code (NFPA 72), 2010

3 STANDARDS

- 3.1 All electrical materials, installation and systems shall meet the requirements of the following standards, including the latest addenda and amendments:

CODES AND STANDARDS

- 3.1.1 American National Standard Institutes (ANSI)
- 3.1.2 Illuminating Engineering Society (IES).
- 3.1.3 Institute of Electrical and Electronics Engineers (IEEE).
- 3.1.4 National Electrical Manufacturer's Associations (NEMA).
- 3.1.5 National Fire Protection Association (NFPA).
- 3.1.6 Occupational Safety and Health Act (OSHA).
- 3.1.7 Underwriter's Laboratories, Inc. (UL).
- 3.1.8 State Requirements for Educational Facilities (SREF – Section 423 of FBC).
- 3.1.9 State of Florida Rules for Hospital Licensure, State of Florida Agency for Health Care Administration, Chapter 59A-3.

END OF SECTION

SECTION 260030 / ELECTRICAL RELATED WORK1 DIVISION 1 - GENERAL REQUIREMENTS

- 1.1 All Division 1 Sections apply to all Division 26 Sections.
- 1.2 Coordinate with the General Contractor for all cutting and patching. Contractors performing Division 26 work shall inform the General Contractor of all cutting and patching required prior to bidding and shall coordinate installation.

2 DIVISION 2 - SITEWORK

- 2.1 Specific requirements for excavation and backfill for underground conduit are contained in Section 26105.
- 2.2 The following is part of Division 26 work.
 - 2.2.1 Underground electrical utilities.

3 DIVISION 3 - CONCRETE

- 3.1 Perform the following as part of Division 26 work, complying with the requirements of Division 3, Concrete.
 - 3.1.1 Curbs, foundations and pads for electrical equipment.
 - 3.1.2 Encasement of electrical work.
 - 3.1.3 Underground structural concrete to accommodate electrical work.
 - 3.1.4 Rough grouting in and around electrical work.
 - 3.1.5 Patching concrete cut to accommodate electrical work.

4 DIVISION 4 - MASONRY

- 4.1 Refer to Division 4, Masonry for:
 - 4.1.1 Patching openings to accommodate electrical work.

5 DIVISION 5 - METALS

- 5.1 Refer to Division 5, Metals for:
 - 5.1.1 Supports for electrical work.
 - 5.1.2 Framing openings for electrical equipment.

6 DIVISION 7 - THERMAL & MOISTURE PROTECTION

ELECTRICAL RELATED WORK

- 6.1 Refer to Division 7, Thermal and Moisture Protection for:
 - 6.1.1 Installation of all supports for electrical work.
 - 6.1.2 Caulking and waterproofing of all wall and roof mounted electrical work.
- 6.2 Perform the following as part of Division 26 work, complying with Division 7 requirements.
 - 6.2.1 Fire barrier penetration seals.
 - 6.2.2 Caulking and related shielding around ducts and pipes for sound isolation and attenuation.
- 7 DIVISION 8 - DOORS AND WINDOWS
 - 7.1 Refer to Division 8, Doors & Windows for:
 - 7.1.1 Installation of all access doors for electrical work.
- 8 DIVISION 9 - FINISHES
 - 8.1 Refer to Division 9, Finishes for:
 - 8.1.1 Painting exposed conduit and equipment.
 - 8.1.2 Painting structural metal and concrete for electrical work.
 - 8.1.3 Painting access panels.
 - 8.2 Colors shall be selected by the Architect for all painting of exposed electrical work unless specified herein.
 - 8.3 Perform the following as part of Division 26 work.
 - 8.3.1 Touch up painting of factory finishes.
- 9 DIVISION 23 - MECHANICAL
 - 9.1 Mechanical Contractor shall furnish to Electrical Contractor all necessary nameplate data, equipment power requirements, wiring diagrams, etc., pertaining to the electrical phase of mechanical installation, as well as all required motors, on/off switches, warning lights, relays, and control devices.
 - 9.2 Electrical Contractor shall furnish and install all power wiring, starters and contactors, and make final electrical connections to motors, on/off switches, warning lights, relays, and control devices.

ELECTRICAL RELATED WORK

- 9.3 Disconnect switches for mechanical equipment shall be furnished and installed by the Electrical Contractor, unless specifically noted on the Drawings as being furnished as part of mechanical equipment.
- 9.4 All duct-mounted smoke detectors shall be furnished and wired by the Electrical Contractor and installed by the Mechanical Contractor.

END OF SECTION

ELECTRICAL RELATED WORK

260030.3

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ELECTRICAL RELATED WORK

260030.4

SECTION 260040 / ALTERATIONS AND ADDITIONS TO EXISTING WORK1 GENERAL

- 1.1 The provisions of this Section are in addition to the provisions of Division 1, Building Modifications.
- 1.2 Building will be occupied by owner during construction.

2 PERFORMANCE2.1 General:

- 2.1.1 All necessary additions and alterations to existing work shall be included as required to provide and maintain a complete and proper electrical installation. As necessary, relocate existing electrical work so other trades can pursue their work and maintain building in service, when occupied.
- 2.1.2 The work shall include, but not be limited to, the following:
 - 2.1.2.1 Relocation of fixtures, pull boxes, electrical ducts, and other similar items, to permit the installation of new equipment.
 - 2.1.2.2 Installation of new conduits, conductors, wiring, and wiring devices, in order to maintain temporary and permanent use of electrical facilities.
 - 2.1.2.3 Disconnection and reconnection of circuits as required for continued operation of services.
 - 2.1.2.4 Provision for the relocation of all mechanical work as required for proper installation of electrical work where not shown or specified in other sections or on other drawings.
- 2.1.3 Unused, existing, surface mounted work shall be removed and concealed. Outlets shall be blanked up.
- 2.1.4 Existing work to be maintained shall be reconnected and shall have all outlets, boxes and devices accessible after completion of work by other trades.
- 2.1.5 Within NEC limitations, existing conduits may be reused after cleaning.
- 2.1.6 All new work in existing areas shall be exposed on walls in unfinished areas and concealed in finishes in finished areas. Where cutting and patching are required, finishes shall match existing surface finishes. In existing finished areas, all work shall be concealed in new finishes.
- 2.1.7 Consolidate existing and new building ground systems.
- 2.1.8 In general, all new work is intended to be concealed in finishes to be added under this project.

ALTERATIONS AND ADDITIONS TO EXISTING WORK

2.2 Existing Building Power Outages:

2.2.1 Refer to Section 01016.

2.2.2 Where portions of buildings are altered, and remainder of building continues in operation, temporary wiring shall be provided to maintain all necessary building functions. Provide all equipment, material, labor for a continuous functional system.

2.3 Temporary Wiring for Remodeled Areas:

2.3.1 Progress of the work will require temporary wiring installations to utilize a portion of the remodeled area. Wiring may not be the final, permanent installation, and shall be included as necessary to supply required electrical function.

2.4 Planning for Sequence of the Work:

2.4.1 Electrical feeders, branch wiring, signal wiring, and other similar work as shown and specified shall be scheduled to correspond with the sequence of work necessary to demolish, remove and construct new work.

2.4.2 Close coordination in scheduling is required between the Owner, Contractor, and other trades to assure a smooth work flow with minimum interference and interruption to building power and communication systems.

2.5 Openings in Existing Work:

2.5.1 Provide cutting and patching of existing work as required. Verify exact locations and materials before performing work. Cutting of structural members and bearing walls shall not be done without written approval of the Engineer.

2.6 Verification of Existing Work:

2.6.1 Where shown on the Drawings, work which is "existing" is assumed to be in place and suitable for the necessary alterations and additions required. Contractor shall carefully field check these items and include alterations as may be necessary for proper installation and guarantee. Minimum items requiring verification shall include – but shall not be limited to – the following: voltage, ampacity, and phase arrangement of any existing circuits to which new or existing loads are to be connected; physical dimensions of existing equipment and building spaces at locations indicated for any new items to be provided or existing items to be relocated (as necessary to confirm adequacy of necessary space including required clearances); and any other existing conditions such as other types of space conflicts or uncoordinated methods of support which would prevent providing the materials and labor as specified in the Contract Documents (for example, a lighting fixture specified as a flange-type fixture for hard ceilings which is indicated in an area of an existing lay-in ceiling which is not indicated as being changed to a hard ceiling has an uncoordinated method of support).

2.7 Removal and Ownership of Existing Work:

ALTERATIONS AND ADDITIONS TO EXISTING WORK

- 2.7.1 Where indicated on the Drawings, existing electrical work shall be removed. Unless otherwise specified, all equipment and materials shall remain the property of the Owner except as that judged obsolete or unusable by the Engineer or Owner.
- 2.7.2 If any new circuit breakers are provided in any existing panelboards or in any existing switchboards as part of this Contract for Construction, then the new circuit breakers provided shall have a short-circuit interrupting-capacity (RMS symmetrical amps) which is greater than or equal to the highest capacity of all of the existing circuit breakers in the existing switchboard or panelboard into which the new circuit breakers are added.
- 2.7.3 Property of Owner shall be delivered to a location where directed by the Owner and all other items shall be promptly removed from the job site.
- 2.8 Cutting of Concrete Materials:
- 2.8.1 Holes for materials and supports shall be made with uniform speed rotation drilling equipment which does not provide effects associated with impact type equipment.
- 2.8.2 The use of impact drills, air drills, and the like is not acceptable for this project.
- 2.9 Maintenance of Existing Lighting Systems and Electric Outlets:
- 2.9.1 Where new lighting layouts are not shown on the Drawings, the existing lighting fixtures and wiring controls shall be reused. If necessary, these items shall be temporarily removed (as light fixtures), if necessary, and shall be reinstalled where removed. New wiring from existing sources shall be provided where remodeling operations require. These items are not shown on the Drawings and shall be site determined by the Contractor.
- 2.9.2 Where existing electrical outlets are located in areas of remodeling, these shall be maintained in service. This work is not shown on the Drawings and shall be site determined by the Contractor.
- 2.10 If any work is performed in existing panelboards or switchboards, Contractor shall provide a typewritten circuit directory with a protective covering in a frame inside the door which indicates all changes to the panelboard or switchboard. In this directory, provide unique labeling for each feeder or branch circuit which indicates load type (REC, LTG, AHU-1, etc.), room number(s) or other location description of the area served, and directional information where needed (N, NE, NW, SW, S, etc.) to clarify location. No two descriptions shall be the same in this directory.

END OF SECTION

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ALTERATIONS AND ADDITIONS TO EXISTING WORK

260040.4

SECTION 260100 / BASIC MATERIALS AND METHODS1 GENERAL

- 1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Sections, apply to the work of this Section.
- 1.2 This Section is a Division-26 Basic Materials and Methods Section, and is part of each Division-26 Section making reference to or requiring products specified herein.
- 1.3 Submittals: Submit the producer's standard descriptive data sheets for each type of product being provided. Mark the data sheet for the product being provided with an identifying mark or arrow. This shall include submittal for means of support of equipment, if necessary, as indicated below in this section.

2 PRODUCTS

- 2.1 Acceptable Producers: Allied Tube and Conduit; Anaconda Industries; Appleton Electric; Belden Corporation; W.H. Brady Co.; Carlon; Crouse-Hinds Co.; ETP; Elcen Metal Products Co.; General Cable Co.; General Electric Co.; Hoffman Engineering Co.; Harvey Hubbell, Inc.; Midland-Ross Corporation; Okonite Co.; O-Z/Gedney; Raco, Inc.; Republic Steel Corporation; 3M; Southwire; Seton Nameplate; Square D Co.; Thomas and Betts; Triangle PWC, Inc.; Walker Parkersburg Textron; Wiremold Co.
- 2.2 As indicated, products listed herein may be common to various Division 26 Sections for this project.
- 2.3 All materials and equipment specified herein shall be UL listed or approved according to the requirements of applicable NEC articles.
- 2.4 Raceways:
 - 2.4.1 Rigid Metal Conduit (NEC Art. 344) shall be galvanized steel, protected inside and outside.
 - 2.4.2 Rigid Nonmetallic Conduit (NEC Art. 352) shall be polyvinyl chloride (PVC), schedule 40 or schedule 80, as indicated on the Drawings.
 - 2.4.3 Liquidtight Flexible Nonmetallic Conduit (NEC Art. 356) shall be flame-resistant nonconductive flexible PVC suitable for direct burial and with smooth inner surface with integral reinforcement within the conduit wall.
 - 2.4.4 Electrical Metallic Tubing (EMT) (NEC Art. 358) shall be steel, protected inside and outside by a coating of approved corrosion-resistant material such as zinc or cadmium.
 - 2.4.5 Flexible Metal Conduit (NEC Art. 348) shall be galvanized steel, protected inside and outside.
 - 2.4.6 Liquid Tight Flexible Metal Conduit (NEC Art. 350) shall be galvanized steel, protected

BASIC MATERIALS AND METHODS

- inside and outside with an extruded outer liquid tight, non-metallic, sunlight resistant jacket. Use with standard liquid tight fittings.
- 2.4.7 Surface Raceways (NEC Art. 386) shall be metal surface race-ways, two piece, snap on cover type, rectangular, rust resistant undercoat and gray, buff or brown finish. Steel shall be minimum .040 inches.
- 2.4.8 Wireways (NEC Art. 376) shall be sheet metal troughs with hinged or removable covers, rust resistant undercoat and gray finish coat. Sizes shall be as indicated on the Drawings or determined by the Contractor based on NEC requirements according to the number of conductors enclosed. Exterior units shall be weatherproof. Steel shall be minimum 14 gauge.
- 2.4.9 Busways (NEC Art. 368) shall be of sheet metal enclosure components, ventilated or non-ventilated, indoor or outdoor type as indicated on the Drawings with copper bus, insulators or insulation jackets, and copper or brass bus fastenings. Sheet metal shall have rust resistant undercoat and factory standard color finish coat. Ampacity and bracing shall be as indicated on the Drawings. Provide full neutral bus and ground bus unless otherwise indicated on the Drawings.
- 2.5 Raceway Fittings:
- 2.5.1 Rigid Metal Conduit shall have threaded fittings, galvanized steel or threadless compression galvanized steel. Fittings shall be rain tight/concrete tight.
- 2.5.2 Rigid Non-Metallic Conduit shall have polyvinyl chloride (PVC) fittings suited for the purpose and joined together by a method approved for the purpose. Schedule 80 conduit sections may be joined together with threaded fitting connectors.
- 2.5.3 Electrical Metallic Tubing (EMT) fittings shall be compression type, all zinc plated steel; zinc plated steel body with cadmium plated malleable iron nut or cadmium plated malleable iron body and compression nut. Fittings shall be UL listed for rain tight, concrete tight or rain tight/concrete tight. EMT fittings for sizes 2" and larger may be zinc plated steel, set screw type unless otherwise indicated on the Drawings. Die cast or indenter type fittings shall not be permitted.
- 2.5.4 Flexible Metal Conduit fittings shall be zinc plated steel or cadmium plated malleable iron screw type with insulated throat and angular wedge fitting between convolutions of conduit.
- 2.5.5 Liquid-tight Flexible Metal Conduit fittings shall be cadmium plated, malleable iron or steel with compression type steel ferrule and neoprene gasket sealing rings, with insulated throat.
- 2.5.6 Surface Raceway fittings shall be steel with rust resistant undercoat and finish coat to match the surface raceway. The fittings shall be so designed that the sections can be electrically and mechanically coupled together without subjecting the conductors to abrasion.

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- 2.5.7 Wireway fittings shall be steel with rust resistant undercoat and finish coat to match the wireway. The fittings shall be so designed that the sections can be electrically and mechanically fitted together to form a complete system. Dead ends shall be closed.
- 2.5.8 Expansion Fittings shall be corrosion protected steel for metal raceways, and PVC for non-metallic raceways. Provide bonding fittings for metal raceways and grounding conductors for PVC raceways.
- 2.5.9 Materials for Conducting Power such as busways, panelboard busbars, switchboard busbars, wires, conductors, or other cable assemblies (including non-current carrying conductive materials such as grounding conductors and buses and neutral conductors and buses) shall not be made of aluminum unless specifically specified as being comprised of aluminum elsewhere in the Contract Documents.
- 2.5.10 Couplings and Unions shall be galvanized steel, tapered thread-standard conduit couplings for rigid metal conduit. PVC couplings for rigid non-metallic conduit shall use approved adhesive, and threaded couplings shall be used for schedule 80 conduit. Split couplings shall be galvanized steel. Unions shall be ground joint type galvanized steel.
- 2.6 Bushings:
- 2.6.1 Bushings shall be one of the following types:
- 2.6.1.1 Galvanized steel, threaded or threadless
- 2.6.1.2 Galvanized-plated steel, threaded or threadless, phenolic insulated with temperature rating of 150°C
- 2.6.1.3 Cadmium-plated malleable iron, threaded or threadless
- 2.6.1.4 Cadmium-plated malleable iron, threaded or threadless, phenolic insulated, with temperature rating of 150°C
- 2.6.1.5 Phenolic with temperature rating of 150°C
- 2.6.1.6 Zinc-plated steel, or cadmium plated malleable iron; threaded or threadless; non-insulated or insulated with grounding connector or grounding lug
- 2.6.2 Insulated bushings shall have phenolic insulation molded to the bushing
- 2.7 Conduit Seals: Conduit Seals shall be galvanized steel, tapered thread for rigid metal conduit with sealing compound and fiber.
- 2.8 Boxes: All boxes shall be 4" x 4" x 1½" deep or larger.
- 2.8.1 For indoor work, flush type junction, outlet and switch boxes shall be galvanized pressed steel.
- 2.8.2 Junction Boxes for exposed work shall be FS or FD type. Boxes shall be threaded, cadmium plated malleable iron with weatherproof galvanized or stainless steel cover and

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- neoprene cover gaskets.
- 2.8.3 Boxes for exposed work in indoor finished spaces shall be FS or FD type, with the appropriate covers for the device and location. Surface type pressed steel boxes shall be used in nonfinished spaces only.
- 2.8.4 Fabricated Boxes shall be steel with inside and outside surfaces coated with corrosion-resistant paint or weather resistant coating. Covers shall be hinged or screwed with or without gaskets depending on location.
- 2.8.5 Floor Boxes, unless noted otherwise on the Drawings, shall be cast iron for watertight application, galvanized steel for standard application. Boxes shall be adjustable for both height and tilt and shall have a bronze hinged lid for receptacles and 2" hinged lid for telephone and sound outlets. Carpet rings shall be provided when carpet is to be installed.
- 2.9 Cabinets: Cabinets shall be flush or surface mounted as indicated on the Drawings, and fabricated of code gauge galvanized steel with turned lip on front. Cover shall be flat steel sheet with hinged door (concealed hinges) and flush catch and lock. All cabinets for the project shall be keyed alike. Cover shall be treated with rust-resistant undercoat and grey baked finish coat.
- 2.10 Low Voltage Conductors:
- 2.10.1 Conductors shall be 98% conductivity copper, medium or soft drawn. Sizes shall be as indicated on the Drawings. Sizes No. 10 and smaller shall be solid unless noted on the drawings. Sizes No. 8 and larger shall be stranded. Insulation shall be THWN only except SI in switchgear.
- 2.10.2 Conductor Identification: Ungrounded conductors larger than No. 10 and grounded conductors larger than No. 6 may have factory colored insulation or black insulation with color coded identification tape.
- 2.10.3 Refer to the section "Conductor and Cable Identification" for color coding and identification of conductors.
- 2.10.4 Identification tags or labels shall be vinyl coated, with 1/8" minimum height, black characters on white background or stamped brass. Tag or label shall be 1/4" wide minimum.
- 2.10.5 Wire Connectors for 600 volt conductors Size No. 18 to No. 6 AWG shall be pressure type, spring connectors. Use 600 volt splicer-reducer pressure connectors for copper conductors to 500 MCM. Use rectangular, solderless pressure connectors or split bolt copper alloy connectors for copper conductors to 1000 MCM.
- 2.10.6 Wire Pulling Lubricant shall be a product produced specifically for wire pulling lubrication.
- 2.11 Ground Rods: Ground rods shall be copper clad steel, 3/4" diameter, 10' length minimum or as indicated on the Drawings. Use thermic welding to connect grounding conductor

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- to ground rod.
- 2.12 Sleeves: Sleeves shall be hot dip galvanized metal flanged type or schedule 40 galvanized steel pipe.
- 2.13 Concrete Inserts: Concrete inserts shall be hot dip galvanized steel, minimum 14 gauge cut to necessary length for the purpose. Use galvanized hardware.
- 2.14 Metal Framing System:
- 2.14.1 Steel channel sections shall be rolled from commercial grade steel.
- 2.14.2 The cross-sectional width dimension of the channel shall be a minimum of 1½." The depth shall be sized to satisfy the load requirements and deflection.
- 2.14.3 Channels 1½" in depth or greater shall be rolled from 12 gauge steel. Channels smaller than 1½" in depth may be 14 gauge steel.
- 2.14.4 Attachment holes shall be factory punched on hole centers equal to the channel cross-sectional width dimension and shall be maximum of 9/16" diameter.
- 2.14.5 The finish on steel components shall be electro-galvanizing for use in dry locations indoor only, hot dip galvanized elsewhere.
- 2.14.6 Nuts, bolts, washers, straps, threaded rod and other parts shall be protected with the same finish as the channels.
- 2.15 Fire Barrier Penetration Seals:
- 2.15.1 Provide seals for any opening through fire-rated walls, floors, or ceilings used as passage for electrical components such as conduit or electrical boxes.
- 2.15.2 Cracks, voids, or holes up to 4" diameter shall be filled with putty, caulking, or one-piece intumescent elastomer which is non-corrosive to metal, compatible with synthetic cable jackets, and capable of expanding 10 times when exposed to flame or heat.
- 2.15.3 For openings 4" or greater use a sealing system capable of passing 3-hour fire test in accordance with ASTM E-814. Sealing system shall consist of wall wrap or liner, partitions, and end caps capable of expanding when exposed to temperatures of 250 to 350°F.
- 2.16 Painting: Painting products are specified in Division 9 - "Finishes".
- 2.17 Equipment Identification: Provide nameplate for equipment identification sized as indicated on the Drawings. Nameplate shall be 3" x 1" minimum. Plates shall be laminated plastic (micarta) with white core. Mount plates with a minimum of two stainless steel screws, with round head or filister head. Normal power nameplates shall be Black. Emergency Power nameplates shall be Red.

2.18 Pull Wire and Pull Rope:

2.18.1 Pullwire shall be galvanized steel wire, No. 14 AWG minimum size.

2.18.2 Pullrope shall be ply cord with 2000 lbs. tensile strength, minimum.

2.19 Terminal Strips: Terminal strips shall be sectional barrier type made of molded phenolic for use in wiring control panels. Number of terminals and ampacity shall be as indicated on the Drawings. The binding head shall be screw in type.

2.20 Equipment Backboards: Equipment Backboards shall be exterior grade $\frac{3}{4}$ " plywood finished on one side. Finish backboard with fire retardant gray paint before mounting.

3 EXECUTION

3.1 General:

3.1.1 Materials and equipment shall be installed in a neat and workmanlike manner according to the standards of the industry. Materials and equipment installed and not meeting the standards of the industry may be rejected and required to be removed and reinstalled by the Contractor at no additional cost to the Owner.

3.1.2 Contractor is responsible for the safety and conditions of the materials and equipment installed until Owner's beneficial occupancy or acceptance.

3.1.3 Minor location changes from those indicated may be necessary so that work can conform with the building as constructed, to fit work of other trades or to comply with the rules of authorities having jurisdiction.

3.2 Raceways:

3.2.1 Install all wiring in metallic raceway systems including grounding, unless specifically indicated otherwise in other Sections herein or on the Drawings. This shall include all controls wiring, thermostat wiring, occupancy sensor wiring, or any other such controls-voltage or low-voltage wiring – unless specifically indicated otherwise in another part of the Contract Documents.

3.2.2 Refer to structural drawings for framed openings for raceways, etc., in floors and roofs. Contractor shall be responsible for locating and providing proper dimensions for all required electrical openings.

3.2.3 Layout and install raceways with sufficient clearance to permit proper installation.

3.2.4 Install raceways straight and plumb. Squarely cut conduit and properly ream to remove all constriction and burrs before making up joints. Paint exposed threads to retard rusting. Bending of conduit with a pipe tee or vise is prohibited.

3.2.5 EMT conduit shall be installed only in interior spaces. EMT shall not be installed in any

BASIC MATERIALS AND METHODS

- slabs on or below grade; however, it is permitted in slabs suspended above grade such as in the floors higher than the ground floor in multistory construction. EMT installed in concrete shall have concrete tight fittings.
- 3.2.6 Maximum size of EMT shall be 4". Minimum size shall be ½" unless noted otherwise on the Drawings. EMT shall only be used with cables rated 600 volts or less.
- 3.2.7 Raceways in hazardous areas shall be rigid metal conduit.
- 3.2.8 Raceways below grade shall be rigid metal conduit or PVC unless noted otherwise. Raceways in concrete slabs-on-grade shall be rigid metal conduit or PVC unless noted otherwise. Raceways in slabs supported above grade (such as the floor slab of the second or higher story of construction) shall be rigid metal conduit or electrical metallic tubing only unless noted otherwise. Raceways penetrating grade or concrete slab-on-grade shall be rigid metal conduit only (conduit and threads shall extend above finished grade or top of slab or contractor shall provide any materials and labor necessary to comply with this requirement); coordinate exact elevations with elevations indicated in contract documents for top of slab. Conduit penetrations of slabs supported above grade shall be rigid metal conduit or electrical metallic tubing only unless noted otherwise. If PVC is used, all elbows in any location and all risers through grade or slab shall be rigid metal conduit only. All rigid metal conduit provided below grade or inside slab-on-grade shall be protected by two coats of bitumastic to above finished grade or to above finished slab. PVC elbows shall not be permitted. PVC slab or grade penetrations shall not be permitted. All exposed conduit in wet or damp locations shall be rigid galvanized steel conduit only (no exception for painting). If not complied with, no additional compensation will be provided to the contractor for the correction of these or other contract requirements.
- 3.2.9 Rigid metal conduit installed in concrete or underground shall be made watertight by applying compound to the threads or using concrete-tight thread-less fittings when installed in concrete, or using rain-tight threadless fittings when installed on outside walls or in wet locations.
- 3.2.10 Rigid metal conduit installed underground or in slab-on-grade shall be painted with two coats of alkali and acid resistant paint such as bitumastic or equal. Coating shall not be diluted.
- 3.2.11 PVC coated rigid metal conduit may be provided as an option in lieu of the two coats of the alkali and acid resistant paint. The joints shall be protected with PVC tape applied after the joints are made. Tools for the purpose shall be used in making up the joints so as not to damage the coating.
- 3.2.12 All raceways shall be provided in concealed locations, only, unless noted otherwise on the Drawings or in the Project Manual.
- 3.2.13 Conduit may be exposed in equipment rooms, vertical chases, mechanical and electrical rooms, other similar spaces not normally habitable or exposed to public view, and where electrical drawings specifically note "exposed conduit."

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- 3.2.14 Raceways shall be supported by approved types of galvanized wall brackets, ceiling trapeze with threaded rod support, or pipe straps. Conduit shall not be supported at any point by wire or wire clips.
- 3.2.15 Job cut threads shall be wire brushed, degreased and given two coats of cold galvanizing paint before assembly and a touch-up coat as necessary after assembly.
- 3.2.16 Conduit in masonry shall be installed ahead of the masons.
- 3.2.17 Cutting of chases is prohibited.
- 3.2.18 Conduit shall be closed during construction to prevent entrance of foreign material.
- 3.2.19 Flexible metal conduit shall be installed only in dry locations and shall be of nominal trade size not less than ½" or as permitted by "Exceptions" in NEC. Flexible metal conduit shall be used with UL approved type fittings. Flexible metal conduit shall be used as a raceway for motors, transformers, or other equipment that may be provided with an adjustable mounting or vibration base.
- 3.2.20 Liquid-tight flexible metal conduit shall be installed in wet locations, in both concealed and exposed work, where required for protection from liquids, vapors or solids. Liquid-tight flexible metal conduit shall be used as a raceway for motors, transformers or other equipment that may be provided with an adjustable mounting or vibration base.
- 3.2.21 Surface raceway and fittings shall be installed in dry locations.
- 3.2.22 Wireways and wireway fittings shall be used for exposed work and when installed outdoors or in wet locations shall be approved weatherproof construction.
- 3.2.23 Expansion fittings shall be provided for raceways to compensate for thermal expansion and contraction and at building expansion joints. Bonding jumpers shall be provided for electrical continuity of the raceway system at the expansion fittings.
- 3.2.24 Bushings shall be provided at the end of a conduit to protect the insulation of the conductor. Provide grounding bushings for metal raceways, boxes, cabinets to insure that all metallic surfaces are effectively grounded. Metallic raceway may be bonded to cabinets, boxes and panelboards by double locknut and bushing to ensure the metallic parts are all effectively grounded.
- 3.2.25 Conduit or raceways through which moisture may enter and contact energized live parts shall be sealed or plugged at either or both ends with conduit seals where portions of an interior raceway system are exposed to widely different temperatures, e.g., circulation of air from a warmer to a cooler section through the raceway shall be prevented by conduit seals.
- 3.2.26 Install pull boxes in conduit at intervals of 200 feet or less except when these intervals will place the pull box cover in a finished floor area or non-accessible place, the interval may be extended to a maximum distance of 450 feet. Request for each deviation or extension of interval shall be made and approval granted by the Engineer before

proceeding with the installation.

3.2.27 Underground Work:

- 3.2.27.1 Excavation and backfilling for underground conduit systems shall be in accordance with Division 2 "Sitework" and Division 26 Section on "Excavation and Backfill." Minimum cover for exterior underground conduit shall be 30" over conduit unless otherwise noted on the Drawings. Ductbanks, if installed, shall be provided as necessary to ensure drainage.
- 3.2.27.2 All underground piping and utilities shall have metalized warning tape installed above the pipe or line that identifies the specific system buried below. Tape shall consist of a minimum 3.5 mil solid foil core encased in a protective plastic jacket (total thickness 5.5 mils) and be 6" wide with black lettering imprinted on a color coded background that conforms to APWA color code specifications. Tape shall be continuously printed with "CAUTION" in large bold letters. A second printed line shall indicate the type of cable beneath (i.e. 12 kV, 480 V, 208V, telephone, etc). Use yellow tape for electric and green for telephone. Tape shall be installed from 18" to 30" above the pipe and in no case less than 6" below grade.

3.2.28 Conduit Installed in Concrete:

- 3.2.28.1 Conform to applicable portion of Section 703 of ACI Standard Code for reinforced concrete.
- 3.2.28.2 Locate conduits in center third of concrete slab thickness. Outside conduit diameter not to exceed 1/3 concrete slab thickness. Install no conduit in concrete slabs of less than 3" thick.
- 3.2.28.3 Install no conduit in terrazzo flooring.
- 3.2.28.4 Conduits in concrete slabs shall not cross at an angle of less than 45 degrees.
- 3.2.28.5 Conduits shall not pass through beams except when shown on the Drawings.
- 3.2.28.6 Space vertical installation of conduit through concrete slabs not closer than three diameter on center.

3.2.29 Cleaning: Clean conduit systems by wire rat brush and mandrel.

3.3 Boxes:

- 3.3.1 Attach boxes to concrete formwork, or to other surrounding building material. Provide additional junction and pull boxes where injury to insulation or deformation of wire would occur due to excessive pulling resistance. When several feeders pass through a common pull box, tag each feeder separately, indicating electrical characteristics and destination.
- 3.3.1.1 Boxes shall be accurately located. Consult Architectural plans for dimensions.

BASIC MATERIALS AND METHODS

- 3.3.1.2 Mount boxes in the course nearest to the height specified when installed in finished block, brick or tile walls.
- 3.3.2 Recessed Installation: Boxes and covers shall be installed so that the covers are flush with the finished surfaces. Boxes in masonry or tile construction shall have masonry boxes or boxes with square cut tile covers. Do not cut concrete block through its entirety in order to accommodate any type box. "Handy" boxes shall not be used.
- 3.3.3 Boxes in Partitions: Through type boxes are not permitted except where shown on electrical drawings. Recessed outlet boxes, cabinets, consoles, etc., when shown located back-to-back shall be provided with ½" fiberglass insulation between the boxes.
- 3.3.4 Lighting Outlets:
- 3.3.4.1 Coordinate location of electrical outlets with architectural features of the building and with the equipment of other trades.
- 3.3.4.2 Paneled or patterned ceilings shall have outlets located according to the ceiling pattern.
- 3.3.4.3 Boxes mounted between bar joists or "T" bars shall be supported from two bars or joists.
- 3.3.4.4 Mounting heights of wall lighting outlets shall be as listed below except when otherwise indicated on the Drawings.
- General - 7'6" above the finished floor.
Over lavatories - 6" to center above top of mirror.
Over doors - 18" to center above door.
Height may be adjusted to allow wall blocks to be cut to nearest edge.
- 3.4 Wiring:
- 3.4.1 General: Conductors shall not be installed until conduit system is complete. Bending radius of insulated wire or cable shall not be less than the minimum recommended by wire or cable manufacturer. Maximum pulling tension of any wire or cable shall not exceed manufacturer's recommended values. Do not injure insulation while installing wire in conduits.
- 3.4.2 Color Coding: Conductors of size No. 6 and smaller shall have color coded insulation. Sizes larger than No. 6 may have color coded insulation or color coded tape for the purpose. Should tape be used, cover not less than 2" of conductor within the enclosure.
- 3.4.3 Switchleg conductors shall be a color other than white, green or the phase or line color.
- 3.4.4 Green shall be used only as the grounding conductor. White or gray shall be used only as the grounded conductor which is the neutral conductor. The neutral shall not be used as the grounding conductor and the grounding conductor shall not be used as the neutral.

BASIC MATERIALS AND METHODS

- 3.4.5 Intercommunications, communications, temperature control, and fire alarm conductors shall be color coded or permanently tagged for identity. If tagged, conductor colors shall not include white, gray or green base color or stripes. Colors shall comply with the Insulated Power Cable Engineers Association (IPCEA) method K-2.
- 3.4.6 Conductors in Parallel: Conductors connected in parallel (electrically joined at both ends to form a single conductor) shall be of the same length, of the same conductor material, the same circular-mil area, the same insulation type and terminate in the same manner. Where installed in separate raceways or cables, the raceways or cables shall have the same physical characteristics.
- 3.4.7 Wiring in motor control, switchboards, panelboards, junction cabinets, etc., shall be neatly formed to present a neat and orderly appearance.
- 3.4.8 A single neutral shall not be shared by more than one load on different phases of power as part of a multiwire branch circuit. If a multiwire branch circuit supplies only one individual load then only one neutral shall be required. Unless they supply only one individual load, all branch circuits shall have a separate and dedicated grounded (neutral) conductor. Provide materials and labor necessary to increase the conduit sizes from that which is specified, as necessary, to accommodate pulling these additional dedicated grounded (neutral) conductors. The Contractors shall not provide two-pole circuit breakers, three-pole circuit breakers, or separate circuit breakers with breaker ties in order to avoid providing these above-required dedicated grounded (neutral) conductors (as would otherwise be required for compliance with NEC 210.4 (B) (2008 Ed.) for more than one load being supplied by a multiwire branch circuit if the above-required additional neutrals were not provided.)
- 3.4.9 The minimum size of wire shall be No. 12 AWG.
- 3.4.10 Interconnections of control wiring shall be on identified numbered terminal strips.
- 3.4.11 Splices: Splices shall be permitted in junction boxes, outlet boxes of other permanently accessible locations where permitted by applicable codes. Conductors No. 6 or smaller shall be spliced with devices approved by Underwriters Laboratories, Inc., as splicing connectors. Splices in conductors larger than No. 6 shall be accomplished with devices approved by Underwriters Laboratories as pressure cable connectors.
- 3.4.12 Splices made in underground boxes or wet locations shall be made with a commercial, UL approved cast resin splicing kit.
- 3.5 Wire Pulling Lubrication: Shall be used when any wire is pulled by mechanical means. Wire and cable shall be carefully handled during installation. Soap flakes or vegetable soaps shall not be used for lubrication.
- 3.6 Equipment Identification: Secure tags and markers to each item of equipment. Secure all cabinet nameplates with self-tapping screws or machine screws and nuts. Do not rely on adhesive mounting. Name tags for equipment operated from normal power shall be "Black." Name tags for equipment operated from emergency power shall be "Red."

3.7 Sleeves, Inserts and Supports:

3.7.1 Equipment Supports: Concrete bases and structural steel to support this Division's equipment and raceways, and not specifically shown on Structural or Architectural Drawings shall be furnished by Contractor whose equipment or raceways is to be supported. Provide a raised reinforced 4" concrete base for all floor supported equipment, or as indicated on the Drawings.

3.7.2 Setting in Concrete: Place all inserts in concrete forms prior to time concrete is poured. If additional inserts are required in existing concrete work, use self-drilling screw anchors.

3.7.3 Support Spacing: Comply with codes and regulations referenced earlier and as follows:

3.7.3.1 Support no electrical work from piping, ductwork, etc. Where metal decking is used, provide supports independent of decking so that loads will not be transferred to decking. Drill through decking and secure supports to concrete slab.

3.7.3.2 Vertical conduit inside building shall be supported at each floor level and at 10'0" intervals.

3.7.3.3 Support conduit within one foot of changes of direction, and within one foot of each enclosure to which it is connected.

3.7.4 Sleeves Through Roofs: Coordinate setting with Division 7. Contractor shall provide penetrations complying with Architectural requirements.

3.8 Additional Steel Support Hardware required for the installation of any electrical or other equipment or devices provided shall be provided by the Contractor. Contractor shall provide materials and labor necessary to ensure that all products are rigidly secured to structure pursuant to applicable portions of NEC 300.11. This shall include – but shall not be limited to – providing additional threaded rods, metal framing, and other hardware required to minimize horizontal as well as vertical movement. Means of support shall be clearly indicated and fully described in the submittal for items suspended. Threaded rods shall not be used as sole means of support for suspended raceway unless approved in writing by engineer or unless assembly can be demonstrated to be substantially free from significant horizontal or vertical sway or movement as is required to comply with NEC. Lighting fixtures shall not be supported by threaded rods or chains unless approved in writing by engineer. See Project Manual Section, "Lighting Fixture Supports, Standards and Poles."

3.9 Caulking and Seals:

3.9.1 Where conduits, wireways, and other electrical raceways pass through fire partitions, fire walls, smoke partitions, or floors, install a fire stop that provides an effective barrier against the spread of fire, smoke and gases in accordance with Division 7 requirements. Fire stop shall be UL listed and NFPA approved for such service. Completely fill and seal clearances between raceways and openings with the fire stop material. Adhere to manufacturer's installation instructions.

- 3.9.2 At floor, exterior wall, and roof conduit penetrations, completely seal clearances around the conduit and make watertight.
- 3.10 Painting:
- 3.10.1 Painting for Division 26 work shall be by the Division 9 finishes contractor and as provided in Division 9 - finishes.
- 3.10.2 The Division 26 Contractor shall be responsible for coordinating with the Division 9 - Finishes Contractor the painting of the materials and equipment of Division 26.
- 3.10.3 Refer to the Finish Schedule on drawings for location and type of paint.
- 3.10.4 NEC Working Space Shall Be Indicated – Areas that pertain to Working Space in Article 110.26 of the NEC shall have yellow striping installed diagonally with stripes being three inches wide and three inches apart. The center of the area shall have the words “Safety Zone” installed with letters at least four inches high. Architect or Engineer shall be consulted for projects in which this area is carpeted, tiled, or otherwise has flooring which is not appropriate for such painting.
- 3.10.5 Finish in areas not listed or otherwise noted shall be black enamel.
- 3.10.6 Hangers, supports, structural steel and equipment that are not factory finished shall be prime coated and finished coated with color to match the area in which it will be located.
- 3.10.7 Electric cabinets, switchboards, panelboards and equipment that are factory finished and have damaged finish shall be touched up to match the factory finish.
- 3.10.8 All surfaces that are to be painted shall be free of rust, scale, oil and grease before prime coat is applied.
- 3.11 Grounding: Ground and bond in accordance with NEC Article 250 and other applicable articles.
- 3.11.1 Provide an equipment grounding conductor which shall be separate from the electrical system neutral conductor. The equipment grounding conductor shall be colored green. It shall be continuous from a connection at the Service Entrance Equipment Ground to all switchboards, distribution and branch panelboards. Equipment grounding conductors shall be provided in all branch circuits serving convenience outlets, receptacles, portable and permanently installed electrical appliances, equipment apparatus and other miscellaneous metal enclosing bodies including light switch boxes normally within contact of personnel. Branch circuit grounding conductors shall be sized in accordance with the National Electrical Code. Connections at panelboards, outlets, equipment and apparatus shall be made in an approved and permanent manner. Resistance to ground shall not exceed 25 ohms.
- 3.11.2 Bond bushings of the raceway system to ground lugs in boxes, cabinets, motors and equipment to assure electrical continuity of all metallic components of the electrical systems. Comply with the requirements of NEC.

BASIC MATERIALS AND METHODS

- 3.12 Equipment Backboards: Locate equipment backboards where indicated on the Drawings. Install straight and plumb. Secure to structure using screws, toggle bolts or masonry anchors. DO NOT use plastic or wood plugs in masonry or concrete. Do not install combustible backboards in air handling space, plenums or where prohibited by the local governing authority.
- 3.13 Underground Raceway Markings: Provide monument marker above the ends of any "Stub Out" raceway. See monument marker detail in these Specifications.
- 3.14 Testing:
- 3.14.1 At the completion of the installation of the conductors or cables into the raceway systems, tests shall be conducted by "megger" to ascertain that the insulation for the conductors or cables has not been damaged. Megger test each feeder and branch circuit conductor or cable with an instrument capable of producing approximately 500 volts for conductors or cables insulated with 600 volt insulation.
- 3.14.2 The minimum insulation resistance shall be 100 megohms per 1000 feet of 500 KCMIL conductors or smaller insulated with THW or THWN, and 1,000 megohms per 100 feet of 500 KCMIL conductors or smaller insulated with XHHW or other cross-linked insulation.

END OF SECTION

SECTION 260101 / CONDUCTOR AND CABLE IDENTIFICATION

1 GENERAL

- 1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Sections, apply to the work of this Section.
- 1.2 This Section is a Division-26 Basic Materials and Methods Section, and is part of each Division-26 Section making reference to or requiring products specified herein.
- 1.3 This Section provides the requirements for identification of grounded conductors (neutral), grounding conductors, ungrounded conductors and terminals.
- 1.4 Grounded Conductor (neutral), Size No. 6 AWG or smaller, shall be identified by a continuous outer finish along its entire length which is the color stated below. Sizes larger than No. 6 AWG shall be identified either by a continuous outer finish along its entire length or at the time of installation by a distinctive marking at its terminations, which is the color stated below.
- 1.5 A continuous white or natural gray covering on a conductor or a termination marking of white or natural gray color shall be used only for the grounded conductor (neutral). See below colors.
- 1.6 Terminals to which a grounded conductor is to be connected shall be substantially white in color or identified by white markings. Other terminals shall be a different, readily distinguishable color, or by markings in different, readily distinguishable colors.
- 1.7 Grounding Conductor Size No. 6 AWG or smaller shall be identified by a continuous green outer finish along its entire length. Sizes larger than No. 6 AWG shall be identified either by a continuous green outer finish along its entire length or at the time of installation by a distinctive green marking at its termination.
- 1.8 Terminals to which grounding conductors are connected shall be green in color.
- 1.9 A continuous green covering on a conductor or a termination marking of green shall be used only for the grounding conductor.
- 1.10 Control wiring and data cables shall be identified by heat shrink sleeves at both ends hot stamped with wire numbers coordinated to wiring diagrams. Adhesively attached Brady tag type markers are specifically forbidden. All terminal boards shall be numbered.

2 PRODUCTS

- 2.1 Comply with the Section 26100, "Basic Materials and Methods."

3 EXECUTION

- 3.1 Identification of conductors shall follow the format set forth herein for the electrical characteristics as indicated:

CONDUCTOR AND CABLE IDENTIFICATION

3.1.1 120/240 Volt Single Phase 3 Wire

Neutral	White
Line 1	Black
Line 2	Red
Grounding Conductor	Green

3.1.2 120/208 Volt Three Phase 4 Wire WYE

Neutral	White
Phase A	Black
Phase B	Red
Phase C	Blue
Grounding Conductor	Green

3.1.3 230/240 Volt Three Phase 4 Wire Delta

Neutral	Gray
Phase A	Black
Phase B	Orange (Hi-Leg)
Phase C	Blue
Grounding Conductor	Green

3.1.4 277/480 Volt Three Phase 4 Wire WYE

Neutral	Gray
Phase A	Brown
Phase B	Orange
Phase C	Yellow
Grounding Conductor	Green with Yellow Stripe (tracer)

3.1.5 Where more than one nominal voltage system exists, provide 1/8" thick engraved phenolic white on black lettered sign on every branch circuit panelboard in the project, new or existing, in compliance with NEC 210.5.

3.2 Communication, temperature control and fire alarm conductors shall be color coded or permanently tagged for identification. The colors shall not include white, gray, or green base colors or stripes (tracers) unless these colors are used on grounded conductors or grounding conductors.

3.3 Colors shall comply with the Insulated Power Cable Engineers Association (IPCEA) Method K-2 chart.

3.4 For direct current (DC) systems, Black shall be negative and Red shall be positive.

3.5 Identification shall be provided at terminations of the conductors and at junction boxes, terminals or cabinets when multi conductors are installed at these locations.

CONDUCTOR AND CABLE IDENTIFICATION

- 3.6 Fire Alarm conductors shall conform with the color code specified in the specification section titled, "Fire Detection and Alarm System."
- 3.6.1 Tag or label each conductor with zone numbers at each end and in each junction or pull box in the raceway system. Example Zone 1, Zone 2 etc. Each conductor shall have in addition to the zone number a terminal number at each end.

END OF SECTION

CONDUCTOR AND CABLE IDENTIFICATION

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CONDUCTOR AND CABLE IDENTIFICATION

260101.4

SECTION 260102 / PVC RACEWAYS1 GENERAL

- 1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Sections, apply to the work of this Section
- 1.2 This Section is a Division-26 Basic Materials and Methods Section, and is part of each Division-26 Section making reference to or requiring products specified herein.
- 1.3 Submittals: Submit the producer's standard descriptive data sheets for each type of product being provided. Mark the data sheet for the product being provided with an identifying mark or arrow.

2 PRODUCTS

- 2.1 PVC Conduit and Fittings: Conduit shall be made of polyvinylchloride, Schedule 40, pipe, conforming to ASTM D 1785. Fittings shall be Schedule 40, socket type, solvent weld, complying with ASTM C 2466. Joints shall be watertight. Threaded type fittings may be used only for Schedule 80 Conduit. Fittings for Schedule 80 conduit shall comply with ASTM D2464.
- 2.2 Bends and Penetrations: Bends and slab or grade-penetrations on PVC conduit runs shall rigid steel conduit. All rigid steel conduit provided below-grade or in slab-on-grade shall be fully coated with two coats of bitumastic to above grade or to above slab-on-grade.

3 EXECUTION

- 3.1 Installation: Install only below grade, in slabs on grade, or where specifically indicated on the drawings. Provide in compliance with manufacturer's instructions. Provide only in straight sections; provide only where concealed; no PVC bends or PVC slab or grade-penetrations shall be provided. All bends, stub-ups, and slab or grade-penetrations of PVC conduit runs shall be Rigid hot-dip-Galvanized Steel (RGS). All RGS conduit provided below-grade or in slab-on-grade shall be fully coated with two coats of bitumastic to above grade or to above slab-on-grade. At no change in the contract amount or time schedule, Contractor shall provide materials and labor necessary to comply with these requirements. For example, if bitumastic is applied to RGS slab penetrations such that the bitumastic level is not above the top of the slab, Contractor shall remove concrete, provide additional bitumastic until above top of slab, and replace concrete; no slab or grade shall contact any RGS not protected by bitumastic. No change in contract amount or time schedule shall be approved for correcting work which lacks compliance with these requirements. Place and join conduit, fittings and appurtenances as shown on the drawings and specified herein.
- 3.2 Joining: Pipe and fittings shall be cement welded or threaded (only for Schedule 80 conduit) and made watertight. All joints shall be cleaned with solvent or sanded smooth prior to application of cement.

PVC RACEWAYS

- 3.3 Supports: Support conduit in compliance with Table 352-30 of the National Electrical Code. Where conduit racks are used, do not bundle or lay conduit on top of each other. A minimum 1/8 inch spacing shall be maintained between parallel runs.

END OF SECTION

PVC RACEWAYS

260102.2

SECTION 260103 / GENERAL GROUNDING ELECTRICAL SYSTEMS1 GENERAL

- 1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Sections, apply to the work of this Section.
- 1.2 This Section is a Division-26 Basic Materials and Methods Section, and is part of each Division-26 Section making reference to or requiring products specified herein.

2 PRODUCTS

- 2.1 Ground rods shall be copperclad 3/4"x 10 feet.
- 2.2 Grounding conductors shall be copper with green insulation.

3 EXECUTION

- 3.1 Grounding Conductor Size No. 6 AWG or smaller shall be identified by a continuous green outer finish along its entire length. Sizes larger than No. 6 AWG shall be identified by either a continuous green outer finish along its entire length or at the time of installation by a distinctive green marking at its termination.
- 3.2 Provide an equipment grounding conductor which shall be separate from the electrical system neutral conductor. The equipment grounding conductor shall be colored green. It shall be continuous from a connection at the Service Entrance Equipment Ground to all switchboards, Motor Control Centers; distribution and branch panelboards. Equipment grounding conductors shall be provided in all branch circuits. Branch circuit grounding conductors shall be sized in accordance with the National Electric Code. Connections at panelboards, outlets, equipment apparatus shall be made in an approved and permanent manner. Electrical raceway shall not be used as a grounding conductor.
- 3.3 All ground connections shall be made on surfaces which have been cleaned of all paint, dirt, oil, etc., so that connections are bare metal to bare metal contact. All ground connections shall be tight, and shall be made with U.L. listed grounding devices fittings, bushings, etc.
- 3.4 Bond all metallic piping and structural systems to the service entrance ground bus with bonding jumpers the same size as the service grounding electrode conductor.
- 3.5 Grounding electrodes shall be driven as required. Where rock is encountered, grounding plates may be used in lieu of grounding rods.
- 3.6 All equipment enclosures, motor and transformer frames, conduits systems, cable armor, and similar items shall be grounded.
- 3.7 Exposed connections shall be made by means of approved grounding clamps. Exposed connections between different metals shall be sealed with No-Oxide Paint Grade A or approved equal. All connections which are buried, concealed in concrete, or otherwise

GENERAL GROUNDING ELECTRICAL SYSTEMS

- not accessible for inspection after construction shall be made by welding process equal to Cadweld.
- 3.8 The Contractor shall exercise care to insure good continuous ground, in particular between the conduit system and equipment frames and enclosures. Where necessary, jumper wires shall be installed.
- 3.9 Provide a #6 ground conductor from each telephone terminal cabinet to the main telephone terminal board.
- 3.10 Multiple conductors in a single lug are not permitted. Each grounding conductor shall terminate in its own terminal lug.
- 3.11 Provide a ground conductor from each transformer location to the building ground system. This conductor shall be used to ground the secondary side neutral, case and core in accord with grounding requirements for a separately derived system.
- 3.12 Testing: The contractor shall test the ground resistance of the system. All test equipment shall be provided by the Contractor and approved by the Engineer. Dry season resistance of the system shall not exceed 5 ohms. If such resistance cannot be obtained with the system as shown, the Contractor shall provide additional grounding as directed by the Engineer without additional payment.

END OF SECTION

SECTION 260110 / DISCONNECT SWITCHES1 GENERAL

- 1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Sections, apply to work of this Section.
- 1.2 Division-26 Basic Electrical Materials and Methods Sections apply to work of this Section.
- 1.3 Submittals: Submit the producer's standard descriptive data sheets for each type of product being provided. Mark the data sheet for the product being provided with an identifying mark or arrow.

2 PRODUCTS

- 2.1 Acceptable Producers: General Electric, Square D, Cutler-Hammer, Westinghouse, and Siemens ITE, or approved equal. Products shall be furnished by one provider.
- 2.2 General: Provide NEMA Heavy Duty type H.D., Underwriters Laboratories listed safety switches of voltage, amperes, and number of poles as indicated on the Drawings. Provide UL rated for service entrance use where indicated on the Drawings.
- 2.3 Mechanism: Switch operating mechanism shall be quick make, quick break. Switches shall have a dual interlock to prevent opening of door when switch is in "ON" position or closing of switch when door is in "OPEN" position.
- 2.4 Switch Interior: Interior of switch shall have fully visible switch blades in "OFF" position when door is open. Switches shall be dead front construction with permanently attached arc suppressors hinged or otherwise attached to permit easy access to line-side lugs, without removal of arc suppressor. Lugs shall be UL listed for copper conductors and shall be front removable. All current carrying parts shall be tin or silver plated by electrolytic processes. Provide ground lug in each switch for grounding conductor.
- 2.5 Enclosures: Use NEMA 3R enclosures for all exterior locations and interior locations in wet or humid areas except NEMA4 where indicated. Use NEMA 1 enclosures elsewhere, except as noted otherwise on the Drawings. Furnish NEMA 1 switches with knockouts. Enclosures for NEMA 1 switches shall be code gauge (UL 98) sheet steel with rust inhibiting phosphate treatment and baked enamel finish. NEMA 3R enclosures shall be of code gauge (UL 98) galvanized steel with rust inhibiting phosphate and baked enamel finish.
- 2.6 Ratings: Safety switches for motors shall be horsepower rated for AC or DC as specified on the Drawings. All fusible switches rated 100 thru 600 amperes at 240 volts, and 30 thru 600 amperes at 600 volts, shall have the capability of field conversion from standard Class H fuse spacing to Class J fuse spacing without affecting the UL listing. The switch also must accept Class R fuses and have field installable UL listed rejection feature to reject all fuses except Class R. UL listed short circuit ratings, when equipped with Class J or Class R fuses shall be 200,000 ampere RMS symmetrical. 800 and 1200 ampere switches shall have provisions for Class L fuses.

DISCONNECT SWITCHES

- 2.7 Fuses: Fuses shall be provided where indicated and sized as shown on the drawings. See Section "Fuses."

3 EXECUTION

- 3.1 Provide unfused or fused disconnect switch as indicated on the Drawings at each motor which is out of sight of its controller or 50 or more feet away from the controller.
- 3.2 Do not stack switches to touch each other, either horizontal or vertically. Allow space between enclosures.
- 3.3 Switch symbols on electric Drawings do not indicate exact switch locations. Locate switches adjacent to motor or equipment unless shown otherwise.
- 3.4 Clean and touch-up paint on disconnect switches damaged or scratched during installation.

END OF SECTION

DISCONNECT SWITCHES

260110.2

SECTION 260112 / FUSES 600 VOLTS AND BELOW1 GENERAL

- 1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Sections, apply to work of this Section.
- 1.2 Division-26 Basic Electrical Materials and Methods Sections apply to work of this Section.
- 1.3 Submittals: Submit the producer's standard descriptive data sheets for each type of product being provided. Mark the data sheet for the product being provided with an identifying mark or arrow.

2 PRODUCTS

- 2.1 Acceptable Producers: Bussman, General Electric, Gould & Brush Fuse.
- 2.2 General: Products listed herein are common to various Divisions and Specification Sections for this project and as shown on this project's Drawings.
- 2.3 All fuses furnished shall be by the same producer.
- 2.4 Voltage Rating:
 - 2.4.1 Provide 600 volt fuses for 277/480 volt systems.
 - 2.4.2 Provide 250 volt fuses for 120, 208 and 240 volt systems.
- 2.5 Ampere Ratings: Ampere ratings of fuses shall be as indicated on the Drawings.
- 2.6 Interrupting Ratings: Interrupting ratings of fuses shall be as indicated on the Drawings.
- 2.7 Current Limitation: Current limiting fuses shall be provided where indicated by the symbol C/L on the Drawings.
- 2.8 Rejection Fuse Clips: Provide fuse with rejection feature for switches required to have the rejection feature as indicated on the Drawings.
- 2.9 Class of Fuses: Provide fuses of Class J, K, L or R. Class H fuses shall be provided only if indicated on the Drawings.

3 EXECUTION

- 3.1 Coordinate fuse type and ampacity with fuse holder.
- 3.2 Provide one set of fuses of each type and ampacity for spares. Voltage to correspond with circuit to be protected.

END OF SECTION

FUSES 600 VOLTS AND BELOW

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FUSES 600 VOLTS AND BELOW

260112.2

SECTION 260120 / CIRCUIT BREAKER ENCLOSURES1 GENERAL

- 1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Sections, apply to work of this Section.
- 1.2 Division-26 Basic Electrical Materials and Methods Sections apply to work of this Section.
- 1.3 Submittals: Submit the producer's standard descriptive data sheets for each type of product being provided. Mark the data sheet for the product being provided with an identifying mark or arrow.

2 PRODUCTS

- 2.1 Acceptable Producers: ABB, Cutler-Hammer, General Electric, Square D, and Siemens ITE or approved equal. Products shall be furnished by one producer.
- 2.2 General: Products listed herein may be common to various of the Divisions and Specification Sections of the project.
- 2.3 Enclosures shall be NEMA type with factory finish baked enamel or as indicated on drawings.
- 2.4 NEMA 1 enclosures shall be furnished with knockouts and fabricated of steel.
- 2.5 NEMA 3R enclosures, rainproof shall be furnished with raintight hubs sized for the conduit as shown on the Drawings. Enclosures shall be fabricated from zinc coated steel.
- 2.6 Provide enclosure with ground bus or terminal and fully insulated neutral bar or terminals.
- 2.7 Circuit breakers are specified in the Sections "Circuit Breakers, Molded Case."

3 EXECUTION

- 3.1 Individual circuit breaker enclosure shall be identified with an engraved laminated plastic legend plate.
- 3.2 Plastic (Dymo) type legend plates shall not be allowed.
- 3.3 Install a wireway for wiring between multiple units. Wireway fill shall not exceed 20% of cross sectional area.
- 3.4 Exterior units shall be in NEMA Type 3R raintight enclosure or as indicated on the Drawings.

END OF SECTION

CIRCUIT BREAKER ENCLOSURES

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CIRCUIT BREAKER ENCLOSURES

260120.2

SECTION 260125 / CIRCUIT BREAKERS, MOLDED CASE1 GENERAL

- 1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Sections, apply to work of this Section.
- 1.2 Division-26 Basic Electrical Materials and Methods Sections apply to work of this Section.
- 1.3 Submittals: Submit the producer's standard descriptive data sheets for each type of product being provided. Mark the data sheet for the product being provided with an identifying mark or arrow.

2 PRODUCTS

- 2.1 Acceptable Producers: General Electric, Siemens/ITE, Cutler-Hammer, and Square D. Products shall be furnished by one producer.
- 2.2 General: Products listed herein may be common to various Divisions and Specification Sections.
- 2.3 Provide molded case circuit breakers with a minimum AIC rating of 10,000 amperes RMS symmetrical and with higher AIC ratings as indicated on the Drawings. Any circuit breaker provided in an existing panelboard or in an existing switchboard shall have minimum short circuit interrupting ratings (AIC) equal to the highest ratings of any of the existing overcurrent devices in the same panelboard or switchboard at the given voltage of the panelboard or switchboard. All circuit breakers shall be fully rated for the interrupting ratings indicated and shall not be series rated. Every overcurrent device provided shall be UL approved to individually interrupt its rated short circuit current and shall not depend upon operation of another overcurrent device to achieve its rating. Series-rated devices are not acceptable.
- 2.4 Individual circuit breakers shall be safety dead front units in NEMA Type enclosure.
- 2.5 Molded case circuit breakers shall have overcenter, trip free, toggle-type operating mechanisms with quick-make, quick-break action and positive handle indication. All breakers shall be bolt-on type.
- 2.6 Two and three pole circuit breakers shall have a common trip.
- 2.7 Each circuit breaker shall have a permanent trip unit containing individual thermal and magnetic trip elements in each pole.
- 2.8 The circuit breaker shall be constructed to accommodate the supply connections at either end.
- 2.9 Circuit breakers provided shall be HACR-type as required by the manufacturers of the equipment supplied; see paragraph 3.1, below.

CIRCUIT BREAKERS, MOLDED CASE

- 2.10 Circuit breaker operating handle shall assume a center position when tripped.
- 2.11 Circuit breakers shall be calibrated for operation in an ambient temperature of 40° C.
- 2.12 Provide molded case circuit breakers with shunt trip features where indicated on the Drawings.

3 EXECUTION

- 3.1 Contractor shall coordinate exact electrical requirements and circuit breaker types with that which is required by manufacturers of the equipment supplied – as necessary to maintain equipment's UL Listing; coordinate with other divisions of this contract. Contractor shall provide HACR-type circuit breakers as required by manufacturers of equipment supplied. See paragraph 3.2.3 of Section 26005 of the Project Manual.
- 3.2 Provide circuit breakers as specified in the Panelboard Schedules on the Drawings. Ampere ratings and the number of poles are indicated on the Panelboard Schedules.
- 3.3 Circuit breakers shall be suitable for mounting and operating in any position.
- 3.4 Circuit breakers shall be UL listed.
- 3.5 Shunt trip device where required shall operate in conjunction with contact closure of push button, ground fault relay or other pilot device to trip open associated circuit breakers upon command.
- 3.6 Coils of shunt trip device shall be rated continuous duty and shall include interlock arrangement to clear power from coil after operation.
- 3.7 Control Power: Where no other source of control power is indicated, energy to actuate tripping devices through action of pilot device shall be 120 volts, 60 Hz as follows:
 - 3.7.1 120/208 Volt Panelboards: Energy shall be from dedicated branch circuit breaker of panelboard set to trip at not greater than 20 amperes.
 - 3.7.2 277/480 Volt Panelboards: Energy shall be from control power transformer, with secondary voltage of 120 volts, 60 Hz and with primary leads protected by current limiting fuses mounted in plug-in style, dead front fuse block. Locate fuse block within panelboard and locate C.P.T. adjacent to panelboard in protected housing. Connect transformer primary at load side of circuit breaker to be tripped.
 - 3.7.3 Switchboards: Energy shall be as specified above for 277/480 volt panelboards, except locate transformer accessibly within switchboard near fuse block.
 - 3.7.4 Testing: Test all circuit breakers which are rated 200 amps or greater, both main and feeders, using standard tests to verify overcurrent and time delay settings and characteristics. Defective devices shall be replaced and the replacement device tested. All testing shall be performed by and independent electrical testing organization regularly involved in such work. Submit name of testing agency thirty days prior to test and advise

CIRCUIT BREAKERS, MOLDED CASE

engineer of test time and date at least two weeks in advance. Submit four copies of test results, including device operating characteristics plotted on log-log time-current paper and operating and maintenance manuals.

END OF SECTION

CIRCUIT BREAKERS, MOLDED CASE

260125.3

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CIRCUIT BREAKERS, MOLDED CASE

260125.4

SECTION 260140 / MOTOR STARTERS1 GENERAL

- 1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Sections, apply to work of this Section.
- 1.2 Division-26 Basic Electrical Materials and Methods Sections apply to work of this Section.
- 1.3 Submittals: Submit the producer's standard descriptive data sheets for each type of product being provided. Mark the data sheet for the product being provided with an identifying mark or arrow.

2 PRODUCTS

- 2.1 Acceptable Producers: Allen-Bradley; General Electric Co., ABB, Siemens/ITE, Challenger, Westinghouse, Square D, and Furnas.
- 2.2 General: Motor starters shall be magnetic type rated in accordance with NEMA Standards, sizes and horsepower. See Drawings for locations. Products shall be furnished by one producer.
- 2.3 Enclosures: Indoors, starters shall be mounted in general purpose enclosures NEMA Type 1 unless otherwise indicated on the Drawings. For outdoor locations starters shall be mounted in NEMA Type 3R raintight or NEMA Type 4 watertight unless otherwise indicated on the Drawings.
- 2.4 Contacts: Starters through NEMA size seven shall be equipped with double break silver-alloy contacts. Contacts shall be replaceable without removing power wiring or removing the starter from the enclosure. The starters shall have straight-through wiring.
- 2.5 Coils: Starter coils shall be molded construction through NEMA size seven. Coils shall be replaceable from the front without removing the starter from the enclosure. Operating voltage shall be as indicated on the Drawings or required by the control system.
- 2.6 Overload relays: Starter overload relays shall be the melting-alloy type with a replaceable control circuit module. Thermal units shall be of one piece construction and interchangeable. The starter shall be inoperative if the thermal unit is removed. Electronic implementation of the thermal overload function is permissible. Overload relay shall monitor current in each phase; overload of any phase shall cause tripping.
- 2.7 Electrical Interlocks: NEMA size 0 through 7 starters shall be suitable for the addition of at least four external electrical interlocks normally open or normally closed type. Interlocks shall be field convertible.
- 2.8 Magnetic motor starters shall have "Hand-Off-Auto" selector switch on cover unless noted otherwise.
- 2.9 Magnetic motor starters shall have "Start-Stop" momentary push buttons on cover or as

MOTOR STARTERS

indicated on the Drawings.

- 2.10 Magnetic motor starters shall have red "run" and green "stop" pilot lights on the cover.
- 2.11 Combination magnetic motor starters shall be manufactured in accordance with NEMA standards, sizes and horsepower ratings.
- 2.12 Disconnect handle used in combination motor starters shall be in control of the disconnect device with the door opened or closed.
- 2.13 The disconnect handle shall be clearly marked "ON" or "OFF."
- 2.14 Combination magnetic motor starters shall be circuit breaker type unless indicated otherwise on the Drawings.
- 2.15 Starters shall be full voltage or reduced voltage type as indicated on the Drawings.
- 2.16 Coordinate with trade supplying motor for the proper starter.
- 2.17 Provide a numbered terminal strip for connection of external control wiring of each starter.
- 2.18 Provide a control circuit fuse holder and fuse for all motor starters where a separate control circuit is shown on the Drawings.
- 2.19 Provide a 460/115V control transformer with fused secondary in 460V starters unless otherwise shown on the Drawings.
- 2.20 Provide phase loss protection with adjustable trip points to de-energize starter upon phase loss or imbalance. Set per motor manufacturer's requirements.

3 EXECUTION

3.1 General:

- 3.1.1 Motor Branch: Provide to each motor with separate circuit, unless otherwise noted on electrical Drawings.
- 3.1.2 Equipment Wiring: Where connections to miscellaneous equipment are necessary or indicated on the Drawings, wire to equipment and make final connections to controllers. In general, connect to equipment where circuit is shown terminating in switch or circuit breaker.
- 3.1.3 Voltages and Capacities: Verify voltages and capacities shown on electrical drawings with the producer's shop drawing submittals for each item of equipment.
- 3.1.4 Locations: See Drawings for equipment locations. These locations may be changed to conform to equipment and connection conditions encountered in the field.

MOTOR STARTERS

- 3.1.5 Mounting: Provide a slotted angle or channel bar with required hardware for securing motor starter to the wall for wall mounted units. Combustible materials are not permitted.
- 3.2 Motor Connections: Make connections with flexible metal conduit, except connections shall be made with liquid tight flexible metal conduit where exposed to oil, grease, water or weather.

END OF SECTION

MOTOR STARTERS

260140.3

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MOTOR STARTERS

260140.4

SECTION 260150 / CONTACTORS1 GENERAL

- 1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Sections, apply to work of this Section.
- 1.2 Division-26 Basic Electrical Materials and Methods Sections apply to work of this Section.
- 1.3 Submittals: Submit the producer's standard descriptive data sheets for each type of product being provided. Mark the data sheet for the product being provided with an identifying mark or arrow.

2 PRODUCTS

- 2.1 Acceptable Producers: Allen-Bradley, ABB, Siemens/ITE, Challenger, Westinghouse, General Electric Co., Square D.
- 2.2 General: See electrical Drawings, panelboard schedules and control diagrams for numbers and types of contactors required. Contactors shall be electrically held, unless indicated otherwise.
- 2.3 Enclosures: Contactors shall be mounted in NEMA type 1 enclosures.
- 2.4 Poles: Required by circuit controlled or as indicated on Drawings.
- 2.5 Ratings: Contactors shall be rated 100 Amperes minimum for inductive and resistive load.
- 2.6 Contactors: Shall be rated for operation at voltage indicated on Drawings.

3 EXECUTION

- 3.1 Mounting: For contactors outside panelboards, furnish contactors in enclosures and the enclosures shall be mounted on walls to slotted angles or channels with required hardware. Combustible materials for mounting are not permitted.
- 3.2 Controls: Install as indicated on Drawings.
 - 3.2.1 System is free from short circuits and other faults.
 - 3.2.2 All equipment operates correctly and as specified.
 - 3.2.3 Grounded equipment shall have maximum of 25 OHMS resistance to ground.

END OF SECTION

CONTACTORS

260150.1

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CONTACTORS

260150.2

SECTION 260155 / RELAYS

1 GENERAL

- 1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Sections, apply to work of this Section.
- 1.2 Division-26 Basic Electrical Materials and Methods Sections apply to work of this Section.
- 1.3 Submittals: Submit the producer's standard descriptive data sheets for each type of product being provided. Mark the data sheet for the product being provided with an identifying mark or arrow.

2 PRODUCTS

- 2.1 Acceptable Producers: Allen-Bradley, General Electric Co. and Square D.
- 2.2 General: See electrical Drawings, Panelboard Schedules and Control Diagrams for numbers and types of relays required. Relays shall be electrically held, unless indicated otherwise on the Drawings.
- 2.3 Enclosures: Relays may be mounted in panelboards or in NEMA type 1 enclosures adjacent to or above panelboard.
- 2.4 Poles: Required by circuit controlled or as indicated on Drawings.
- 2.5 Ratings: Rated for inductive and resistive load, or as indicated on Drawings.

3 EXECUTION

- 3.1 Mounting: For relays outside panelboards, furnish relays in enclosures. The enclosures shall be mounted on walls to slotted angles or channels with required hardware. Combustible materials for mounting are not permitted.
- 3.2 Controls: Install as indicated on Drawings.

END OF SECTION

RELAYS

260155.1

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RELAYS

260155.2

SECTION 260160 / TIME SWITCHES

1 GENERAL

- 1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Sections, apply to work of this Section.
- 1.2 Division-26 Basic Electrical Materials and Methods Sections apply to work of this Section.
- 1.3 Submittals: Submit the producer's standard descriptive data sheets for each type of product being provided. Mark the data sheet for the product being provided with an identifying mark or arrow.

2 PRODUCTS

- 2.1 General: Drawings indicate units as flush mounted or surface mounted types as well as control switching functions. Surface mounted units shall be dead front type, NEMA 1 enclosures. Flush mounted units shall be manufactured for mounting into recessed metallic housings.
- 2.2 Time Clocks: Time clocks shall be astronomic 24 hour time control type with Skip-a-Day feature and spring wound reserve which is automatically rewound for maintaining schedule during a power outage for a minimum of 16 hours.
 - 2.2.1 Momentary Contacts: Momentary contacts shall be provided with mechanically held contactors or relays with two N.O. contacts. Contacts shall withstand relay coil inrush current.
 - 2.2.2 Contacts: Contacts other than momentary contact type shall be rated minimum 40 amperes per pole at 277 volts. Number of poles shall be as shown on the Drawings.
 - 2.2.3 Timing Motors: Timing motors shall be heavy duty synchronous, self starting, high torque type.
 - 2.2.4 Terminals: Terminals shall be screw type. Timing motor terminals shall be separate from switch circuit.
- 2.3 Timer:
 - 2.3.1 Contacts: Timer contacts shall be rated 20 ampere 125 volt or 10 ampere 277 volt, S.P.S.T.
 - 2.3.2 Producer Shall Be Tork 7000Z series, Paragon, M.H. Rhodes, or approved equal.

3 EXECUTION

- 3.1 Mount time switches adjacent to or above contactors or circuits to be controlled as shown on the Drawings.

TIME SWITCHES

- 3.2 Wire drive motors independently. Drive motor circuits shall be served at 120 volts from normal power source, unless otherwise noted on the Drawings.

END OF SECTION

TIME SWITCHES

260160.2

SECTION 260165 / PHOTOCELL CONTROL1 GENERAL

- 1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Sections, apply to work of this Section.
- 1.2 Division-26 Basic Electrical Materials and Methods Sections apply to work of this Section.
- 1.3 Submittals: Submit the producer's standard descriptive data sheets for each type of product being provided. Mark the data sheet for the product being provided with an identifying mark or arrow.

2 PRODUCTS

- 2.1 Acceptable Producers: Intermatic, Tork, M.H. Rhodes, or approved equal.
- 2.2 General: Drawings indicate unit types required as well as control switching function.
- 2.3 Photocontrol: Shall be Intermatic EK 4000 series or K4200 series, 60 HZ, with appropriate ratings for voltage and amperage, as indicated on the Drawings.

3 EXECUTION

- 3.1 Mount photocontrol switches as indicated on the Drawings.

END OF SECTION

PHOTOCELL CONTROL

260165.1

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PHOTOCELL CONTROL

260165.2

SECTION 260170 / GENERAL WIRING DEVICES1 GENERAL

- 1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Sections, apply to work of this Section.
- 1.2 Division-26 Basic Electrical Materials and Methods Sections apply to work of this Section.
- 1.3 Submittals: Submit the producer's standard descriptive data sheets for each type of product being provided. Mark the data sheet for the product being provided with an identifying mark or arrow.

2 PRODUCTS

- 2.1 Acceptable Producers: Leviton, General Electric, Hubbell, Pass and Seymour, Sierra, Bryant, or Eagle Electric.
- 2.2 General: Devices shall be specification grade. Use white finished devices throughout except as hereinafter noted otherwise. Any color selection shall be approved by Architect prior to ordering. See Electrical Drawings for gang switches, receptacles and notes for special wiring devices. All wiring devices, including dimmer switches, shall be rated for 20A, minimum.
- 2.3 Switches:
 - 2.3.1 Single Pole, 20 amp, 120/277V shall be Hubbell 1221 or approved equal.
 - 2.3.2 Double Pole, 20 amp, 120/277V shall be Hubbell 1222 or approved equal.
 - 2.3.3 Three-Way, 20 amp, 120/277V shall be Hubbell 1223 or approved equal.
 - 2.3.4 Four-Way, 20 amp, 120/277V shall be Hubbell 1224 or approved equal.
 - 2.3.5 Single Pole, 30 amp, 120/277V shall be Hubbell 3031 or approved equal.
 - 2.3.6 Lock Type, same Hubbell catalog numbers above except add suffix "L". Furnish associated key with each lock type device.
 - 2.3.7 Lighted Handle devices with handle lighted in "OFF" position shall be same catalog numbers as above or approved equals except suffixes shall be "IL" for 120V and "IL7" for 277V.
 - 2.3.8 Lighted Handle, toggle type devices with handle lighted "ON" position shall be same catalog numbers as above or approved equals except suffixes shall be "PL" for 120V and "PL7" for 277V.
 - 2.3.9 Narrow Wood or Metal Jambs and Partitions: Devices for installation in narrow wood or metal jambs and partitions shall be Pass and Seymour catalog numbers ACD201-I,

GENERAL WIRING DEVICES

ACD203-I or approved equal.

- 2.3.10 20 Ampere Interchangeable Switches: Provide pass and Seymour No. ACD201-I or approved equal, with identification engraved on cover plate. Engraving shall be 1/8" block letters, black enamel filled.
- 2.3.11 Pilot Light Switches: Provide switches with 120 volts pilot light as indicated on the Drawings. Mount switch and pilot light separately but in common cover plate. Pilot light shall be "ON" when switch is "ON".
- 2.3.12 Vaporproof and Weatherproof Switches: Provide standard tumbler switches in cast boxes with gasketed covers and operating handle. Switches shall be Pass and Seymour No. 4521 or approved equal.

2.4 Receptacles:

- 2.4.1 Catalog numbers indicated below are for Hubbell devices. Hubbell catalog numbers are used to give a standard for bidding purposes. However, approved equals will be accepted as indicated in other sections of these specifications.

Where indicated on the Drawings, the following suffixes shall be added to the Hubbell catalog numbers depending on the required color finish:

I	Ivory
R	Red
GY	Grey
WHI	White

No suffix indicates black or brown color finish. Add prefix IG to indicate isolated ground devices. Add prefix GF to indicate ground fault interrupting devices.

2.4.2 Single Receptacle Devices:

20 amp, 2 pole, 3 wire, 125V, NEMA 5-20R Hubbell #5361
 30 amp, 2 pole, 3 wire, 125V, NEMA 5-30R Hubbell #9308
 50 amp, 2 pole, 3 wire, 125V, NEMA 5-50R Hubbell #9360
 20 amp, 2 pole, 3 wire, 250V, NEMA 6-20R Hubbell #5461
 30 amp, 2 pole, 3 wire, 250V, NEMA 6-30R Hubbell #9330
 50 amp, 2 pole, 3 wire, 250V, NEMA 6-50R Hubbell #9367
 30 amp, 2 pole, 3 wire, 277V, NEMA 7-30R Hubbell #9315
 50 amp, 2 pole, 3 wire, 277V, NEMA 7-50R Hubbell #9365
 20 amp, 3 pole, 4 wire, 125/250V, NEMA 14-20R Hubbell #8410
 30 amp, 3 pole, 4 wire, 125/250V, NEMA 14-30R Hubbell #9430
 50 amp, 3 pole, 4 wire, 125/250V, NEMA 14-50R Hubbell #9450
 60 amp, 3 pole, 4 wire, 125/250V, NEMA 14-60R Hubbell #9460
 20 amp, 3 pole, 4 wire, 250V, 3PH, No Neutral NEMA 15-20R Hubbell #8420
 30 amp, 3 pole, 4 wire, 250V, 3PH, No Neutral NEMA 15-30R Hubbell #8430
 50 amp, 3 pole, 4 wire, 250V, 3PH, No Neutral NEMA 15-50R Hubbell #8450
 60 amp, 3 pole, 4 wire, 250V, 3PH, No Neutral NEMA 15-60R Hubbell #8460

GENERAL WIRING DEVICES

2.4.3 Duplex Receptacle Devices:

20 amp, 2 pole, 3 wire, 125V, NEMA 5-20R Hubbell #5362
20 amp, 2 pole, 3 wire, 250V, NEMA 6-20R Hubbell #5462
20 amp, 2 pole, 3 wire, 125V, NEMA 5-20R One boss, 250V,
NEMA 6-20R second boss Hubbell #5492

2.4.4 Locking Type Devices:

20 amp, 2 pole, 3 wire, 125V, NEMA L5-20R Hubbell #2310
30 amp, 2 pole, 3 wire, 125V, NEMA L5-30R Hubbell #2610
20 amp, 2 pole, 3 wire, 250V, NEMA L6-20R Hubbell #2320
30 amp, 2 pole, 3 wire, 250V, NEMA L6-30R Hubbell #2620
20 amp, 2 pole, 3 wire, 277V, NEMA L7-20R Hubbell #2330
30 amp, 2 pole, 3 wire, 277V, NEMA L7-30R Hubbell #2630
20 amp, 2 pole, 3 wire, 480V, NEMA L8-20R Hubbell #2340
30 amp, 2 pole, 3 wire, 480V, NEMA L8-30R Hubbell #2640
20 amp, 3 pole, 4 wire, 125/250V, NEMA L14-20R Hubbell #2410
30 amp, 3 pole, 4 wire, 125/250V, NEMA L14-30R Hubbell #2710
20 amp, 3 pole, 4 wire, 250V, 3PH, No Neutral NEMA L15-20R Hubbell #2420
30 amp, 3 pole, 4 wire, 250V, 3PH, No Neutral NEMA L15-30R Hubbell #2720
20 amp, 3 pole, 4 wire, 480V, 3PH, No Neutral NEMA L16-20R Hubbell #2430
30 amp, 3 pole, 4 wire, 480V, 3PH, No Neutral NEMA L16-30R Hubbell #2730
20 amp, 4 pole, 5 wire, 120/208V, 3PH, NEMA L21-20R Hubbell #2510
30 amp, 4 pole, 5 wire, 120/208V, 3PH, NEMA L21-30R Hubbell #2810
20 amp, 4 pole, 5 wire, 277/480V, 3PH, NEMA L22-20R Hubbell #2520
30 amp, 4 pole, 5 wire, 277/480V, 3PH, NEMA L22-30R Hubbell #2820

2.4.5 Weatherproof receptacles shall be installed in flush weatherproof box with cast gasketed cover and self-closing spring door.

2.5 Miscellaneous Devices:

2.5.1 Pilot light shall be flush mounting, 7.5 watt, 125 volt unit with red jewel. Provide with stainless steel plate.

2.5.2 Clock outlets shall be single, 15 ampere, grounded 125 volt, with flush mounted stainless steel cover plate and clock hanger. Outlet shall be recessed for attachment plug.

2.5.3 Vaporproof or weatherproof pilot lights shall be flush mounted with bull's eye in gasketed cast cover.

2.6 Plates: Except as noted below, all wiring device plates shall be nylon or fiberglass reinforced with smooth white finish. Any color selections shall be approved by Architect prior to ordering.

2.6.1 Exposed wiring devices shall be provided with galvanized steel plates with rounded corners.

GENERAL WIRING DEVICES

- 2.6.2 Vaporproof and weatherproof devices shall be provided with cast covers with galvanized or cadmium finish.
- 2.6.3 Unless noted otherwise in the Contract Documents, floor outlet cover plates and raceways shall be satin bronze or chrome plated.
- 2.6.4 Boxes in which no devices are installed shall be equipped with blank plates.

3 EXECUTION

- 3.1 Outlet box heights shall be considered to be measured to the center-line of the box unless noted otherwise. Unless noted otherwise, light switches shall be provided at one of the following elevations: if the switch is in an area which is required to be compliant with the Accessibility requirements for the Americans with Disabilities Act and if it is above a counter-top or other such permanent obstruction which would prevent the close approach of a wheelchair, then the switch shall be located at an elevation of 45-1/2" above the finished floor; and otherwise, the switch shall be at an elevation of 47-1/2" above the finished floor or grade.
- 3.2 Determine door swings from architectural documents before installing room switch boxes. Install switches on latch side of door.
- 3.3 Contractor shall provide materials and labor necessary to ensure that all spaces in buildings which are larger than 5,000 square feet are provided with occupancy sensors or automatic lighting controls system for the occupancy-sensed or scheduled control, respectively, of all lighting fixtures provided under this contract except for the applicable exceptions specified in the Florida Building Code, as is required by the Florida Building Code. Some of these exceptions in the Florida Building Code are where lighting is designated for 24-hour illumination, where lighting is for security, or where lighting is for areas where automatic control might be dangerous such as in mechanical, electrical, or janitor rooms.
- 3.4 Provide ground wire (#12 AWG green) in each conduit in addition to phase and neutral wires. Ground wires shall interconnect equipment grounds, receptacle grounds, outlets and exposed equipment conductive surfaces with ground bars in panelboards.
- 3.5 Furnish template for receptacles, switches and other cutouts in casework to the Millwork supplier.
- 3.6 Where switches are located in tile wall finish, install them in tile, varying standard mounting height if necessary. Do not mount over 48" above finished floor unless so indicated on the Drawings.
- 3.7 Where several rows of lights are to be controlled, the switch nearest the door shall control the row nearest the interior wall, and the switch furthest from the door shall control the row furthest from the interior wall.
- 3.8 Receptacles Under Any Cooking Hoods shall be provided with all materials and labor

GENERAL WIRING DEVICES

- necessary to automatically disconnect power to these receptacles upon activation of automatic fire suppression system if any hoods or fire suppression systems are utilized for this project (as is required by the Florida Building Code). Coordinate these exact requirements with the requirements of the manufacturers of all Division 15 materials for hoods and fire suppression equipment if any of these systems are utilized.
- 3.9 Switches that control remote outlets, fans, etc., shall have engraved plastic name tags indicating the outlets, fans, etc. that are controlled.
- 3.10 A Special Receptacle shall be provided in any mechanical room in which coils are located, unless such a receptacle is found to be existing to remain in that room. This receptacle shall be a NEMA 6-20R receptacle supplied with 208V power, and it shall be located near the door into the room and within 50 feet of any coils. Unless stated otherwise elsewhere in the Contract Documents, provide materials and labor necessary to supply these receptacles from the nearest available power sources with sufficient capacity. Coordinate the exact requirements with field conditions, if coils or air handlers with coils are added to an existing building.
- 3.11 Receptacle Outlets: Mounting heights for receptacle outlets shall be 18" above finished floor or as indicated on the Drawings.
- 3.12 Miscellaneous Outlets:
- 3.12.1 Install clock outlets 96" above finished floor or as indicated on the Drawings.
- 3.12.2 Install outlets for equipment as required by the particular item. Verify that the plug provided with the equipment is compatible with the receptacle installed.
- 3.13 Wiring Devices and Plates: Wiring devices shall be rigidly installed properly aligned and plumb with wall and floor lines. A device plate shall be furnished for each device. Plates shall be installed with all four edges in continuous contact with the finish. Plates shall not support the wiring devices. Gaskets shall be installed where necessary to insure watertight and vapor tight construction.

END OF SECTION

GENERAL WIRING DEVICES

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GENERAL WIRING DEVICES

260170.6

SECTION 260200 / EMERGENCY LIGHT AND POWER SYSTEM1 GENERAL

- 1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Sections, apply to work of this Section.
- 1.2 Division-26 Basic Electrical Materials and Methods Sections apply to work of this Section.
- 1.3 Submittals: Submit the producer's standard descriptive data sheets for each type of product being provided. Mark the data sheet for the product being provided with an identifying mark or arrow.

2 PRODUCTS

Not Applicable.

3 EXECUTION

- 3.1 System shall have two sources of power as follows:
 - 3.1.1 Normal system.
 - 3.1.2 Emergency system to be comprised of Unit Equipment.
- 3.2 Emergency circuit wiring shall be kept entirely independent of all other wiring and equipment and shall not enter the same raceway, cable, box or cabinet with other wiring except in transfer switches and in exit or emergency lighting fixtures supplied from two sources, or in a common junction box attached to exit or emergency lighting fixtures supplied from two sources.

END OF SECTION

EMERGENCY LIGHT AND POWER SYSTEM

260200.1

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EMERGENCY LIGHT AND POWER SYSTEM

260200.2

SECTION 260215 / EMERGENCY LIGHTING, BATTERY INVERTER UNITS1 GENERAL

- 1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Sections, apply to work of this Section.
- 1.2 Division - 26 Basic Electrical Materials and Methods Sections apply to work of this Section.
- 1.3 Submittals: Submit the producer's standard descriptive data sheets for each type of product being provided. Mark the data sheet for the product being provided with an identifying mark or arrow.

2 PRODUCTS

- 2.1 Acceptable Producers: Bodine Company, Chloride, Emergi-Lite, or approved equal.
- 2.2 General: Units shall be UL listed for installation as an integral part of the lighting fixture or UL listed for retrofit field installation. Build and test units to comply with applicable NEMA, ANSI, IEEE and UL Standards.
- 2.3 Units shall provide power to a lamp or lamps for a period of 90 minutes as prescribed in UL Standard 924. Minimum light output shall be 900 lumens.
- 2.4 Battery: Inverter units shall be provided with nickel cadmium, maintenance free, rechargeable type batteries unless otherwise indicated.
- 2.5 Guarantee: Battery guarantee shall be for a period of five (5) years.
- 2.6 Inverter units shall be designed for operation in an ambient temperature of 32°F to 130°F.
- 2.7 Charger: Inverter units shall be provided with a constant current, solid state charger to return the battery to full charge within 24 hours after discharging and maintain it at that level. The charger shall have dual voltage input 120 or 277 volts, 60 hertz.
- 2.8 Control: Inverter units shall be equipped with electronic circuitry, inverter ballast and transfer switch. A charging indicator light shall be provided as well as a test switch to simulate normal power failure.
- 2.9 In the event of a prolonged power failure, an automatic low-end-cut-off shall be provided to prevent overdischarge of the batteries.

3 EXECUTION

- 3.1 Units shall be installed in accordance with manufacturer's recommendations.
- 3.2 A lighting emergency battery inverter pack shall not be provided in a location which is not accessible with a standard 8 foot tall step ladder. If any emergency battery inverter packs are indicated to be in such locations, the Contractors shall provide materials and

EMERGENCY LIGHTING, BATTERY INVERTER UNITS

labor necessary to provide remote-mounted emergency battery inverter packs in locations which are accessible with only a standard 8 foot step ladder or with no ladder at all. This shall include – but shall not be limited to – providing additional conduit, conductors, junction boxes, different emergency battery inverter packs suitable for the remote locations chosen, and any other materials or labor necessary to ensure that the emergency battery inverter packs provided comply with this requirement.

3.3 See Section "Lighting Fixture Schedule".

END OF SECTION

EMERGENCY LIGHTING, BATTERY INVERTER UNITS

SECTION 260420 / PANELBOARDS1 GENERAL

- 1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Sections, apply to work of this Section.
- 1.2 Division-26 Basic Electrical Materials and Methods Sections apply to work of this Section.
- 1.3 Submittals: Submit the producer's standard descriptive data sheets for each type of product being provided. Mark the data sheet for the product being provided with an identifying mark or arrow.
- 1.4 Depth Coordination: Provide panelboards with depths coordinated with wall thicknesses in locations shown on electrical drawings. Refer to architectural drawings for all dimensions. Include cost of any accommodations for dimensions of proposed panelboards in bid; no adjustments will be made in contract amount for lack of coordination.

2 PRODUCTS

- 2.1 Acceptable Producers: General Electric Co., ABB, Siemens/ITE, Cutler-Hammer, and Square D. Products shall be furnished by one producer.
- 2.2 General: Panelboards shall be UL listed, bolt-in circuit breaker type, with copper bus and door-in-door covers for all NEMA 1 enclosures. Door-in-door enclosure shall not require the use of any tools or the removal of any screws or other attachment hardware in order to access wiring compartment; only a separate key shall be required for this access. Piano-Hinge type enclosures are not suitable for this requirement. Door-in-door covers are not required for enclosure types other than NEMA 1. See panel schedules on Drawings for electrical characteristics.
- 2.3 Bus Assembly and Temperature Rise: Panelboard bus structure and main lugs or main breaker shall have current ratings as shown on the panelboard schedule. Ratings shall be established by heat rise tests in accordance with Underwriters Laboratories Standard UL 67. Provide copper bus assembly and copper only lugs for copper conductors. Bus bars shall be copper.
- 2.4 Circuit Breakers: Circuit breakers shall be full module, bolt-on type, equipped with individually insulated, braced and protected connectors. The front faces of all circuit breakers shall be flush with each other. Large permanent, individual circuit numbers shall be affixed adjacent to each breaker in a uniform position. Trip indication shall be clearly shown by the breaker handle. Provisions for additional breakers shall be such that no additional connectors will be required to add circuit breakers.
- 2.5 Provide shunt trip feature when indicated on the Drawings.
- 2.6 Equipment Short Circuit Rating: Each panelboard, as a complete unit, shall have a short circuit current rating equal to or greater than the equipment rating shown on the

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panelboard schedule on the Drawings, but under no circumstances less than 10,000 amperes. Panelboard and circuit breakers shall be fully rated for interrupting ratings indicated. Under no circumstances will series rated equipment be acceptable. Every overcurrent device provided shall be UL approved to individually interrupt its rated short circuit current and shall not depend upon operation of another overcurrent device to achieve its rating.

- 2.7 Grounding Terminals: Provide each panelboard unit with a ground terminal bar and with lugs for equipment ground wires. Ampacity shall be the same as the full capacity of the main bus. Ground bar or lugs shall be copper.
- 2.8 Neutral Terminals: Provide each panelboard unit with an insulated neutral terminal bar. Ampacity of neutral bar shall be the same as the full capacity of the main bus bars. Neutral bar shall be copper.
- 2.9 Cabinet: Panelboard assembly shall be enclosed in a galvanized steel cabinet. The rigidity and gauge of steel shall be as specified in UL Standard 50 for cabinets. The size of wiring gutters shall be in accordance with UL Standard 67. Cabinet fronts shall be door in door type. Cabinets shall be equipped with latch and tumbler lock on door. Doors over 48" high shall be equipped with three point latch and vault lock. All locks shall be keyed alike. Minimum depth of cabinets shall be 5-3/4" and minimum width shall be 20". Cabinet shall not have ventilating openings.
- 2.10 Safety Barriers: The panelboard interior assembly shall be dead front with panelboard front removed. Main lugs or main breakers shall be barriered.
- 2.11 UL Listing: Panelboards shall be listed by Underwriters Laboratories and shall bear the UL label. When indicated, panelboards shall be suitable for use as service equipment.
- 2.12 Nameplates: Provide an engraved laminated phenolic identification plate 1" high by 3" wide with minimum 1/4" letters indicating the panelboard identification shown on the drawings. Nameplate shall be affixed to the exterior of the panelboard, visible with door closed.

In addition, panelboard shall bear a nameplate showing Manufacturer, Voltage, Ampacity, Type of Panelboard, Manufacturer's Order No. and Date, Interrupting Rating - RMS Sym.

- 2.13 Ground Fault Protection: Provide ground fault protection as indicated on the Drawings. Ground fault protection provisions shall comply with NEC Article 230.95.

3 EXECUTION

- 3.1 Provide circuit breakers with I.C. Ratings, amperes and number of poles as specified in the schedules on the Drawings.
- 3.2 Circuit breakers shall be UL listed.
- 3.3 Shunt trip device shall operate with the contact closure of pushbutton, ground fault relay

PANELBOARDS

- or other pilot device to trip open associated circuit breakers upon command.
- 3.4 Coils of shunt trip device shall be rated continuous duty and shall include interlock arrangement to clear power from coil after operation.
- 3.5 Mount adjacent panelboards so that they are aligned and do not touch each other.
- 3.6 Provide a typewritten circuit directory with a protective covering in a frame inside the door. In this directory, provide unique labeling for each feeder or branch circuit which indicates load type (REC, LTG, AHU-1, etc.), room number(s) or other location description of the area served, and directional information where needed (N, NE, NW, SW, S, etc.) to clarify location. No two descriptions shall be the same in this directory.
- 3.7 Mount panelboards so maximum height of circuit breakers above finished floor does not exceed 78 inches.
- 3.8 Wiring Gutters: Feeder and Branch circuit conductors are sized for circuit ampacity and anticipated voltage drop and may be larger than the allowable ampacities in Table 310.16 of the NEC. Contractor shall provide cabinets with gutters sized to accommodate the conductors and connections actually being installed complying with Article 366 and Article 310.4.

END OF SECTION

PANELBOARDS

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SECTION 260521 / LIGHTING FIXTURES

1 GENERAL

- 1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Sections, apply to work of this Section.
- 1.2 Division-26 Basic Electrical Materials and Methods Sections apply to work of this Section.
- 1.3 Submittals:
 - 1.3.1 Submit in brochure form, catalog sheet or cuts of all lighting fixtures. Mark each sheet to match "type" number as specified in Fixture Schedule on the Drawings. Fabricate no fixtures until approval of submittals and catalog cuts have been made.
 - 1.3.2 Fixtures described do not include all stem hangers, frames and other necessary accessories. At each location, provide lighting fixture specified and all accessories necessary for proper installation and operation.
 - 1.3.3 Provide lighting fixtures complete with lamps in accordance with the Fixture Schedule on the Drawings.

2 PRODUCTS

- 2.1 Acceptable Producers: Ballasts produced by Advance, MagneTek, Osram, or approved equal are acceptable; and lamps may be produced by Phillips, Osram, or Sylvania. See Lighting Fixture Schedule on the Drawings for producers of lighting fixtures.
- 2.2 Ballasts:
 - 2.2.1 Ballasts shall be electronic and high frequency (at least 20 KHz). Ballasts for 4' fluorescent lamps shall be designed specifically for use with 265mA T8 lamps. Compact fluorescent ballasts shall illuminate lamps immediately with no noticeable delay.
 - 2.2.2 Ballasts shall be UL listed (class P) with a class A sound rating, and they shall be CBM certified by ETL. Ballasts shall be the energy saving type and shall have a minimum starting temperature of +50°F. Ballasts shall be serviceable while fixtures are in their normally installed position and shall not be mounted to removable reflectors or wireway covers.
 - 2.2.3 Ballasts shall produce less than 10% current Total Harmonic Distortion (THD) and shall operate at a power factor of at least 90%. Ballasts shall be programmed-rapid-start type.
 - 2.2.4 Ballasts shall be capable of operating two, three, or four T8 lamps.
 - 2.2.5 Qualifying manufacturers shall have been manufacturing electronic fluorescent ballasts for a minimum of five years with a satisfactory performance record. Ballasts shall be warranted by the manufacturer for a minimum of three years.

LIGHTING FIXTURES

- 2.2.6 Ballasts shall be manufactured by Advance Transformer Company, Sylvania, GE, or approved equal.
- 2.3 Automatic Resetting Thermal Protectors: Furnish with each fluorescent ballast to provide protection against damage.
- 2.4 Fixtures: See Lighting Fixture Schedule in the drawings.
- 2.5 Fixture Wire: Type SF-1, SF-2, TF, TFF, TFN, TFFN or other approved wire.
- 2.6 Gasket: Provide gaskets on all lenses to prevent light leaks. Provide gaskets on all fixtures located in damp and wet locations.
- 2.7 Plaster Frames: Furnish with all fixtures installed in stucco or plaster surfaces.
- 2.8 Plastic Accessories: Use 100% clear virgin methyl methacrylate. Lenses shall be male conical prismatic type, with minimum thickness of .125 inch.
- 2.9 Lenses and Diffusers: Incandescent fixture lenses and diffusers shall be tempered glass, unless scheduled otherwise.
- 2.10 Fuses, if provided, shall be GLR type and not the in-line style.
- 2.11 Low Temperature Ratings shall be provided for all lighting fixtures which are indicated to be located outside. This shall include the ratings for all fixture assembly components including lamp, ballast, and emergency battery inverter unit, if specified.
- 2.12 Sloped-Ceiling Adapters (whenever available for a fixture type as a standard option and unless stated otherwise on the Drawings) shall be provided in all locations where electrical drawings indicate lighting fixtures being installed in ceilings which are not flat. Refer to architectural documents for the locations of all sloped ceilings. Any ceilings with less than 2° (from horizontal) rise in elevation – in all directions – shall be considered to be flat for the purposes of this section of the project manual. Any ceilings with 2° or more rise in elevation shall be considered to not be flat.
- 2.13 Lamps: Fluorescent lamps shall be 4-foot, rapid-start, 32 watt, 265mA, T-8 Octron with 4100K color temperature and minimum Color Rendering Index (CRI) of 85, unless otherwise noted in the Fixture Schedule on the Drawings. Lamps shall be Phillips, Sylvania, GE, or approved equal. Lamps shall have a rated life of 30,000 hours at 3 hours per start and 35,000 hours at 12 hours per start. Incandescent lamps shall be inside-frosted, long life unless noted otherwise. Incandescent lamps shall be rated 130 volts.
- 2.14 Lamp Sockets:
- 2.14.1 Fluorescent: Lampholder contacts shall be the biting edge type or phosphorous-bronze with silver flash contact surface type. Lampholders for bi-pin lamps, with the exception of those for "U" type lamps, shall be of the telescoping compression type, or the single slot entry type requiring a one-quarter turn of the lamp after insertion.

LIGHTING FIXTURES

- 2.14.2 Incandescent: Lampholder contacts for incandescent lamps shall have porcelain enclosures.

3 EXECUTION

- 3.1 Where a fixture type is not designated on Electrical Drawings, install the fixture type used in a similar location.
- 3.2 Locate fixtures to suit architectural detail of area involved. Where located in acoustic ceilings, coordinate placement with architectural reflected ceiling plan, or if such plan is not available, obtain approval of fixture location.
- 3.3 Fixture Schedule on the Drawings shows type of fixture required. Determine modifications to make fixtures suitable for the ceilings in which they are installed and furnish fixtures adapted to ceiling.
- 3.4 A lighting ballast shall not be provided in a location which is not accessible with a standard 8 foot tall step ladder. If any ballasts are indicated to be in such locations, the Contractors shall provide materials and labor necessary to provide remote-mounted ballasts in locations which are accessible with only a standard 8 foot step ladder or with no ladder at all. This shall include – but shall not be limited to – providing additional conduit, conductors, junction boxes, different ballasts suitable for the remote locations chosen, and any other materials or labor necessary to ensure that the ballasts provided comply with this requirement.
- 3.4.1 Ceiling types and elevations are often subject to change late in project design. Verify the types of ceiling construction, vertical clearances, and horizontal clearances before ordering fixture fabrication. Determine that suspension methods, flange arrangements, and fixture depths for fixtures coordinate with ceiling types, their suspension systems, and available vertical and horizontal clearances. This shall include coordination with any existing conditions if necessary. Immediately report in writing to the Engineer any discrepancies discovered. Options and fixture types stated regarding ceiling types as indicated on electrical Drawings shall be considered for bidding purposes only. Contractor is responsible for providing fixture types and options appropriate to accommodate ceiling types and available ceiling spaces specified by Architectural Documents even if electrical drawings indicate options or fixture types for different ceiling types or available ceiling spaces.
- 3.5 Determine exact inscription for exit signs.
- 3.6 Interferences: In areas where industrial type fixtures are to be installed, such as equipment rooms, fixtures which are near obstructions such as ducts, large pipes, groups of pipes, etc., are to be suspended so that bottom of the fixture is not higher than bottom of duct, etc. Do not locate outlets until locations of these obstructions are determined. Install conduits and outlets exposed to insure accessibility.
- 3.7 Protect all fixtures and lamps and replace broken parts including those for temporary lighting system.

LIGHTING FIXTURES

- 3.8 Clean all lenses and louvers after all other trades have completed their work in each area; or do not install lenses and louvers before that time.

END OF SECTION

LIGHTING FIXTURES

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SECTION 260620 / SURGE PROTECTION - SECONDARY1 GENERAL

- 1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Sections, apply to work of this Section.
- 1.2 Division-26 Basic Electrical Materials and Methods sections apply to work of this Section.
- 1.3 Submittals: Submit the producer's standard descriptive data sheets for each type of product being provided. Mark the data sheet for the product being provided with an identifying mark or arrow. Submittal shall include UL 1449 Listing Classification file indicating level of containment which the device has demonstrated in UL fault current tests.

2 PRODUCTS

- 2.1 Acceptable Producers: Advance Protection Technologies, Siemens TPS, General Electric, Joslyn Mfg. & Supply Co., McGraw-Edison, RTE Corp., Leviton, Wiremold, LEA Dynatech, Intermatic.
- 2.2 General: Units shall be designed for application on systems up to 600 volts, 60 Hz, with the number of phases shown in the Drawings for the equipment where installed. Units shall be UL Listed in accordance with UL 1283 and 1449 (most recent edition officially adopted by UL), including the highest fault current of Section 37.3.
- 2.3 Characteristics: Surge protection device shall prevent power surges and spikes from damaging electrical equipment or system it protects. Unit shall have a maximum continuous operating voltage of not less than 115% of nominal phase-to-neutral operating voltage of equipment protected. TVSS unit shall be marked with a Short Circuit Current Rating (SCCR) which is equal to or greater than that which is indicated in the Contract Documents for the equipment protected; series-rated combinations are prohibited; only fully-rated devices shall be provided. Shall provide line-neutral, line-ground, and neutral-ground modes of protection for Wye (such as 3-phase 4-wire) systems and shall have line-line and line-ground modes of protection in Delta wiring systems. UL 1449 Listed Line Suppressed Voltage Ratings for line-neutral, line-ground, and neutral-ground modes of protection shall not exceed 400V for 208Y/120V equipment and shall not exceed 800V for 480Y/277V equipment. TVSS shall meet or exceed the following surge capacities: 240kA modular for main distribution equipment, 160kA modular for distribution switchboards and panelboards supplied by main distribution equipment, and 120kA non-modular for branch panelboards. TVSS shall have EMI/RFI (Electro-Magnetic Interference/Radio-Frequency Interference) filtering with minimum attenuation of -40dB at 100kHz.
- 2.4 Design: Surge suppressor shall be completely self-contained in metal enclosure and arranged for knockout mounting on panelboards. Provide complete with factory leads.

SURGE PROTECTION - SECONDARY

3 EXECUTION

- 3.1 Provide materials and labor necessary to provide Transient Voltage Surge Suppression (TVSS) at the following locations in the electrical system provided under this contract: at service entrance disconnection means (main distribution equipment), at designated panelboards, at all panelboards provided which supply either fluorescent lighting loads or power receptacles adjacent to computer data or phone outlets, and at other locations as indicated on the Drawings. This shall include – but shall not be limited to – providing additional circuit breakers and labor as necessary to ensure that TVSS unit is installed in compliance with manufacturer's instructions and the requirement that unit's conductor lengths be minimized; this shall include labor to relocate circuit breakers and re-label circuit directories as necessary to shorten these conductor lengths by locating TVSS unit as close as possible to connection points. Properly connect to phase conductors and to ground as recommended by the manufacturer.

END OF SECTION

SURGE PROTECTION - SECONDARY

SECTION 260770 / DIMMING AND CONTROL1 GENERAL

- 1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Sections, apply to work of this Section.
- 1.2 Division-26 Basic Electrical Materials and Methods Sections apply to work of this Section.
- 1.3 Submittals:
 - 1.3.1 Submit the producer's standard descriptive data sheets for each type of product being provided. Mark the data sheet for the product being provided with an identifying mark or arrow.
 - 1.3.2 Submit wiring diagram indicating the interconnections for the system. Indicate the equipment numbers, terminal numbers and wire numbers. The submittal shall be made prior to the installation of the wiring into the system.
- 1.4 System Description:
 - 1.4.1 Furnish all material, labor, equipment including conduits, wiring, cables, junction boxes, etc., to provide a complete system as specified herein and as indicated on the Drawings.
 - 1.4.2 It is recognized that the different techniques used by the different equipment manufacturers may require modifications. Such modifications may be requested prior to bid date in accordance with the requirements for "Request for Substitution" in the Section "Electrical/General" of these Specifications. The request will be considered provided the criteria of the Specifications are met in performance. The intent of the Specifications is to provide the necessary equipment for a complete stage lighting system.

2 PRODUCTS

- 2.1 General: Provide products by the stage lighting and control equipment manufacturer indicated on the drawings and specifications. The stage lighting and control equipment specified is called out in terms of products as manufactured by Colortran, Inc. This apparatus is fully catalogued and described with complete technical data available from the manufacturer.

Equipment by a manufacturer which has not been approved prior to the bid shall not be acceptable. The manufacturer shall be named as a part of the bid.
- 2.2 Prior Approval Submittals:
 - 2.2.1 Substitutes will be considered only when they are submitted 14 days prior to bid date, and are accompanied by sufficient catalog data, specifications, and technical information for evaluation. Summarize proposal with a list of equipment catalog or series numbers.

DIMMING AND CONTROL

- Prior approval submittal, review, and approval shall not be considered to be shop drawing review and approval.
- 2.2.2 The stage lighting and control manufacturer shall be one who has been continuously engaged in the manufacture of stage lighting luminaries, wiring devices, control equipment, and SCR dimmers for ten years or more.
- 2.2.3 The dimming system bidders, submitting other equipment, shall include pertinent performance data, charts and drawings showing how the system will function in accordance with the specification, and define how it will deviate from the specification. This submittal shall include, but not be limited to the following.
- 2.2.3.1 Rated ampacity, peak single cycle surge current rating, I^2t rating, and Transient voltage rating of the SCR's (or solid state switching modules) employed in the dimmers;
- 2.2.3.2 Laboratory verification of minimum current rise time at a 90° conductive angle, measured from 10% to 90% of the output wave form with the dimmer operating at maximum load;
- 2.2.3.3 Description of the means by which the effect of Electronic Noise Reduction can be achieved to reduce lamp filament noise on any dimmed circuits.
- 2.2.3.4 Description of the air cooling and channel air circulation systems, showing how the dimmer system will meet the requirement for controlled component cooling;
- 2.2.3.5 Description of the packaging and ease of replacement for all spare parts required in this specification, demonstrating the ability to meet the modular spare component requirement of the bid.
- 2.2.3.6 Description of the method employed to meet the switchable Non-Dim requirement of this specification;
- 2.2.3.7 Original Manufacturer's catalog data sheets for all major components of the dimmer system.
- 2.2.4 In the case of substitution for the control system, the bidder shall submit the name of the manufacturer, and list of fifteen or more operating systems installed in the U.S.A. of the type specified which meet the performance and control functions designated.
- 2.2.5 This information shall be mandatory as a basis for determining the bidder's intent in meeting the full requirements of this specification, and shall be submitted at least ten days in advance of bidding. Manufacturers which are not approved prior to the bid shall not be acceptable.
- 2.2.6 It is understood that any additions or revisions of wiring required by the use of substitute equipment, whether such wiring be part of the stage contract or of the prime electrical contract, shall be the responsibility of the bidder making the substitution.
- 2.2.7 If required by the Owner, the Engineer, or the Architect, the bidder shall provide working

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- samples of substitute equipment including lamping for any lighting fixtures, to be delivered to the premises designated, for examination by the Architects, Engineers, and such representatives as the Owner may direct. Handling shipping and delivery to, or removal from the site, of any sample required shall be at the cost of the Electrical Contractor. The Electrical Contractor shall be responsible for the arrangement of the cost of electrical supply required to properly test any lighting instruments or item of equipment.
- 2.2.8 Proposals which fail to address specification requirements or review comments will be rejected.
- 2.3 Control Console: Shall be a microprocessor-based lighting control system specifically designed and constructed for the control of theatrical, television, and architectural dimming systems.
- 2.3.1 The Status 24/48 control console shall be a free-standing table-top assembly, no larger than 4" high, 14" deep, and 30.5" long. Weight shall not exceed 17 lbs.
- 2.3.2 The console shall be finished in a gray and black powder coat with white and blue silk screen graphics.
- 2.3.3 Storage capacity for memory operation shall be 120 cues. Console shall control up to 512 dimmers.
- 2.3.4 The console shall not require the use of any peripheral device such as a disk drive or cassette to function. The operating program shall be stored in an internal non-volatile read-only memory (ROM).
- Show data in CMOS memory. Battery backup shall retain data for a minimum of one year without external power.
- 2.3.5 Off-line cue and patch data storage shall be accomplished with an optional EEPROM memory cartridge. Systems utilizing off line storage devices with moving parts such as disk drives shall not be acceptable.
- 2.3.6 Console shall selectively communicate with dimming systems via either the Colortran digital or the USITT DMX-512 protocol.
- 2.3.7 For ease of service, the entire front panel control surface shall hinge up from the console housing.
- 2.4 Standard Features: The left half of the panel is used for manual level setting and playback. The right half of the panel is used for memory setting and playback. The Status 24/48 control console shall provide, but not be limited to the following features and controls:
- 2.4.1 A two-scene or multi-scene select switch which determines two-scene preset operation or memory operation.

DIMMING AND CONTROL

- 2.4.2 A Grand Master to provide proportional master level control for all operational functions.
- 2.4.3 A Blackout switch.
- 2.4.4 An airflow LED indicating a loss of airflow condition in the dimmer rack or packs.
- 2.4.5 Forty-eight slide potentiometers for manual two-scene preset operation of twenty-four control channels or single-scene memory operation of 48 control channels.
- 2.4.6 Twenty-four fully-overlapping submaster slide potentiometers or effects masters.
- 2.4.7 Twenty-four bump buttons selectable for momentary Pile-on or Solo operation of Submasters or Channels.
- 2.4.8 Split dipless crossfader to provide manual or timed crossfades between Scene 1 and Scene 2. Timed fade rates adjustable from 0 to 999 seconds.
- 2.4.9 Two green LED bar graphs to indicate fade progress.
- 2.4.10 A back-lit LCD display for viewing Dimmer to Channel Patch, Fade Times, Channel Levels in Live cues, Blind cues, Effects and Submasters, and for setting and reviewing System Parameters. The LCD display shall permit "Blind" setting of cues, effects, and submasters.
- 2.4.11 Four buttons, "Stage", "Cue", "Submaster", and "Setup" for controlling the LCD display.
- 2.4.12 A "Record Cue" button for storing the current stage picture as a Cue.
- 2.4.13 A "Record Submaster" button for storing a stage picture as a Submaster.
- 2.4.14 A "Time" button to assign a fade time to a cue or a step time to an effect.
- 2.4.15 A "Dimmer" button for assigning dimmers to channels in the Electronic Patch.
- 2.4.16 An expanded numeric keypad used to enter numeric information. This key pad shall include "+" (plus), or "@" (at), ">" (thru), ".", and "Enter" keys. The "." permits insertion of up to nine cues between any two whole-numbered cues and the "Enter" key executes a previously specified command string.
- 2.4.17 Dual raise and lower keys for setting levels and paging through menus. One set of keys shall increment level rapidly while the other set of keys increment slowly.
- 2.4.18 A "Next Cue" key to enable cues to be executed out of sequence.
- 2.4.19 A "Fade Time" key to enable the operator to alter the fade time of a cue.
- 2.4.20 A Cycle Mode in which the console automatically executes a sequence of sequential cues.

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2.4.21 Effects software which permits up to 24 stepped effects to operate simultaneously with individual level control. Four chase patterns shall be available to the user.

2.5 Sizes and Quantities: Provide the following as manufactured by Colortran, Inc.:

(1)	1	602-106	Status 24/48 with Power Supply factory installed.
(2)	1	168-660	6' Control cable with connectors
(3)	2	168-670	Flush control connection wall plate (fits standard one-gang back box by others)

2.6 Dimmer Rack:

2.6.1 Mechanical:

2.6.1.1 The ENR 24 dimmer rack shall be a free standing dead front switchboard no larger than 21-1/2"H x 14"W x 9"D and shall house all specified equipment. It shall be constructed of code gauge formed steel and aluminum structural members. All bus bars, lugs, and terminals shall be nickel-plated. All exterior surfaces shall be finished in grey or black polyurethane paint. The rack shall weigh no more than 24 lbs. (57 lbs. including dimmers and control modules).

Racks shall be designed to allow for adjacent mounting of multiple racks. The rear section of the rack shall be utilized as a contractor's wireway with a minimum of 5" of wiring space behind the dimmer module. The following knockouts shall be provided on both the top and bottom of the rack for contractor entry: four 1/2", 1", 1-1/4" knockouts and one 1-1/4", 1-1/2" knockout.

2.6.1.2 The rack shall be constructed to permit insertion and removal of dimmers and control modules without the use of tools. Positive, interlocking guides shall be provided for precise alignment of the dimmers to the signal and power connectors in the rack. Dimmer supports shall be incorporated into the sides of the rack, allowing clear access to the power, load, and neutral terminals and the wireway. Racks requiring disassembly to access the terminals and wireway or requiring the use of tools for replacement of dimmers and control modules shall not be acceptable.

2.6.1.3 The rack shall be designed to contain twelve plug-in dimmer modules (either dual 1.8/2.4 kW or single 6.0 kW dimmers). Each module position shall have a mating power bus, two load connectors, and three gold-plated PC signal contacts and shall be mechanically-keyed to accept only the dimmer module specified for that position. The control module position shall include appropriate contractor control signal terminal blocks and a signal distribution connector.

2.6.1.4 The rack shall contain two continuous-duty low-noise fans with a maximum NC rating of 27 to maintain temperatures at proper operating levels with all 2.4 kW dimmers under full load and ambient temperatures up to 40 degrees C. The rack shall be provided with an airflow sensor to shut off dimmers in the rack should safe operating temperatures be exceeded. A signal shall be provided to operate a remove over-temperature LED if the airflow sensor has been activated. Cooling air shall be drawn through the dimmers and exhausted through the top of the rack. Since there is no air flow over any electrical

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connections in the dimmer, no filtration shall be required. Racks not using dimmer airflow channels and therefore requiring filters shall not be acceptable.

*A rack equipped with 6.0 kW dimmer modules shall have a maximum NC rating of 33.

- 2.6.1.5 The rack shall have a 24 user-selectable control panic switches located on the signal distribution card in the rack. Racks without a panic feature or using non-reprogrammable panic selection devices such as clippable diodes shall not be acceptable.
- 2.6.1.6 The rack shall have a lockable door with a maximum swing radius of 4-1/2" to prevent unauthorized access to dimmer and control modules. A blank label shall be provided inside the door and directly adjacent to each dimmer for user identification of each circuit.
- 2.6.1.7 Both load and neutral terminals shall accept up to a #2 gauge wire. Neutral terminals shall be located directly adjacent to load terminals for each of contractor wiring. Provisions shall be made for optional fault current protection devices (amp traps) which may be installed and serviced from the front of the rack.
- 2.6.1.8 The rear of the rack shall contain holes for 3/8" diameter bolts for simple contractor installation onto a wall. The location of holes shall be on 16" centers for two-rack assemblies. Unistrut shall be used for assemblies with more than two racks.

2.6.2 Electrical:

- 2.6.2.1 The rack shall be designed to operate from either 120 or 240 volts and either single or three phase power. Knockouts shall be provided on the sides of the rack to allow simple rack to rack bussing.
- 2.6.2.2 The rack shall be factory-tested and control modules shall be burned in at elevated temperatures for a minimum of four hours. The rack shall be UL listed for 120V applications and can have an interrupting capacity of 10,000A.

2.7 Dimmer Modules:

2.7.1 Mechanical:

- 2.7.1.1 Each plug-in module shall consist of a fully enclosed two piece plastic chassis containing one or two circuit breakers, a solid state power device and two filter chokes. The bottom chassis shall be injection molded of high temperature engineering grade composite plastic. The cover shall be injection molded of a high impact plastic and shall include an integral handle. Three independent molded air channels shall provide high velocity ambient air cooling for the power device and filter chokes while preventing airflow over connection points and other components. Dimmers with a single air channel (which develops a thermal gradient from component to component) or dimmers allowing air flow over connection points (which allows the build-up of oil and dust on these connections) shall not be acceptable.
- 2.7.1.2 The module shall be electrically and thermally non-conductive with no thermally hot components accessible when the module is removed from the rack. All internal power

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connections shall be made of stamped and formed bronze or nickel-plated copper. All internal signal connections shall be made of stamped and roll-formed gold-plated phosphor bronze. The module shall be completely enclosed with no exposed wires, connections or components and with all external connectors fully recessed. Dimmers with exposed wires, connections, and components or dimmers made of electrically and thermally conductive material shall not be acceptable.

- 2.7.1.3 The dimmer modules shall have the following maximum dimensions and weights:

Size: 1.25"H x 12.0"W x 4.0"D
Weight: 2.5 lbs.

2.7.2 Electrical (Dimming):

- 2.7.2.1 Each dimming channel shall be capable of hot patching cold incandescent loads up to its full rated capacity.

- 2.7.2.2 Each dimming channel shall operate satisfactorily on 50/60 Hz 100 volts to 130 volts or 200 volts to 260 volts AC lines and in ambient air temperatures from 0-40°C.

- 2.7.2.3 Each dimming channel shall produce essentially a full sine wave when the control signal is full on, and an output of zero volts when the control signal is off.

- 2.7.2.4 The output voltage of each dimming channel shall be automatically regulated for incoming line voltage variations except that output voltage cannot be increased above a level equal to the difference between incoming line voltage and dimmer voltage drop. Dimmer voltage drop shall not exceed 3V or 120V units and 5V for 240V units. Line regulation shall be $\pm 2\%V$ for 1% to 100% of rated current at any control setting.

- 2.7.2.5 The output voltage of each dimming channel shall follow a modified square-law curve from 0 to 100% control signal and shall be repeatable within $\pm 4/-2$ volts. The response time of the dimmer shall not exceed 0.1 second. All dimming curve characteristics shall be factory set with no user adjustments required.

2.7.3 Electrical (Module):

- 2.7.3.1 The dimmer module shall be protected by one or two fully magnetic circuit breakers with the following ratings:

<u>Catalog #</u>	<u>Description</u>	<u>Current Rating</u>
166-362	Dual 2.4 kW, 120V	2 x 20A

The circuit breakers shall serve as load disconnects and shall have a 10,000 amp interrupting capacity.

- 2.7.3.2 Each dimmer module shall contain a solid state power device with two or four SCR's in an anti-parallel configuration which are reflow soldered to nickel-plated copper lead frames which are in turn reflowed to a beryllium oxide ceramic substrate. The ceramic

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substrate shall be reflow soldered to an integral nickel-plated aluminum heat sink for maximum thermal conductivity and maximum semiconductor reliability. Dimmers using separate semiconductor assemblies (such as solid state relays) attached to a heat sink and requiring heat sink grease and mechanical mounting hardware shall not be acceptable. Surface mounted optical isolators shall be utilized to provide a minimum of 2500 volts of electrical isolation between the power semiconductors and the control signal. The active components in the power device shall be encapsulated in a high dielectric potting compound for mechanical protection and electrical isolation. The SCR's shall have the following minimum ratings:

<u>Catalog #</u>	<u>Description</u> <u>Voltage</u>	<u>Single Cycle Surge</u>	<u>Transient</u>
166-362	Dual 2.4 kW, 120V	650A	600V

- 2.7.3.3 Each 120V dimmer module shall be a recognized component of Underwriters' Laboratory for incandescent and inductive loads and shall be so labelled.

2.7.4 Environmental:

- 2.7.4.1 Each Dimmer Module shall include a toroidal filter choke to limit objectionable harmonics, radiated radio frequencies electromagnetic interference on the conductors and acoustical noise in the load amp filament. Current rise time shall be no less than 500 microseconds measured at 90 degrees conductive angle from 10% to 90% of the output wave form with the dimmer operating at maximum load.

An ENR (Electronic Noise Reduction) SCR firing technique shall further reduce incandescent lamp filament noise below that produced by a conventional 500 microsecond rise time dimmer. In a typical downlight fixture utilizing an R40 lamp source or in a 2 kW Fresnel with a CYX lamp, there shall be an average reduction of 6 decibels or one fourth the sound pressure level generated by a conventional 500 microsecond rise time dimmer without ENR.

- 2.7.4.2 Power efficiency of each dimming channel shall be at least 97% at full load. Maximum heat loss for each dimming channel shall be as follows:

<u>Catalog #</u>	<u>Description</u>	<u>Watts</u>	<u>BTU/hr</u>	<u>Tons AC</u>
166-362	Dual 2.4 kW, 120V	54	184	.015

2.7.5 Quantities and Sizes:

- 2.7.5.1 Provide the following modules as manufactured by Colortran, Inc.:

- (1) 10 #166-362 Dual 2.4 kW Dimmer Modules
- (2) 2 #166-360 Air Flow Control Modules

2.8 Connector Strip and Plug Boxes:

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- 2.8.1 This assembly shall consist of a code gauge aluminum wire-way 4" x 3" in cross section in lengths specified containing terminal strips for feed connections, and wire extending to pigtails terminating in receptacles as specified, or to flush mounted receptacles as specified.
- 2.8.1.1 Female 120V receptacles shall be as follows:
- 2 pole 3 wire grounding pin connectors in capacities specified (20 ampere).
- 2.8.1.2 The strip shall contain 150°C rated wiring of proper size and quantity to connect the individual outlets to the terminal blocks in circuits of capacity as specified.
- 2.8.1.3 Pigtails shall be 18" long (unless otherwise specified), rubber covered type S, SO or ST and shall be secured to the strip body by strain relief clamps.
- 2.8.1.4 Strip shall be supplied with 3/16" thick x 2" wide steel mounting brackets each with 1/8" x 1" formed steel hold-down bracket for attachment at adjustable locations along the strip. Bracket suitable for surface, pipe or cable mounting as specified shall be finished identical to strip and supplied in quantities to support strip on 5' centers. A U-bolt shall be supplied to grip up to 1-1/2" T.S. (2" if specified) pipe for each non-surface mounting bracket.
- 2.8.1.5 For Connector Strips containing in excess of 12-20 amp circuits, an extended terminal box of appropriate length shall be incorporated on either end or in the center, of the strip, as specified. A bracket, similar in construction to the other brackets, specifically designed to support the extended box shall be provided for all hanging units.
- 2.8.2 Standard Features:
- 2.8.2.1 UL listed and labeled. Finished in black baked enamel with large 3" white circuit numbers to permit circuit identification from floor.
- 2.8.2.2 Completely prewired to terminals under an easy-to-remove cover ready to install.
- 2.8.2.3 Mounting brackets provided for surface, cable or pipe mounting.
- 2.8.2.4 Safe rugged construction ideal for television studio and theater power distribution.
- 2.8.3 Quantities and Sizes: Provide connector strips and plug boxes as manufactured by SSRC, Inc. and as indicated in contract drawings.
- 3 EXECUTION:
- 3.1 Field Quality and Control:
- 3.1.1 Installer must examine areas and conditions under which stage lighting and controls are to be installed and notify contractor in writing of conditions detrimental to proper completion of the work. Do not proceed with the work until unsatisfactory conditions

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have been corrected in a manner acceptable to the installer.

- 3.1.2 At the date of substantial completion, replace lamps in stage lighting fixtures which are observed to be noticeably dimmed after Electrical Contractor's use and testing, as judged by the Engineer.
- 3.2 Installation: Install stage lighting and controls where shown, in accordance with manufacturer's written instructions and with recognized industry practice to ensure that stage lighting equipment complies with applicable requirements of NEC and UL standards and with the applicable portions of NECA's "Standard of Installation".
- 3.3 Adjust and Clean:
 - 3.3.1 Clean stage lighting equipment of dirt and debris upon completion of installation.
 - 3.3.2 Protect installed stage lighting equipment and lamps during remainder of construction period.

END OF SECTION

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SECTION 260900 / WORK REQUIRED FOR EQUIPMENT FURNISHED IN OTHER DIVISIONS1 GENERAL

- 1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Sections, apply to work of this Section.
- 1.2 Division-26 Basic Electrical Materials and Methods Sections apply to work of this Section.
- 1.3 Submittals: Submit the producer's standard descriptive data sheets for each type of product being provided. Mark the data sheet for the product being provided with an identifying mark or arrow.

2 PRODUCTS

- 2.1 Materials for this section are specified in the Section "Basic Materials and Methods."
- 2.2 Refer to the section "Related Divisions and Sections" for equipment that is furnished in other Divisions.

3 EXECUTION

- 3.1 Provide raceway boxes, fittings, devices and conductors for the electrical power to equipment furnished and installed in the other Divisions.
- 3.2 Make connections for the electrical power to equipment furnished and installed in other Divisions.

END OF SECTION

WORK REQUIRED FOR EQUIPMENT FURNISHED IN OTHER DIVISIONS

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WORK REQUIRED FOR EQUIPMENT FURNISHED IN OTHER DIVISIONS

260900.2

SECTION 260923 / LIGHTING CONTROL DEVICES

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 the following lighting control devices:

1. Time switches.
2. Outdoor and indoor photoelectric switches.
3. Indoor occupancy sensors.
4. Outdoor motion sensors.
5. Lighting contactors.
6. Emergency shunt relays.

1.3 DEFINITIONS

- A. LED: Light-emitting diode.
- B. PIR: Passive infrared.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show installation details for occupancy and light-level sensors.
 1. Interconnection diagrams showing field-installed wiring.
- C. Field quality-control test reports.
- D. Operation and Maintenance Data: For each type of product to include in emergency, operation, and maintenance manuals.

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.

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1.6 COORDINATION

- A. Coordinate layout and installation of ceiling-mounted devices with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, smoke detectors, fire-suppression system, and partition assemblies.

PART 2 - PRODUCTS

2.1 TIME SWITCHES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.
 - 1. Area Lighting Research, Inc.; Tyco Electronics.
 - 2. Leviton Mfg. Company Inc.
 - 3. Square D; Schneider Electric.
 - 4. TORK.
 - 5. Watt Stopper (The).
- B. Electronic Time Switches: Electronic, solid-state programmable units with alphanumeric display; complying with UL 917.
 - 1. Contact Configuration: [SPST] [DPST] [DPDT]
 - 2. Contact Rating: [30-A inductive or resistive, 240-V ac] [20-A ballast load, 120/240-V ac].
 - 3. Program: An annual holiday schedule that overrides the weekly operation on holidays.
 - 4. Circuitry: Allow connection of a photoelectric relay as substitute for on-off function of a program on selected channels.
 - 5. Astronomic Time: All channels.
 - 6. Battery Backup: For schedules and time clock.

2.2 OUTDOOR PHOTOELECTRIC SWITCHES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified:
 - 1. Area Lighting Research, Inc.; Tyco Electronics.
 - 2. Intermatic, Inc.
 - 3. Paragon Electric Co.; Invensys Climate Controls.
 - 4. TORK.
 - 5. Watt Stopper (The).
- B. Description: Solid state, with [SPST] [DPST] dry contacts rated for [1800-VA tungsten or 1000-VA inductive], to operate connected relay, contactor coils, or microprocessor input; complying with UL 773A.

1. Light-Level Monitoring Range: 1.5 to 10 fc, with an adjustment for turn-on and turn-off levels within that range, and a directional lens in front of photocell to prevent fixed light sources from causing turn-off.
2. Time Delay: 15-second minimum, to prevent false operation.
3. Surge Protection: Metal-oxide varistor, complying with IEEE C62.41.1, IEEE C62.41.2, and IEEE 62.45 for Category A1 locations.
4. Mounting: Twist lock complying with IEEE C136.10, with base-and-stem mounting or stem-and-swivel mounting accessories as required to direct sensor to the north sky exposure.

2.3 INDOOR PHOTOELECTRIC SWITCHES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified:
1. Area Lighting Research, Inc.; Tyco Electronics.
 2. Intermatic, Inc.
 3. MicroLite Lighting Control Systems.
 4. Paragon Electric Co.; Invensys Climate Controls.
 5. TORK.
 6. Watt Stopper (The).
- B. Ceiling-Mounted Photoelectric Switch: Solid-state, light-level sensor unit, with separate relay unit, to detect changes in lighting levels that are perceived by the eye. Cadmium sulfide photoresistors are not acceptable.
1. Sensor Output: Contacts rated to operate the associated relay, complying with UL 773A. Sensor shall be powered from the relay unit.
 2. Relay Unit: Dry contacts rated for 20-A ballast load at 120- and 277-V ac, for 13-A tungsten at 120-V ac, and for 1 hp at 120-V ac. Power supply to sensor shall be 24-V dc, 150-mA, Class 2 power source as defined by NFPA 70.
 3. Light-Level Monitoring Range: 10 to 200 fc, with an adjustment for turn-on and turn-off levels within that range.
 4. Time Delay: Adjustable from 5 to 300 seconds to prevent cycling, with deadband adjustment.
 5. Indicator: Two LEDs to indicate the beginning of on-off cycles.
- C. Skylight Photoelectric Sensors: Solid-state, light-level sensor; housed in a threaded, plastic fitting for mounting under skylight, facing up at skylight; with separate relay unit, to detect changes in lighting levels that are perceived by the eye. Cadmium sulfide photoresistors are not acceptable.
1. Sensor Output: Contacts rated to operate the associated relay, complying with UL 773A. Sensor shall be powered from the relay unit.
 2. Relay Unit: Dry contacts rated for 20-A ballast load at 120- and 277-V ac, for 13-A tungsten at 120-V ac, and for 1 hp at 120-V ac. Power supply to sensor shall be 24-V dc, 150-mA, Class 2 power source as defined by NFPA 70.
 3. Light-Level Monitoring Range: 1000 to 10,000 fc, with an adjustment for turn-on and turn-off levels within that range.

4. Time Delay: Adjustable from 5 to 300 seconds to prevent cycling, with deadband adjustment.
5. Indicator: Two LEDs to indicate the beginning of on-off cycles.

2.4 INDOOR OCCUPANCY SENSORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified:
1. Hubbell Lighting.
 2. Leviton Mfg. Company Inc.
 3. Lithonia Lighting; Acuity Lighting Group, Inc.
 4. Novitas, Inc.
 5. RAB Lighting, Inc.
 6. Sensor Switch, Inc.
 7. TORK.
 8. Watt Stopper (The).
- B. General Description: Wall- or ceiling-mounting mounted, solid-state units with a separate relay unit.
1. Operation: Unless otherwise indicated, turn lights on when covered area is occupied and off when unoccupied; with a time delay for turning lights off, adjustable over a minimum range of 1 to 15 minutes.
 2. Sensor Output: Contacts rated to operate the connected relay, complying with UL 773A. Sensor shall be powered from the relay unit.
 3. Relay Unit: Dry contacts rated for 20-A ballast load at 120- and 277-V ac, for 13-tungsten at 120-V ac, and for 1 hp at 120-V ac. Power supply to sensor shall be 24-V dc, 150-mA, and Class 2 power source as defined by NFPA 70.
 4. Mounting:
 - a. Sensor: Suitable for mounting in any position on a standard outlet box.
 - b. Relay: Externally mounted through a 1/2-inch knockout in a standard electrical enclosure.
 - c. Time-Delay and Sensitivity Adjustments: Recessed and concealed behind hinged door.
 5. Indicator: LED, to show when motion is being detected during testing and normal operation of the sensor.
 6. Bypass Switch: Override the on function in case of sensor failure.
 7. Automatic Light-Level Sensor: Adjustable from 2 to 200 fc; keep lighting off when selected lighting level is present.
- C. Dual-Technology Type: Ceiling mounting; detect occupancy by using a combination of PIR and ultrasonic detection methods in area of coverage. Particular technology or combination of technologies that controls on-off functions shall be selectable in the field by operating controls on unit.
1. Sensitivity Adjustment: Separate for each sensing technology.

2. Detector Sensitivity: Detect occurrences of 6-inch- minimum movement of any portion of a human body that presents a target of not less than 36 sq. in., and detect a person of average size and weight moving not less than 12 inches in either a horizontal or a vertical manner at an approximate speed of 12 inches/s.
3. Detection Coverage (Standard Room): Detect occupancy anywhere within a circular area of 1000 sq. ft. when mounted on a 96-inch- high ceiling.

2.5 OUTDOOR MOTION SENSORS (PIR)

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified:
 1. Hubbell Lighting
 2. Paragon Electric Co.; Invensys Climate Controls.
 3. TORK.
 4. Watt Stopper (The).
- B. Performance Requirements: Suitable for operation in ambient temperatures ranging from minus 400F to plus 1300F, rated as raintight according to UL 773A.
 1. Operation: Turn lights on when sensing infrared energy changes between background and moving body in area of coverage; with a time delay for turning lights off, adjustable over a minimum range of 1 to 15 minutes.
 2. Mounting:
 - a. Sensor: Suitable for mounting in any position on a standard outdoor junction box.
 - b. Relay: Internally mounted in a standard weatherproof electrical enclosure.
 - c. Time-Delay and Sensitivity Adjustments: Recessed and concealed behind hinged door.
 3. Bypass Switch: Override the on function in case of sensor failure.
 4. Automatic Light-Level Sensor: Adjustable from 1 to 20 fc; keep lighting off during daylight hours.
- C. Detector Sensitivity: Detect occurrences of 6-inch- minimum movement of any portion of a human body that presents a target of not less than 36 sq. in..
- D. Detection Coverage: Up to 100 feet, with a field of view of 60 degrees. Individually Mounted Sensor: Contacts rated to operate the connected relay, complying with UL 773A. Sensor shall be powered from the relay unit.
 1. Relay Unit: Dry contacts rated for 20-A ballast load at 120- and 277-V ac, for 13-A tungsten at 120-V ac, and for 1 hp at 120-V ac. Power supply to sensor shall be 24-V dc, 150-mA, Class 2 power source as defined by NFPA 70.
 2. Indicator: LED, to show when motion is being detected during testing and normal operation of the sensor.

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2.6 LIGHTING CONTACTORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified:
1. ASCO Power Technologies, LP; a division of Emerson Electric Co.
 2. Eaton Electrical Inc.; Cutler-Hammer Products.
 3. Hubbell Lighting.
 4. MicroLite Lighting Control Systems.
 5. Square D; Schneider Electric.
 6. TORK.
 7. Touch-Plate, Inc.
 8. Watt Stopper (The).
- B. Description: Electrically operated and mechanically held, combination type with fusible switch, complying with NEMA ICS 2 and UL 508.
1. Current Rating for Switching: Listing or rating consistent with type of load served, including tungsten filament, inductive, and high-inrush ballast (ballast with 15 percent or less total harmonic distortion of normal load current).
 2. Fault Current Withstand Rating: Equal to or exceeding the available fault current at the point of installation.
 3. Enclosure: Comply with NEMA 250.
 4. Provide with control and pilot devices as indicated on Drawings, matching the NEMA type specified for the enclosure.
- C. BAS Interface: Provide hardware interface to enable the BAS to monitor and control lighting contactors.
1. Monitoring: On-off status,
 2. Control: On-off operation,

2.7 EMERGENCY SHUNT RELAY

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified:
1. Lighting Control and Design, Inc.
 2. Nine 24, Inc.
 3. Watt Stopper / Legrand
- B. Description: Normally closed, electrically held relay, arranged for wiring in parallel with manual [or automatic] switching contacts; complying with UL 924.
1. Coil Rating: 120 and/or 277 V.

2.8 CONDUCTORS AND CABLES

- A. Power Wiring to Supply Side of Remote-Control Power Sources: Not smaller than No. 12 AWG. Comply with requirements in Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."
- B. Classes 2 and 3 Control Cable: Multiconductor cable with stranded-copper conductors not smaller than No. 18 AWG. Comply with requirements in Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."
- C. Class 1 Control Cable: Multiconductor cable with stranded-copper conductors not smaller than No. 14 AWG. Comply with requirements in Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

PART 3 - EXECUTION

3.1 SENSOR INSTALLATION

- A. Install and aim sensors in locations to achieve not less than 90 percent coverage of areas indicated. Do not exceed coverage limits specified in manufacturer's written instructions.

3.2 CONTACTOR INSTALLATION

- A. Mount electrically held lighting contactors with elastomeric isolator pads, to eliminate structure-borne vibration, unless contactors are installed in an enclosure with factory-installed vibration isolators.

3.3 WIRING INSTALLATION

- A. Wiring Method: Comply with Division 26 Section "Low-Voltage Electrical Power Conductors and Cables." Minimum conduit size shall be.
- B. Wiring within Enclosures: Comply with NECA 1. Separate power-limited and nonpower-limited conductors according to conductor manufacturer's written instructions.
- C. Size conductors according to lighting control device manufacturer's written instructions, unless otherwise indicated.
- D. Splices, Taps, and Terminations: Make connections only on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures.

3.4 IDENTIFICATION

- A. Identify components and power and control wiring according to Division 26 Section "Identification for Electrical Systems."
 - 1. Identify controlled circuits in lighting contactors.
 - 2. Identify circuits or luminaires controlled by photoelectric and occupancy sensors at each sensor.
- B. Label time switches and contactors with a unique designation.

3.5 FIELD QUALITY CONTROL

- A. Perform the following field tests and inspections and prepare test reports:
 - 1. After installing time switches and sensors, and after electrical circuitry has been energized, adjust and test for compliance with requirements.
 - 2. Operational Test: Verify operation of each lighting control device, and adjust time delays.
- B. Lighting control devices that fail tests and inspections are defective work.

3.6 ADJUSTING

- A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting sensors to suit occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

3.7 DEMONSTRATION

- A. Coordinate demonstration of products specified in this Section with demonstration requirements for low-voltage, programmable lighting control system specified in Division 26 Section "Network Lighting Controls."
- B. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain lighting control devices. Refer to Division 01 Section "Demonstration and Training."

END OF SECTION

SECTION 265119 / LED INTERIOR LIGHTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Interior solid-state luminaires that use LED technology.
 - 2. Lighting fixture supports.
- B. Related Requirements:
 - 1. Section 26 09 23 "Lighting Control Devices" for automatic control of lighting, including time switches, photoelectric relays, occupancy sensors, and multi-pole lighting relays and contactors.
 - 2. Section 26 09 43.23 "Relay-Based Lighting Controls" for manual or programmable control systems with low-voltage control wiring or data communication circuits.

1.3 DEFINITIONS

- A. CCT: Correlated color temperature.
- B. CRI: Color Rendering Index.
- C. Fixture: See "Luminaire."
- D. IP: International Protection or Ingress Protection Rating.
- E. LED: Light-emitting diode.
- F. Lumen: Measured output of lamp and luminaire, or both.
- G. Luminaire: Complete lighting unit, including lamp, reflector, and housing.

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1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Arrange in order of luminaire designation.
2. Include data on features, accessories, and finishes.
3. Include physical description and dimensions of luminaires.
4. Include emergency lighting units, including batteries and chargers.
5. Include life, output (lumens, CCT, and CRI), and energy efficiency data.
6. Photometric data and adjustment factors based on laboratory tests, complying with IESNA Lighting Measurements Testing and Calculation Guides, of each lighting fixture type. The adjustment factors shall be for lamps and accessories identical to those indicated for the lighting fixture as applied in this Project IES LM-79 and IES LM-80.

- a. Manufacturers' Certified Data: Photometric data certified by manufacturer's laboratory with a current accreditation under the National Voluntary Laboratory Accreditation Program for Energy Efficient Lighting Products.

B. Shop Drawings: For nonstandard or custom luminaires.

1. Include plans, elevations, sections, and mounting and attachment details.
2. Include details of luminaire assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Include diagrams for power, signal, and control wiring.

C. Product Schedule: For luminaires and lamps. Use same designations indicated on Drawings.

1.5 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plan(s) and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Lighting luminaires.
2. Suspended ceiling components.
3. Partitions and millwork that penetrate the ceiling or extend to within 300 mm of the plane of the luminaires.
4. Structural members to which equipment and or luminaires will be attached.
5. Initial access modules for acoustical tile, including size and locations.
6. Items penetrating finished ceiling, including the following:
 - a. Other luminaires.
 - b. Air outlets and inlets.
 - c. Speakers.
 - d. Sprinklers.

- e. Access panels.
 - f. Ceiling-mounted projectors.
- 7. Moldings.
- B. Qualification Data: For testing laboratory providing photometric data for luminaires.
- C. Sample warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For luminaires and lighting systems to include in operation and maintenance manuals.
 - 1. Provide a list of all lamp types used on Project; use ANSI and manufacturers' codes.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Lamps: Ten (10) for every 100 of each type and rating installed. Furnish at least one of each type.
 - 2. Diffusers and Lenses: One (1) for every 100 of each type and rating installed. Furnish at least one of each type.
 - 3. Globes and Guards: One (1) for every 20 of each type and rating installed. Furnish at least one of each type.

1.8 QUALITY ASSURANCE

- A. Luminaire Photometric Data Testing Laboratory Qualifications: Luminaire manufacturer's laboratory that is accredited under the NVLAP for Energy Efficient Lighting Products.
- B. Provide luminaires from a single manufacturer for each luminaire type.
- C. Each luminaire type shall be binned within a three-step MacAdam Ellipse to ensure color consistency among luminaires.
- D. Mockups (where indicated on plans or notes): For interior lighting luminaires in room or module mockups, complete with power and control connections.
 - 1. Obtain Architect's approval of luminaires in mockups before starting installations.
 - 2. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.

LED INTERIOR LIGHTING

3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Protect finishes of exposed surfaces by applying a strippable, temporary protective covering before shipping.

1.10 WARRANTY

- A. Warranty: Manufacturer and Installer agree to repair or replace components of luminaires that fail in materials or workmanship within specified warranty period.
- B. Warranty Period: Five (5) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 LUMINAIRE REQUIREMENTS

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. NRTL Compliance: Luminaires for hazardous locations shall be listed and labeled for indicated class and division of hazard by an NRTL.
- C. FM Global Compliance: Luminaires for hazardous locations shall be listed and labeled for indicated class and division of hazard by FM Global.
- D. Recessed Fixtures: Comply with NEMA LE 4.
- E. Bulb shape complying with ANSI C79.1.
- F. Lamp base complying with ANSI C81.61.
- G. CRI of 80 CCT of 3500 K.
- H. Rated lamp life of 50,000 hours.
- I. Lamps dimmable from 0 - 10 percent of maximum light output.
- J. Internal driver.
- K. Nominal Operating Voltage: 277 V AC.

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1. Lens Thickness: At least 0.125 inch (3.175 mm) minimum unless otherwise indicated.

L. Housings:

1. As specified in Luminaire Schedule

2.2 MATERIALS

A. Metal Parts:

1. Free of burrs and sharp corners and edges.
2. Sheet metal components shall be steel unless otherwise indicated.
3. Form and support to prevent warping and sagging.

B. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.

C. Diffusers and Globes:

1. As specified in Luminaire Schedule

D. Housings:

1. As specified in Luminaire Schedule.

E. Factory-Applied Labels: Comply with UL 1598. Include recommended lamps. Locate labels where they will be readily visible to service personnel, but not seen from normal viewing angles when lamps are in place.

1. Label shall include the following lamp characteristics:

- a. "USE ONLY" and include specific lamp type.
- b. Lamp diameter, shape, size, wattage, and coating.
- c. CCT and CRI for all luminaires.

2.3 METAL FINISHES

- A. Variations in finishes are unacceptable in the same piece. Variations in finishes of adjoining components are acceptable if they are within the range of approved Samples and if they can be and are assembled or installed to minimize contrast.

2.4 LUMINAIRE FIXTURE SUPPORT COMPONENTS

- A. Comply with requirements in Section 26 05 29 "Raceways & Electrical System Supports" for channel and angle iron supports and nonmetallic channel and angle supports.
- B. Single-Stem Hangers: 1/2-inch (13-mm) steel tubing with swivel ball fittings and ceiling canopy. Finish same as luminaire.
- C. Wires: ASTM A 641/A 641 M, Class 3, soft temper, zinc-coated steel, 12 gage (2.68 mm)
- D. Rod Hangers: 3/16-inch (5-mm) minimum diameter, cadmium-plated, threaded steel rod.
- E. Hook Hangers: Integrated assembly matched to luminaire, line voltage, and equipment with threaded attachment, cord, and locking-type plug.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in for luminaire to verify actual locations of luminaire and electrical connections before fixture installation. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 TEMPORARY LIGHTING

- A. If approved by the Architect, use selected permanent luminaires for temporary lighting. When construction is sufficiently complete, clean luminaires used for temporary lighting and install new lamps.

3.3 INSTALLATION

- A. Comply with NECA 1.
- B. Install luminaires level, plumb, and square with ceilings and walls unless otherwise indicated.
- C. Install lamps in each luminaire.

D. Supports:

1. Sized and rated for luminaire weight.
2. Able to maintain luminaire position after cleaning and relamping.
3. Provide support for luminaire without causing deflection of ceiling or wall.
4. Luminaire mounting devices shall be capable of supporting a horizontal force of 100 percent of luminaire weight and vertical force of 400 percent of luminaire weight.

E. Flush-Mounted Luminaire Support:

1. Secured to outlet box.
2. Attached to ceiling structural members at four points equally spaced around circumference of luminaire.
3. Trim ring flush with finished surface.

F. Wall-Mounted Luminaire Support:

1. Attached to a minimum 20 gauge backing plate attached to wall structural members.
2. Do not attach luminaires directly to gypsum board.

G. Ceiling-Mounted Luminaire Support:

1. As specified in Luminaire Schedule

H. Suspended Luminaire Support:

1. As specified in Luminaire Schedule
2. Do not use ceiling grid as support for pendant luminaires. Connect support wires or rods to building structure.

I. Ceiling-Grid-Mounted Luminaires:

1. Secure to any required outlet box.
2. Secure luminaire to the luminaire opening using approved fasteners in a minimum of four locations, spaced near corners of luminaire.
3. Use approved devices and support components to connect luminaire to ceiling grid and building structure in a minimum of four locations, spaced near corners of luminaire.

J. Comply with requirements in Section 26 05 19 "Low-Voltage Electrical Power Conductors and Cables" for wiring connections.

3.4 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 26 05 53 "Identification for Electrical Systems."

3.5 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:
 - 1. Operational Test: After installing luminaires, switches, and accessories, and after electrical circuitry has been energized, test units to confirm proper operation.
 - 2. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery power and retransfer to normal.
- B. Luminaire will be considered defective if it does not pass operation tests and inspections.
- C. Prepare test and inspection reports.

3.6 STARTUP SERVICE

- A. Comply with requirements for startup specified in Section 26 09 43.23 "Relay-Based Lighting Controls."

3.7 ADJUSTING

- A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting the direction of aim of luminaires to suit occupied conditions. Make up to two visits to Project during other-than-normal hours for this purpose. Some of this work may be required during hours of darkness.
 - 1. During adjustment visits, inspect all luminaires. Replace lamps or luminaires that are defective.
 - 2. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.
 - 3. Adjust the aim of luminaires in the presence of the Architect.

END OF SECTION

SECTION 270712 / TELEPHONE, COMPUTER, TELEVISION SYSTEMS1 GENERAL

- 1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Sections, apply to work of this Section.
- 1.2 Division-26 Basic Electrical Materials and Methods Sections apply to work of this Section.
- 1.3 Submittals: Submit the producer's standard descriptive data sheets for each type of product being provided. Mark the data sheet for the product being provided with an identifying mark or arrow.

2 PRODUCTS

- 2.1 Provide raceways, fittings and boxes that conform to the Section "Basic Materials and Methods."
- 2.2 Provide screw type copper ground bus with minimum #6 (provide a different size if so indicated on the Drawings for the telecommunications bonding jumper) copper radial connections to all installed equipment, raceway and connecting communications and power feeders and branch circuits. All grounds must be radial without loop through, joint or splice. Daisy-chain grounds are specifically forbidden. Building telecommunications bonding jumpers shall be homerun back to the existing building main telecommunications room.

3 EXECUTION

- 3.1 Telephone and computer data network conduit systems shall be complete including outlets and conduits for feeder cables. Provide terminal boards required for the systems. Telecommunications, data, or TV service providers or Owner's vendors will provide all telephone service, networking, and TV cables for services and branch distribution as well as the terminations for these cables.
- 3.2 Provide boxes and conduits with pull wire or pull rope for installation of the systems. See Drawings for sizes and locations.
- 3.3 Provide eight feet high 3/4" thick Readyspec plywood back boards completely covering all walls of any Telecommunications Rooms (TRs). The Readyspec backboard shall be painted gray with two coats of 100% latex primer sealer applied to the front and sides of backboards. Install back board panels to support 500 pounds per sheet with a 1 foot moment arm. Paint with two coats of fire retardant gray. Clearly indicate the fire resistivity and affix to the backboard. Provide cutouts as necessary for building systems. The backboard shall reach from corner to corner. Install the backboard vertically at 12" AFF and anchor securely to wall substrate with a minimum of five (5) equally spaced fasteners along each vertical edge and down the centerline of each panel. Backboard kits shall include fasteners for masonry, hollow block, steel frame and wood frame walls. Fasteners must be flush with surface of backboard. Fasteners shall be of the appropriate type for each substrate. Install fasteners flush with the surface of the

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- backboard. Provide blocking or additional studs in framed walls to receive backboard panel fasteners. Provide any power receptacles in any TRs such that they are completely below 12 inches AFF, and below the backboards.
- 3.4 Provide screw type copper ground bus with minimum #6 (provide a different size if so indicated on the Drawings for the telecommunications bonding jumper) copper radial connections to all installed equipment, raceway and connecting communications and power feeders and branch circuits. All grounds must be radial without loop through, joint or splice. Loop through or daisy-chain grounds are specifically forbidden. Ground all equipment racks. Provide separate, minimum, #6 AWG telecommunications bonding jumpers (provide a different size if so indicated on the Drawings for the telecommunications bonding jumper) in 1 inch conduits from existing building main telecommunications room to each new telecommunications room provided under this contract.
- 3.5 Ream out all conduits. Conduits not terminating in boxes or cabinets shall be terminated with bushings.
- 3.6 Conduit with more than two right angle bends, or exceeding 200 feet in length shall have an intermediate pull box. Pull boxes shall have full size screw-fastened covers.
- 3.7 All wall outlets shall be flush and have nylon or fiberglass reinforced cover with bushed opening.
- 3.8 Refer to the Drawings for feeder conduit sizes.
- 3.9 Installation of devices, equipment and feeder cables are not included in the work of this Contract.

END OF SECTION

SECTION 280731 / FIRE DETECTION AND ALARM SYSTEM - ADDRESSABLE (CLASS B)1 GENERAL

- 1.1 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Sections, apply to work of this Section.
- 1.2 Division-26 Basic Electrical Materials and Methods Sections apply to work of this Section.
- 1.2.1 The fire alarm system shall be installed by a state certified fire alarm system installation contractor with an unlimited electrical license (Type EC) or a certified alarm system contractor I license (Type EF). The installation contractor shall also be either the prime contractor or a subcontractor to the prime contractor and shall not be a subcontractor to another subcontractor.
- 1.2.2 The contractor shall warrant the fire alarm system for a period of one year from the later of the following dates: the date of final acceptance by the state fire marshal or the date of substantial completion.
- 1.3 Submittals for Approval
 - 1.3.1 Prior to beginning any work on the fire alarm and detection system, submit for approval a copy of the appropriate license certifying that the installation contractor is legally qualified to install the fire alarm and detection system.
 - 1.3.2 Submit the manufacturer's standard descriptive data sheets for each type of product being provided. Mark the data sheets for the products being provided with an identifying mark or arrow. Provide shop drawings showing locations of all equipment and devices connected to the fire alarm control panel including – but not limited to – terminal cabinets, air handler shutdown relays, smoke damper relays, remote reporting relays and any other connections to mechanical systems. Indicate the device types, device location descriptions, signal types (whether device generates an Alarm or Supervisory signal) and device addresses to be programmed into the control panel. In this submittal, include a description of the default method used to prioritize multiple initiating signals when they are displayed at the fire alarm control panel and annunciators. The submittal shall be made for approval prior to the installation of wiring in the raceways.
- 1.4 Close-out Submittals
 - 1.4.1 Two weeks prior to substantial completion, three bound copies of the operation and maintenance manuals shall be provided. These manuals shall include, but are not limited to, diagrams and instructions which detail installation, operation and maintenance of the fire alarm and detection system. The maintenance instructions shall include a spare parts list and troubleshooting instructions. The contractor shall also provide a 3.5" diskette with a copy of the job data – specific to this project – which is necessary to reprogram the system.
 - 1.4.2 Fire alarm supplier shall submit battery life calculations verifying that the fire alarm system is capable of operating on battery backup for 60 hours plus five minutes with the

FIRE DETECTION AND ALARM SYSTEM - ADDRESSABLE

alarm sounding.

- 1.4.3 A point-to-point wiring diagram showing all equipment connected to the fire alarm and detection system shall be included with both the paper and computer diskette copies of the As-Built Drawings. Indicate the physical routing of all of the wiring provided as well as the location of all other fire alarm materials provided. This wiring diagram shall indicate equipment names and numbers; ratings and locations of end-of-line resistors; terminal numbers; wire numbers; and device types, locations, and addresses.

1.5 Quality Assurance

- 1.5.1 Manufacturers shall be firms which have been regularly engaged in the production of fire alarm and detection devices and systems which are of the same type, size and characteristics required for this project and which have been installed, with satisfactory records, in similar projects for not less than five years.
- 1.5.2 The installer shall have at least five years of successful installation experience on projects with fire alarm and detection system installation work similar to that required for this project.

1.6 System Description

- 1.6.1 The fire detection and alarm system is an existing system to remain with the addition of the devices indicated.

1.7 System Operation

- 1.7.1 The system shall monitor all inputs and outputs for abnormal conditions. A single open or non-simultaneous single ground fault shall not inhibit communication between the control panel and any of the devices except those wired on the other side of the fault from the control panel. All open or ground faults shall cause a Trouble signal unless the fault occurs under circumstances listed as one of the exceptions in section 4.4.7.1.17 of NFPA Article 72.
- 1.7.2 The recall signal shall be separate and distinct from any other signal. The recall control, push button or other type shall be located in the fire alarm control panel under lock and key.
- 1.7.3 Operation of any manual or automatic initiating device shall sound all alarm signals and shall also sound an alarm and indicate, on the fire alarm annunciator and fire alarm control panels, the locations of all activated initiating devices.
- 1.7.4 Operation of any manual or automatic initiating device shall shut down all air handling units in the building unless noted otherwise on the Drawings.
- 1.7.5 Malfunction of supervised circuits – either Alarm or Supervisory – shall be indicated as Trouble on the fire alarm annunciator and control panels. An audible and visual signal shall indicate Trouble with provisions to silence the audible signal but not the visual indication.

- 1.7.6 Activation of the fire alarm and detection system's Alarm, Supervisory or Trouble signals shall operate the necessary contacts to communicate the signals to remote locations as required by the owner. The Alarm contacts shall be normally open and the Trouble and Supervisory contacts shall be normally closed. The system shall be provided with a digital communicator which shall use standard telephone lines for this purpose.
- 1.7.7 If elevator is provided; activation of elevator lobby smoke detectors shall cause elevator car to return nonstop to the designated level (ground floor), or to the alternate level (second floor), if the alarm originated from the designated level. These smoke detectors shall also sound a general alarm.
- 1.7.8 If elevator is provided; activation of elevator equipment room smoke detector shall activate Phase I elevator recall, cause the "Do Not Use Elevator" warning sign to flash, and shall sound a general alarm. The Warning sign shall be located at the elevator call buttons on both the designated and alternate levels.
- 1.7.9 If elevator is provided; activation of the smoke detector in the elevator shaft shall sound a general alarm in addition to activating Phase I recall.
- 1.7.10 The system shall have the ability to operate with non-addressable devices. This ability shall be provided through the use of individual addressable modules designed specifically for this purpose.

2 PRODUCTS

2.1 Acceptable Producers

- 2.1.1 The system and its components shall be Underwriters Laboratories, Inc. (UL) listed under the appropriate UL testing standard as listed herein for fire alarm applications and shall be installed in compliance with the UL listing. Equipment and material provided shall also comply with the latest revisions of applicable codes and standards of ANSI, NEMA, and NFPA and shall be listed, approved, and labeled for the applications. All fire alarm and detection system components provided shall be specifically UL Listed and Labeled for use with the particular brand and type of fire alarm and detection system to which they are connected, and all such components shall also be approved by the manufacturer of the existing fire alarm and detection system. Wherever possible, shall have the same manufacturer as the existing fire alarm and detection system control panel.
- 2.1.2 All fire alarm and detection system components provided shall be specifically UL Listed and Labeled for the form of installation and for the type of usage which is provided.

2.2 Materials and Equipment

- 2.2.1 Pull Stations (Manual Fire Alarm Boxes) shall be intelligent addressable type, single action, non-coded, keyed alike for all cabinets and boxes in system and with key lock for test and reset, recessed pull lever and protective shield. Boxes shall have surface or semi-flush mounting and cast metal or Lexan box with red finish.

- 2.2.2 Smoke Detectors shall operate on the photoelectric principle to detect and report the presence of products of combustion gases. Detectors shall have a minimum coverage rating adequate for 30 foot spacings, as determined by the manufacturer. Smoke detectors shall have matching base and shall be intelligent addressable type. The detectors shall support automatic compensation adjustment of setpoints and measurement of analog detector sensitivity from the fire alarm control panel. The detectors shall have built-in type identification and two blinking LEDs. The LEDs shall blink each time the device is addressed and shall be continuously illuminated when the device is in alarm. Ceiling smoke detectors shall mount on a 4" square box and shall have a remote reset at the control panel.
- 2.2.3 Smoke Detectors (Duct-Mounted) shall operate on the photoelectric principle to detect and report the presence of products of combustion gases. Duct-mounted smoke detectors shall be intelligent, addressable type and provided with air duct type housing and sampling tubes (extended the full width of the duct). The detectors shall support automatic compensation adjustment of setpoints and measurement of analog detector sensitivity from the fire alarm control panel. The detectors shall have built-in type identification and two blinking LEDs. The LEDs shall blink each time the device is addressed and shall be continuously illuminated when the device is in alarm. Detectors shall be UL listed specifically for use in air handling systems. Detectors, including housing and sampling tubes, shall be listed or approved for the range of air velocities which may exist in service and for the maximum temperature which may exist in service. Duct-mounted smoke detectors connected in the signal actuating circuit of the fire protective signalling system shall be listed or approved for this application. A remote annunciator LED shall be provided where detector is concealed above ceiling or in other locations.
- 2.2.4 Heat Detectors: Shall operate on the rate-of-rise plus fixed temperature principle to detect and report a rise in temperature of 15°F per minute or a fixed temperature of 135°F. Detector shall mount on 4" square box.
- 2.2.5 Speaker/Strobe Signal Appliance shall be a combined modular speaker and lamp assembly. Lamp shall be a Xenon strobe--clear or nominal white--with a minimum intensity of 75 candela unless noted to be higher in the Drawings (per requirements of UL 1971; compliance with UL 1638 at 75cd is not sufficient and shall not be approved unless device is also rated at minimum of 75cd per UL 1971). Housing shall be red in color. Sound intensity shall exceed 85 db at 10 feet. Appliances shall be semi-flush mounting. Assembly shall be DC operated. Assembly shall be ADA approved.
- 2.2.6 Visual Signal Appliance (Strobe) shall be a modular lamp assembly. Lamp shall be a Xenon strobe – clear or nominal white – with a minimum intensity of 75 candela unless noted to be higher in the Drawings (per requirements of UL 1971; compliance with UL 1638 at 75cd is not sufficient and shall not be approved unless device is also rated at minimum of 75cd per UL 1971). Housing shall be red in color. Appliance shall be semi-flush mounting. Assembly shall be DC operated. Assembly shall be ADA approved.
- 2.2.7 Speaker Notification Appliance shall be semi-flush mounted, consisting of a thermoplastic injection molded acoustic panel and a 4" treated paper cone speaker. Sound intensity shall exceed 85 db at 10 feet.

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- 2.2.8 Individual Addressable Modules shall be located in back boxes of field devices or in enclosures near field devices. The individual addressable modules shall allow tamper switches, pressure switches or any other non-addressable devices to be addressed by the fire alarm control panel.
- 2.2.9 Remote LCD Annunciator shall be fully compatible with fire alarm control panel and shall have key controlled trouble silence, system reset, alarm silence and LCD readout matching control panel.
- 2.2.10 Fire Alarm Control Panel is existing to remain.
- 2.2.11 Wiring and conductors to connect the equipment and materials for the fire alarm system shall only be type THWN insulated copper conductors rated for 600 volts. System wiring shall be color coded as listed in Section 3.10, below. Wire size shall be as recommended by the Fire Alarm manufacturer. Addressable loop conductor data cables shall be two-conductor twisted shielded pairs.

3 EXECUTION

- 3.1 Contractor shall provide all materials and labor necessary to accommodate the addition of new fire alarm system components under this contract, to the existing fire alarm control panel. This shall include – but shall not be limited to – providing detection system reprogramming and providing additional signal and initiating circuit expansion cards to be mounted inside of or adjacent to existing fire alarm control panel, as necessary. Provide cabinet for enclosing expansion cards as necessary. If it is determined that the existing fire alarm control panel or panels will not accommodate the addition of the devices indicated, then the Contractor shall include in the Bid Price all costs necessary to provide new fire alarm control panels as necessary to accommodate the existing and new fire alarm devices to be added. Coordinate exact requirements with existing conditions prior to Bid. No Change Order will be approved for a failure to comply with these requirements.
- 3.2 Wiring shall be in metallic conduit solely for the fire detection and alarm system. Install and connect wiring in conformance with the recommendations and wiring diagrams provided by the fire alarm and detection system manufacturer.
- 3.3 Provide surge protection compliant with UL 497B for all fire alarm circuits which leave the air-conditioned envelope of a building; protection shall be provided at each end of each circuit near where circuit enters or leaves a building.
- 3.4 All wiring shall be tagged, numbered, color coded and terminated on terminal blocks in the cabinets, in boxes, at equipment and at devices. Wire nuts or splices shall not be used.
- 3.5 Contractor shall provide the quantity of duct-mounted smoke detectors – in locations where indicated – as specified by the Division 15 documents. Any indications of quantities or locations of duct-mounted smoke detectors shown in the division 26 documents shall be considered to be for general reference purposes only; exact

- quantities and locations shall be coordinated with Division 15 Contract Documents prior to pricing, and price shall be based on quantities and locations indicated in the Division 15 documents, only.
- 3.6 Contractor shall provide materials and labor necessary to provide a smoke detector above all fire alarm control panels and above all fire alarm terminal cabinets.
- 3.7 Comply with all NFPA requirements as applicable to construction and installation of fire alarm and detection components and accessories.
- 3.8 Mounting of pull stations shall be 48" above finished floor to the top of the box (Handicapped Code).
- 3.9 Unless indicated otherwise in the Contract Documents, mounting of all fire alarm strobes shall be at an elevation such that the lowest portion of the strobe lens is between 80" and 81" above the finished floor elevation at that location unless this device elevation would require that the highest portion of the strobe lens would be less than 5" below the lowest portion of the ceiling at that location. If this device elevation would be such that the highest portion of the lens would be less than 5" from the lowest portion of the ceiling at that location then this fire alarm strobe shall be provided at a lower elevation such that the highest portion of the strobe lens is between 5" and 6" below the lowest portion of the ceiling at that location, and the Engineer shall be immediately notified in writing of this lower elevation being provided, so that the necessary de-rating mandated by NFPA 72 for devices provided at lower elevations may be considered.
- 3.10 Junction boxes and cabinets for the Fire Alarm System, shall be painted international fire red.
- 3.11 Provide, in a frame and under glass, a professionally-drafted Mylar plan of the building and site which denotes the locations and addresses of all devices connected to the fire alarm and detection system. Install frame near the fire alarm annunciator panel or at a location designated by the Owner's representative.
- 3.12 Provide a spare parts kit which includes the following: one of each kind of detector head and base, one pull station, one speaker-light combination, one speaker and two of any type of line resistor or capacitor necessary.
- 3.13 Duct-mounted smoke detectors shall be furnished by the fire alarm contractor, installed by a mechanical contractor, and wired by the fire alarm contractor.
- 3.14 Air duct smoke detectors shall not initiate a building general fire alarm but shall initiate a fire alarm supervisory alarm and shall shutdown all air handlers in the building.
- 3.15 New fire alarm conductors provided shall match the colors used for any existing fire alarm system conductors; or if none are existing, the following colors shall be used:
- | | |
|--------------------------------|----------------------|
| Strobes: | Purple (-) White (+) |
| Initiating Circuits: | Yellow (-) Blue (+) |
| A/C and Ventilation Shut Down: | Orange (-) Brown (+) |

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Miscellaneous Circuits:	Tan (-) Violet (+)
Speakers:	Black (-) Clear (+)
Data:	Red Jacket

- 3.16 Tests shall be provided. Upon completion of the installation, the contractor and the manufacturer's authorized representative together shall test every alarm initiating device for proper response and location indication, every alarm signaling device for effectiveness and all auxiliary functions. Repeat all tests with normal power disconnected. At a minimum, all testing shall comply with NFPA 72 requirements for such testing including – but not necessarily limited to – the chapter, “Inspection, Testing, and Maintenance.” The owner and designated representative shall be given the opportunity to witness these tests. An itemized test report shall be submitted to the owner, detailing and certifying all results.
- 3.17 Instructions including 16 hours of complete instructions and training for operation and maintenance of system shall be furnished to owner's designated representative upon completion.

END OF SECTION

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