*Submittal:*

**Construction Documents**

BKJ Architecture Project No. 24.121

August 18, 2025

# Office Renovation

for

# Florida Association of Insurance Agents (FAIA)

1117 Thomasville Road, Tallahassee, Florida

BKJ, Inc. Architecture
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Set No.: Date issued:

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|---|---|
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| ARCHITECT OF RECORD | BONINE J. DAVENPORT<br>FLORIDA #AR95011 |
| MECHANICAL, ELECTRICAL AND PLUMBING FIRM | MCGINNISS + FLEMING ENGINEERING<br>1401 MICCOSUKEE ROAD<br>TALLAHASSEE, FLORIDA 32308<br>CERTIFICATE OF AUTHORIZATION #2485 |
| MECHANICAL ENGINEER | JON BARBER, PE<br>DIVISIONS: 21, 22, 23<br>FLORIDA #55427 |
| ELECTRICAL ENGINEER | BRIAN WALLACE, PE<br>DIVISIONS: 26<br>FLORIDA #75562 |

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# SECTION 011000 - SUMMARY

## PART 1 - GENERAL

### 1.1 SUMMARY

A. Section Includes:

1. Project information.
2. Work covered by Contract Documents.
3. Access to site.
4. Work restrictions.
5. Specification and drawing conventions.

### 1.2 PROJECT INFORMATION

A. Project Identification: Florida Association of Insurance Agents (FAIA) – Office Renovation

1. Project Location: 1117 Thomasville Road, Tallahassee, FL 32303

B. Owner: Florida Association of Insurance Agents (FAIA)

1. Owner's Representative: Kyle Ulrich, email: kulrich@faia.com

C. Architect: BKJ, Inc. Architecture, Bonnie Davenport, 850.778.8007, bdavenport@bkjarchitecture.com

1. Architect's Project Manager: Bonnie Davenport, 850.524.3701 bdavenport@bkjarchitecture.com

### 1.3 WORK COVERED BY CONTRACT DOCUMENTS

A. The Work of Project is defined by the Contract Documents and consists of the following:

1. The project includes the interior renovation of an existing office building for the Florida Association of Insurance Agents (FAIA). The building is a split-level building with a basement and 1st level. The basement is approx. 7,434 GSF, the 1st level is approx. 8,178 GSF. Therefore the total building area is 15,612 GSF.

2. The project work area (reconfigured area) is approx. 8,258 gfs. The building renovation includes new finishes and fixtures, installing an automatic fire sprinkler system, and reconfiguring a large portion of the building including the existing restrooms for ADA compliance. The building occupancy is not changing.

B. Type of Contract.

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

1.4 ACCESS TO SITE

A. General: Contractor shall have full use of Project site for construction operations during construction period. Contractor's use of Project site is limited only by Owner's right to perform work or to retain other contractors on portions of Project.

1.5 WORK RESTRICTIONS

A. Work Restrictions, General: Comply with restrictions on construction operations.

1. General Contractor to coordinate with Owner for access to the space, sequencing of work and areas that will be off limits during construction.

B. Nonsmoking Building: Smoking is not permitted within the building or within 25 feet of entrances, operable windows, or outdoor-air intakes.

C. Controlled Substances: Use of tobacco products and other controlled substances on Project site is not permitted.

1.6 SPECIFICATION AND DRAWING CONVENTIONS

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

1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.

B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.

C. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:

1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
2. Abbreviations: Materials and products are identified by abbreviations published as part of the U.S. National CAD Standard and scheduled on Drawings.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000

# SECTION 012300 - ALTERNATES

## PART 1 - GENERAL

### 1.1 SUMMARY

A. Section includes administrative and procedural requirements for alternates.

### 1.2 DEFINITIONS

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

1. Alternates described in this Section are part of the Work only if enumerated in the Agreement.
2. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternates into the Work. No other adjustments are made to the Contract Sum.

### 1.3 PROCEDURES

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

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

B. Execute accepted alternates under the same conditions as other work of the Contract.

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

## PART 2 - PRODUCTS (Not Used)

## PART 3 - EXECUTION

### 3.1 SCHEDULE OF ALTERNATE

Refer to the Cover Sheet (CS) for a list of alternates which are also listed below.

A. Alternate #1:

Remove PL1 accent wall on south wall of Lobby (100). Paint gyp wall PT2.

B. Alternate #2:
Gym (011) and Shower (012) to be a white box. Stub out plumbing and no finishes.

C. Alternate #3:
Remove W4 wall tile in Break (002A & 002B). Paint walls PT2, epoxy-based paint.

D. Alternate #4:
Remove cable trays shown on systems plans - sheets E3.2 & E3.5.

E. Alternate #5:
Replace TP1 with Scranton products, eclipse partitions, stainless hammered.

F. Alternate #6:
Remove W3 wall tiles in Men (020), Women (021), Shower (012), Men (126), Women (127) restrooms. Paint gyp walls PT1, epoxy-based paint. W4 wall tiles behind sinks to remain.

G. Alternate #7:
Provide wood veneer doors, red oak, rift cut, stained to match PL1, in lieu of plastic laminate doors. Refer to specifications.

H. Alternate #8:
Refinish or replace all existing wood window sills on the 1st floor stained to match doors and PL1.

END OF SECTION 012300

# SECTION 012500 - SUBSTITUTION PROCEDURES

## PART 1 - GENERAL

### 1.1 SUMMARY

A. Section includes administrative and procedural requirements for substitutions.

B. Related Requirements:

1. Section 016000 "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.

### 1.2 DEFINITIONS

A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

### 1.3 ACTION SUBMITTALS

A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Substitution Request Form: Use CSI Form 13.1A.
2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:

    a. Statement indicating why specified product or fabrication, or installation cannot be provided, if applicable.
    b. Coordination information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.
    c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
    d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
    e. Certificates and qualification data, where applicable or requested.
    f. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
    g. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
    h. Research reports evidencing compliance with building code in effect for Project, from all applicable codes.
    i. Cost information, including a proposal of change, if any, in the Contract Sum.

3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Architect will notify Contractor through Construction Manager of acceptance or rejection of proposed substitution within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.

    a. Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.
    b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

1.4 QUALITY ASSURANCE

A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers.

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 15 days prior to time required for preparation and review of related submittals.

1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied:

    a. Requested substitution is consistent with the Contract Documents and will produce indicated results.

    b. Requested substitution will not adversely affect Contractor's construction schedule.

    c. Requested substitution has received necessary approvals of authorities having jurisdiction.

    d. Requested substitution is compatible with other portions of the Work.

    e. Requested substitution has been coordinated with other portions of the Work.

    f. Requested substitution provides specified warranty.

    g. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

B. Substitutions for Convenience: Architect will consider requests for substitution if received within 30 days after the Notice of Award.

1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied:

    a. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.

b. Requested substitution does not require extensive revisions to the Contract Documents.

c. Requested substitution is consistent with the Contract Documents and will produce indicated results.

d. Requested substitution will not adversely affect Contractor's construction schedule.

e. Requested substitution has received necessary approvals of authorities having jurisdiction.

f. Requested substitution is compatible with other portions of the Work.

g. Requested substitution has been coordinated with other portions of the Work.

h. Requested substitution provides specified warranty.

i. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

PART 3 - EXECUTION (Not Used)

END OF SECTION 012500

# SECTION 013300 - 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 017823 "Operation and Maintenance Data" for submitting operation and maintenance manuals.
2. Section 017839 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.

### 1.2 DEFINITIONS

A. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action.

B. Informational Submittals: Written and graphic information and physical samples that do not require Architect'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 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 Agreement form acceptable to Owner and Architect 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 reserves 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. Architect 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. 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.
4. Transmittal Form for Electronic Submittals: Use software-generated form from electronic project management software electronic form acceptable to Owner, containing the following information:

    a. Project name.
    b. Date.
    c. Name and address of Architect.
    d. Name of Contractor.
    e. Name of firm or entity that prepared submittal.
    f. Names of subcontractor, manufacturer, and supplier.
    g. Category and type of submittal.
    h. Submittal purpose and description.
    i. Specification paragraph number or drawing designation and generic name for each of multiple items.
    j. Drawing number and detail references, as appropriate.
    k. Location(s) where product is to be installed, as appropriate.
    l. Related physical samples submitted directly.
    m. Indication of full or partial submittal.
    n. Transmittal number numbered consecutively.
    o. Other necessary identification.

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.
    e.

E. Options: Identify options requiring selection by Architect.

F. Deviations: Identify deviations from the Contract Documents on submittals.

G. 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 action stamp.

H. 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.

I. 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 action stamp.

## PART 2 - PRODUCTS

### 2.1 SUBMITTAL PROCEDURES

A. General Submittal Procedure Requirements:

1. Post electronic submittals as PDF electronic files directly to specifically established for Project.

    a. Architect will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.

2. Submit electronic submittals via email as PDF electronic files.

    a. Architect will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.

3. Action Submittals: Submit six paper copies of each submittal unless otherwise indicated. Architect, through Construction Manager, will return four copies.
4. Informational Submittals: Submit two paper copies of each submittal unless otherwise indicated. Architect will not return copies.
5. 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.

4. For equipment, include the following in addition to the above, as applicable:

a. Wiring diagrams showing factory-installed wiring.
b. 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 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 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. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Section 017700 "Closeout Procedures."

F. Maintenance Data: Comply with requirements specified in Section 017823 "Operation and Maintenance Data."

G. 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.

H. Schedule of Tests and Inspections: Comply with requirements specified in Section 014000 "Quality Requirements."

I. 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.

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 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.

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 ACTION

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

B. Action Submittals: Architect will review each submittal, make marks to indicate corrections or revisions required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action.

C. On advice of counsel, retain appropriate terms for action stamp and insert term and explanation of each action taken in subparagraph below. See Evaluations.

D. Informational Submittals: Architect will review each submittal and will not return it or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.

E. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.

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

END OF SECTION 013300

# SECTION 014000 - QUALITY REQUIREMENTS

## PART 1 - GENERAL

### 1.1 SUMMARY

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

B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
   1. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
   2. Requirements for Contractor to provide quality-assurance and -control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.
   3. Specific test and inspection requirements are not specified in this Section.

### 1.2 DEFINITIONS

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

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

C. Mockups: Full-size physical assemblies that are constructed on-site. Mockups are constructed to verify selections made under Sample submittals; to demonstrate aesthetic effects and, where indicated, qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.

D. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.

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

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

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

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

I. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
   1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).

J. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

## 1.3 CONFLICTING REQUIREMENTS

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

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

## 1.4 INFORMATIONAL SUBMITTALS

A. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility sent to authorities having jurisdiction before starting work on the following systems:

   1. Seismic-force-resisting system, designated seismic system, or component listed in the designated seismic system quality-assurance plan prepared by Architect.
   2. Main wind-force-resisting system or a wind-resisting component listed in the wind-force-resisting system quality-assurance plan prepared by Architect.

B. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.

## 1.5 REPORTS AND DOCUMENTS

A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:

   1. Date of issue.
   2. Project title and number.
   3. Name, address, and telephone number of testing agency.

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

B. Manufacturer's Field Reports: Prepare written information documenting tests and inspections specified in other Sections. Include the following:

1. Name, address, and telephone number of representatives making report.
2. Statement on condition of substrates and their acceptability for installation of product.
3. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
4. Results of operational and other tests and a statement of whether observed performance complies with requirements.
5. Other required items indicated in individual Specification Sections.

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

1.6 QUALITY ASSURANCE

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

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

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

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

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

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

1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.

G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329 Insert standard; and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.
1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.

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

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

1. Contractor responsibilities include the following:

a. Provide test specimens representative of proposed products and construction.
b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
c. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
d. When testing is complete, remove test specimens, assemblies, mockups; do not reuse products on Project.

2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.

J. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:

1. Build mockups in location and of size indicated or, if not indicated, as directed by Architect.
2. Notify Architect seven days in advance of dates and times when mockups will be constructed.
3. Demonstrate the proposed range of aesthetic effects and workmanship.
4. Obtain Architect's approval of mockups before starting work, fabrication, or construction.

a. Allow seven days for initial review and each re-review of each mockup.

5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.

6. Demolish and remove mockups when directed unless otherwise indicated.

1.7 QUALITY CONTROL

A. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.

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

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

2. Notify testing agencies at least 24 hours in advance of time when work that requires testing or inspecting will be performed.
3. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
4. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

B. Manufacturer's Field Services: Where indicated, engage a manufacturer's representative to observe and inspect the Work. Manufacturer's representative's services include examination of substrates and conditions, verification of materials, inspection of completed portions of the Work, and submittal of written reports.

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

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

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

E. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
1. Access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.

3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
4. Facilities for storage and field curing of test samples.
5. Delivery of samples to testing agencies.
6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
7. Security and protection for samples and for testing and inspecting equipment at Project site.

F. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
1. Schedule times for tests, inspections, obtaining samples, and similar activities.

1.8 SPECIAL TESTS AND INSPECTIONS

A. Special Tests and Inspections: Conducted by a qualified testing agency as required by authorities having jurisdiction, as indicated in individual Specification Sections and in Statement of Special Inspections attached to this Section, and as follows:

1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviews the completeness and adequacy of those procedures to perform the Work.
2. Notifying Architect and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
3. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect with copy to Contractor and to authorities having jurisdiction.
4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
6. Retesting and reinspecting corrected work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:
1. Date test or inspection was conducted.
2. Description of the Work tested or inspected.
3. Date test or inspection results were transmitted to Architect.
4. Identification of testing agency or special inspector conducting test or inspection.

B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Architect's reference during normal working hours.

3.2 REPAIR AND PROTECTION

A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
   1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 017300 "Execution."

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

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

END OF SECTION 014000

# SECTION 016000 - PRODUCT REQUIREMENTS

## PART 1 - GENERAL

### 1.1 SUMMARY

A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.

B. Related Requirements:

1. Section 012500 "Substitution Procedures" for requests for substitutions.

### 1.2 DEFINITIONS

A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature, that is current as of date of the Contract Documents.
2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
3. Comparable Product: Product that is demonstrated and approved through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

B. Basis-of-Design Product Specification: A specification in which a specific manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of additional manufacturers named in the specification.

### 1.3 ACTION SUBMITTALS

A. Comparable Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Architect will notify Contractor of approval or rejection of proposed comparable product request within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.

a. Form of Approval: As specified in Section 013300 "Submittal Procedures."

b. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.

B. Basis-of-Design Product Specification Submittal: Comply with requirements in Section 013300 "Submittal Procedures." Show compliance with requirements.

1.4 QUALITY ASSURANCE

A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.

B. Delivery and Handling:

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.

C. Storage:

1. Store products to allow for inspection and measurement of quantity or counting of units.
2. Store materials in a manner that will not endanger Project structure.
3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
4. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
6. Protect stored products from damage and liquids from freezing.

1.6 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.

2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.

1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
3. Refer to other Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: Comply with requirements in Section 017700 "Closeout Procedures."

## PART 2 - PRODUCTS

### 2.1 PRODUCT SELECTION PROCEDURES

A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.

1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
4. Where products are accompanied by the term "as selected," Architect will make selection.
5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.

B. Product Selection Procedures:

1. Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
3. Products:

a. Nonrestricted List: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product.

4. Manufacturers:

a. Nonrestricted List: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed, or a product by an unnamed manufacturer, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed manufacturer's product.

5. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.

2.2 COMPARABLE PRODUCTS

A. Conditions for Consideration: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with these requirements:

1. Evidence that the proposed product does not require revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
3. Evidence that proposed product provides specified warranty.
4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
5. Samples, if requested.

PART 3 - EXECUTION (Not Used)

END OF SECTION 016000

# SECTION 017300 - EXECUTION

## PART 1 - GENERAL

### 1.1 SUMMARY

A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:

1. Construction layout.
2. Field engineering and surveying.
3. Installation of the Work.
4. Cutting and patching.
5. Coordination of Owner-installed products.
6. Progress cleaning.
7. Starting and adjusting.
8. Protection of installed construction.

B. Related Requirements:

1. Section 011000 "Summary" for limits on use of Project site.
2. Section 017700 "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.

### 1.2 INFORMATIONAL SUBMITTALS

A. Certificates: Submit certificate signed by land surveyor certifying that location and elevation of improvements comply with requirements.

B. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

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

1. For projects requiring compliance with sustainable design and construction practices and procedures, use products for patching that comply with requirements of Section 018113.13 "Sustainable Design Requirements - LEED for New Construction and Major Renovations," Section 018113.16 "Sustainable Design Requirements - LEED for Commercial Interiors," Section 018113.19 "Sustainable Design Requirements - LEED for Core and Shell Development," and Section 018113.23 "Sustainable Design Requirements - LEED for Schools."

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

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

PART 3 - EXECUTION

3.1 EXAMINATION

A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, and other construction affecting the Work.

1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping, underground electrical services, and other utilities.
2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.

B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

C. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Existing Utility Information: Furnish information to local utility Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.

B. Field Measurements: **Take field measurements as required to fit the Work properly**. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

**D.** Review of Contract Documents and Field Conditions: **Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Architect according to requirements in Section 013100 "Project Management and Coordination."**

## 3.3 CONSTRUCTION LAYOUT

A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect promptly.

B. General: Engage a land surveyor professional engineer to lay out the Work using accepted surveying practices.

1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
2. Establish limits on use of Project site.
3. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
4. Inform installers of lines and levels to which they must comply.
5. Check the location, level and plumb, of every major element as the Work progresses.
6. Notify Architect when deviations from required lines and levels exceed allowable tolerances.
7. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.

C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.

D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.

E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect.

## 3.4 FIELD ENGINEERING

A. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.

B. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.

1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.

C. Certified Survey: On completion of foundation walls, major site improvements, and other work requiring field-engineering services, prepare a certified survey showing dimensions, locations, angles, and elevations of construction and sitework.

D. Final Property Survey: Engage a land surveyor to prepare a final property survey showing significant features (real property) for Project. Include on the survey a certification, signed by land surveyor, that principal metes, bounds, lines, and levels of Project are accurately positioned as shown on the survey.

1. Recording: At Substantial Completion, have the final property survey recorded by or with authorities having jurisdiction as the official "property survey."

## 3.5 INSTALLATION

A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.

1. Make vertical work plumb and make horizontal work level.
2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.

D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.

E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.

F. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.

G. Templates: Obtain and distribute to the parties' involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.

1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
2. Allow for building movement, including thermal expansion and contraction.
3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

I. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

J. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.6 CUTTING AND PATCHING

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

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

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

C. Temporary Support: Provide temporary support of work to be cut.

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

E. Adjacent Occupied Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

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

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

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

H. Patching: Patch construction by filling, repairing, refinishing, closing, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.

I. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

## 3.7 PROGRESS CLEANING

A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.

1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F.
3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.

B. Site: Maintain Project site free of waste materials and debris.

C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.

1. Remove liquid spills promptly.
2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways.

H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

## 3.8 STARTING AND ADJUSTING

A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

B. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.

C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Manufacturer's Field Service: Comply with qualification requirements in Section 014000 "Quality Requirements"

## 3.9 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

B. Comply with manufacturer's written instructions for temperature and relative humidity.

END OF SECTION 017300

# SECTION 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

## PART 1 - GENERAL

### 1.1 SUMMARY

A. Section includes administrative and procedural requirements for the following:

1. Salvaging nonhazardous demolition and construction waste.
2. Recycling nonhazardous demolition and construction waste.
3. Disposing of nonhazardous demolition and construction waste.

### 1.2 DEFINITIONS

A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.

B. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.

C. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.

D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.

E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.

F. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

## PART 2 - PRODUCTS (Not Used)

## PART 3 - EXECUTION

### 3.1 PLAN IMPLEMENTATION

A. General: Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.

B. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work occurring at Project site.

1. Distribute waste management plan to everyone concerned within three days of submittal return.
2. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.

C. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

## 3.2 RECYCLING DEMOLITION AND CONSTRUCTION WASTE, GENERAL

A. General: Recycle paper and beverage containers used by on-site workers.

B. Recycling Receivers and Processors: List below is provided for information only; available recycling receivers and processors include, but are not limited to, the following:

1. MARPAN.

C. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall accrue to Contractor.

D. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical according to approved construction waste management plan.

1. Provide appropriately marked containers or bins for controlling recyclable waste until they are removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.

a. Inspect containers and bins for contamination and remove contaminated materials if found.

2. Remove recyclable waste from Owner's property and transport to recycling receiver or processor.

## 3.3 RECYCLING DEMOLITION WASTE

A. Asphalt Paving: Break up and transport paving to asphalt-recycling facility.

B. Concrete: Remove reinforcement and other metals from concrete and sort with other metals.

C. Masonry: Remove metal reinforcement, anchors, and ties from masonry and sort with other metals.

D. Metals: Separate metals by type.

## 3.4 RECYCLING CONSTRUCTION WASTE

A. Packaging:

1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.

2. Polystyrene Packaging: Separate and bag materials.
3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.
4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.

3.5 DISPOSAL OF WASTE

A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.

1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Burning: Do not burn waste materials.

C. N/A

D. Disposal: Remove waste materials from Owner's property and legally dispose of them.

END OF SECTION 017419

# SECTION 017700 - CLOSEOUT PROCEDURES

## PART 1 - GENERAL

### 1.1 SUMMARY

A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:

1. Substantial Completion procedures.
2. Final completion procedures.
3. Warranties.
4. Final cleaning.
5. Repair of the Work.

B. Related Requirements:

1. Section 017823 "Operation and Maintenance Data" for operation and maintenance manual requirements.
2. Section 017839 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.

### 1.2 ACTION SUBMITTALS

A. Product Data: For cleaning agents.

B. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.

### 1.3 CLOSEOUT SUBMITTALS

A. Certificates of Release: From authorities having jurisdiction.

B. Certificate of Insurance: For continuing coverage.

C. Field Report: For pest control inspection.

### 1.4 MAINTENANCE MATERIAL SUBMITTALS

A. Schedule of Maintenance Material Items: For maintenance material submittal items specified in other Sections.

### 1.5 SUBSTANTIAL COMPLETION PROCEDURES

A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.

B. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
2. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information.
3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by. Label with manufacturer's name and model number where applicable.

    a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section. Obtain signature for receipt of submittals.

5. Submit test/adjust/balance records.
6. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.

C. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Advise Owner of pending insurance changeover requirements.
2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
3. Complete startup and testing of systems and equipment.
4. Perform preventive maintenance on equipment used prior to Substantial Completion.
5. Advise Owner of changeover in heat and other utilities.
6. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
7. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
8. Complete final cleaning requirements, including touchup painting.
9. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for final completion.

1.6 FINAL COMPLETION PROCEDURES

A. Preliminary Procedures: Before requesting final inspection for determining final completion, complete the following:

1. Submit a final Application for Payment according to Section 012900 "Payment Procedures."
2. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Submit pest-control final inspection report and warranty.
5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings.

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

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.7 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.

1. Organize list of spaces in sequential order, starting with exterior areas first and proceeding from lowest floor to highest floor.
2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
3. Submit list of incomplete items in the following format:

a. MS Excel electronic file. Architect will return annotated copy.

1.8 SUBMITTAL OF PROJECT WARRANTIES

A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated, or when delay in submittal of warranties might limit Owner's rights under warranty.

B. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.

1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.

2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
4. Warranty Electronic File: Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide bookmarked table of contents at beginning of document.

C. Provide additional copies of each warranty to include in operation and maintenance manuals.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

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

## PART 3 - EXECUTION

### 3.1 FINAL CLEANING

A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:

    a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
    b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
    c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
    d. Remove tools, construction equipment, machinery, and surplus material from Project site.
    e. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.

f. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
g. Sweep concrete floors broom clean in unoccupied spaces.
h. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
i. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
j. Remove labels that are not permanent.
k. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
l. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
m. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
n. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.
o. Leave Project clean and ready for occupancy.

## 3.2 REPAIR OF THE WORK

A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.

B. Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specify condition.

1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.
2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that that already show evidence of repair or restoration.

    a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.

3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

END OF SECTION 017700

# SECTION 017823 - OPERATION AND MAINTENANCE DATA

## PART 1 - GENERAL

### 1.1 SUMMARY

A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:

1. Operation and maintenance documentation directory.
2. Operation manuals for systems, subsystems, and equipment.
3. Product maintenance manuals.

### 1.2 CLOSEOUT SUBMITTALS

A. Manual Content: Operations and maintenance manual content is specified in individual Specification Sections to be reviewed at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.

1. Architect will comment on whether content of operations and maintenance submittals are acceptable.
2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.

B. Format: Submit operations and maintenance manuals in the following format:

1. PDF electronic file. Assemble each manual into a composite electronically indexed file. Submit on digital media acceptable to Architect.

   a. Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically linked operation and maintenance directory.
   b. Enable inserted reviewer comments on draft submittals.

2. Three paper copies. Include a complete operation and maintenance directory. Enclose title pages and directories in clear plastic sleeves. Architect will return two copies.

C. Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 15 days before commencing demonstration and training. Architect will return copy with comments.

1. Correct or revise each manual to comply with Architect's comments. Submit copies of each corrected manual within 15 days of receipt of Architect's comments and prior to commencing demonstration and training.

PART 2 - PRODUCTS

2.1 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

A. Directory: Prepare a single, comprehensive directory of emergency, operation, and maintenance data and materials, listing items and their location to facilitate ready access to desired information.

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

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

C. Title Page: Include the following information:

1. Subject matter included in manual.
2. Name and address of Project.
3. Name and address of Owner.
4. Date of submittal.
5. Name and contact information for Contractor.
6. Name and contact information for Architect.
7. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.

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

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

F. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.

1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
2. File Names and Bookmarks: Enable bookmarking of individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.

G. Manuals, Paper Copy: Submit manuals in the form of hard copy, bound and labeled volumes.

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

    a. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents. Indicate volume number for multiple-volume sets.

2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment.
4. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.

    a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
    b. If drawings are too large to be used as foldouts, fold, and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

## 2.2 OPERATION MANUALS

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

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

B. Descriptions: Include the following:

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

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

1. Startup procedures.
2. Equipment or system break-in procedures.
3. Routine and normal operating instructions.
4. Regulation and control procedures.
5. Instructions on stopping.
6. Normal shutdown instructions.
7. Seasonal and weekend operating instructions.
8. Required sequences for electric or electronic systems.
9. Special operating instructions and procedures.

## 2.3 PRODUCT MAINTENANCE MANUALS

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

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

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

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

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

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

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

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

# PART 3 - EXECUTION

## 3.1 MANUAL PREPARATION

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

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

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

D. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.
   1. Do not use original project record documents as part of operation and maintenance manuals.

E. Comply with Section 017700 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION 017823

# SECTION 017839 - PROJECT RECORD DOCUMENTS

## PART 1 - GENERAL

### 1.1 SUMMARY

A. Section includes administrative and procedural requirements for project record documents, including the following:

1. Record Drawings.
2. Record Specifications.
3. Record Product Data.

B. Related Requirements:

1. Section 017823 "Operation and Maintenance Data" for operation and maintenance manual requirements.

### 1.2 CLOSEOUT SUBMITTALS

A. Record Drawings: Comply with the following:

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

a. Initial Submittal:

1) Submit PDF electronic files of scanned record prints and one set(s) of file prints.
2) Submit record digital data files and one set(s) of plots.
3) Architect will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.

b. Final Submittal:

1) Submit PDF electronic files of scanned record prints and one set(s) of prints.
2) Print each drawing, whether or not changes and additional information were recorded.

B. Record Specifications: Submit one paper copy and annotated PDF electronic files of Project's Specifications, including addenda and contract modifications.

C. Record Product Data: Submit one paper copy and annotated PDF electronic files and directories of each submittal.

## PART 2 - PRODUCTS

### 2.1 RECORD DRAWINGS

A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised Drawings as modifications are issued.

1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.

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

2. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
3. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
4. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

B. Record Digital Data Files: Immediately before inspection for Certificate of Substantial Completion, review marked-up record prints with Architect. When authorized, prepare a full set of corrected digital data files of the Contract Drawings, as follows:

1. Format: Annotated PDF electronic file with comment function enabled.
2. Architect will furnish Contractor one set of digital data files of the Contract Drawings for use in recording information.

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

1. Record Prints: Organize record prints and newly prepared record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
2. Format: Annotated PDF electronic file with comment function enabled.
3. Record Digital Data Files: Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each digital data file.
4. Identification: As follows:

    a. Project name.
    b. Date.
    c. Designation "PROJECT RECORD DRAWINGS."
    d. Name of Architect.
    e. Name of Contractor.

## 2.2 RECORD SPECIFICATIONS

A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.

4. Note related Change Orders, record Product Data, and record Drawings where applicable.

B. Format: Submit record Specifications as annotated PDF electronic file paper copy.

2.3 RECORD PRODUCT DATA

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

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
3. Note related Change Orders, record Specifications, and record Drawings where applicable.

B. Format: Submit record Product Data as annotated PDF electronic file paper copy.

2.4 MISCELLANEOUS RECORD SUBMITTALS

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

B. Format: Submit miscellaneous record submittals as PDF electronic file paper copy.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and revisions to project record documents as they occur; do not wait until end of Project.

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

END OF SECTION 017839

# SECTION 024119 - SELECTIVE DEMOLITION

## PART 1 - GENERAL

### 1.1 SUMMARY

A. Section Includes:

1. Demolition and removal of selected elements.
2. Salvage of existing items to be reused or recycled.

### 1.2 DEFINITIONS

A. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and salvaged or removed and reinstalled.

B. Remove and Salvage: Carefully detach from existing construction, in a manner to prevent damage, and deliver to Owner ready for reuse.

C. Remove and Reinstall: Detach items from existing construction, prepare for reuse, and reinstall where indicated.

D. Existing to Remain: Existing items of construction that are not to be permanently removed and that are not otherwise indicated to be removed, removed, and salvaged, or removed and reinstalled.

### 1.3 FIELD CONDITIONS

A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.

B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

D. Storage or sale of removed items or materials on-site is not permitted.

E. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.

1. Maintain fire-protection facilities in service during selective demolition operations.

## PART 2 - PRODUCTS

### 2.1 PEFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

B. Standards: Comply with ANSI/ASSE A10.6 and NFPA 241.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

A. Verify that utilities have been disconnected and capped before starting selective demolition operations.

B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.

C. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate, and measure the nature and extent of conflict. Promptly submit a written report to Architect.

### 3.2 PREPARATION

A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

### 3.3 SELECTIVE DEMOLITION, GENERAL

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:

1. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering, and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
2. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
3. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain fire watch and portable fire-suppression devices during flame-cutting operations.
4. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
5. Dispose of demolished items and materials promptly. Comply with requirements in Section 017419 "Construction Waste Management and Disposal."

B. Removed and Salvaged Items:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers.

3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's storage area designated by Owner.
5. Protect items from damage during transport and storage.

C. Removed and Reinstalled Items:

1. Clean and repair items to functional condition adequate for intended reuse.
2. Pack or crate items after cleaning and repairing. Identify contents of containers.
3. Protect items from damage during transport and storage.
4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

D. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

## 3.4 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Except for items or materials indicated to be recycled, reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.

1. Do not allow demolished materials to accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
4. Comply with requirements specified in Section 017419 "Construction Waste Management and Disposal."

B. Burning: Do not burn demolished materials.

C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

## 3.5 CLEANING

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION 024119

# SECTION 061000 - ROUGH CARPENTRY

## PART 1 - GENERAL

### 1.1 SUMMARY

A. Section Includes:
   1. Wood blocking.

## PART 2 - PRODUCTS

### 2.1 WOOD-PRESERVATIVE-TREATED LUMBER

A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with the ground, Use Category UC3b for exterior construction not in contact with the ground, and Use Category UC4a for items in contact with the ground.

   1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium. Do not use inorganic boron (SBX) for sill plates.

B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or that does not comply with requirements for untreated material.

C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.

D. Application: Treat items indicated on Drawings, and the following:

   1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
   2. Wood sills, sleepers, blocking, and similar concealed members in contact with masonry or concrete.
   3. Wood floor plates that are installed over concrete slabs-on-grade.

### 2.2 PLYWOOD BACKING PANELS

A. Equipment Backing Panels: DOC PS 1, Exterior, AC, fire-retardant treated, in thickness indicated or, if not indicated, not less than 3/4-inch (19-mm) nominal thickness.

### 2.3 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.

1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.

B. Power-Driven Fasteners: NES NER-272.

C. Bolts: Steel bolts complying with ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with ASTM A 563 (ASTM A 563M) hex nuts and, where indicated, flat washers.

## 2.4 MISCELLANEOUS MATERIALS

A. Sill-Sealer Gaskets: Glass-fiber-resilient insulation, fabricated in strip form, for use as a sill sealer; 1-inch (25-mm) nominal thickness, compressible to 1/32 inch (0.8 mm); selected from manufacturer's standard widths to suit width of sill members indicated.

B. Sill-Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch (6.4 mm) thick, selected from manufacturer's standard widths to suit width of sill members indicated.

# PART 3 - EXECUTION

## 3.1 INSTALLATION, GENERAL

A. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry to other construction; scribe and cope as needed for accurate fit. Locate nailers, blocking, and similar supports to comply with requirements for attaching other construction.

B. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.

C. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.

D. Install fire-retardant treated plywood backing panels with classification marking of testing agency exposed to view.

E. Shear Wall Panels: Install shear wall panels to comply with manufacturer's written instructions.

F. Metal Framing Anchors: Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.

G. Do not splice structural members between supports unless otherwise indicated.

H. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.

I. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.

J. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:

1. NES NER-272 for power-driven fasteners.
2. Table 2304.9.1, "Fastening Schedule," in FBC's International Building Code.
3. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in FBC's International Residential Code for One- and Two-Family Dwellings.

3.2 PROTECTION

A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

B. Protect rough carpentry from weather. If, despite protection, rough carpentry becomes sufficiently wet that moisture content exceeds that specified, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 061000

# SECTION 064023 - INTERIOR ARCHITECTURAL WOODWORK

## 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 standing and running trim.

B. Related Requirements:

1. Section 061000 "Rough Carpentry" for wood furring, blocking, shims, and hanging strips required for installing interior architectural woodwork that are concealed within other construction before interior architectural woodwork installation.

### 1.3 COORDINATION

A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that interior architectural woodwork can be supported and installed as indicated.

### 1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

### 1.5 ACTION SUBMITTALS

A. Samples: For each exposed product and for each color and finish specified, in manufacturer's or fabricator's standard size.

### 1.6 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver interior architectural woodwork until painting and similar finish operations that might damage woodwork have been completed in installation areas. Store woodwork in installation areas or in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.

1.7 FIELD CONDITIONS

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

B. Environmental Limitations: Do not deliver or install interior architectural woodwork until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature between 60 and 90 deg F and relative humidity between 25 and 55 percent during the remainder of the construction period.

C. Field Measurements: Where interior architectural woodwork is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Locate concealed framing, blocking, and reinforcements that support woodwork by field measurements before being concealed by construction, and indicate measurements on Shop Drawings.

D. Established Dimensions: Where interior architectural woodwork is indicated to fit to other construction, establish dimensions for areas where woodwork is to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

PART 2 - PRODUCTS

2.1 INTERIOR ARCHITECTURAL WOODWORK, GENERAL

A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades of interior architectural woodwork indicated for construction, finishes, installation, and other requirements.

1. Provide inspections of fabrication and installation together with labels and certificates from AWI certification program indicating that woodwork complies with requirements of grades specified.
2. The Contract Documents contain requirements that are more stringent than the referenced quality standard. Comply with requirements of Contract Documents in addition to those of the referenced quality standard.

2.2 INTERIOR STANDING AND RUNNING TRIM FOR TRANSPARENT FINISH

A. Grade: Premium.

B. Wood Species and Cut:

1. Species: White Maple.
2. Cut: Quarter cut/quarter sawn.

C. For trim items other than base wider than available lumber, use veneered construction. Do not glue for width.

1. For veneered base, use hardwood lumber core, glued for width.

D. For base wider than available lumber, glue for width. Do not use veneered construction.

E. For rails thicker than available lumber, use veneered construction. Do not glue for thickness.

## 2.3 INTERIOR STANDING AND RUNNING TRIM FOR OPAQUE FINISH

A. Grade: Premium.

B. Wood Species: Poplar.

## 2.4 FABRICATION

A. Sand fire-retardant-treated wood lightly to remove raised grain on exposed surfaces before fabrication.

B. Fabricate interior architectural woodwork to dimensions, profiles, and details indicated. Ease edges to radius indicated for the following:

1. Edges of Solid-Wood (Lumber) Members: 1/16 inch unless otherwise indicated.
2. Edges of Rails and Similar Members More Than 3/4 Inch Thick: 1/8 inch.

C. Complete fabrication, including assembly, 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 allowance for scribing, trimming, and fitting.

1. Notify Architect seven days in advance of the dates and times interior architectural woodwork fabrication will be complete.
2. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that parts fit as intended and check measurements of assemblies against field measurements indicated on approved Shop Drawings before disassembling for shipment.

# PART 3 - EXECUTION

## 3.1 PREPARATION

A. Before installation, condition interior architectural woodwork to average prevailing humidity conditions in installation areas.

B. Before installing interior architectural woodwork, examine shop-fabricated work for completion and complete work as required, including removal of packing and back priming.

3.2 INSTALLATION

A. Grade: Install interior architectural woodwork to comply with same grade as item to be installed.

B. Assemble interior architectural woodwork and complete fabrication at Project site to the extent that it was not completed in the shop.

C. Install interior architectural woodwork level, plumb, true in line, and without distortion. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches.

D. Scribe and cut interior architectural woodwork to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.

E. Preservative-Treated Wood: Where cut or drilled in field, treat cut ends and drilled holes according to AWPA M4.

F. Fire-Retardant-Treated Wood: Handle, store, and install fire-retardant-treated wood to comply with chemical treatment manufacturer's written instructions, including those for adhesives used to install woodwork.

G. Anchor interior architectural woodwork 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 interior architectural woodwork.

1. For shop-finished items, use filler matching finish of items being installed.

H. Standing and Running Trim: Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to greatest extent possible. Do not use pieces less than 60 inches long except where shorter single-length pieces are necessary.

1. Scarf running joints and stagger in adjacent and related members.
2. Fill gaps, if any, between top of base and wall with plastic wood filler; sand smooth; and finish same as wood base if finished.
3. Install standing and running trim with no more variation from a straight line than 1/8 inch in 96 inches.

I. Railings: Install rails with no more than 1/8 inch in 96-inch variation from a straight line.

1. Stair Rails: Glue and dowel or pin balusters to treads and railings, and railings to newel posts.
2. Wall Rails: Support rails on indicated metal brackets securely fastened to wall framing.

a. Space rail brackets not more than 48 inches o.c.

J. Touch up finishing work specified in this Section after installation of interior architectural woodwork. Fill nail holes with matching filler where exposed.

1. Apply specified finish coats, including stains and paste fillers if any, to exposed surfaces where only sealer/prime coats are shop applied.

K. See Section 099300 "Staining and Transparent Finishing" for final finishing of installed interior architectural woodwork not indicated to be shop finished.

## 3.3 ADJUSTING AND CLEANING

A. Repair damaged and defective interior architectural woodwork, where possible, to eliminate functional and visual defects. Where not possible to repair, replace interior architectural woodwork. Adjust joinery for uniform appearance.

B. Clean interior architectural woodwork on exposed and semi exposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

END OF SECTION 064023

# SECTION 064116 - 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 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. Thermoset decorative panels, for each color, pattern, and surface finish

### 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: Premium.

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

    a. Wilsonart International; Div. of Premark International, Inc.

F. Laminate Cladding for Exposed Surfaces:

1. Horizontal Surfaces: Grade HGS.
2. Vertical Surfaces: Grade VGS.

G. Materials for Semi exposed Surfaces:

1. Surfaces Other Than Drawer Bodies: High-pressure decorative laminate, NEMA LD 3, Grade VGS.
2. Drawer Sides and Backs: Solid-hardwood lumber.
3. Drawer Bottoms: Hardwood plywood.

H. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:

1. Plastic Laminate Cabinets:
    a. PL1 – CABINETS/WALLS: WILSONART, MONTANA WALNUT 7110K-78

2. Plastic Laminate Countertops:
    a. PL2 – COUNTERTOP: WILSONART, MUSHROOM 5013K-19, LENO WEAVE FINIS

3. Plastic Laminate Sink Shroud:
    a. PL3 - SINK SHROUD: WILSONART, BATTLESHIP 5014K-19, LENO WEAVE FINISH

4. As indicated by laminate manufacturer's designations.

## 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.

1. Wood Moisture Content: 5 to 10 percent.

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

1. Softwood Plywood: DOC PS 1, medium-density overlay.
2. Veneer-Faced Panel Products (Hardwood Plywood): HPVA HP-1, made with adhesive containing no urea formaldehyde.

## 2.3 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 (Descriptive Specification)."

B. Frameless Concealed Hinges (European Type): BHMA A156.9, B01602, 170 degrees of opening, self-closing.

C. Wire Pulls: Hafele Pull Cube (H1935), Aluminum, Back mounted, 5 inches long

D. Adjustable Shelf Standards and Supports: BHMA A156.9, B04071; with shelf rests, B04081.

E. Drawer Slides: BHMA A156.9.

1. Grade 1 and Grade 2: Side mounted and extending under bottom edge of drawer; full-extension type; zinc-plated steel with polymer rollers.
2. Grade 1HD-100 and Grade 1HD-200: Side mounted; full-extension type; zinc-plated-steel ball-bearing slides.
3. For drawers not more than 3 inches high and not more than 24 inches wide, provide Grade 1.
4. For drawers more than 3 inches high but not more than 6 inches high and not more than 24 inches wide, provide Grade 1HD-100.
5. For drawers more than 6 inches high or more than 24 inches wide, provide Grade 1HD-100.
6. For computer keyboard shelves, provide Grade 1HD-100.
7. For trash bins not more than 20 inches high and 16 inches wide, provide Grade 1HD-100.

F. Door Locks: BHMA A156.11, E07121.

G. Drawer Locks: BHMA A156.11, E07041.

H. Door and Drawer Silencers: BHMA A156.16, L03011.

I. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.

1. Satin Chromium Plated: BHMA 626 for brass or bronze base; BHMA 652 for steel base.

## 2.4 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.

2.5 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.

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 screws sized for not less than 1-1/2-inch penetration into wood framing, blocking, or hanging strips.

**See Section 123661.19 Quartz Surfacing Countertops**

END OF SECTION 064116

# SECTION 072119 - FOAMED-IN-PLACE INSULATION

## PART 1 GENERAL

### 1.01 SUMMARY

A. Section Includes: This Section specifies open cell, low-density, spray foam insulation.

B. Related Requirements:
   1. Section 072100 Thermal Inslation
   2. Section 079200 Joint Sealants.

### 1.02 REFERENCES

A. Reference Standards:
   1. ASTM International (ASTM):
      a. ASTM C518 Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
      b. ASTM D1623 Standard Test Method for Tensile and Tensile Adhesion Properties of Rigid Cellular Plastics.
      c. ASTM D1622 Standard Test Method for Apparent Density of Rigid Cellular Plastics.
      d. ASTM D2842 Standard Test Method for Water Absorption of Rigid Cellular Plastics.
      e. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials.
      f. ASTM E96 Standard Test Methods for Water Vapor Transmission of Materials.
      g. ASTM E283 Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls and Doors Under Specified Pressure Differences Across the Specimen.

### 1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Coordinate work of this Section with work of other trades for proper time and sequence to avoid construction delays. Comply with Section 013100 - Project Management and Coordination.

B. Preinstallation Meetings: Conduct preinstallation meeting prior to commencing work of this Section to verify project requirements, substrate conditions and coordination with other building subtrades and to review manufacturer's installation instructions and manufacturer's warranty requirements.

C. Sequencing: Sequence work of this section in accordance with manufacturer's written recommendations for sequencing construction operations.

### 1.04 ACTION SUBMITTALS

A. General: Submit listed submittals in accordance with Contract Conditions and Section 013300 - Submittal Procedures.

B. Product Data: Submit specified products as follows:
   1. Manufacturer's product data, including manufacturer's technical product sheet.

2. Catalog pages illustrating products to be incorporated into project.
3. Material Safety Data Sheets (MSDS).
4. Code Compliance Research Report.

C. Shop Drawings: Indicate information on shop drawings as follows:
1. Areas to be insulated with thickness of insulation.
2. Details of insulation joints with sealants.

1.05 INFORMATION SUBMITTALS

A. General: Submit listed submittals in accordance with Contract Conditions and Section 013300 - Submittal Procedures.

B. Test and Evaluation Reports:
1. Certified test reports showing compliance with specified performance characteristics and physical properties.

C. Manufacturer's Instructions: Submit manufacturer's storage and application instructions.

D. Source Quality Control: Submit documentation verifying that components and materials specified in this Section are from single manufacturer.

E. Qualification Statements:
1. Submit letter of verification for Manufacturer's Qualifications.
2. Submit letter of verification for Installer's Qualifications.

1.06 QUALITY ASSURANCE

A. Qualifications:
1. Manufacturer:
a. [5] years experience manufacturing components similar to or exceeding requirements of project.
b. Having sufficient capacity to produce and deliver required materials without causing delay in work.
c. Capable of providing field service representation during construction.
2. Installer: Acceptable to the manufacturer, experienced in performing work of this section and has specialized in installation of work similar to that required for this project.

1.07 DELIVERY, STORAGE & HANDLING

A. Delivery and Acceptance Requirements:
1. Deliver material in accordance with manufacturer's written instructions.
2. Deliver materials in manufacturer's original packaging with identification labels intact and in sizes to suit project.

B. Storage and Handling Requirements:
1. Store materials protected from exposure to harmful weather conditions and at temperature conditions recommended by manufacturer.

C. Packaging Waste Management:
1. Separate waste materials for recycling in accordance with Section 017419 - Construction Waste Management and Disposal.
2. Remove packaging materials from site and dispose of at appropriate recycling

facilities.

1.08 SITE CONDITIONS

A. Ambient Conditions:

1. Maintain materials, substrates and surrounding air temperature between 32 degrees F (0 degrees C) and 130 degrees F (54 degrees C) prior to, during and 48 hours after completion of foamed-in-place insulation application.

PART 2 PRODUCTS

2.01 QUIK-SHIELD 108YM

A. Manufacturer: SWD Urethane.

1. Contact: 540 South Drew Street, Mesa, AZ 85201; Phone: 800-828-1394, Phone: Fax: 480-461-6936; E-mail: sales@swdurethane.com; Website: www.swdurethane.com.
2. Single Source Responsibility: Provide components and materials specified in this section from a single manufacturer.
3. Substitution Limitations:
   a. Substitutions: In accordance with Section 012500 - Substitution Procedures.

B. Description:

1. Compatibility:
   a. Ensure components and materials are compatible with specified accessories and adjacent materials.

C. Performance Criteria:

1. Thermal Resistance (R), ASTM C518 at 180 days aged: 3.7 degrees F. $ft.^2$; h/Btu at 1 inch thickness and 3.6 degrees F. $ft.^2$; h/Btu at 3.5 inch thickness, minimum.
2. Air Leakage, ASTM E283: <0.02 L/second/$meter^2$ at 3.5” thickness.
3. Core Density, ASTM D1622: 0.36-0.04 lb./$ft.^2$, maximum.
4. Tensile Strength, ASTM D1623: 3.0 psi, minimum.
5. Flame Spread, ASTM E84: 25, maximum.
6. Smoke Developed, ASTM E84: 450, maximum.

D. Materials:

1. Low-density, open cell, two-component, spray-applied, polyurethane system.

E. Mixes:

1. In accordance with manufacturer’s recommendations.

F. Location and thickness:

1. Underside of roof sheathing: 5.5 “ and R-20

2.02 DC315 Intumescent Coating

A. DC315 intumescent coating, manufactured by IFTI, Paint to Protect, is a water-based coating supplied in 5-gallon pails and 55-gallon drums. The coating material has a shelf life of 24 months when stored in factory-sealed containers at temperatures between 41 degrees F and 95 degrees F. DC315 complies with ICC-ES AC456 as recognized in ICC-ES ESR-3702.

B. Alternate intumescent coatings

1. FS-IB intumescent coating
2. NO-BURN Plus ThB intumescent coating.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verification of Conditions: Verify that conditions of substrates previously installed under other sections or contracts are acceptable for product installation in accordance with manufacturer's instructions prior to foamed-in-place insulation application.

1. Inform Architect of unacceptable conditions immediately upon discovery.
2. Proceed with installation only after unacceptable conditions have been remedied.

3.02 PREPARATION

A. Ensure structure or substrate is adequate to support foamed-in-place insulation.

B. Surface Preparation: Prepare surface in accordance with manufacturer's written recommendations.

3.03 APPLICATION

A. Coordinate application of systems in accordance with manufacturer's written recommendations.

B. The foam plastic must be covered on all surfaces with DC135 intumescent coating at an application rate of 0.9 gallons per 100 sq. ft. to achieve 14 wet mils (9 dry mils). If alternate intumescent coating is used apply according to manufacturer's recommendations.

3.04 REPAIR

A. Coordinate repair of systems in accordance with manufacturer's written recommendations.

3.05 CLEANING

A. Upon completion, remove surplus materials, rubbish, tools and equipment.

B. Waste Management:

1. Coordinate recycling of waste materials with 017419 - Construction Waste Management and Disposal.
2. Collect recyclable waste and dispose of or recycle field generated construction waste created during demolition, construction or final cleaning.
3. Remove recycling containers and bins from site.

3.07 PROTECTION

A. Protect installed product from damage during construction in accordance with manufacturer's written recommendations.

B. Repair damage to adjacent materials caused by foamed-in-place insulation application.

END OF SECTION 072119

# SECTION 079200 - JOINT SEALANTS

## PART 1 - GENERAL

### 1.1 SUMMARY

A. Section Includes:

1. Mildew-resistant joint sealants.
2. Latex joint sealants.

### 1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

### 1.3 ACTION SUBMITTALS

A. Product Data: For each joint-sealant product.

B. Samples: For each kind and color of joint sealant required.

C. Joint-Sealant Schedule: Include the following information:

1. Joint-sealant application, joint location, and designation.
2. Joint-sealant manufacturer and product name.
3. Joint-sealant formulation.
4. Joint-sealant color.

### 1.4 PRECONSTRUCTION TESTING

A. Preconstruction Field-Adhesion Testing: Before installing sealants, field test their adhesion to Project joint substrates. Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1.1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.

### 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: Two years 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 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 JOINT SEALANTS, GENERAL

A. VOC Content of Interior Sealants: Sealants and sealant primers used inside the weatherproofing system shall comply with the following:

1. Architectural sealants shall have a VOC content of 250 g/L or less.
2. Sealants and sealant primers for nonporous substrates shall have a VOC content of 250 g/L or less.

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

2.2 MILDEW-RESISTANT JOINT SEALANTS

A. Mildew-Resistant Joint Sealants: Formulated for prolonged exposure to humidity with fungicide to prevent mold and mildew growth.

B. Silicone, Mildew Resistant, Acid Curing, S, NS, 25, NT: Mildew-resistant, single-component, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, acid-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 25, Use NT. (SS-3)

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Dow Corning Corporation; 786-M White.

C. Acrylic Latex: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF. (AS-1)

1. Products: Subject to compliance with requirements, provide one of the following:

a. BASF Construction Chemicals - Building Systems; MasterSeal NP 520.
b. Pecora Corporation; AC-20.
c. Tremco Incorporated; Tremflex 834.

D. Acoustical Acrylic Latex: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF. (AS-2)

1. Products: Subject to compliance with requirements, provide the following:

a. Pecora Corporation; AC-20 FTR
b. STI; Smoke & Sound

2.3 JOINT-SEALANT BACKING

A. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin) Type O (open-cell material) Type B (bicellular material with a surface skin) or any of the preceding types, as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide Insert manufacturer's name; product name or designation or comparable product by one of the following:

    a. BASF Construction Chemicals - Building Systems.
    b. Construction Foam Products, a division of Nomaco, Inc.

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.

## 3.3 FIELD QUALITY CONTROL

A. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:

1. Extent of Testing: Test completed and cured sealant joints as follows:

a. Perform 10 tests for the first 1000 feet of joint length for each kind of sealant and joint substrate.
b. Perform one test for each 1000 feet of joint length thereafter or one test per each floor per elevation.

2. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.

B. Evaluation of Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

## 3.4 JOINT-SEALANT SCHEDULE

A. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces not subject to significant movement AS-1.

1. Joint Locations:

a. Control joints on exposed interior surfaces of exterior walls.
b. Perimeter joints between interior wall surfaces and frames of interior doors windows.
c. Other joints as indicated on Drawings.

2. Joint Sealant: Siliconized Acrylic Latex.
3. Joint-Sealant Color: As indicated by manufacturer's designations.

B. Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces SS-3.

1. Joint Locations:

    a. Joints between plumbing fixtures and adjoining walls, floors, and counters.
    b. Tile control and expansion joints where indicated.
    c. Other joints as indicated on Drawings.

2. Joint Sealant: Silicone, mildew resistant, acid curing, S, NS, 25, NT.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

C. Joint-Sealant Application: Acoustical Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces AS-2.

1. Joint Locations:

    a. Acoustic joints.
    b. Other joints as indicated on Drawings.

2. Joint Sealant: Siliconized acrylic latex, mildew resistant, acid curing, OP, NF.
3. Joint-Sealant Color: White.

END OF SECTION 079200

SECTION 081113 - HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes hollow-metal work.

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, door edge details, frame profiles, metal thicknesses, preparations for hardware, and other details.

PART 2 - PRODUCTS

2.1 REGULATORY REQUIREMENTS

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

2.2 INTERIOR DOORS AND FRAMES

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

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

    a. Type: As indicated in the Door and Frame Schedule.
    b. Thickness: 1-3/4 inches.
    c. Face: Metallic-coated, cold-rolled steel sheet, minimum thickness of 0.042 inch.
    d. Edge Construction: Model 2, Seamless.
    e. Core: Manufacturer's standard.

3. Frames:

    a. Materials: Metallic-coated, steel sheet, minimum thickness of 0.053 inch.
    b. Frames: Fabricated from same thickness material as adjacent door frame.
    c. Construction: Knocked down.

4. Exposed Finish: Prime.

2.3 FRAME ANCHORS

A. Jamb Anchors:
1. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch thick.

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

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

2.4 MATERIALS

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

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

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

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

E. Power-Actuated Fasteners in Concrete: From corrosion-resistant materials.

F. Grout: ASTM C 476, except with a maximum slump of 4 inches, as measured according to ASTM C 143/C 143M.

G. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing).

H. Glazing: Section 088000 "Glazing."

I. Bituminous Coating: Cold-applied asphalt mastic, compounded for 15-mil dry film thickness per coat.

2.5 FABRICATION

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

B. Hollow-Metal Doors:

1. Exterior Doors: Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape. Seal joints in top edges of doors against water penetration.
2. Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated.

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

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

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

    b. Post installed Expansion Type: Locate anchors not more than 6 inches from top and bottom of frame. Space anchors not more than 26 inches o.c.

5. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers.

    a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.

D. Hardware Preparation: Factory prepare hollow-metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to SDI A250.6, the Door Hardware Schedule, and templates.

1. Reinforce doors and frames to receive no templated, mortised, and surface-mounted door hardware.
2. Comply with applicable requirements in SDI A250.6 and BHMA A156.115 for preparation of hollow-metal work for hardware.

E. Stops and Moldings: Provide stops and moldings around glazed lite where indicated. Form corners of stops and moldings with mitered hairline joints.

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

## 2.6 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 antifreeze agents.

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

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

3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation inside frames.
4. Concrete Walls: Solidly fill space between frames and concrete with mineral-fiber insulation.
5. In-Place Metal or Wood-Stud Partitions: Secure slip-on drywall frames in place according to manufacturer's written instructions.
6. 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.

B. Hollow-Metal Doors: Fit hollow-metal doors accurately in frames, within clearances specified below. Shim as necessary.

1. Non-Fire-Rated Steel Doors:

    a. Between Door and Frame Jambs and Head: 1/8 inch plus or minus 1/32 inch.

b. Between Edges of Pairs of Doors: 1/8 inch to 1/4 inch plus or minus 1/32 inch.
c. At Bottom of Door: 3/4 inch plus or minus 1/32 inch.
d. Between Door Face and Stop: 1/16 inch to 1/8 inch plus or minus 1/32 inch.

2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.

C. Glazing: Comply with installation requirements in Section 088000 "Glazing" and with hollow-metal manufacturer's written instructions.

1. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches o.c. and not more than 2 inches o.c. from each corner.

## 3.2 ADJUSTING AND CLEANING

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

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

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

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

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

END OF SECTION 081113

# SECTION 081416 - FLUSH WOOD DOORS

## PART 1 - GENERAL

### 1.1 SUMMARY

A. Section Includes:

1. Solid-core doors with plastic-laminate faces.

B. Related Requirements:

1. Section 088000 "Glazing" for glass view panels in flush wood doors.

### 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 blocking.
2. Dimensions and locations of mortises and holes for hardware.
3. Dimensions and locations of cutouts.
4. Undercuts.
5. Requirements for veneer matching.
6. Fire-protection ratings for fire-rated doors.

C. Samples: For plastic-laminate door faces.

### 1.3 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer that is a certified participant in AWI's Quality Certification Program.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

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

1. Algoma Hardwoods, Inc.
2. Marshfield Door Systems, Inc.
3. Mohawk Doors; a Masonite company.
4. VT Industries, Inc.

2.2 FLUSH WOOD DOORS, GENERAL

A. Quality Standard: In addition to requirements specified, comply with AWI's, AWMAC's, and WI's "Architectural Woodwork Standards ."

1. Provide AWI Quality Certification Labels indicating that doors comply with requirements of grades specified.

B. Low-Emitting Materials: Fabricate doors with adhesives and composite wood products that comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

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. Mineral-Core Doors:

1. Core: Noncombustible mineral product complying with requirements of referenced quality standard and testing and inspecting agency for fire-protection rating indicated.
2. Blocking: Provide composite blocking with improved screw-holding capability approved for use in doors of fire-protection ratings indicated as needed to eliminate through-bolting hardware.
3. Edge Construction: At hinge stiles, provide laminated-edge construction with improved screw-holding capability and split resistance. Comply with specified requirements for exposed edges.

2.3 PLASTIC-LAMINATE-FACED DOORS

A. Interior Solid-Core Doors:

1. Grade: Premium.
2. Plastic-Laminate Faces: High-pressure decorative laminates complying with NEMA LD 3, Grade HGS.
3. Colors, Patterns, and Finishes: As indicated.
4. Exposed Vertical Edges: Plastic laminate that matches faces, applied before faces.
5. Core: Structural composite lumber.
6. Construction: Five plies. Stiles and rails are bonded to core, then entire unit is abrasive planed before faces and crossbands are applied. Faces are bonded to core using a hot press.

2.4 FABRICATION

A. Factory machine doors for hardware that is not surface applied.

B. Openings: Factory cut and trim openings through doors.

1. Light Openings: Trim openings with moldings of material and profile indicated.
2. Glazing: Factory install glazing in doors indicated to be factory finished. Comply with applicable requirements in Section 088000 "Glazing."
3. Louvers: Factory install louvers in prepared openings.

## 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.

1. Install fire-rated doors according to NFPA 80.

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.

a. Comply with NFPA 80 for fire-rated doors.

END OF SECTION 081416

# SECTION 084113 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

## PART 1 - GENERAL

### 1.1 SUMMARY

A. Section Includes:

1. Interior storefront framing.
2. Interior manual-swing entrance doors and door-frame units.

### 1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

### 1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Include plans, elevations, sections, full-size details, and attachments to other work.

1. Show connection to and continuity with adjacent thermal, weather, air, and vapor barriers.

C. Samples: For each exposed finish required.

D. Entrance Door Hardware Schedule: Prepared by or under supervision of supplier, detailing fabrication and assembly of entrance door hardware, as well as procedures and diagrams.

### 1.4 CLOSEOUT SUBMITTALS

A. Maintenance data.

### 1.5 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

B. Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of assemblies. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction.

1. Do not change intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If changes are proposed, submit comprehensive explanatory data to Architect for review.

1.6 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of aluminum-framed entrances and storefronts that do not comply with requirements or that fail in materials or workmanship within specified warranty period.

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

B. Special Finish Warranty: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of factory-applied finishes within specified warranty period.

1. Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

B. Basis-of-Design Product: Subject to compliance with requirements, provide Kawneer Trifab VG451, Center or comparable product by one of the following:

1. Kawneer North America.

2.2 FRAMING

A. Framing Members: Manufacturer's extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.

1. Construction: Nonthermal.
2. Glazing System: Retained mechanically with gaskets on four sides.
3. Glazing Plane: Center.
4. Finish: Dark Bronze
5. Fabrication Method: Field-fabricated stick system.

B. Backer Plates: Manufacturer's standard, continuous backer plates for framing members, if not integral, where framing abuts adjacent construction.

C. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.

D. Materials:

1. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.

a. Sheet and Plate: ASTM B 209.
b. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
c. Extruded Structural Pipe and Tubes: ASTM B 429/B 429M.

d. Structural Profiles: ASTM B 308/B 308M.

2. Steel Reinforcement: Manufacturer's standard zinc-rich, corrosion-resistant primer complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM, and prepare surfaces according to applicable SSPC standard.

a. Structural Shapes, Plates, and Bars: ASTM A 36/A 36M.
b. Cold-Rolled Sheet and Strip: ASTM A 1008/A 1008M.
c. Hot-Rolled Sheet and Strip: ASTM A 1011/A 1011M.

## 2.3 ENTRANCE DOOR SYSTEMS

A. Entrance Doors: Manufacturer's standard glazed entrance doors for manual-swing operation.

1. Door Construction: 1 3/4-inch overall thickness, with minimum 0.188-inch- thick, extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deeply penetrated and fillet welded or that incorporate concealed tie rods.
2. Door Design: As indicated on the drawings, Medium stile; 3-1/2-inch nominal width side and top rail and 10” bottom rail. As indicated.
3. Glazing Stops and Gaskets: Beveled, snap-on, extruded-aluminum stops and preformed gaskets.

## 2.4 ENTRANCE DOOR HARDWARE

A. Entrance Door Hardware: Hardware not specified in this Section is specified in Section 087100 "Door Hardware."

B. General: Provide entrance door hardware and entrance door hardware sets indicated in door and frame schedule for each entrance door to comply with requirements in this Section.

1. Entrance Door Hardware Sets: Provide quantity, item, size, finish or color indicated, and products complying with BHMA standard referenced].
2. Sequence of Operation: Provide electrified door hardware function, sequence of operation, and interface with other building control systems indicated.
3. Opening-Force Requirements:

a. Exterior Doors: Not more than 5 lb to release the latch and not more than than 8.5 lb to open the door to its minimum required width.

b. Interior Doors: Not more than 5 lb to release the latch and not more than than 5 lb to open the door to its minimum required width.

C. Designations: Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of entrance door hardware are indicated in "Entrance Door Hardware Sets" Article. Products are identified by using entrance door hardware designations as follows:

1. Named Manufacturers' Products: Manufacturer and product designation are listed for each door hardware type required for the purpose of establishing minimum requirements. Manufacturers' names are abbreviated in "Entrance Door Hardware Sets" Article.
2. References to BHMA Standards: Provide products complying with these standards and requirements for description, quality, and function.

D. Pivot Hinges: BHMA A156.4, Grade 1.

1. Offset-Pivot Hinges: Provide top, bottom, and intermediate offset pivots at each door leaf.

E. Automatic and Self-Latching Flush Bolts: BHMA A156.3, Grade 1.

F. Panic Exit Devices: BHMA A156.3, Grade 1, listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for panic protection, based on testing according to UL 305.

G. Cylinders: As specified in Section 087100 "Door Hardware." BHMA A156.5, Grade 1.

H. Closers: BHMA A156.4, Grade 1, with accessories required for a complete installation, sized as required by door size, exposure to weather, and anticipated frequency of use; adjustable to comply with field conditions and requirements for opening force.

I. Door Stops: BHMA A156.16, Grade 1, floor or wall mounted, as appropriate for door location indicated, with integral rubber bumper.

J. Weather Stripping: Manufacturer's standard replaceable components.

K. Weather Sweeps: Manufacturer's standard exterior-door bottom sweep with concealed fasteners on mounting strip.

L. Thresholds: BHMA A156.21, raised thresholds beveled with a slope of not more than 1:2, with maximum height of 1/2 inch.

## 2.5 GLAZING

A. Glazing: Comply with Section 088000 "Glazing."

B. Glazing Gaskets: Manufacturer's standard sealed-corner pressure-glazing system of black, resilient elastomeric glazing gaskets, setting blocks, and shims or spacers.

C. Glazing Sealants: As recommended by manufacturer.

D. Sealants used inside the weatherproofing system shall have a VOC content of 250 g/L.

E. Sealants used inside the weatherproofing system shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

## 2.6 FABRICATION

A. Form or extrude aluminum shapes before finishing.

B. Fabricate components that, when assembled, have the following characteristics:

1. Profiles that are sharp, straight, and free of defects or deformations.
2. Accurately fitted joints with ends coped or mitered.
3. Physical and thermal isolation of glazing from framing members.

4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
5. Provisions for field replacement of glazing from .
6. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.

C. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.

D. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.

E. Entrance Doors: Reinforce doors as required for installing entrance door hardware.

F. Entrance Door Hardware Installation: Factory install entrance door hardware to the greatest extent possible. Cut, drill, and tap for factory-installed entrance door hardware before applying finishes.

G. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

A. General:

1. Comply with manufacturer's written instructions.
2. Do not install damaged components.
3. Fit joints to produce hairline joints free of burrs and distortion.
4. Rigidly secure nonmovement joints.
5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
6. Seal perimeter and other joints watertight unless otherwise indicated.

B. Metal Protection:

1. Where aluminum is in contact with dissimilar metals, protect against galvanic action by painting contact surfaces with materials recommended by manufacturer for this purpose or by installing nonconductive spacers.
2. Where aluminum is in contact with concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

C. Set continuous sill members and flashing in full sealant bed as specified in Section 079200 "Joint Sealants" to produce weathertight installation.

D. Install components plumb and true in alignment with established lines and grades.

E. Install operable units level and plumb, securely anchored, and without distortion. Adjust weather-stripping contact and hardware movement to produce proper operation.

F. Install glazing as specified in Section 088000 "Glazing."

G. Entrance Doors: Install doors to produce smooth operation and tight fit at contact points.

1. Exterior Doors: Install to produce weathertight enclosure and tight fit at weather stripping.
2. Field-Installed Entrance Door Hardware: Install surface-mounted entrance door hardware according to entrance door hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.

END OF SECTION 084113

# SECTION 08 7100 - DOOR HARDWARE

## 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. Mechanical and electrified door hardware for:
      a. Swinging doors.

B. Related Sections:
   1. Division 01 Section “Alternates” for alternates affecting this section.
   2. Division 07 Section “Joint Sealants” for sealant requirements applicable to threshold installation specified in this section.
   3. Division 09 sections for touchup finishing or refinishing of existing openings modified by this section.

### 1.3 REFERENCES

A. UL - Underwriters Laboratories
   1. UL 10B - Fire Test of Door Assemblies
   2. UL 10C - Positive Pressure Test of Fire Door Assemblies
   3. UL 1784 - Air Leakage Tests of Door Assemblies
   4. UL 305 - Panic Hardware

B. DHI - Door and Hardware Institute
   1. Sequence and Format for the Hardware Schedule
   2. Recommended Locations for Builders Hardware
   3. Key Systems and Nomenclature

C. ANSI - American National Standards Institute
   1. ANSI/BHMA A156.1 - A156.29, and ANSI/BHMA A156.31 - Standards for Hardware and Specialties.

D. Florida Building Codes.

### 1.4 SUBMITTALS

A. General:
   1. Submit in accordance with Conditions of Contract and Division 01 requirements.
   2. Highlight, encircle, or otherwise specifically identify on submittals deviations from Contract Documents, issues of incompatibility or other issues which may detrimentally affect the Work.
   3. Prior to forwarding submittal, comply with procedures for verifying existing door and frame compatibility for new hardware, as specified in PART 3, “EXAMINATION” article, herein.

B. Action Submittals:
   1. Product Data: Product data including manufacturers’ technical product data for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements.
   2. Riser and Wiring Diagrams: After final approval of hardware schedule, submit details of electrified door hardware, indicating:
      a. Wiring Diagrams: For power, signal, and control wiring and including:
         1) Details of interface of electrified door hardware and building safety and security systems.
         2) Schematic diagram of systems that interface with electrified door hardware.
         3) Point-to-point wiring.
         4) Risers.
   3. Samples for Verification: If requested by Architect, submit production sample or sample installations of each type of exposed hardware unit in finish indicated, and tagged with full description for coordination with schedule.

a. Samples will be returned to supplier in like-new condition. Units that are acceptable to Architect may, after final check of operations, be incorporated into Work, within limitations of key coordination requirements.

4. Door Hardware Schedule: Submit schedule with hardware sets in vertical format as illustrated by Sequence of Format for the Hardware Schedule as published by the Door and Hardware Institute. Indicate complete designations of each item required for each door or opening, include:
   a. Door Index; include door number, heading number, and Architects hardware set number.
   b. Opening Lock Function Spreadsheet: List locking device and function for each opening.
   c. Type, style, function, size, and finish of each hardware item.
   d. Name and manufacturer of each item.
   e. Fastenings and other pertinent information.
   f. Location of each hardware set cross-referenced to indications on Drawings.
   g. Explanation of all abbreviations, symbols, and codes contained in schedule.
   h. Mounting locations for hardware.
   i. Door and frame sizes and materials.
   j. Name and phone number for local manufacturer's representative for each product.
   k. Operational Description of openings with any electrified hardware (locks, exits, electromagnetic locks, electric strikes, automatic operators, door position switches, magnetic holders or closer/holder units, and access control components). Operational description should include how door will operate on egress, ingress, and fire and smoke alarm connection.
      1) Submittal Sequence: Submit door hardware schedule concurrent with submissions of Product Data, Samples, and Shop Drawings. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate fabrication of other work that is critical in Project construction schedule.
5. Key Schedule:
   a. After Keying Conference, provide keying schedule listing levels of keying as well as explanation of key system's function, key symbols used and door numbers controlled.
   b. Use ANSI/BHMA A156.28 “Recommended Practices for Keying Systems” as guideline for nomenclature, definitions, and approach for selecting optimal keying system.
   c. Provide 3 copies of keying schedule for review prepared and detailed in accordance with referenced DHI publication. Include schematic keying diagram and index each key to unique door designations.
   d. Index keying schedule by door number, keyset, hardware heading number, cross keying instructions, and special key stamping instructions.
   e. Provide one complete bitting list of key cuts and one key system schematic illustrating system usage and expansion.
      1) Forward bitting list, key cuts and key system schematic directly to Owner, by means as directed by Owner.
   f. Prepare key schedule by or under supervision of supplier, detailing Owner’s final keying instructions for locks.
6. Templates: After final approval of hardware schedule, provide templates for doors, frames and other work specified to be factory prepared for door hardware installation.

C. Informational Submittals:
1. Qualification Data: For Supplier, Installer and Architectural Hardware Consultant.
2. Product Certificates for electrified door hardware, signed by manufacturer:
   a. Certify that door hardware approved for use on types and sizes of labeled fire-rated doors complies with listed fire-rated door assemblies.
3. Certificates of Compliance:
   a. Certificates of compliance for fire-rated hardware and installation instructions if requested by Architect or Authority Having Jurisdiction.
   b. Installer Training Meeting Certification: Letter of compliance, signed by Contractor, attesting to completion of installer training meeting specified in “QUALITY ASSURANCE” article, herein.
   c. Electrified Hardware Coordination Conference Certification: Letter of compliance, signed by Contractor, attesting to completion of electrified hardware coordination conference, specified in “QUALITY ASSURANCE” article, herein.
4. Product Test Reports: For compliance with accessibility requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by qualified testing agency, for door hardware on doors located in accessible routes.

5. Warranty: Special warranty specified in this Section.

D. Closeout Submittals:
   1. Operations and Maintenance Data: Provide in accordance with Division 01 and include:
      a. Complete information on care, maintenance, and adjustment; data on repair and replacement parts, and information on preservation of finishes.
      b. Catalog pages for each product.
      c. Name, address, and phone number of local representatives for each manufacturer.
      d. Parts list for each product.
      e. Final approved hardware schedule edited to reflect conditions as installed.
      f. Final keying schedule
      g. Copies of floor plans with keying nomenclature
      h. As-installed wiring diagrams for each opening connected to power, both low voltage and 110 volts.
      i. Copy of warranties including appropriate reference numbers for manufacturers to identify project.

1.5 QUALITY ASSURANCE

A. Product Substitutions: Comply with product requirements stated in Division 01 and as specified herein.
   1. Where specific manufacturer's product is named and accompanied by "No Substitute," including make or model number or other designation, provide product specified. (Note: Certain products have been selected for their unique characteristics and particular project suitability.)
      a. Where no additional products or manufacturers are listed in product category, requirements for "No Substitute" govern product selection.

B. Supplier Qualifications and Responsibilities: Recognized architectural hardware supplier with record of successful in-service performance for supplying door hardware similar in quantity, type, and quality to that indicated for this Project and that provides certified Architectural Hardware Consultant (AHC) available to Owner, Architect, and Contractor, at reasonable times during the Work for consultation.
   1. Warehousing Facilities: In Project's vicinity.
   2. Scheduling Responsibility: Preparation of door hardware and keying schedules.
   3. Engineering Responsibility: Preparation of data for electrified door hardware, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.
   4. Coordination Responsibility: Coordinate installation of electronic security hardware with Architect and electrical engineers and provide installation and technical data to Architect and other related subcontractors.
      a. Upon completion of electronic security hardware installation, inspect and verify that all components are working properly.

C. Installer Qualifications: Qualified tradesmen, skilled in application of commercial grade hardware with record of successful in-service performance for installing door hardware similar in quantity, type, and quality to that indicated for this Project.

D. Architectural Hardware Consultant Qualifications: Person who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project and meets these requirements:
   1. For door hardware, DHI-certified, Architectural Hardware Consultant (AHC).
   2. Can provide installation and technical data to Architect and other related subcontractors.
   3. Can inspect and verify components are in working order upon completion of installation.
   4. Capable of producing wiring diagrams.
   5. Capable of coordinating installation of electrified hardware with Architect and electrical engineers.

E. Single Source Responsibility: Obtain each type of door hardware from single manufacturer.
   1. Provide electrified door hardware from same manufacturer as mechanical door hardware, unless otherwise indicated.
   2. Manufacturers that perform electrical modifications and that are listed by testing and inspecting agency acceptable to authorities having jurisdiction are acceptable.

F. Fire-Rated Door Openings: Provide door hardware for fire-rated openings that complies with NFPA 80 and requirements of authorities having jurisdiction. Provide only items of door hardware that are listed and are identical to products tested by Underwriters Laboratories, Intertek Testing Services, or other

testing and inspecting organizations acceptable to authorities having jurisdiction for use on types and sizes of doors indicated, based on testing at positive pressure and according to NFPA 252 or UL 10C and in compliance with requirements of fire-rated door and door frame labels.

G. Smoke- and Draft-Control Door Assemblies: Where smoke- and draft-control door assemblies are required, provide door hardware that meets 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 tested pressure differential of 0.3-inch wg of water.

H. Electrified Door Hardware: Listed and labeled as defined in NFPA 70, Article 100, by testing agency acceptable to authorities having jurisdiction.

I. Means of Egress Doors: Latches do not require more than 15 lbf to release latch. Locks do not require use of key, tool, or special knowledge for operation.

J. Accessibility Requirements: For door hardware on doors in an accessible route, comply with governing accessibility regulations cited in "REFERENCES" article, herein.
   1. Provide operating devices that do not require tight grasping, pinching, or twisting of wrist and that operate with force of not more than 5 lbf.
   2. Maximum opening-force requirements:
      a. Interior, Non-Fire-Rated Hinged Doors: 5 lbf applied perpendicular to door.
      b. Sliding or Folding Doors: 5 lbf applied parallel to door at latch.
      c. Fire Doors: Minimum opening force allowable by authorities having jurisdiction.
   3. Bevel raised thresholds with slope of not more than 1:2. Provide thresholds not more than 1/2 inch high.
   4. Adjust door closer sweep periods so that, from open position of 70 degrees, door will take at least 3 seconds to move to 3 inches from latch, measured to leading edge of door.

K. Keying Conference: Conduct conference at Project site to comply with requirements in Division 01.
   1. Attendees: Owner, Contractor, Architect, Installer, and Supplier's Architectural Hardware Consultant.
   2. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including:
      a. Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
      b. Preliminary key system schematic diagram.
      c. Requirements for key control system.
      d. Requirements for access control.
      e. Address for delivery of keys.

L. Pre-installation Conference: Conduct conference at Project site**.**
   1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
   2. Inspect and discuss preparatory work performed by other trades.
   3. Inspect and discuss electrical roughing-in for electrified door hardware.
   4. Review sequence of operation for each type of electrified door hardware.
   5. Review required testing, inspecting, and certifying procedures.

M. Coordination Conferences:
   1. Installation Coordination Conference: Prior to hardware installation, schedule and hold meeting to review questions or concerns related to proper installation and adjustment of door hardware.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up for hardware delivered to Project site.

B. Tag each item or package separately with identification coordinated with final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package.
   1. Deliver each article of hardware in manufacturer's original packaging.

C. Project Conditions:
   1. Maintain manufacturer-recommended environmental conditions throughout storage and installation periods.

2. Provide secure lock-up for door hardware delivered to Project, but not yet installed. Control handling and installation of hardware items so that completion of Work will not be delayed by hardware losses both before and after installation.

D. Protection and Damage:
1. Promptly replace products damaged during shipping.
2. Handle hardware in manner to avoid damage, marring, or scratching. Correct, replace or repair products damaged during Work.
3. Protect products against malfunction due to paint, solvent, cleanser, or any chemical agent.

E. Deliver keys to manufacturer of key control system for subsequent delivery to Owner.

F. Deliver keys **and permanent cores** to Owner by registered mail, overnight package service or hand delivery with signed receipt.

1.7 COORDINATION

A. Coordinate layout and installation of floor-recessed door hardware with floor construction. Cast anchoring inserts into concrete. Concrete, reinforcement, and formwork requirements are specified in Division 03.

B. Installation Templates: Distribute for doors, frames, and other work specified to be factory prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

C. Security: Coordinate installation of door hardware, keying, and access control with Owner's security consultant.

D. Electrical System Roughing-In: Coordinate layout and installation of electrified door hardware with connections to power supplies and building safety and security systems.

E. Existing Openings: Where hardware components are scheduled for application to existing construction or where modifications to existing door hardware are required, field verify existing conditions and coordinate installation of door hardware to suit opening conditions and to provide proper door operation.

F. Direct shipments not permitted, unless approved by Contractor.

1.8 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.
1. Warranty Period: Years from date of Substantial Completion, for durations indicated.
a. Closers:
1) Mechanical: 10 years.
b. Locksets:
1) Mechanical: 3 years.
2. Warranty does not cover damage or faulty operation due to improper installation, improper use or abuse.

1.9 MAINTENANCE

A. Maintenance Tools:
1. Furnish complete set of special tools required for maintenance and adjustment of hardware, including changing of cylinders.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. The Owner requires use of certain products for their unique characteristics and particular project suitability to ensure continuity of existing and future performance and maintenance standards. After investigating available product offerings Awarding Authority has elected to prepare proprietary specifications.

B. Approval of manufacturers and/or products other than those listed as “Scheduled Manufacturer” or “Acceptable Manufacturers” in the individual article for the product category shall be in accordance with QUALITY ASSURANCE article, herein.

C. Approval of products from manufacturers indicated in “Acceptable Manufacturers” is contingent upon those products providing all functions and features and meeting all requirements of scheduled manufacturer’s product.

D. Hand of Door: Drawings show direction of slide, swing, or hand of each door leaf. Furnish each item of hardware for proper installation and operation of door movement as shown.

E. Where specified hardware is not adaptable to finished shape or size of members requiring hardware, furnish suitable types having same operation and quality as type specified, subject to Architect's approval.

2.2 MATERIALS

A. Fasteners
1. Provide hardware manufactured to conform to published templates, generally prepared for machine screw installation.
2. Furnish screws for installation with each hardware item. Finish exposed (exposed under any condition) screws to match hardware finish, or, if exposed in surfaces of other work, to match finish of this other work including prepared for paint surfaces to receive painted finish.
3. Provide concealed fasteners for hardware units exposed when door is closed except when no standard units of type specified are available with concealed fasteners. Do not use thru-bolts for installation where bolt head or nut on opposite face is exposed in other work unless thru-bolts are required to fasten hardware securely. Review door specification and advise Architect if thru-bolts are required.
4. Install hardware with fasteners provided by hardware manufacturer.

2.3 HINGES

A. Provide Five-knuckle, Ball Bearing hinges.
1. Manufacturers and Products:
a. Scheduled Manufacturer and Product: Stanley FBB series.
b. Acceptable Manufacturer: Ives 5BB series, McKinney TA series, Hager BB series.

B. Requirements, unless otherwise specified:
1. 1-3/4” thick doors, up to and including 36 inches wide:
a. Exterior: Standard weight, bronze or stainless steel, 4-1/2 inch high.
b. Interior: Standard weight, steel, 4-1/2 inch high.
2. 1-3/4” thick doors over 36 inches wide:
a. Exterior: Heavy weight, bronze/stainless steel, 5 inch high.
b. Interior: Heavy weight, steel, 5 inch high.
3. 2” or thicker doors:
a. Exterior: Heavy weight, bronze or stainless steel, 5 inch high.
b. Interior: Heavy weight, steel, 5 inch high.
4. Provide three hinges per door leaf for doors 90 inches or less in height, and one additional hinge for each 30 inches of additional door height.
5. Where new hinges are specified for existing doors or existing frames, provide new hinges of identical size to hinge preparation present in existing door or existing frame.
6. Hinge Pins: Except as otherwise indicated, provide hinge pins as follows:
a. Steel Hinges: Steel pins.
b. Non-Ferrous Hinges: Stainless steel pins.
c. Out-Swinging Exterior Doors: Non-removable pins.
d. Out-Swinging Interior Lockable Doors: Non-removable pins.
e. Interior Non-lockable Doors: Non-rising pins.
7. Width of hinges: 4-1/2” at 1-3/4” thick doors, and 5” at 2” or thicker doors. Adjust hinge width as required for door, frame, and wall conditions to allow proper degree of opening.
8. Doors 36” wide or less furnish hinges 4-1/2” high; doors greater than 36” wide furnish hinges 5” high, heavy weight or standard weight as specified.

2.4 CYLINDRICAL LOCKS - GRADE 1, HEAVY DUTY

A. Manufacturers and Products:
   1. Scheduled Manufacturers and Products: Best 9K Series.
   2. Acceptable Manufacturers: Dorma C800 Series, Sargent 10 Line, Schlage ND series.

B. Requirements:
   1. Tested and approved by BHMA for ANSI A156.2, Series 4000, Operational Grade 1, Extra-Heavy Duty, and be UL10C listed.
   2. Fit modified ANSI A115.2 door preparation.
   3. Locksets and cores to be of the same manufacturer to maintain complete lockset warranty.
   4. Locksets to have anti-rotational studs that are thru-bolted.
   5. Keyed lever shall not have exposed “keeper” hole.
   6. Each lever to have independent spring mechanism controlling it.
   7. 2-3/4” backset.
   8. 9/16“ throw latchbolt.
   9. Provide sufficient curved strike lip to protect door trim.
   10. Outside lever sleeve to be seamless, of one-piece construction made of a hardened steel alloy.
   11. Keyed lever to be removable only after core is removed, by authorized control key.
   12. Hub, side plate, shrouded rose, locking pin to be a one-piece casting with a shrouded locking lug.
   13. Locksets outside locked lever must withstand minimum 1400-inch pounds of torque. In excess of that, a replaceable part will shear. Key from outside and inside lever will still operate lockset.
   14. Core face must be the same finish as the lockset.
   15. Functions as indicated in the hardware groups.
   16. Lever Design: “14” Lever, “D” Rose.

2.5 CYLINDERS

A. Manufacturer and Product:
   1. Scheduled Manufacturer and Product: **Existing System; Corbin Russwin LFIC**.
   2. Coordinate specific keyway, cylinder and key requirements with Owner prior to ordering.

B. Requirements: Provide cylinders/cores complying with the following requirements.
   1. Cylinders/cores compliant with ANSI/BHMA A156.5; latest revision, Section 12, Grade 1; permanent cylinders; cylinder face finished to match lockset, manufacturer’s series as indicated.

C. Full-sized cylinders with large format interchangeable cores (LFIC), in the below-listed configuration(s), distributed throughout the Project as indicated.
   1. Keying: Manufacturer-keyed permanent cylinders/cores, configured into keying system per “KEYING” article herein.
   2. Features: Cylinders/cores shall incorporate the following features.

D. Mark permanent cylinders/cores and keys with applicable blind code per DHI publication “Keying Systems and Nomenclature” for identification. Blind code marks shall not include actual key cuts.

E. Identification stamping provisions must be approved by the Architect and Owner.

F. Failure to comply with stamping requirements shall be cause for replacement of cylinders/cores involved at no additional cost to Owner.
   1. Forward cylinders/cores to Owner, separately from keys, by means as directed by Owner.

G. Project Cylinder/Core Distribution: Provide cylinders/cores complying with the following requirements in Project locations as indicated.

H. Replaceable Construction Cores.
   1. Provide temporary construction cores replaceable by permanent cores. Provide 12 operating keys for contractor use during construction.

I. Permanent Keyed Cores:
   1. Contractor to replace construction cores with permanent cores as directed by Owner. Installation will be in presence of owner representative, indicating keys operate locking hardware and to turn over all permanent keys.

2.6 KEYING

A. Keying System: Factory registered, complying with guidelines in ANSI/BHMA A156.28, incorporating decisions made at keying conference.

B. Keying Requirements – General for Commercial
   1. Permanent cylinders/cores keyed by the manufacturer according to the following key system.

C. Key Features: Provide keys with the following features.
   1. Patent Protection: Keys and blanks protected by a special broaching in restricted keyway

D. Keys
   1. Material: Nickel silver; minimum thickness of .107-inch (2.3mm)
   2. Identification: Stamp all keys with keyset symbol
   3. Quantity of keys:
      a. Provide (2) operating keys per keyed core.
      b. Provide (6) Master Keys.
      c. Provide (2) Control Keys

E. Coordinate with cylinder/core and key identification requirements above.

F. Stamp keys with Owner's unique key system facility code as established by the manufacturer; key symbol and embossed or stamped with "DO NOT DUPLICATE".

G. Failure to comply with stamping requirements shall be cause for replacement of keys involved at no additional cost to Owner.

2.7 DOOR CLOSERS – HEAVY DUTY

A. Manufacturer and Product:
   1. Scheduled Manufacturer and Product: Stanley Commercial QDC100 series.
      a. Acceptable Manufacturers: Dorma 8900, Sargent 281 Series, LCN 4040 XP Series.

B. Requirements:
   1. Tested and approved by BHMA for ANSI 156.4, Grade 1.
   2. UL10C certified.
   3. Closer shall have extra-duty arms and knuckles.
   4. Conform to ANSI 117.1.
   5. Maximum 2 7/16" case projection with non-ferrous cover.
   6. Separate adjusting valves for closing and latching speed, and backcheck.
   7. Provide adapter plates, shim spacers and blade stop spacers as required by frame and door conditions.
   8. Full rack and pinion type closer with 1-1/2" minimum bore.
   9. Mount closers on non-public side of door, unless otherwise noted in specification.
   10. Closers shall be non-handed, non-sized and multi-sized.

2.8 DOOR TRIM

A. Manufacturers:
   1. Scheduled Manufacturer: Trimco
   2. Acceptable Manufacturers: Burns, Don-Jo, Ives, Rockwood

B. Requirements:
   1. Provide push plates 4 inches wide by 16 inches high by 0.050" thick and beveled 4 edges. Where width of door stile prevents use of 4 inches wide plate, adjust width to fit.
   2. Provide push bars of solid bar stock, diameter and length as scheduled. Provide push bars of sufficient length to span from center to center of each stile. Where required, mount back to back with pull.
   3. Provide offset pulls of solid bar stock, diameter and length as scheduled. Where required, mount back to back with push bar.
   4. Provide flush pulls as scheduled. Where required, provide back-to-back mounted model.
   5. Provide pulls of solid bar stock, diameter and length as scheduled. Where required, mount back to back with push bar.
   6. Provide wire pulls of solid bar stock, diameter and length as scheduled.

2.9 PROTECTION PLATES

A. Manufacturers:
   1. Scheduled Manufacturer: Trimco
   2. Acceptable Manufacturers: Burns, Don-Jo, Ives, Rockwood

B. Requirements:
   1. Provide kick plates, mop plates, and armor plates minimum of 1/8 inch thick as scheduled. Furnish with sheet metal or wood screws, finished to match plates.
   2. Sizes of plates:
      a. Kick Plates: 10 inches high by 2 inches less width of door on single doors, 1 inch less width of door on pairs
      B. Mop Plates: 6 inches high by 2 inches less width of door on single doors, 1 inch less width of door on pairs

2.10 DOOR STOPS AND HOLDERS

A. Manufacturers:
   1. Scheduled Manufacturer: Trimco
   2. Acceptable Manufacturers: Burns, Don-Jo, Ives, Rockwood

B. Provide door stops at each door leaf:
   1. Provide wall stops wherever possible. Provide convex type where mortise type locks are used and concave type where cylindrical type locks are used.
   2. Where a wall stop cannot be used, provide universal floor stops for low or high rise options.
   3. Where wall or floor stop cannot be used, provide medium duty surface mounted overhead stop.

2.11 GASKETING

A. Manufacturers:
   1. Scheduled Manufacturer: National Guard
   2. Acceptable Manufacturers: Pemko, Reese, Zero International

B. Requirements:
   1. Provide thresholds, weatherstripping (including door sweeps, seals, astragals) and gasketing systems (including smoke, sound, and light) as specified and per architectural details. Match finish of other items.

2.12 SILENCERS

A. Manufacturers:
   1. Scheduled Manufacturer: Trimco
   2. Acceptable Manufacturers: Burns, Don-Jo, Ives, Rockwood

B. Requirements:
   1. Provide "push-in" type silencers for hollow metal or wood frames.
   2. Provide one silencer per 30 inches of height on each single frame, and two for each pair frame.
   3. Omit where gasketing is specified.

2.13 ELECTROMAGNETIC LOCKS

A. Certified by BHMA for A156.23; electrically powered, of strength and configuration indicated; with electromagnet attached to frame and armature plate attached to door.
   1. Type: Full exterior or full interior, as required by application indicated.
   2. Strength Ranking: 750 lbf. Minimum

2.14 POWER SUPPLY

A. UL Listed, Field Selectable 12VDC or 24VDC output. The power supply will be specifically designed to support electric locks and access controls. The filtered and regulated output power is field selectable for 12 or 24 VDC.

   1. Fire Alarm/Life Safety emergency release included in power supply.

2. Available options for multiple door options four or more control stations, Adjustable Time delay relay, Battery charging, Battery Back-Up.

2.15 ELECTRIC DOOR STRIKE

A. Certified by ANSI/BHMA 156.31, Grade 1. and listed for Burglary Protection ANSI/ UL1034 Grade 1.

1. For General use provide fail-secure electric strike and with fire-rated device.
2. Listed UL10C for Fire Door assemblies
3. Listed UL294
4. Latchbolt monitor switch option when specified in hardware sets.
5. Provide the electric strike in the appropriate model that will accept a 5/8” or 3/4" latchbolt.

2.16 DOOR POSITION SWITCH

A. Provide door position switch for door status monitoring as indicated in hardware sets.

1. At all fired rated doors the door and frames, position switch preparation will be provided by the door and frame manufacturer or by an authorized label service agent.

2.17 FINISH

A. Door hardware finish to most closely match dark bronze storefront finish. Indicate hardware finishes are those listed in ANSI/BHMA A156.18 including coordination with traditional U.S. finishes shown by certain manufacturers for their products

B. Powder coat door closers to match other hardware, unless otherwise noted.

C. Aluminum items shall be finished to match predominant adjacent material. Gasketing to coordinate with frame color.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Prior to installation of hardware, examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance.

B. Existing Door and Frame Compatibility: Field verify existing doors and frames receiving new hardware and existing conditions receiving new openings. Verify that new hardware is compatible with existing door and frame preparation and existing conditions.

C. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.

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

3.2 PREPARATION

A. Where on-site modification of doors and frames is required:
1. Carefully remove existing door hardware and components being reused. Clean, protect, tag, and store in accordance with storage and handling requirements specified herein.
2. Field modify and prepare existing door and frame for new hardware being installed.
3. When modifications are exposed to view, use concealed fasteners, when possible.
4. Prepare hardware locations and reinstall in accordance with installation requirements for new door hardware and with:
   a. Steel Doors and Frames: For surface applied door hardware, drill and tap doors and frames according to ANSI/SDI A250.6.
   b. Wood Doors: DHI WDHS.5 "Recommended Hardware Reinforcement Locations for Mineral Core Wood Flush Doors."
   c. Doors in rated assemblies: NFPA 80 for restrictions on on-site door hardware preparation.

3.3 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 WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."

B. Install each hardware item in compliance with manufacturer's instructions and recommendations, using only fasteners provided by manufacturer.

C. Do not install surface mounted items until finishes have been completed on substrate. Protect all installed hardware during painting.

D. Set units level, plumb and true to line and location. Adjust and reinforce attachment substrate as necessary for proper installation and operation.

E. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.

F. Install operating parts so they move freely and smoothly without binding, sticking, or excessive clearance.

G. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than quantity 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.

H. Lock Cylinders: Install construction cores to secure building and areas during construction period.
   1. Replace construction cores with permanent cores as indicated in keying section.

I. Door Closers: Mount closers on room side of corridor doors, inside of exterior doors, and stair side of stairway doors from corridors. Closers shall not be visible in corridors, lobbies and other public spaces unless approved by Architect.

J. 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 may impede traffic or present tripping hazard.

K. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.

3.4 ADJUSTING

A. Initial Adjustment: 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.
   1. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.

B. Occupancy Adjustment: Approximately three months after date of Substantial Completion, Installer's Architectural Hardware Consultant shall examine and readjust each item of door hardware, including adjusting operating forces, as necessary to ensure function of doors, door hardware, and electrified door hardware.

3.5 CLEANING AND PROTECTION

A. Clean adjacent surfaces soiled by door hardware installation.

B. Clean operating items as necessary to restore proper function and finish.

C. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of Substantial Completion.

3.6 DEMONSTRATION

A. Provide training for Owner's maintenance personnel to adjust, operate, and maintain door hardware and door hardware finishes. Refer to Division 01 Section "Demonstration and Training."

B. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

3.7 DOOR HARDWARE SETS

A. The hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.

B. The supplier is responsible for handing and sizing all products and providing the correct option for the appropriate door type and material where more than one is presented in the hardware sets. Quantities listed are for each single door.

3.8 DOOR HARDWARE SCHEDULE

A. These Hardware Sets indicate requirements for single doors of that type, with conditional requirements for pairs and other situations.

B. Pairs of Swinging Doors: Provide one of each specified item on each leaf unless specifically stated otherwise. Treat pairs as two active leaves unless otherwise indicated.

C. HARDWARE TYPE AND FINISH TO MOST CLOSELY MATCH THE DARK BRONZE STOREFRONT FINISH. AOR TO REVIEW HARDWARE FINISHES DURING SUBMITTAL PROCESS.

## Hardware Sets

Set #01 - Office

| | |
|---|---|
| 3 | Hinges |
| 1 | Office Lockset |
| 1 | Core |
| 1 | Door Closer *(only doors 001, 002, 007A, 007B, 011, 016A)* |
| 1 | Wall Bumper *(not required door 001)* |
| 3 | Silencer |

Set #02 - Entry

| | |
|---|---|
| 3 | Butt Hinge |
| 1 | Lockset-Storeroom |
| 1 | Electric Strike |
| 1 | Closer |
| 1 | Kick Plate |
| 1 | Wall Bumper |
| 1 | Power Supply |
| 1 | Card Reader |
| 1 | Conc.Door Position Switch |
| 1 | PIR Request-to-Exit Sensor |
| 3 | Silencer |

NOTE: Door normally locked. Presenting valid credential to card reader temporarily unlocks electric strike, allowing entry. Electric strike is fail-secure and remains locked during fire alarm or loss of power. Inside lever always unlocked for free egress at all times. Door Position Switch monitors door status. Infrared Request-to-Exit Sensor is activated upon exiting, signaling authorized opening of door. Coordinate wiring and electrical requirements with Electrical Contractor and Security Contractor.

Set #03 – Storeroom
3 Butt Hinge
1 Lockset-Storeroom
1 Closer
1 Kick Plate
1 Mop Plate
1 Wall Bumper *(not required doors 004A, 017, 018, 019, 124)*
3 Silencer

Set #04 – Passage
3 Butt Hinge
1 Closer
1 Mop Plate
1 Kick Plate *(not required on door 131)*
1 Wall Bumper
3 Silencer

Set #05 - Privacy
3 Butt Hinge
1 Privacy Set w/ Indicator
1 Closer
1 Mop Plate
1 Kick Plate
3 Silencer

Set #06 – Classroom
3 Butt Hinge
1 Lockset-Classroom
1 Closer
1 Mop Plate
1 Kick Plate
1 Wall Bumper *(not required doors 004B)*
3 Silencer

Opening List

| Opening | Door Material | Door Finish | Frame Material | Frame Finish | Hardware |
|---|---|---|---|---|---|
| 000G | WD | PL | HM | PT | HW-4 |
| 001 | WD | PL | HM | PT | HW-1 |
| 002 | WD | PL | AL | FA | HW-1 |
| 003 | WD | PL | HM | PT | HW-3 |
| 004A | WD | PL | HM | PT | HW-3 |
| 004B | WD | PL | HM | PT | HW-6 |
| 004C | WD | PL | HM | PT | HW-6 |
| 005 | WD | PL | HM | PT | HW-3 |
| 007A | WD | PL | HM | PT | HW-1 |
| 007B | WD | PL | HM | PT | HW-1 |
| 008 | WD | PL | HM | PT | HW-1 |
| 009 | WD | PL | HM | PT | HW-1 |
| 010 | WD | PL | HM | PT | HW-1 |
| 011 | WD | PL | HM | PT | HW-1 |
| 012 | WD | PL | HM | PT | HW-5 |
| 013 | WD | PL | HM | PT | HW-3 |
| 015A | WD | PL | HM | PT | HW-1 |

| | | | | | |
|---|---|---|---|---|---|
| 015B | WD | PL | HM | PT | HW-1 |
| 016A | WD | PL | HM | PT | HW-1 |
| 017 | WD | PL | HM | PT | HW-3 |
| 018 | WD | PL | HM | PT | HW-3 |
| 019 | WD | PL | HM | PT | HW-3 |
| 020 | WD | PL | HM | PT | HW-4 |
| 021 | WD | PL | HM | PT | HW-4 |
| 100 | WD | PL | AL | FA | HW-2 |
| 100J | WD | PL | HM | PT | HW-4 |
| 101 | WD | PL | AL | FA | HW-1 |
| 102 | WD | PL | AL | FA | HW-1 |
| 103 | WD | PL | AL | FA | HW-1 |
| 104 | WD | PL | AL | FA | HW-1 |
| 105 | WD | PL | AL | FA | HW-1 |
| 106 | WD | PL | AL | FA | HW-1 |
| 107 | WD | PL | AL | FA | HW-1 |
| 108 | WD | PL | AL | FA | HW-1 |
| 109 | WD | PL | AL | FA | HW-1 |
| 110 | WD | PL | AL | FA | HW-1 |
| 111 | WD | PL | AL | FA | HW-1 |
| 112 | WD | PL | AL | FA | HW-1 |
| 113 | WD | PL | AL | FA | HW-1 |
| 114 | WD | PL | AL | FA | HW-1 |
| 115 | WD | PL | AL | FA | HW-1 |
| 116 | WD | PL | AL | FA | HW-1 |
| 117 | WD | PL | AL | FA | HW-1 |
| 118 | WD | PL | AL | FA | HW-1 |
| 119 | WD | PL | AL | FA | HW-1 |
| 120 | WD | PL | AL | FA | HW-1 |
| 121 | WD | PL | AL | FA | HW-1 |
| 122 | WD | PL | AL | FA | HW-1 |
| 123 | WD | PL | AL | FA | HW-1 |
| 124 | WD | PL | HM | PT | HW-3 |
| 125 | WD | PL | HM | PT | HW-3 |
| 126 | WD | PL | HM | PT | HW-4 |
| 127 | WD | PL | HM | PT | HW-4 |
| 128 | WD | PL | HM | PT | HW-3 |
| 129 | WD | PL | AL | FA | HW-1 |
| 130 | WD | PL | AL | FA | HW-1 |
| 131 | WD | PL | AL | FA | HW-4 |
| 132 | WD | PL | AL | FA | HW-1 |
| 133 | WD | PL | HM | PT | HW-3 |
| 134 | WD | PL | AL | FA | HW-1 |

# SECTION 088000 - GLAZING

## PART 1 - GENERAL

### 1.1 SUMMARY

A. Section includes:

1. Glass for windows doors storefront.
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.

### 1.4 INFORMATIONAL SUBMITTALS

A. Preconstruction adhesion and compatibility test report.

### 1.5 QUALITY ASSURANCE

A. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.

### 1.6 PRECONSTRUCTION TESTING

A. Preconstruction Adhesion and Compatibility Testing: Test each glass product, tape sealant, gasket, glazing accessory, and glass-framing member for adhesion to and compatibility with elastomeric glazing sealants.

1. Testing is not required if data are submitted based on previous testing of current sealant products and glazing materials matching those submitted.

1.7 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. Basis-of-Design Glass Product: Subject to compliance with requirements, provide product indicated in glass schedules or comparable product by one of the following:

1. Vitro Architectural Glass.

2.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design glazing.

B. Structural Performance: Glazing shall withstand the following design loads within limits and under conditions indicated determined according to the International 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.

C. Safety Glazing: Where safety glazing is indicated, provide glazing that complies with 16 CFR 1201, Category II.

D. 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.

C. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IGCC.

D. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass that complies with performance requirements and is not less than the thickness indicated.

E. Strength: Where annealed float glass is indicated, provide annealed float glass, heat-strengthened float glass, or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where heat-strengthened float glass is indicated, provide heat-strengthened float glass or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where fully tempered float glass is indicated, provide fully tempered float glass.

2.4 GLASS PRODUCTS

A. Basis-of-Design Product: Vitro Architectural Glass, Solarban 90 Solar Control Low-E Glass.

B. Basis-of-Design Product: ICD High Performance Coatings, OPACI-COAT-300.

C. Clear Annealed Float Glass: ASTM C 1036, Type I, Class 1 (clear), Quality-Q3.

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

E. Silicone-Coated Spandrel Glass: ASTM C 1048, Type I, Condition B, Quality-Q3.

2.5 INSULATING GLASS

A. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E 2190.

1. Sealing System: Dual seals.
2. Spacer: Manufacturer's standard spacer material and construction.

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.

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 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.

3.5 Remove and replace glass that is damaged during construction period.

3.6 MONOLITHIC GLASS SCHEDULE

A. Glass Type G4: Clear fully tempered float glass.

1. Minimum Thickness: 1/2".
2. Class 1, Kind FT (Fully Tempered)

B. Class Type G5: Clear fully tempered float glass.
1. Minimum Thickness: 3/8”
2. Class 1, Kind FT (Fully Tempered)

C. Class Type G6: Clear fully tempered float glass.
1. Minimum Thickness: 1/4"
2. Class 1, Kind FT (Fully Tempered)

END OF SECTION 088000

# SECTION 092216 - 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.

## 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.

B. Studs and Runners: ASTM C 645.

C. Firestop Tracks: Top runner manufactured to allow partition heads to expand and contract with movement of structure while maintaining continuity of fire-resistance-rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Fire Trak Corp; Fire Trak System attached to studs with Fire Trak Posi Clip.
b. Metal-Lite; The System.

D. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.

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

    a. MRI Steel Framing, LLC.

E. Hat-Shaped, Rigid Furring Channels: ASTM C 645.

1. Minimum Base-Metal Thickness: 0.0329 inch .
2. Depth: As indicated on Drawings.

## 2.3 SUSPENSION SYSTEMS

A. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch- diameter wire, or double strand of 0.048-inch- diameter wire.

B. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.16 inch in diameter.

## 2.4 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. 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. 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.
2. 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.
3. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.
    a. Firestop Track: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.
4. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.
5. Curved Partitions:
    a. Bend track to uniform curve and locate straight lengths so they are tangent to arcs.
    b. Begin and end each arc with a stud, and space intermediate studs equally along arcs. On straight lengths of no fewer than two studs at ends of arcs, place studs 6 inches o.c.

E. Direct Furring:

1. Screw to wood framing.
2. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.

F. 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.

3.3 INSTALLING SUSPENSION SYSTEMS

A. Install suspension system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.

B. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.

C. Suspend hangers from building structure as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.

    a. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, counters playing, or other equally effective means.

2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.

    a. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced installation standards.

3. Wire Hangers: Secure by looping and wire tying, either directly to structures or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.
4. Do not attach hangers to steel roof deck.
5. Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
6. Do not attach hangers to rolled-in hanger tabs of composite steel floor deck.
7. Do not connect or suspend steel framing from ducts, pipes, or conduit.

D. Fire-Resistance-Rated Assemblies: Wire tie furring channels to supports.

E. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

END OF SECTION 092216

# SECTION 092900 - 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.

C. Ceiling and wall materials shall comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

### 2.2 INTERIOR GYPSUM BOARD

A. Gypsum Wallboard: ASTM C 1396/C 1396M.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

    a. Georgia-Pacific Building Products.
    b. National Gypsum Company.
    c. USG

3. Thickness: 5/8 inch

4. Long Edges: Tapered and featured (rounded or beveled) for prefilling.

B. Gypsum Ceiling Board: ASTM C 1396/C 1396M.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

    a. Georgia-Pacific Building Products.
    b. National Gypsum Company.
    c. USG.

3. Thickness: 1/2 inch .
4. Long Edges: Tapered.

C. Moisture and Mold-Resistant Gypsum Board: ASTM C1396/C 1396M. With moisture- and mold-resistant core and paper surfaces.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

    a. Georgia-Pacific Building Products.
    b. National Gypsum Company.
    c. USG.

3. Core: As indicated.
4. Long Edges: Tapered.
5. Mold Resistance: ASTM D3273, score of 10 as rated according to ASTM D 3274.

2.3 TILE BACKING PANELS

A. Glass-Mat, Water-Resistant Backing Board: ASTM C 1178/C 1178M, with manufacturer's standard edges.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide Georgia Pacific, Dens Shield, Tile Backer, or comparable product by one of the following:

    a. CertainTeed Corporation.
    b. National Gypsum Company.

3. Core: 5/8 inch.
4. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

2.4 TRIM ACCESSORIES

A. Interior Trim: ASTM C 1047.

1. Material:
2. Shapes:

    a. Cornerbead.
    b. LC-Bead: J-shaped; exposed long flange receives joint compound.

c. L-Bead: L-shaped; exposed long flange receives joint compound.
d. U-Bead: J-shaped; exposed short flange does not receive joint compound.
e. Expansion (control) joint.

2.5 JOINT TREATMENT MATERIALS

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

B. Joint Tape:

1. Interior Gypsum Board: Paper.
2. Glass-Mat Gypsum Sheathing Board: 10-by-10 glass mesh.

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, rounded or beveled panel edges, 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 setting-type, sandable topping compound.
4. Finish Coat: For third coat, use setting-type, sandable topping compound.
5. Skim Coat: For final coat of Level 5 finish, use setting-type, sandable topping compound.

2.6 AUXILIARY MATERIALS

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

B. 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.

C. 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.

D. Acoustical Sealant: Manufacturer's standard no sag, paintable, no staining 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. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

a. Hilti, Inc.
b. Pecora Corporation.
c. United States Gypsum Company.

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- to 1/2-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, rounded or beveled edges, 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 1: Ceiling plenum areas, concealed areas, and where indicated.
2. Level 2: Panels that are substrate for tile.
3. Level 3: Where indicated on Drawings.
4. Level 4: At panel surfaces that will be exposed to view and all drywall ceilings and bulkheads.
5. Level 5: None.

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 092900

# SECTION 093000 - TILING

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

A. Section Includes:

1. Porcelain tile.
2. Stone Thresholds

B. Related Sections:

1. Division 9 Section "Gypsum Board" for glass-mat, water-resistant backer board.

### 1.3 DEFINITIONS

A. General: Definitions in the ANSI A108 series of tile installation standards and in ANSI A137.1 apply to Work of this Section unless otherwise specified.

B. ANSI A108 Series: ANSI A108.01, ANSI A108.02, ANSI A108.1A, ANSI A108.1B, ANSI A108.1C, ANSI A108.4, ANSI A108.5, ANSI A108.6, ANSI A108.8, ANSI A108.9, ANSI A108.10, ANSI A108.11, ANSI A108.12, ANSI A108.13, ANSI A108.14, ANSI A108.15, ANSI A108.16, and ANSI A108.17, which are contained in "American National Standard Specifications for Installation of Ceramic Tile."

C. Module Size: Actual tile size plus joint width indicated.

D. Face Size: Actual tile size, excluding spacer lugs.

### 1.4 PERFORMANCE REQUIREMENTS

A. Static Coefficient of Friction: For tile installed on walkway surfaces, provide products with the following values as determined by testing identical products per ASTM C 1028:

1. Level Surfaces: greater than or equal to 0.60 (wet and dry).
2. Step Treads: greater than or equal to 0.60 (wet and dry).

### 1.5 SUBMITTALS

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

B. Shop Drawings: Show locations of each type of tile and tile pattern. Show widths, details, and locations of expansion, contraction, control, and isolation joints in tile substrates and finished tile surfaces.

C. Samples for Verification:

1. Full-size units of each type and composition of tile and for each color and finish required.
2. Full-size units of each type of trim and accessory.
3. Stone thresholds in 6-inch lengths.
4. Metal edge strips in 6-inch lengths.

1.6 QUALITY ASSURANCE

A. Source Limitations for Tile: Obtain tile from one source or producer.

1. Obtain tile of each type and color or finish from same production run and of consistent quality in appearance and physical properties for each contiguous area.

B. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from one manufacturer and each aggregate from one source or producer.

C. Source Limitations for Other Products: Obtain each of the following products specified in this Section from a single manufacturer for each product:

1. Stone thresholds.
2. Crack isolation membrane.
3. Joint sealants.
4. Metal edge strips.

D. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Build mockup of each type of floor tile installation.
2. Build mockup of each type of wall tile installation.
3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

E. Preinstallation Conference: Conduct conference at Project site.

1. Review requirements in ANSI A108.01 for substrates and for preparation by other trades.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirements in ANSI A137.1 for labeling tile packages.

B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.

C. Store aggregates where grading and other required characteristics can be maintained and contamination can be avoided.

D. Store liquid materials in unopened containers and protected from freezing.

E. Handle tile that has temporary protective coating on exposed surfaces to prevent coated surfaces from contacting backs or edges of other units. If coating does contact bonding surfaces of tile, remove coating from bonding surfaces before setting tile.

1.8 PROJECT CONDITIONS

A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

1.9 EXTRA MATERIALS

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.
2. Grout: Furnish quantity of grout equal to 3 percent of amount installed for each type, composition, and color indicated.

PART 2 - PRODUCTS

2.1 PRODUCTS, GENERAL

A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.

1. Provide tile complying with Standard grade requirements unless otherwise 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 TCA installation methods specified in tile installation schedules, and other requirements specified.

C. Factory Blending: For tile exhibiting color variations within ranges, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.

D. Mounting: For factory-mounted tile, provide back- or edge-mounted tile assemblies as standard with manufacturer unless otherwise indicated.

E. Factory-Applied Temporary Protective Coating: Where indicated under tile type, protect exposed surfaces of tile against adherence of mortar and grout by precoating with continuous film of petroleum paraffin wax, applied hot. Do not coat unexposed tile surfaces.

2.2 TILE PRODUCTS

A. Porcelain Floor Tile (PFT1)

1. Basis-of-Design Product: Daltile, Marble Attache Lavish, Diamond Carrar MA70, Satin finish
2. Composition: Porcelain.
3. Module Size: 24” x 24”
4. Thickness: 3/8”
5. Face: Plain with square edges.
6. Surface: Slip-resistant, Cross Slate.
7. Grout type: Premium polymer-enhanced sanded cement grout.
   a. Basis-of-Design Product: Mapei Ultracolor Plus.
8. Grout Color: TBD, as selected by architect from manufacturer's full range of colors.
9. Grout Joint: 1/8” per manufacturers recommendation

B. Porcelain Wall Base (TB1)

1. Basis-of-Design Product: Daltile, Marble Attache Lavish, Diamond Carrar MA07, Satin finish
2. Composition: Porcelain.
3. Module Size: 3x24 floor bullnose S43F9
4. Face: Plain with square edges.
5. Surface: Slip-resistant, Cross Slate.
6. Grout type: Premium polymer-enhanced sanded cement grout.
   a. Basis-of-Design Product: Mapei Ultracolor Plus.
7. Grout Color: TBD, as selected by architect from manufacturer's full range of colors.

C. Porcelain Wall Tile (W3)

1. Basis-of-Design Product: Daltile, Annapolis Remix, Sail, AP06, Glossy, 6x18
2. Composition: Porcelain.
3. Module Size: 6x18 Sail Rectangle AP06 Glossy
4. Thickness: 5/16”
5. Grout type: Premium polymer-enhanced sanded cement grout.
   a. Basis-of-Design Product: Mapei Ultracolor Plus.
6. Grout Color: TBD, as selected by architect from manufacturer's full range of colors.
7. Grout Joint: 1/16” per manufacturers recommendation

D. Porcelain Wall Tile (W4)

1. Basis-of-Design Product: Daltile, Mythology, Titan Rectangle Undulated, MY96, Glossy, 4x12
2. Composition: Porcelain.
3. Module Size: 4x12 Titan Rectangle Undulated MY96 Glossy
4. Thickness: 5/16”
5. Grout type: Premium polymer-enhanced sanded cement grout.
   a. Basis-of-Design Product: Mapei Ultracolor Plus.
6. Grout Color: TBD, as selected by architect from manufacturer's full range of colors.
7. Grout Joint: 1/16” per manufacturers recommendation

2.3 THRESHOLDS

A. General: Fabricate to sizes and profiles indicated or required to provide transition between adjacent floor finishes.

1. Bevel edges at 1:2 slope, with lower edge of bevel aligned with or up to 1/16 inch above adjacent floor surface. Finish bevel to match top surface of threshold. Limit height of threshold to 1/2 inch or less above adjacent floor surface.

B. Marble Thresholds: ASTM C 503, with a minimum abrasion resistance of 12 per ASTM C 1353 or ASTM C 241 and with honed finish.

1. Description: Uniform, fine- to medium-grained white stone with gray veining.

2.4 SETTING MATERIALS

A. Latex-Portland Cement Mortar (Thin Set): ANSI A118.4.

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

a. Boiardi Products; a QEP company.
b. Bonsal American; an Oldcastle company.
c. Bostik, Inc.
d. C-Cure.
e. Custom Building Products.
f. Jamo Inc.
g. Laticrete International, Inc.
h. MAPEI Corporation.
i. Mer-Kote Products, Inc.
j. Southern Grouts & Mortars, Inc.
k. Summitville Tiles, Inc.
l. TEC; a subsidiary of H. B. Fuller Company.

2. For wall applications, provide mortar that complies with requirements for nonsagging mortar in addition to the other requirements in ANSI A118.4.

2.5 GROUT MATERIALS

1. Basis-of-Design Product: Subject to compliance with requirements, provide Mapei; UltracolorPlus or comparable product by one of the following:

a. Atlas Minerals & Chemicals, Inc.
b. Boiardi Products; a QEP company.
c. Bonsal American; an Oldcastle company.
d. Bostik, Inc.
e. C-Cure.
f. Custom Building Products.
g. Jamo Inc.
h. Laticrete International, Inc.
i. Mer-Kote Products, Inc.
j. Southern Grouts & Mortars, Inc.
k. Summitville Tiles, Inc.

l. TEC; a subsidiary of H. B. Fuller Company.

2. Provide product capable of withstanding continuous and intermittent exposure to temperatures of up to 140 deg F and 212 deg F, respectively, and certified by manufacturer for intended use.

2.6 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. Crack Isolation membrane shall be installed below tile at all locations.

C. Anodized Aluminum Edge Protection: Basis of design, Schluter- JOLLY.

D. Temporary Protective Coating: Either product indicated below that is formulated to protect exposed surfaces of tile against adherence of mortar and grout; compatible with tile, mortar, and grout products; and easily removable after grouting is completed without damaging grout or tile.

1. Petroleum paraffin wax, fully refined and odorless, containing at least 0.5 percent oil with a melting point of 120 to 140 deg F per ASTM D 87.
2. Grout release in form of manufacturer's standard proprietary liquid coating that is specially formulated and recommended for use as temporary protective coating for tile.

E. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.

F. Grout Sealer: Manufacturer's standard silicone product for sealing grout joints and that does not change color or appearance of grout.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Bostik, Inc.; CeramaSeal Magic Seal .
b. Jamo Inc.; Matte Finish Penetrating Sealer.
c. MAPEI Corporation; KER 004, Keraseal Penetrating Sealer for Unglazed Grout and Tile.

2.7 MIXING MORTARS AND GROUT

A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.

B. Add materials, water, and additives in accurate proportions.

C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

## 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 installed tile.

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 adhesives, bonded mortar bed, or thin-set mortar comply with surface finish requirements in ANSI A108.01 for installations indicated.

    a. Verify that surfaces that received a steel trowel finish have been mechanically scarified.
    b. Verify that protrusions, bumps, and ridges have been removed by sanding or grinding.

3. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed.
4. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.

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 thin-set 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.

D. Field-Applied Temporary Protective Coating: If indicated under tile type or needed to prevent grout from staining or adhering to exposed tile surfaces, precoat them with continuous film of temporary protective coating, taking care not to coat unexposed tile surfaces.

### 3.3 TILE INSTALLATION

A. Comply with TCA's "Handbook for Ceramic Tile Installation" for TCA 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 TCA 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. Exterior tile floors.
    b. Tile floors in wet areas.
    c. Tile swimming pool decks.
    d. Tile floors in laundries.
    e. Tile floors composed of tiles 8 by 8 inches or larger.
    f. Tile floors composed of rib-backed tiles.

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. 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.

1. For tile mounted in sheets, make joints between tile sheets same width as joints within tile sheets so joints between sheets are not apparent in finished work.
2. Where adjoining tiles on floor, base, walls, or trim are specified or indicated to be same size, align joints.
3. Where tiles are specified or indicated to be whole integer multiples of adjoining tiles on floor, base, walls, or trim, align joints unless otherwise indicated.

E. Joint Widths: Unless otherwise indicated, install tile with the following joint widths:

1. Ceramic Mosaic Tile: 1/16 inch.
2. Quarry Tile: 1/4 inch.
3. Paver Tile: 3/16 inch.
4. Glazed Wall Tile: 1/16 inch.

F. Lay out tile wainscots to dimensions indicated or to next full tile beyond dimensions indicated.

G. 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.
2. Prepare joints and apply sealants to comply with requirements in Division 7 Section "Joint Sealants."

H. Metal Edge Strips: Install where exposed edge of tile flooring meets carpet, wood, or other flooring that finishes flush with or below top of tile and no threshold is indicated.

I. Grout Sealer: Apply grout sealer to[ cementitious] grout joints[ in tile floors] according to grout-sealer manufacturer's written instructions. As soon as grout sealer has penetrated grout joints, remove excess sealer and sealer from tile faces by wiping with soft cloth.

3.4 CLEANING AND PROTECTING

A. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.

1. Remove epoxy and latex-portland cement grout residue from tile as soon as possible.
2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.
3. Remove temporary protective coating by method recommended by coating manufacturer and that is acceptable to tile and grout manufacturer. Trap and remove coating to prevent drain clogging.

B. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear. If recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors.

C. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.

D. Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces.

END OF SECTION 093000

SECTION 095113 - ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes acoustical panels and exposed suspension systems for interior ceilings.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For each exposed product and for each color and texture specified.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance data.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
   1. Flame-Spread Index: Class A according to ASTM E1264.
   2. Smoke-Developed Index: 50 or less.

2.2 ACOUSTICAL PANELS

A. ACT1 (Square, Tegular)

   1. Manufacturers: Subject to compliance with requirements, provide products by the following:

   2. Basis-of-Design Product: Subject to compliance with requirements, provide Armstrong, Optima 9/16” Square Tegular, 3251, 24"x24"x1".

   3. Acoustical Panel Standard: Manufacturer's standard panels according to ASTM E 1264.

   4. Color: White.

   5. Light Reflectance (LR): .88.

   6. Ceiling Attenuation Class (CAC): N/A.

7. Noise Reduction Coefficient (NRC): 0.95.
8. Edge/Joint Detail: Square, Tegular.
9. Thickness: 1 inch.
10. Modular Size: 24 by 24 inches.
11. Surface Burn Test: Class A.

B. ACT2 (Tegular)

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide Armstrong, Lyra PB Tegular Acoustical Panels (custom pattern) w/ 6” axium Classic Straight Perimeter Trim (White)
3. Acoustical Panel Standard: Manufacturer's standard panels according to ASTM E 1264.
4. Color: White.
5. Light Reflectance (LR): .88.
6. Noise Reduction Coefficient (NRC): 0.95.
7. Edge/Joint Detail: Square, Tegular.
8. Thickness: 1 inch.
9. Modular Size: 24 by 72 inches, 4 x 48 inches, 12 by 96 inches
10. Surface Burn Test: Class A.

C. ACT3 (Tegular)

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide Armstrong, CALLA Shapes for DESIGNFlex (Square Tegular)
3. Acoustical Panel Standard: Manufacturer's standard panels according to ASTM E 1264.
4. Color: White.
5. Noise Reduction Coefficient (NRC): 0.80.
6. Edge/Joint Detail: Square, Tegular.
7. Thickness: 1 inch.
8. Modular Size: Varies. See drawings for ceiling pattern and composition.
9. Surface Burn Test: Class A.

2.3 METAL SUSPENSION SYSTEM

A. ACT1

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

2. Basis-of-Design Product: Subject to compliance with requirements, provide Armstrong Suprafine XL, 9/16 Exposed Tee System.

3. Metal Suspension-System Standard: Manufacturer's standard, direct-hung, metal suspension system and accessories according to ASTM C 635/C 635M.

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

B. ACT2

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

2. Basis-of-Design Product: Subject to compliance with requirements, provide Armstrong Suprafine XL, 9/16 Exposed Tee System.

3. Metal Suspension-System Standard: Manufacturer's standard, direct-hung, metal suspension system and accessories according to ASTM C 635/C 635M.

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

C. ACT3

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

2. Basis-of-Design Product: Subject to compliance with requirements, provide Armstrong Suprafine XM, 9/16 suspension system.

3. Metal Suspension-System Standard: Manufacturer's standard, direct-hung, metal suspension system and accessories according to ASTM C 635/C 635M.

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

2.4 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. Hold-Down Clips: Manufacturer's standard hold-down.

C. Impact Clips: Manufacturer's standard impact-clip system designed to absorb impact forces against acoustical panels.

2.5 METAL EDGE MOLDINGS AND TRIM

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

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 that comply with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension-system runners.

## PART 3 - EXECUTION

### 3.1 PREPARATION

A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders unless otherwise indicated.

B. Layout openings for penetrations centered on the penetrating items.

### 3.2 INSTALLATION

A. Install acoustical panel ceilings according to ASTM C 636/C 636M, seismic design requirements, 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 panels.
   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.
   3. Arrange directionally patterned acoustical panels as follows:
      a. As indicated on reflected ceiling plans.
      b. Install panels with pattern running in one direction parallel to long axis of space.
      c. Install panels in a basket-weave pattern.
   4. Install hold-down impact clips in areas indicated; space according to panel manufacturer's written instructions unless otherwise indicated.

### 3.3 FIELD QUALITY CONTROL

A. Special Inspections: Engage a qualified special inspector to perform inspections.
   1. Periodic inspection during the installation of suspended ceiling grids according to ASCE/SEI 7.

END OF SECTION 095113

# SECTION 096500 - RESILIENT FLOORING

## PART 1 - GENERAL

### 1.1 SECTION INCLUDES

A. Resilient tile flooring.

B. Installation accessories.

### 1.2 REFERENCE STANDARDS

A. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2011.

B. ASTM F1861 - Standard Specification for Resilient Wall Base; 2008 (Reapproved 2012).

C. RFCI (RWP) - Recommended Work Practices for Removal of Resilient Floor Coverings; Resilient Floor Covering Institute; October 2011.

### 1.3 SUBMITTALS

A. See Section 013100 - Project Management and Coordination, for procedures.

B. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.

C. Verification Samples: Submit two samples, 12 x 7 inch in size illustrating color and pattern for each resilient flooring product specified.

### 1.4 FIELD CONDITIONS

A. Store materials for not less than 48 hours prior to installation in area of installation at a temperature of 70 degrees F to achieve temperature stability. Thereafter, maintain conditions above 55 degrees F.

## PART 2 - PRODUCTS

### 2.1 Luxury Vinyl Tile (LVT1)

A. Manufacturer: Shaw Contract

B. Collection: Noble Materials

C. Style Name: Emerge (0618V)

D. Color: Talc Platinum (18535)

E. Construction: Heavy Commercial Luxury Vinyl Tile

F. Edge Profile: Square Edge

G. Classification: Class / ASTM F 1700 Class III, Type B

H. Overall Thickness: 0.098 in | 2.5 mm

I. Wear Layer Thickness: 20 mil (0.51 mm).

J. Actual Size / ASTM F 536: 23.62 in x 23.62 in

K. Installation: Direct Glue per manufacturer's recommendations

L. Installation Pattern: Quarter Turn

M. Attic Stock: 5%, but not less than one carton.

2.2 Accessories

A. Subfloor Filler: White premix latex; type recommended by adhesive material manufacturer.

B. Primers, Adhesives, and Seaming Materials: Waterproof; types recommended by flooring manufacturer.

C. Moldings, Transition and Edge Strips: Provide moldings, transitions and edge strips at transitions between materials, at edges of materials and other conditions as needed to provide a complete installation. Color to match base unless otherwise indicated.

1. LVT to Carpet Transition:
   a. Manufacturer: Tarkett Johnsonite
   b. Style: Metal Edge Trios
   c. Color: 179 Ironstone

2. LVT/Carpet to Concrete Transition:
   a. Manufacturer: Tarkett Johnsonite
   b. Style: Reducer
   c. Color: 29 Moon Rock

D. Sealer and Wax: Type recommended by flooring manufacturer.

PART 3 - EXECUTION

3.1 Examination

A. Verify that surfaces are flat to tolerances acceptable to flooring manufacturer, free of cracks that might telegraph through flooring, clean, dry, and free of curing compounds, surface hardeners, and other chemicals that might interfere with bonding of flooring to substrate.

B. Cementitious Sub-floor Surfaces: Verify that substrates are dry enough and ready for resilient flooring installation by testing for moisture and pH.

1. Test in accordance with ASTM F710.
2. Obtain instructions if test results are not within limits recommended by resilient flooring manufacturer and adhesive materials manufacturer.

3.2 Preparation

A. Remove existing resilient flooring and flooring adhesives; follow the recommendations of RFCI Recommended Work Practices for Removal of Resilient Floor Coverings.

B. Prepare floor substrates as recommended by flooring and adhesive manufacturers.

C. Remove sub-floor ridges and bumps. Fill minor low spots, cracks, joints, holes, and other defects with sub-floor filler to achieve smooth, flat, hard surface.

D. Prohibit traffic until filler is cured.

E. Apply primer as required to prevent "bleed-through" or interference with adhesion by substances that cannot be removed.

3.3 Installation

A. Starting installation constitutes acceptance of sub-floor conditions.

B. Install in accordance with manufacturer's instructions.

C. Spread only enough adhesive to permit installation of materials before initial set.

D. Fit joints tightly.

E. Set flooring in place, press with heavy roller to attain full adhesion.

F. Where type of floor finish, pattern, or color are different on opposite sides of door, terminate flooring under centerline of door.

G. Install edge strips at unprotected or exposed edges, where flooring terminates, and where indicated.

1. Resilient Strips: Attach to substrate using adhesive.

H. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.

I. Install flooring in recessed floor access covers, maintaining floor pattern.

3.4 Tile Flooring

A. Mix tile from container to ensure shade variations are consistent when tile is placed, unless manufacturer's instructions say otherwise.

B. Lay flooring with joints and seams parallel to building lines to produce symmetrical tile pattern.

3.5 Resilient Base

A. Fit joints tightly and make vertical. Maintain minimum dimension of 18 inches between joints.

B. Install base on solid backing. Bond tightly to wall and floor surfaces.

C. Scribe and fit to door frames and other interruptions.

3.6 Cleaning

A. Remove excess adhesive from floor, base, and wall surfaces without damage.

B. Clean in accordance with manufacturer's instructions.

3.7 Protection

A. Prohibit traffic on resilient flooring for 48 hours after installation.

END OF SECTION 096500

# SECTION 096513 - RESILIENT BASE AND ACCESSORIES

## PART 1 - GENERAL

### 1.1 SUMMARY

A. Section Includes:

1. Resilient base.
2. Resilient molding accessories.

### 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, not less than 12 inches long.

## PART 2 - PRODUCTS

### 2.1 RESILIENT BASE RB1

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Mannington Commercial

B. Product Standard: ASTM F 1861, Type TP (thermoplastic rubber).

1. Group: I (solid, homogeneous).

C. Style: Reveal MW-XX-F

D. Thickness: 1/4"

E. Height: 4-1/4”

F. Lengths: Coils in manufacturer's standard length.

G. Outside Corners: Preformed corners.

H. Inside Corners: Preformed corners.

I. Colors: TB1 Peppercorn

2.2 INSTALLATION MATERIALS

A. Trowel-able 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 trowel-able 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 if 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.

3.3 RESILIENT ACCESSORY INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient accessories.

B. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of floor covering that would otherwise be exposed.

3.4 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protecting resilient products.

B. Cover resilient products subject to wear and foot traffic until Substantial Completion.

END OF SECTION 096513

# SECTION 096813 - TILE CARPETING

## PART 1 - GENERAL

### 1.1 SUMMARY

A. Section Includes:

1. Modular carpet tile.
2. Broadloom carpet.

### 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 QUALITY ASSURANCE

A. Installer Qualifications: Certified by the International Certified Floorcovering Installers Association at the Commercial II certification level.

### 1.4 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: Lifetime Limited Wear and Backing Warranty, Limited 15-Year XGUARD Stain Resistant Warranty, Limited 15-Year ColorSafe Bleach Resistant Warranty.

## PART 2 - PRODUCTS

### 2.1 CARPET TILE: CT1

A. Manufacturers: Shaw Contract

B. Type: Carpet Tile

C. Collection: Hand Drawn

D. Style: Lineweight Tile, 5T114

E. Color: Graphite (13510)

F. Fiber Type: Ecosolution Q100® Nylon

G. Construction Type: Multi-Level Pattern Cut/Loop

H. Tufted Weight: 20 oz/yd² | 678.1 g/m²

I. Dye Method: 100% Solution Dyed

J. Backing Type: Ecoworx® Tile

K. Installation Method: Ashlar

L. Size: 18 in x 36 in | 46 cm x 91 cm

M. Attic Stock: 5%, but not less than one carton.

2.2 CARPET TILE: CT2

A. Manufacturers: Shaw Contract

B. Type: Broadloom carpet

C. Collection: Hand Drawn

D. Style: Conte'

E. Color: Graphite (13510)

F. Fiber Type: 100% Nylon

G. Construction Type: Multi-Level Pattern Loop

H. Tufted Weight: 20 oz/yd² | 678.1 g/m²

I. Backing Type: Ultraloc ® Pattern

J. Size: 12.00 feet

K. Total thickness: 0.289 inches

L. Attic Stock: 5%, but not less than one carton.

2.3 INSTALLATION ACCESSORIES

A. Trowel-able Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer.

B. Adhesives: Water-resistant, mildew-resistant, non-staining, 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 F1869. 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 F2170. 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 the Carpet and Rug Institute's CRI 104 and with carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile.

B. Use trowel-able 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. Broom and vacuum clean substrates to be covered immediately before installing carpet tile.

## 3.3 INSTALLATION

A. General: Comply with the Carpet and Rug Institute's CRI 104, Section 10, "Carpet Tile," and with carpet tile manufacturer's written installation instructions.

B. Installation Method: As recommended in writing by carpet tile manufacturer.

C. Maintain dye-lot integrity. Do not mix dye lots in same area.

D. Maintain temperature at 60-85 degrees F with ambient humidity between 40-60% for 48-72 hours before, during installation, and at least 48-72 hours after installation. Maintain temperature between 55-90 degrees F for product life.

E. Material conditioning: carpet tiles and adhesives must be allowed to adjust to the job-site temperature for a minimum of 48 hours prior to installation.

F. Prior to installation ensure that levelness and finish of existing concrete slab meets or exceeds American Concrete Institute standards, ACI 301

G. Maintain pile-direction patterns indicated on Drawings.

H. Sequencing: select palettes by number located on each carton of tiles starting with the lowest numbers first and progressing lowest to highest numbers. Plan sequencing prior to installation for uniform look.

I. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.

J. 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, non-staining marking device.

K. Install pattern parallel to walls and borders.

L. 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 096813

# SECTION 099123 - INTERIOR PAINTING

## PART 1 GENERAL

### 1.1 SECTION INCLUDES

A. Interior paint and coating commercial systems including surface preparation.

### 1.2 RELATED SECTIONS

A. Section 081113 - Hollow Metal Doors and Frames.

B. Section 081416 – Flush Wood Doors

C. Section 092900 - Gypsum Board

### 1.3 REFERENCES

A. Steel Structures Painting Council (SSPC):
1. SSPC-SP 1 - Solvent Cleaning.
2. SSPC-SP 2 - Hand Tool Cleaning.
3. SSPC-SP 3 - Power Tool Cleaning.
4. SSPC-SP5/NACE No. 1, White Metal Blast Cleaning.
5. SSPC-SP6/NACE No. 3, Commercial Blast Cleaning.
6. SSPC-SP7/NACE No. 4, Brush-Off Blast Cleaning.
7. SSPC-SP10/NACE No. 2, Near-White Blast Cleaning.
8. SSPC-SP11, Power Tool Cleaning to Bare Metal.
9. SSPC-SP12/NACE No. 5, Surface Preparation and Cleaning of Metals by Waterjetting Prior to Recoating.
10. SSPC-SP 13 / NACE No. 6 Surface Preparation for Concrete.

B. Material Safety Data Sheets / Environmental Data Sheets: Per manufacturer's MSDS/EDS for specific VOCs (calculated per 40 CFR 59.406). VOCs may vary by base and sheen.

C. California Department of Public Health (CDPH):
1. CDPH v1.1-2010 and V1.2-2017

### 1.4 SUBMITTALS

A. Submit under provisions of Section 013300 – Submittal Procedures.

B. Product Data: For each paint system indicated, including.
1. Product characteristics.
2. Surface preparation instructions and recommendations.
3. Primer requirements and finish specification.
4. Storage and handling requirements and recommendations.
5. Application methods.
6. Cautions for storage, handling and installation.

C. Selection Samples: Submit a complete set of color chips that represent the full range of manufacturer's products, colors and sheens available.

D. Verification Samples: For each finish product specified, submit samples that represent actual product, color, and sheen.

E. Coating Maintenance Manual: Upon conclusion of project, the Contractor or paint

manufacturer/supplier shall furnish a coating maintenance manual, such as Sherwin-Williams, "Custodian Project Color and Product Information" report or equal. Manual shall include an Area Summary with finish schedule, Area Detail designating where each product/color/finish was used, product data pages, Material Safety Data Sheets, care and cleaning instructions, touch-up procedures, and color samples of each color and finish used.

F. Only submit complying products based on project requirements (i.e. LEED). One must also comply with the regulations regarding VOCs (CARB, OTC, SCAQMD, LADCO). To ensure compliance with district regulations and other rules, businesses that perform coating activities should contact the local district in each area where the coating will be used.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A firm or individual experienced in applying paints and coatings similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.

B. Paint exposed surfaces. If a color of finish, or a surface is not specifically mentioned, Architect will select from standard products, colors and sheens available.

C. Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels unless indicated.

D. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
1. Finish surfaces for verification of products, colors and sheens.
2. Finish area designated by Architect.
3. Provide samples that designate primer and finish coats.
4. Compatibility and Adhesion: Check after one week of drying and curing by testing in accordance with ASTM D3359; Adhesion by tape test. If coating system is incompatible, additional surface preparation up to and including complete removal may be required.
5. Do not proceed with remaining work until the Architect approves the mock-up.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver manufacturer's unopened containers to the work site. Packaging shall bear the manufacturer's name, label, and the following list of information.
1. Product name, and type (description).
2. Application and use instructions.
3. Surface preparation.
4. VOC content.
5. Environmental handling.
6. Batch date.
7. Color number.

B. Storage: Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

C. Store materials in an area that is within the acceptable temperature range, per manufacturer's instructions. Protect from freezing.

D. Handling: Maintain a clean, dry storage area, to prevent contamination or damage to the coatings.

1.7 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits

recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's recommended limits.

1.8 EXTRA MATERIALS

A. Furnish extra paint materials from the same production run as the materials applied and in the quantities described below. Package with protective covering for storage and identify with labels describing contents. Deliver extra materials to Owner.

B. Furnish Owner with an additional one percent of each material and color, but not less than 1 gal (3.8 l) or 1 case, as appropriate.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: Sherwin-Williams, which is located at: 101 Prospect Ave.; Cleveland, OH 44115; ASD Toll Free Tel: 800-524-5979; Tel: 216-566-2000; Fax: 440-826-1989; Email: request infospecifications@sherwin.com; Web:www.swspecs.com.

B. Requests for substitutions will be considered in accordance with provisions of Section 012500 – Substitution Procedures.

2.2 APPLICATIONS/SCOPE

A. Interior Paint and Coating Commercial Systems:
1. Metal: Hollow Metal Doors and Frames.
2. Wood: Doors
3. Drywall: Drywall board, Gypsum board.

2.3 PAINT MATERIALS - GENERAL

A. Paints and Coatings:
1. Unless otherwise indicated, provide factory-mixed coatings. When required, mix coatings to correct consistency in accordance with manufacturer's instructions before application. Do not reduce, thin, or dilute coatings or add materials to coatings unless such procedure is specifically described in manufacturer's product instructions.
2. For opaque finishes, tint each coat including primer coat and intermediate coats, one-half shade lighter than succeeding coat, with final finish coat as base color. Or follow manufactures product instructions for optimal color conformance.

B. Primers: Where the manufacturer offers options on primers for a particular substrate, use primer categorized as "best" by the manufacturer.

C. Coating Application Accessories: Provide all primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials required, per manufacturer's specifications.

D. Color: Refer to Finish Schedule for paint colors, and as selected.

2.4 INTERIOR PAINT AND COATING COMMERCIAL SYSTEMS

A. Metal: Hollow Metal Doors and Frames.
1. Alkyd Systems; Waterbased:
a. Semi-Gloss Finish:
1) 1st Coat: S-W Pro Industrial Pro-Cryl Universal Primer, B66-1310 Series

(5.0 mils wet, 2.0 mils dry). (Can eliminate this coat if factory primed)
2) 2nd Coat: S-W Pro Industrial Waterbased Alkyd Urethane Enamel Semi-Gloss, B53-1150 Series.
3) 3rd Coat: S-W Pro Industrial Waterbased Alkyd Urethane Enamel Semi-Gloss, B53-1150 Series (4.0-5.0 mils wet, 1.4 - 1.7 mils dry per coat).

B. Wood: Doors (Factory Primed)
1. Alkyd Systems; Waterbased:
a. Semi-Gloss Finish:
1) 1st Coat: S-W Pro Industrial Waterbased Alkyd Urethane Enamel Semi-Gloss, B53-1150 Series.
2) 2nd Coat: S-W Pro Industrial Waterbased Alkyd Urethane Enamel Semi-Gloss, B53-1150 Series (4.0-5.0 mils wet, 1.4 - 1.7 mils dry per coat).

C. Drywall: Walls, Ceilings
1. Latex Systems:
a. Satin Finish: **Walls**:
1) 1st Coat: S-W ProMar200 Zero VOC Interior Latex Primer, B28W2600 (4 mils wet, 1.5 mils dry).
2) 2nd Coat: S-W ProMar 200 Zero VOC Latex Satin, B31-2600 Series.
3) 3rd Coat: S-W ProMar 200 Zero VOC Latex Satin, B31-2600 Series (4 mils wet, 1.5 mils dry per coat).
b. Flat Finish: **Ceilings**
1) 1st Coat: S-W ProMar 200 Zero VOC Interior Latex Primer, B28W2600 (4 mils wet, 1.5 mils dry).
2) 2nd Coat: S-W ProMar 200 Zero VOC Latex Flat, B30-12600 Series.
3) 3rd Coat: S-W ProMar 200 Zero VOC Latex Flat, B30-12600 Series (4 mils wet, 1.6 mils dry per coat).

2. Epoxy Systems (Water Based):
a. Semi-Gloss Finish: (Mils per coat as recommended by manufacturer)
1) 1st Coat: S-W ProMar 200 Zero VOC Latex Primer, B280W2600
2) 2nd Coat: S-W Pro Industrial Pre-Catalyzed Waterbased Epoxy Semi-Gloss, K46- Series.
3) 3rd Coat: S-W Pro Industrial Pre-Catalyzed Waterbased Epoxy Semi-Gloss, K46- Series.

## PART 3 EXECUTION

### 3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared; notify Architect of unsatisfactory conditions before proceeding. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

B. Proceed with work only after conditions have been corrected and approved by all parties, otherwise application of coatings will be considered as an acceptance of surface conditions.

C. Previously Painted Surfaces: Verify that existing painted surfaces do not contain lead based paints, notify Architect immediately if lead based paints are encountered.

### 3.2 SURFACE PREPARATION

A. General: Surfaces shall be dry and in sound condition. Remove oil, dust, dirt, loose rust, peeling paint or other contamination to ensure good adhesion.
1. Prior to attempting to remove mildew, it is recommended to test any cleaner on a

small, inconspicuous area prior to use. Bleach and bleaching type cleaners may damage or discolor existing paint films. Bleach alternative cleaning solutions are advised.

2. Remove mildew before painting by washing with a solution of 1 part liquid household bleach and 3 parts of warm water. Apply solution and scrub the mildewed area. Allow solution to remain on the surface for 10 minutes. Rinse thoroughly with clean water and allow surface to dry before painting. Wear protective glasses or goggles, waterproof gloves, and protective clothing. Quickly wash off any of the mixture that comes in contact with your skin. Do not add detergents or ammonia to the bleach/water solution.
3. Remove items including but not limited to thermostats, electrical outlets, switch covers and similar items prior to painting. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.
4. No exterior painting should be done immediately after a rain, during foggy weather, when rain is predicted, or when the temperature is below 50 degrees F (10 degrees C), unless products are designed specifically for these conditions. On large expanses of metal siding, the air, surface and material temperatures must be 50 degrees F (10 degrees F) or higher to use low temperature products.

B. Drywall - Interior: Must be clean and dry. All nail heads must be set and spackled. Joints must be taped and covered with a joint compound. Spackled nail heads and tape joints must be sanded smooth and all dust removed prior to painting.

C. Steel: Structural, Plate, And Similar Items: Should be cleaned by one or more of the surface preparations described below. These methods are used throughout the world for describing methods for cleaning structural steel. Visual standards are available through the Society of Protective Coatings. A brief description of these standards together with numbers by which they can be specified follow.

1. Solvent Cleaning, SSPC-SP1: Solvent cleaning is a method for removing all visible oil, grease, soil, drawing and cutting compounds, and other soluble contaminants. Solvent cleaning does not remove rust or mill scale. Change rags and cleaning solution frequently so that deposits of oil and grease are not spread over additional areas in the cleaning process. Be sure to allow adequate ventilation.
2. Hand Tool Cleaning, SSPC-SP2: Hand Tool Cleaning removes all loose mill scale, loose rust, and other detrimental foreign matter. It is not intended that adherent mill scale, rust, and paint be removed by this process. Before hand tool cleaning, remove visible oil, grease, soluble welding residues, and salts by the methods outlined in SSPC-SP1.
3. Power Tool Cleaning, SSPC-SP3: Power Tool Cleaning removes all loose mill scale, loose rust, and other detrimental foreign matter. It is not intended that adherent mill scale, rust, and paint be removed by this process. Before power tool cleaning, remove visible oil, grease, soluble welding residues, and salts by the methods outlined in SSPC-SP1.
4. White Metal Blast Cleaning, SSPC-SP5 or NACE 1: A White Metal Blast Cleaned surface, when viewed without magnification, shall be free of all visible oil, grease, dirt, dust, mill scale, rust, paint, oxides, corrosion products, and other foreign matter. Before blast cleaning, visible deposits of oil or grease shall be removed by any of the methods specified in SSPC-SP1 or other agreed upon methods.
5. Commercial Blast Cleaning, SSPC-SP6 or NACE 3: A Commercial Blast Cleaned surface, when viewed without magnification, shall be free of all visible oil, grease, dirt, dust, mill scale, rust, paint, oxides, corrosion products, and other foreign matter, except for staining. Staining shall be limited to no more than 33 percent of each square inch of surface area and may consist of light shadows, slight streaks, or minor discoloration caused by stains of rust, stains of mill scale, or stains of previously applied paint. Before blast cleaning, visible deposits of oil or grease shall be removed by any of the methods specified in SSPC-SP1 or other agreed upon methods.

6. Brush-Off Blast Cleaning, SSPC-SP7 or NACE 4: A Brush-Off Blast Cleaned surface, when viewed without magnification, shall be free of all visible oil, grease, dirt, dust, loose mill scale, loose rust, and loose paint. Tightly adherent mill scale, rust, and paint may remain on the surface. Before blast cleaning, visible deposits of oil or grease shall be removed by any of the methods specified in SSPC-SP 1 or other agreed upon methods.
7. Power Tool Cleaning to Bare Metal, SSPC-SP11: Metallic surfaces that are prepared according to this specification, when viewed without magnification, shall be free of all visible oil, grease, dirt, dust, mill scale, rust, paint, oxide corrosion products, and other foreign matter. Slight residues of rust and paint may be left in the lower portions of pits if the original surface is pitted. Prior to power tool surface preparation, remove visible deposits of oil or grease by any of the methods specified in SSPC-SP1, Solvent Cleaning, or other agreed upon methods.
8. Near-White Blast Cleaning, SSPC-SP10 or NACE 2: A Near White Blast Cleaned surface, when viewed without magnification, shall be free of all visible oil, grease, dirt, dust, mill scale, rust, paint, oxides, corrosion products, and other foreign matter, except for staining. Staining shall be limited to no more than 5 percent of each square inch of surface area and may consist of light shadows, slight streaks, or minor discoloration caused by stains of rust, stains of mill scale, or stains of previously applied paint. Before blast cleaning, visible deposits of oil or grease shall be removed by any of the methods specified in SSPC-SP1 or other agreed upon methods.
9. High- and Ultra-High Pressure Water Jetting for Steel and Other Hard Materials: SSPC-SP12 or NACE 5: This standard provides requirements for the use of high- and ultra-high pressure water jetting to achieve various degrees of surface cleanliness. This standard is limited in scope to the use of water only without the addition of solid particles in the stream.
10. Water Blasting, SSPC-SP12/NACE No. 5: Removal of oil grease dirt, loose rust, loose mill scale, and loose paint by water at pressures of 2,000 to 2,500 psi at a flow of 4 to 14 gallons per minute

D. Wood: Must be clean and dry. Prime and paint as soon as possible. Knots and pitch streaks must be scraped, sanded, and spot primed before a full priming coat is applied. Patch all nail holes and imperfections with a wood filler or putty and sand smooth.

3.3 INSTALLATION

A. Apply all coatings and materials with the manufacturer's specifications in mind. Mix and thin coatings according to manufacturer's recommendations.

B. Do not apply to wet or damp surfaces. Wait at least 30 days before applying to new concrete or masonry. Or follow manufacturer's procedures to apply appropriate coatings prior to 30 days. Test new concrete for moisture content. Wait until wood is fully dry after rain or morning fog or dew.

C. Apply coatings using methods recommended by manufacturer.

D. Uniformly apply coatings without runs, drips, or sags, without brush marks, and with consistent sheen.

E. Apply coatings at spreading rate required to achieve the manufacturers recommended dry film thickness.

F. Regardless of number of coats specified, apply as many coats as necessary for complete hide, and uniform appearance.

G. Inspection: The coated surface must be inspected and approved by the Architect just prior to the application of each coat.

3.4 PROTECTION

A. Protect finished coatings from damage until completion of project.

B. Touch-up damaged coatings after substantial completion, following manufacturer's recommendation for touch up or repair of damaged coatings. Repair any defects that will hinder the performance of the coatings.

END OF SECTION

# SECTION 099300 - STAINING AND TRANSPARENT FINISHING

## 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 surface preparation and application of wood stains and transparent finishes on the following substrates:

1. Interior Substrates:

a. Dressed lumber (finish carpentry or woodwork).

B. Related Requirements:

1. Section 099123 "Interior Painting" for stains and transparent finishes on concrete floors.

### 1.3 DEFINITIONS

A. MPI Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.

B. 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.

C. MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.

D. MPI Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.

E. MPI Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

### 1.4 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

1. Include printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
2. Indicate VOC content.

B. Samples for Verification: For each type of finish system and in each color and gloss of finish required.

1. Submit Samples on representative samples of actual wood substrates, 8 inches square or 8 inches long.

2. Apply coats on Samples in steps to show each coat required for system.
3. Label each coat of each Sample.
4. Label each Sample for location and application area.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Stains and Transparent Finishes: 5 percent, but not less than 1 quart of each material and color applied.

1.6 QUALITY ASSURANCE

A. Mockups: Apply mockups of each finish system indicated and each color selected to verify preliminary selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

1. Architect will select one surface to represent surfaces and conditions for application of each type of finish system and substrate.

a. Vertical and Horizontal Surfaces: Provide samples of at least 10 sq. ft..
b. Other Items: Architect will designate items or areas required.

2. Final approval of stain color selections will be based on mockups.

a. If preliminary stain color selections are not approved, apply additional mockups of additional stain colors selected by Architect at no added cost to Owner.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.8 FIELD CONDITIONS

A. Apply finishes only when temperature of surfaces to be finished and ambient air temperatures are between 50 and 95 deg F.

B. Do not apply finishes when relative humidity exceeds 85 percent, at temperatures less than 5 deg F above the dew point, or to damp or wet surfaces.

C. Do not apply exterior finishes in snow, rain, fog, or mist.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. VOC Content: For field applications, paints and coatings shall comply with VOC content limits of authorities having jurisdiction and the following VOC content limits:

1. Stains: 100 g/L.

B. Stain Colors: Match Architect's samples, Architect will provide a sample of the selected door stain to be matched.

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 Exterior Wood Substrates: 15 percent, when measured with an electronic moisture meter.

C. Maximum Moisture Content of Interior Wood Substrates: 15 percent, when measured with an electronic moisture meter.

D. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

E. Proceed with finish application only after unsatisfactory conditions have been corrected.

1. Beginning finish application constitutes Contractor's acceptance of substrates and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and finishing.

1. After completing finishing operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

C. Clean and prepare surfaces to be finished according to manufacturer's written instructions for each substrate condition and as specified.

1. Remove dust, dirt, oil, and grease by washing with a detergent solution; rinse thoroughly with clean water and allow to dry. Remove grade stamps and pencil marks by sanding lightly. Remove loose wood fibers by brushing.
2. Remove mildew by scrubbing with a commercial wash formulated for mildew removal and as recommended by stain manufacturer.

D. Interior Wood Substrates:

1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
2. Apply wood filler paste to open-grain woods, as defined in "MPI Architectural Painting Specification Manual," to produce smooth, glasslike finish.
3. Sand surfaces exposed to view and dust off.
4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dry.

3.3 APPLICATION

A. Apply finishes according to manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual."

1. Use applicators and techniques suited for finish and substrate indicated.
2. Finish surfaces behind movable equipment and furniture same as similar exposed surfaces.
3. Do not apply finishes over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.

B. Apply finishes to produce surface films without cloudiness, holidays, lap marks, brush marks, runs, ropiness, or other surface imperfections.

3.4 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing finish application, clean spattered surfaces. Remove spattered materials by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from finish application. Correct damage by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced finished wood surfaces.

3.5 INTERIOR WOOD -FINISH-SYSTEM SCHEDULE

A. Wood Substrates: Wood trim.

1. 1st Coat: SW Wood Classics Interior Stain, A49 Series.
2. 2nd Coat: SW Wood Classics Fast Dry Oil Based Varnish, A66-300 Series.
3. 3rd Coat: SW Wood Classics Fast Dry Oil Based Varnish, A66-300 Series.

END OF SECTION 099300

SECTION 102113.17 – PHENOLIC TOILET COMPARTMENTS

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. Solid-plastic toilet compartments and urinal screens configured as toilet enclosures.

B. Related Requirements:

1. Section 061000 "Rough Carpentry" for blocking.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for toilet compartments.

B. Shop Drawings: For toilet compartments.

1. Include plans, elevations, sections, details, and attachment details.
2. Show locations of cutouts for compartment-mounted toilet accessories.
3. Show locations of centerlines of toilet fixtures.
4. Show locations of floor drains.
5. Show overhead support or bracing locations.

C. Samples for Verification: For the following products, in manufacturer's standard sizes unless otherwise indicated:

1. Each type of material, color, and finish required for toilet compartments, prepared on 6inch- square Samples of same thickness and material indicated for Work.
2. Each type of hardware and accessory.

1.4 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of toilet fixtures, walls, columns, ceilings, and other construction contiguous with toilet compartments by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: 25 or less.
2. Smoke-Developed Index: 450 or less.

B. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities and ICC A117.1 for toilet compartments designated as accessible.

2.2 PHENOLIC TOILET COMPARTMENTS

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

B. Basis-of-Design Product: Subject to compliance with requirements, provide toilet partitions as manufactured by and supplied by American Specialties Inc, Accurate Partitions, Alpaco, Classic Partitions. – Toilet Compartments & Urinal Screens

a Color: 5107 Burnt Strand

b Core: Color Thru

C. Toilet-Enclosure Style: Overhead braced Floor anchored w/ pedestal legs.

D. Door, Panel, Screen, and Pilaster Construction: : Phenolic-resin impregnated, wood-based product core with melamine-impregnated decorative surface papers and transparent, protective topcoat; NEMA LD 3 Compact Laminate.

a Finish: Matte

b Color-Thru Phenolic Color: 5107 Burnt Strand

2.3 COMPONENTS

A. Doors, Panels, and Pilasters: Phenolic-resin impregnated, wood-based product core with melamine-impregnated decorative surface papers and transparent, protective topcoat; NEMA LD 3 Compact Laminate.
   1. Finish: Matte.
   2. Color-Thru Phenolic Color: 5107 Burnt Strand
   3. Privacy: Provide interlocking doors and pilasters with integral Zero-Sightline System routed edges.

B. Standard Door and Panel Dimensions:
   1. Urinal and Entrance Screen Panel Height: 58 inches
   2. Urinal and Entrance Screen Panel Height above Floor: 12 inches

C. Standard Pilasters: 3/4 inch (19 mm) thick, of sizes required to suit compartment width and spacing.

D. Alpaco Classic Door, Panel, and Pilaster Dimensions:
   1. Thickness: 1/2 inch

2. Door and Panel Height: 76-3/4 inches
3. Pilaster Height: 78-3/4 inches

E. Alpaco Classic and Alpaco Elegance Panel or Pilaster Pedestal Legs: Brushed stainless steel, adjustable in height plus or minus to 1 inch to support panel 4 inches above finished floor.

F. Alpaco Classic Head Rails: Extruded aluminum headrail, octagonal in cross-section, powder - coated black.

2.3 MATERIALS

A. Stainless Steel Sheet: ASTM A240/A240M or ASTM A666, Type 304, stretcher-leveled standard of flatness.

B. Stainless Steel Castings: ASTM A743/A743M.

C. Zamac: ASTM B86, commercial zinc-alloy die castings, chrome plated.

D. Phenolic Panels: Monolithic core of phenolic resin, reinforced with cellulose fibers, manufactured under high pressure and at high temperatures, with melamine-impregnated decorative surface papers; NEMA LD 3, Compact Laminate.

2.4 HARDWARE AND ACCESSORIES

A. Brackets:

a. Continuous Type: Brushed stainless steel, standard depth

B. Alpaco Door Hardware:

a. Hinges: Brushed stainless steel barrel hinges.

b. Latch and Keeper: Brushed stainless steel latch with occupancy indicator.

c. Coat Hook: Brushed stainless steel. Manufacturer's Alpaco coat hook with rubber bumper; one per compartment, mounted on door.

d. Door Pull: Brushed stainless steel. Provide door pull for outswinging doors. Provide on both sides of doors designated as accessible.

e. Door Bumper: Brushed stainless steel. Provide rubber-tipped door bumpers at out-swinging doors.

C. Attachments, Screws, and Bolts: Stainless steel, tamper-resistant type.

a. For Attaching Panels and Pilasters to Brackets: Sex-type through-bolts and nuts, tamper-resistant.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that field measurements are as indicated on shop drawings

C. Verify correct spacing of and between plumbing fixtures.

D. Verify correct location of built-in framing, anchorage, and bracing.

3.2 INSTALLATION

A. Install partitions secure, rigid, plumb, and level in accordance with manufacturer's written instructions.

B. Attach panel brackets securely to walls using anchor devices.

C. Attach panels and pilasters to brackets. Locate head rail joints at pilaster centerlines.

D. Field touch-up of scratches or damaged finish not permitted. Replace damaged or scratched materials with new materials.

3.4 TOLERANCES

A. Maximum Variation from True Position: 1/4 inch

B. Maximum Variation from Plumb: 1/8 inch

3.5 ADJUSTING

A. Adjust and align hardware to uniform clearance at vertical edge of doors, not exceeding 3/16 inch (5 mm).

B. Adjust hinges to locate doors in partially opened position when unlatched. Return outswinging doors to closed condition.

C. Adjust adjacent components for consistency of line or plane.

3.6 CLEANING

A. Clean partition and screen surfaces with materials and cleansers in accordance with manufacturer's recommendations.

END OF SECTION 102113.17

# SECTION 102800 - TOILET, BATH, AND LAUNDRY ACCESSORIES

## PART 1 - GENERAL

### 1.1 SUMMARY

A. Section Includes:

1. Public-use washroom accessories.
2. Healthcare accessories.
3. Custodial accessories.

### 1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

### 1.3 CLOSEOUT SUBMITTALS

A. Maintenance data.

### 1.4 WARRANTY

A. Manufacturer's Special Warranty for Mirrors: Manufacturer agrees to repair or replace mirrors 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 PERFORMANCE 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.

### 2.2 PUBLIC-USE WASHROOM ACCESSORIES

A. Grab Bar A1 and A2:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

a. Bobrick Washroom Equipment, Inc.
b. Bradley Corporation.

3. Mounting: Flanges with concealed fasteners.
4. Material: Stainless steel, 0.05 inch thick.

    a. Finish: Smooth, No. 4 finish (satin) on ends and slip-resistant texture in grip area.

5. Outside Diameter: 1-1/2 inches.
6. Configuration and Length: As indicated on Drawings.

B. Toilet Tissue (Roll) Dispenser A3:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
2. Retain "Basis-of-Design Product" Subparagraph below and insert list of manufacturers to identify a specific product or a comparable product from manufacturers listed. Retain option and delete insert note if manufacturer's name and model number are indicated on Drawings.
3. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

    a. Bobrick Washroom Equipment, Inc. B-2888

4. Mounting: Surface mounted.
5. Capacity: (2) rolls
6. Material and Finish: Satin-Finish Stainless Steel

C. Sanitary-Napkin Disposal Unit A4:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

    a. Bobrick Washroom Equipment, Inc.
    b. Bradley Corporation.

3. Mounting: Surface mounted.
4. Door or Cover: Self-closing, disposal-opening cover and hinged face panel with tumbler lockset.
5. Receptacle: Removable.
6. Material and Finish: Satin-Finish Stainless Steel

D. Mirror Unit A5:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

    a. Bobrick Washroom Equipment, Inc.
    b. Bradley Corporation.

3. Frame: Stainless-steel channel.

a. Corners: Mitered and mechanically interlocked.

4. Hangers: Produce rigid, tamper- and theft-resistant installation, using method indicated below.

a. One-piece, galvanized-steel, wall-hanger device with spring-action locking mechanism to hold mirror unit in position with no exposed screws or bolts.
b. Wall bracket of galvanized steel, equipped with concealed locking devices requiring a special tool to remove.

5. Size: As indicated on Drawings.

E. Liquid-Soap Dispenser A6:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

a. ASI American Specialties (0347-41)

3. Mounting: Surface mounted.
4. Material and Finish: Matte Black

F. Paper Towel & Waste Receptacle A7:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

a. ASI American Specialties – Piatto 6467-00

3. Mounting: Concealed Mounting
4. Material and Finish: Type 304 Stainless Steel Frame w/ White Phenolic Door

G. Coat Hook A8:

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

a. Bobrick Washroom Equipment, Inc.
b. Bradley Corporation.

2. Description: Single-prong unit.
3. Material and Finish: Stainless steel, No. 4 finish (satin).

H. Towel Bar A11:

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

a. Bobrick Washroom Equipment, Inc.

2. Description: Surface Mounted Round Bar
3. Length: 24”
4. Material and Finish: Satin- Stainless steel

I. Shower Curtain Rod A12:

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

   a. Bobrick Washroom Equipment, Inc.

2. Description: Shower Curtain Rod with Concealed Mounting
3. Material and Finish: Satin- Stainless steel

J. Two-Wall Grab Bar A14:

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

   a. Bobrick Washroom Equipment, Inc.

2. Mounting: Flanges with concealed fasteners.
3. Material: Stainless steel, 0.05 inch thick.

   a. Finish: Smooth, No. 4 finish (satin) on ends and slip-resistant texture in grip area.

4. Outside Diameter: 1-1/2 inches.

5. Configuration and Length: As indicated on Drawings.

K. L-Shaped Shower Seat A15:

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

   a. ASI American Specialties, Inc. .

2. Description: Folding Shower Seat, Left Hand ADA
3. Material and Finish: Satin- Stainless steel

2.3 CUSTODIAL ACCESSORIES

A. Mop and Broom Holder A13:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

a. Bobrick Washroom Equipment, Inc.
b. Bradley Corporation.

2.4 FABRICATION

A. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.

B. Grab Bars: Install to withstand a downward load of at least 250 lbf, when tested according to ASTM F 446.

END OF SECTION 102800

# SECTION 104410 - FIRE-PROTECTION SPECIALTIES

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

A. This Section includes the following:

1. Portable fire extinguishers.
2. Fire-protection cabinets for the following:

    a. Portable fire extinguishers.

3. Mounting brackets for fire extinguishers.

B. Related Sections include the following:

1. Division 7 Section "Through-Penetration Firestop Systems" for firestopping sealants at fire-rated cabinets.

### 1.3 SUBMITTALS

A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for fire-protection cabinets.

1. Fire Extinguishers: Include rating and classification.
2. Fire-Protection Cabinets: Include roughing-in dimensions, details showing mounting methods, relationships of box and trim to surrounding construction, door hardware, cabinet type, trim style, and panel style.

B. Maintenance Data: For fire extinguishers and fire-protection cabinets to include in maintenance manuals.

### 1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain fire extinguishers and fire-protection cabinets through one source from a single manufacturer.

B. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."

C. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.

1. Provide fire extinguishers approved, listed, and labeled by FMG.

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

1.5 COORDINATION

A. Coordinate size of fire-protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.

1.6 SEQUENCING

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

1.7 WARRANTY

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

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

a. Failure of hydrostatic test according to NFPA 10.
b. Faulty operation of valves or release levers.

2. Warranty Period: Six years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Basis-of-Design Product: The design for each product is based on the product named. Subject to compliance with requirements, provide either the named product or a comparable product by one of the other manufacturers specified.

2.2 MATERIALS

A. Aluminum: Alloy and temper recommended by aluminum producer and manufacturer for type of use and finish indicated, and as follows:

1. Sheet: ASTM B 209.
2. Extruded Shapes: ASTM B 221.

B. Tempered Float Glass: ASTM C 1048, Kind FT, Condition A, Type I, Quality q3, 3 mm thick, Class 1 (clear).

2.3 PORTABLE FIRE EXTINGUISHERS

A. Available Manufacturers:

1. Amerex Corporation.
2. Ansul Incorporated.
3. Badger Fire Protection.
4. Buckeye Fire Equipment Company.
5. Fire End & Croker Corporation.
6. General Fire Extinguisher Corporation.
7. JL Industries, Inc.
8. Kidde Fyrnetics.
9. Larsen's Manufacturing Company.
10. Modern Metal Products; Div. of Technico.
11. Moon American.
12. Potter Roemer; Div. of Smith Industries, Inc.
13. Watrous; Div. of American Specialties, Inc.

B. General: Provide fire extinguishers of type, size, and capacity for each fire-protection cabinet and mounting bracket indicated.

1. Valves: Manufacturer's standard.
2. Handles and Levers: Aluminum with satin anodized finish..
3. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B and bar coding for documenting fire extinguisher location, inspections, maintenance, and recharging.

C. Multipurpose Dry-Chemical Type in Steel Container: UL-rated 2-A:10-B:C, 5-lb nominal capacity, with monoammonium phosphate-based dry chemical in enameled-steel container.

2.4 FIRE-PROTECTION CABINET FEC

A. Basis-of-Design Product: Larsen’s Manufacturing; Vertical Duo or a comparable product by one of the following:

B. Available Manufacturers:

1. Fire End & Croker Corporation.
2. General Accessory Mfg. Co.
3. JL Industries, Inc.
4. Kidde Fyrnetics.
5. Larsen's Manufacturing Company.
6. Modern Metal Products; Div. of Technico.
7. Moon American.
8. Potter Roemer; Div. of Smith Industries, Inc.
9. Watrous; Div. of American Specialties, Inc.

C. Cabinet Type: Suitable for fire extinguisher.

D. Cabinet Construction: Nonrated, 1-hour and 2-hour fire rated.

E. Cabinet Material: Aluminum

F. Semi-recessed Cabinet: Cabinet box partially recessed in walls of shallow depth to suit style of trim indicated; with one-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend).

1. Rolled-Edge Trim: 2-1/2-inch (64-mm).

G. Cabinet Trim Material: Satin aluminum, clear anodized.

H. Door Material: Satin aluminum, clear anodized.

I. Door Style: Vertical duo panel with frame.

J. Door Glazing: Tempered float glass (clear).

K. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.

1. Provide non-locking keyless cabinet with projecting door pull and friction latch.
2. Provide manufacturer's standard hinge permitting door to open 180 degrees.

L. Accessories:

1. Mounting Bracket: Manufacturer's standard steel, designed to secure fire extinguisher to fire-protection cabinet, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.
2. Lettered Door Handle: One-piece, cast-iron door handle with the word "FIRE" embossed into face.
3. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.

a. Identify fire extinguisher in fire-protection cabinet with the words "FIRE EXTINGUISHER."

1) Location: Applied to cabinet glazing.
2) Application Process: Pressure-sensitive vinyl letters.
3) Lettering Color: Black
4) Orientation: Vertical.

M. Finishes:

1. Manufacturer's standard baked-enamel paint for the following:

a. Exterior of cabinet door and trim, except for those surfaces indicated to receive another finish.
b. Interior of cabinet and door.

## 2.5 MOUNTING BRACKETS

A. Available Manufacturers:

1. Amerex Corporation.
2. Ansul Incorporated.
3. Badger Fire Protection.
4. Buckeye Fire Equipment Company.

5. Fire End & Croker Corporation.
6. General Fire Extinguisher Corporation.
7. JL Industries, Inc.
8. Larsen's Manufacturing Company.
9. Potter Roemer; Div. of Smith Industries, Inc.

B. Mounting Brackets: Manufacturer's standard steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.

1. Color: Black.

C. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.

1. Identify bracket-mounted fire extinguishers with the words "FIRE EXTINGUISHER" in black letter decals applied to mounting surface.

a. Orientation: Vertical.

## 2.6 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.

1. Weld joints and grind smooth.
2. Construct fire-rated cabinets with double walls fabricated from 0.0428-inch- thick, cold-rolled steel sheet lined with minimum 5/8-inch- thick, fire-barrier material.

a. Provide factory-drilled mounting holes.

B. Cabinet Doors: Fabricate doors according to manufacturer's standards, from materials indicated and coordinated with cabinet types and trim styles selected.

1. Fabricate door frames with tubular stiles and rails and hollow-metal design, minimum 1/2 inch thick.
2. Miter and weld perimeter door frames.

C. Cabinet Trim: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.

## 2.7 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Finish fire-protection cabinets after assembly.

D. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.8 STEEL FINISHES

A. Surface Preparation: Clean surfaces of dirt, oil, grease, mill scale, rust, and other contaminants that could impair paint bond using manufacturer's standard methods.

B. Factory Priming for Field-Painted Finish: Apply shop primer specified below immediately after surface preparation and pretreatment.

1. Shop Primer: Manufacturer's or fabricator's standard, fast-curing, lead- and chromate-free, universal primer, selected for resistance to normal atmospheric corrosion, for compatibility with substrate and field-applied finish paint system indicated, and for capability to provide a sound foundation for field-applied topcoats despite prolonged exposure.

C. Baked-Enamel Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-enamel finish consisting of prime coat and thermosetting topcoat. Comply with paint manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of 2 mils.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine walls and partitions for suitable framing depth and blocking where semirecessed cabinets will be installed.

B. Examine fire extinguishers for proper charging and tagging.

1. Remove and replace damaged, defective, or undercharged units.

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

3.2 PREPARATION

A. Prepare recesses for semi-recessed fire-protection cabinets as required by type and size of cabinet and trim style.

3.3 INSTALLATION

A. General: Install fire-protection specialties in locations and at mounting heights indicated or, if not indicated, at heights acceptable to authorities having jurisdiction.

1. Fire-Protection Cabinets: 54 inches above finished floor to top of cabinet.
2. Mounting Brackets: 54 inches above finished floor to top of fire extinguisher.

B. Fire-Protection Cabinets: Fasten fire-protection cabinets to structure, square and plumb.

1. Provide inside latch and lock for break-glass panels.
2. Fasten mounting brackets to inside surface of fire-protection cabinets, square and plumb.

C. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated.

D. Identification: Apply vinyl lettering at locations indicated.

## 3.4 ADJUSTING AND CLEANING

A. Remove temporary protective coverings and strippable films, if any, as fire-protection specialties are installed, unless otherwise indicated in manufacturer's written installation instructions.

B. Adjust fire-protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.

C. On completion of fire-protection cabinet installation, clean interior and exterior surfaces as recommended by manufacturer.

D. Touch up marred finishes, or replace fire-protection cabinets that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by fire-protection cabinet manufacturer.

E. Replace fire-protection cabinets that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 104410

# SECTION 123661.19 - QUARTZ AGGLOMERATE COUNTERTOPS

## PART 1 - GENERAL

### 1.1 SUMMARY

A. Section Includes:

1. Quartz agglomerate countertops and backsplash.

### 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 QUARTZ AGGLOMERATE COUNTERTOP MATERIALS

A. Quartz Agglomerate: Solid sheets consisting of quartz aggregates bound together with a matrix of filled plastic resin and complying with ICPA SS-1, except for composition.

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

a. Wilsonart Quartz

2. Colors and Patterns: Madeira Beach Q4054, Polished finish

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 quartz agglomerate manufacturer's written instructions and the AWI/AWMAC/WI's "Architectural Woodwork Standards."

1. Grade: Premium.

B. Configuration:

1. Front: Straight, slightly eased at top.

C. Countertops: 3/4-inch- thick, quartz agglomerate with front edge built up with same material.

2.3 INSTALLATION MATERIALS

A. Joint Adhesive: Methacrylate-based adhesive for chemically bonding quartz surfacing seams. Color complementary to quartz surfacing sheet material. UL 2818 GREENGUARD Gold certified and complying with SCAQMD Rule 1168.

1. Basis-of-Design Product: Wilsonart Hard Surface Adhesive.

2. Adhesives shall have a VOC content of 70 g/L or less.

B. Elastomeric Sealant: Mildew-resistant silicone sealant for filling gaps between countertops and terminating substrates in wet environment applications. Complies with ASTM C920, Type S (single component), Grade NS (nonsag).

1. Basis-of-Design Product: Wilsonart; Color Matched Caulk.

2. Color: TBD. Architect to select from sealant manufacturer's standard offerings

C. Siliconized Acrylic Sealant: Siliconized acrylic latex sealant. For general applications to fill gaps between countertops and at terminating substrates. Complies with ASTM C 384, Type OP, Grade NF, and SCAQMD Rule 1168.

1. Basis-of-Design Product: Wilsonart; Color Matched Caulk.

2. Color: TBD. Architect to select from sealant manufacturer's standard offerings.

D. Construction Adhesive: Countertop manufacturer's recommended silicone-based construction adhesive for backsplashes, end splashes, and other applications according to manufacturer's published fabrication instructions.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Fasten countertops by screwing through corner blocks of base units into underside of countertop. Predrill 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 quartz agglomerate 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 123661.19

# SECTION 21 11 00 - FIRE PROTECTION PIPING AND ACCESSORIES

## PART 1 -– GENERAL

### 1.1 GENERAL CONDITIONS

A. The work described hereunder shall be installed in accordance with the "Mechanical General Provisions," Section 23 01 00.

### 1.2 DESCRIPTION OF THE WORK

A. The extent of the work is indicated on the Drawings. In general, the work consists of, but is not limited to, the following:

1. Installation of a new Fire Main, including Backflow Preventer
2. Installation of a Fire Department Connection including piping both inside of the building and underground exterior.
3. Installation of tamper switches on new and existing valves, at locations shown on the drawings.
4. All equipment, devices and anchors, cutting & patching as necessary for a complete and operable fire standpipe system including restoration of site to original conditions.

### 1.3 RELATED WORK

A. Fire alarm wiring, demolition, and connections are by others.

### 1.4 QUALITY ASSURANCE:

A. Installer Qualifications: Installation and alterations of fire protection piping, equipment, specialties, and accessories, and repair and servicing of equipment shall be performed only by a State of Florida certified fire protection installer having a minimum of 5 previous projects similar in size and scope to this project, familiar with all precautions required, and having complied with all the requirements of the authority having jurisdiction.

B. Codes and Standards:

1. Comply with current editions of all codes as listed on the Drawings including but not limited to:
2. NFPA 13 - Standard for Installation of Sprinkler Systems.
3. NFPA 24 - Standard for Installation of Private Fire Service Mains and Appurtenances.
4. UL and FM Compliance: Fire protection system materials and components shall be Underwriter's Laboratories listed and labeled, and Factory Mutual approved for the application anticipated.

### 1.5 PERMITS AND APPROVALS:

A. Contractor shall obtain all permits and approvals required for execution of his work.

### 1.6 WORKING PLANS:

A. Work Plans: Have been prepared for the Contractor's submittal to the local authority having jurisdiction. Signed and sealed sets will be provided to the Contractor as needed.

### 1.7 SHOP DRAWINGS:

A. Shop Drawings: The Contractor shall produce a set of installation plans including, pipe cut based upon field measurements, proposed pipe support and miscellaneous Contractor information required by NFPA standards 13, 14 & 24.

1.8 SUBMITTALS:

A. Submit to the Architect/Engineer for approval electronic copies of brochures, technical data and/or shop drawings, and as many additional copies as required for Contractor use:

1. Shop Drawings: Submit drawings which indicate pipe cut, support detail and other installation data.

2. Product Data: Submit manufacturer's technical product data for all fire protection valves, devices, piping, and fittings.

3. Proposed fire proofing systems at penetrations of rated walls

4. Proposed water proofing systems at penetrations of exterior walls

1.9 PRODUCT DELIVERY, STORAGE, AND HANDLING:

A. Handle components carefully to prevent damage. Do not install damaged components; replace with new.

B. Store components in clean dry place. Protect from weather, dirt, fumes, water, construction debris, and physical damage.

1.10 GUARANTEE AND WARRANTY:

A. Installer shall guarantee in writing, his responsibility for defective materials and workmanship for a period of one (1) year from date of Final Acceptance issued by the Engineer and correct any deficiencies, labor and material, without additional cost to Owner.

1.11 CONTRACTOR'S CERTIFICATES:

A. Installer shall complete all system acceptance tests and provide copies of material and test certificates as required by referenced NFPA codes, and/or manufacturer’s installation instructions.

PART 2 -– PRODUCTS

2.1 GENERAL REQUIREMENTS:

A. All products and materials shall comply with referenced Codes and Standards.

2.2 PIPING:

A. Interior Piping: Black steel pipe: ASTM A53, A795 or A135. All threaded piping shall be schedule 40. All roll-grooved piping shall be schedule 10. Blaze Master PVC will be accepted.

B. Grooved fitting specifically listed for fire main service approved by NFPA 13, 14 & 24 for the pipe specified will be acceptable.

C. Below Grade Piping: Ductile iron pipe, C900, or HDPE, as approved by NFPA for this service.

2.3 VALVES:

A. All valves shall be specifically listed or approved for fire protection service by UL or Factory Mutual. Provide for supervision of valves as indicated on drawings.

1. Gate: OS&Y, 250 psig WWP.
2. Butterfly: Gear operated, indicating type, 250 psig WWP.
3. Underground Check: Ductile Iron swing type, 250 psig WWP.
4. Test and Drain Valves: Threaded bronze angle or globe with composition disc, 250 psig WWP.

B. Provide identification sign (enamel on metal) to all valves.

2.4 AUTOMATIC BALL DRIPS:

A. UL or Factory Mutual approved, 3/4-inch cast brass in-line automatic ball drip. Pipe drain to spill through building wall, over floor drain, over mop sink or as approved.

2.5 FIRE DEPARTMENT INLET CONNECTION

A. Free Standing Inlet Connection: Chrome plated brass clappered FDC: see plans for connections. Provide chrome plated brass identification plate, with words " Standpipe & Auto Spkr" in raised letters.

2.6 MATERIALS WHICH PENETRATE FIRE WALLS

A. Where bare-metal piping systems penetrate fire walls, provide a permanent sleeve which is grouted or rocked into wall. Provide a UL listed fire caulk for the annular space.

PART 3 -– EXECUTION

3.1 PIPING INSTALLATIONS:

A. Locations and Arrangements: Drawings (plans, schematics, and diagrams) indicate the general location and arrangement of piping systems. So far as practical, install piping as indicated.

B. Deviations from approved "Working Plans" for piping, requires written approval of the authority having jurisdiction. Written approval shall be on file with the Architect/Engineer prior to deviating from the approved "Working Plans."

C. Install flanges on valves, apparatus, and equipment having 2-1/2 inch and larger connections.

D. Hangers and Supports: Comply with the applicable requirements of NFPA 14 or 24. Hanger and support spacing and locations for piping joined with grooved mechanical couplings shall be in accordance with the grooved mechanical coupling manufacturer's written instructions, for rigid systems.

E. Make connections between underground and above-ground piping using an approved transition piece fastened to prevent separation.

F. Install mechanical sleeve seal at pipe penetrations in basement and foundation walls.

3.2 PIPE JOINTS:

A. Welded Joints: AWS D10.9, Level AR-3. Welding shall not be performed on site unless the building and contents are noncombustible.

B. Threaded Joints: Conform to ANSI B1.20.1, tapered pipe threads for field cut threads. Join pipe, fittings, and valves as follows:

1. Note the internal length of threads in fittings or valve ends, and proximity of internal seat or wall, to determine how far pipe should be threaded into joint. Align threads at point of

assembly. Apply appropriate tape or thread compound to the external pipe threads. Assemble joint to appropriate thread depth. When using a wrench on valves place the wrench on the valve end into which the pipe is being threaded.

2. Damaged Threads: Do not use pipe with threads which are stripped, chipped, corroded, or otherwise damaged. If a weld opens during cutting or threading operations, that portion of pipe shall not be used.

C. Flanged Joints: Align flanges surfaces parallel. Assemble joints by sequencing bolt tightening to make initial contact of flanges and gaskets as flat and parallel as possible. Use suitable lubricants on bolt threads. Tighten bolts gradually and uniformly to appropriate torque specified by the bolt manufacturer.

D. Mechanical Grooved Joints: Cut or roll grooves on pipe ends dimensionally compatible with the couplings.

E. End Treatment: After cutting pipe lengths, remove burrs and fins from pipe ends.

3.3 VALVE INSTALLATIONS:

A. General: Install fire protection valves, fittings, and specialties in accordance with the manufacturer's written instructions, NFPA 14 and 24, and the authority having jurisdiction.

3.4 FIRE DEPARTMENT CONNECTION INSTALLATIONS:

A. General: Install FDC valves, fittings, and specialties in accordance with the manufacturer's written instructions, NFPA 14 and 24, and the authority having jurisdiction.

B. Install automatic drip valves and check valve on the fire department connection to the mains. Install mechanical sleeve seal at pipe penetration in outside walls.

3.5 DRAINS, TEST PIPES AND ACCESSORIES:

A. Provide drains on valved sections and at other locations as necessary for complete drainage of system. Drains shall be valved and plugged or drained to the pump room drain.

3.6 FIELD QUALITY CONTROL:

A. Test and inspect piping systems in accordance with NFPA 13, 14 & 24

B. Provide all testing as recommended by the Manufacturer

C. Replace piping system components which do not pass the test procedures specified, and retest repaired portion of the system.

D. Hydrostatically test entire system to 50 psi over normal operating pressure or 150 psi whichever is more.

E. Required tests to be witnessed by Fire Marshal.

END OF SECTION 21 11 00

# SECTION 21 13 00 - FIRE PROTECTION SPRINKLERS

## PART 1 -GENERAL

### 1.1 GENERAL CONDITIONS

A. The work described hereunder shall be installed in accordance with the "Mechanical General Provisions," Section 23 01 00.

### 1.2 DESCRIPTION OF THE WORK

A. The extent of the work is indicated on the Drawings.

B. In general, the work consists of, but is not limited to, the following:

C. Installation of wet pipe sprinkler system including all piping, equipment, devices and hangers as necessary for a complete and operable fire protection sprinkler system.

### 1.3 QUALITY ASSURANCE:

A. Installer Qualifications: Installation and alterations of fire protection piping, equipment, specialties, and accessories, and repair and servicing of equipment shall be performed only by a State of Florida certified fire protection installer having a minimum of 5 previous projects similar in size and scope to this project, familiar with all precautions required, and having complied with all the requirements of the authority having jurisdiction.

B. Codes and Standards:

1. NFPA 13 - Comply with 2019 Edition of NFPA 13, Standard for Installation of Sprinkler Systems.

2. UL and FM Compliance: Fire protection system materials and components shall be Underwriter's Laboratories listed and labeled, and Factory Mutual approved for the application anticipated.

### 1.4 PERMITS AND APPROVALS:

A. Contractor shall obtain all permits and approvals required for execution of his work.

### 1.5 DESIGN CRITERIA PLANS & SHOP DRAWINGS:

A. Design Criteria Plans: Design Criteria plans have been prepared for the Contractor's bid and submittal to the local authority having jurisdiction.

B. Shop Drawings: The Contractor shall produce a set of installation plans including hydraulic calculations, pipe cut based upon field measurements, proposed pipe support and miscellaneous Contractor information required by NFPA 13.

### 1.6 SUBMITTALS:

A. Submit to the Architect/Engineer for approval electronic copies of brochures, technical data and/or shop drawings, and as many additional copies as required for Contractor use:

1. Shop Drawings: Submit drawings which indicate pipe cut, support detail and other installation data.

2. Product Data: Submit manufacturer's technical product data, include each type sprinkler head, valve, piping specialty, fire protection specialty, and fire department connection.

### 1.7 INSTRUCTION AND MAINTENANCE MANUALS:

A. Installer shall instruct Owner's designated employee in the proper operation and maintenance all fire protection systems and equipment. Installer will also furnish Owner with typed operating instructions, for inclusion in operating and maintenance manual specified in Division 1 and Division 15.

B. Maintenance Data: For each type sprinkler head, valve, piping specialty, fire protection specialty, and fire department connection, for inclusion in operating and maintenance manual specified in Division 1 and Division 15.

1.8 PRODUCT DELIVERY, STORAGE, AND HANDLING:

A. Handle components carefully to prevent damage. Do not install damaged components; replace with new.

B. Store components in clean dry place. Protect from weather, dirt, fumes, water, construction debris, and physical damage.

1.9 GUARANTEE AND WARRANTY:

A. Installer shall guarantee in writing, his responsibility for defective materials and workmanship for a period of one (1) year from date of Final Acceptance issued by the Architect and correct any deficiencies, labor and material, without additional cost to Owner.

1.10 CONTRACTOR'S CERTIFICATES:

A. Installer shall complete all system acceptance test and provide copies of material and test certificates as required by referenced NFPA codes.

1.11 AUTHORITY APPROVAL:

A. Provide final approval letter from local authority.

PART 2 -– PRODUCTS

2.1 GENERAL REQUIREMENTS:

A. All products and materials shall comply with referenced Codes and Standards.

2.2 PIPING:

A. Interior Piping: Black steel pipe: ASTM A53, A795 or A135. Where a specific joining method is not indicated on the Drawings, any fittings approved by NFPA 13 for the pipe specified will be acceptable.

B. Exterior Corrosion Protection: All exposed piping shall be cleaned, primed, and painted.

2.3 VALVES:

A. All valves shall be specifically listed or approved for fire protection service by UL or Factory Mutual.

B. Test and Drain Valves: Threaded bronze angle or globe with composition disc, 175 psig WWP.

C. Provide identification sign (enamel on metal) to all valves in accordance with NFPA No. 13.

2.4 SPRINKLERS:

A. UL approved, automatic, quick-response with 1/2 inch orifice discharge, having temperature ratings suitable for installation. See Drawing Notes for additional information. Provide the following type of sprinkler heads:

1. Unfinished ceiling areas: Standard, upright, brass
2. Finished ceilings: Flush with two-piece escutcheon

B. Finished ceiling pendant sprinklers shall be a flush type, chrome plated with push-on escutcheon.

2.5 SPRINKLER CABINET:

A. Complete with sprinklers and special wrenches in accordance with NFPA 13.

PART 3 -– EXECUTION

3.1 PIPING INSTALLATIONS:

A. Locations and Arrangements: Drawings (plans, schematics, and diagrams) indicate the general location and arrangement of piping systems. So far as practical, install piping as indicated.

B. Deviations from approved "Design Criteria Plans" for sprinkler piping, requires written approval of the authority having jurisdiction. Written approval shall be on file with the Architect/Engineer prior to deviating from the approved “Design Criteria Plans."

C. Install sprinkler piping to provide for system drainage in accordance with NFPA 13.

D. Use approved fittings to make all changes in direction, branch takeoff from mains, and reductions in pipe sizes.

E. Install unions in pipes 2 inch and smaller, adjacent to each valve. Unions are not required on flanged devices or in piping installations using grooved mechanical couplings.

F. Install flanges on valves, apparatus, and equipment having 2-1/2 inch and larger connections.

G. Hangers and Supports: Comply with the applicable requirements of NFPA 13. Hanger and support spacing and locations for piping joined with grooved mechanical couplings shall be in accordance with the grooved mechanical coupling manufacturer's written instructions, for rigid systems.

3.2 PIPE JOINTS:

A. Welded Joints: AWS D10.9, Level AR-3. Welding shall not be performed on site unless the building and contents are noncombustible.

B. Threaded Joints: Conform to ANSI B1.20.1, tapered pipe threads for field cut threads. Join pipe, fittings, and valves as follows:

1. Note the internal length of threads in fittings or valve ends, and proximity of internal seat or wall, to determine how far pipe should be threaded into joint. Align threads at point of assembly. Apply appropriate tape or thread compound to the external pipe threads. Assemble joint to appropriate thread depth. When using a wrench on valves place the wrench on the valve end into which the pipe is being threaded.

2. Damaged Threads: Do not use pipe with threads which are stripped, chipped, corroded, or otherwise damaged. If a weld opens during cutting or threading operations, that portion of pipe shall not be used.

C. End Treatment: After cutting pipe lengths, remove burrs and fins from pipe ends.

D. Flanged Joints: Align flanges surfaces parallel. Assemble joints by sequencing bolt tightening to make initial contact of flanges and gaskets as flat and parallel as possible. Use

suitable lubricants on bolt threads. Tighten bolts gradually and uniformly to appropriate torque specified by the bolt manufacturer.

E. Mechanical Grooved Joints: Cut or roll grooves on pipe ends dimensionally compatible with the couplings.

3.3 VALVE INSTALLATIONS:

A. General: Install fire protection valves, fittings, and specialties in accordance with the manufacturer's written instructions, NFPA 13, and the authority having jurisdiction.

3.4 SPRINKLER HEAD INSTALLATIONS:

A. Use proper tools to prevent damage during installations.

3.5 DRAINS, TEST PIPES AND ACCESSORIES:

A. Provide drains at base of risers, on valved sections and at other locations as necessary for complete drainage of system. Drains shall be valved and plugged or connected to the central drain riser system to discharge outside over splash block or as indicated.

B. Provide test pipes in accordance with NFPA No. 13. Test pipes shall be valved and piped to discharge through proper orifice. Provide approved required accessories such as sight glasses, etc. Test connections may also serve as drain pipes.

3.6 FIELD QUALITY CONTROL:

A. Flush, test, and inspect sprinkler piping systems in accordance with NFPA 13.

B. Replace piping system components which do not pass the test procedures specified, and retest repaired portion of the system.

END OF SECTION 21 13 00

# SECTION 22 05 00 - PLUMBING

## PART 1 -– GENERAL

### 1.1 GENERAL CONDITIONS

A. The work described hereunder shall be installed in accordance with the "Mechanical General Conditions," Section 23 01 00.

### 1.2 DESCRIPTION OF THE WORK

A. The extent of the work is indicated on the Drawings. In general, the work consists of, but is not limited to, the following:

B. Plumbing demolition and new plumbing fixture and piping installation.

### 1.3 RELATED WORK

A. Insulation is specified in Section 23 07 10.

B. Pipe hangers and supports are specified in Section 23 05 29.

### 1.4 QUALITY ASSURANCE

A. All materials and installations are to comply with the following. If conflicts occur between plumbing codes and the specifications, the most restrictive requirements shall govern.

1. National Electric Code
2. Florida Building Code
3. Florida Plumbing Code
4. Florida Energy Efficiency Code for Building Construction
5. Florida Administrative Code, 10D-10, Sanitary Facilities for Buildings Serving the Public and Places of Employment.
6. Accessibility Requirements Manual, Florida Board of Building Codes & Standards

B. Furnish and install equipment having the characteristics and accessories indicated on the drawings or in these specifications. The manufacturer's specifications for the models shown on the drawings or given as basis for design, plus all features, options, and accessories indicated on the drawings or in these specifications, whether or not standard for the model scheduled or offered as a substitute, shall constitute the minimum requirements for equipment furnished under this section.

### 1.5 SUBMITTALS

A. Submit to the Architect/Engineer for approval electronic copies of brochures, technical data and/or shop drawings of the following, and as many additional copies as required for Contractor use:

1. Piping and Fittings
2. Plumbing fixtures
3. Valves, cleanouts, and floor drains
4. Proposed fire proofing systems at penetrations of rated walls.
5. Pipe hangers and supports.

1.6 CHANGES

A. The Drawings indicate generally the locations of plumbing fixtures, apparatus, piping, etc., and while these are to be followed as closely as possible, if before installation, it is found necessary to change the location of same to accommodate the conditions at the building, such changes shall be made without additional cost to the Owner and as directed by the Architect/Engineer.

PART 2 -– PRODUCTS

2.1 MATERIALS WHICH PENETRATE FIRE WALLS

A. Where insulated piping or plastic materials penetrate fire walls, provide a UL listed systems for maintaining the rating.

B. Where bare-metal piping systems penetrate fire walls, provide a permanent sleeve which is grouted or rocked into wall. Provide a UL listed fire caulk for the annular space.

2.2 PLUMBING FIXTURES, TRIM AND FITTINGS

A. Furnish and install all plumbing fixtures and trim, floor drains and cleanouts as shown on the Drawings. Fixtures shall be as specified or equivalent quality fixtures by American Standard, Kohler, Universal Rundle or Eljer.

B. Provide all items of brass and chrome plated finish except where otherwise noted.

C. Brackets, Anchors, and Cleats: Furnish and install where required for support, conceal behind finished wall.

2.3 PIPING

A. Where more than one material is specified for a particular application, comply with Drawing Notes. Where interfacing with an existing system supply materials to match the existing. Where not connecting to existing and where not specified on the Drawings, then the Contractor may select from the options listed.

B. All materials shall comply with latest ASTM specifications in each instance that ASTM has specifications and standards relating to such materials.

C. Sanitary Waste and Vent

1. PVC DWV Soil Pipe, schedule 40, ASTM D2665

2. PVC Sewer Pipe, schedule 40, ASTM D2665

3. Copper tubing, Type L, conforming to ASTM B88, with brazed or solder-joint copper, brass or bronze fittings conforming to ANSI B16.18 or B16.22.

4. Copper tubing, DWV grade, hard temper conforming to ASTM B306, with solder joint, cast bronze fittings conforming to ANSI B16.23. Tubing larger than 2 inches shall use wrought copper fittings conforming to ANSI B16.29.

D. Domestic Water Pipe:

1. Above grade domestic water pipe shall be type L hard copper, conforming to ASTM B88. ProPress cast or wrought fittings per ASME B16.18 or B16.22. Where required solder fittings are acceptable

2. Piping below grade shall be annealed soft copper per ASTM B88. Limit fittings where possible.

3. Below Grade Piping: PVC pipe: ASTM D2241, Class 150, working pressure 150 psig, fittings to be AWWA C151. J-M Ring-Tite or approved equal.

4. Below Grade Piping 4" and Above: PVC pipe: AWWA C900, Class 150, working pressure 150 psig, fittings to be AWWA C151. J-M Ring Tite or approved equal.

E. Exposed Pipe in Toilet Areas:

1. Exposed pipe shall be chrome plated brass, American Brass Co., or equivalent. Furnish and install chrome plated brass wall plates.

F. Lavatory and Similar Waste Arms:

1. Type M or L copper water tube, Mueller or equivalent.

G. Urinal Waste Arms:

1. PVC.

H. Roof Drain Piping:

1. PVC DWV Soil Pipe, schedule 40, ASTM D2665

2. PVC Sewer Pipe, schedule 40, ASTM D2665

3. Below grade and below slab piping may be PVC pipe and fittings: schedule 40, conforming to ASTM D2665 or D2661 respectively.

2.4 PIPE ACCESSORIES:

A. Pipe sleeves: metal sized to allow minimum clearance between pipe and sleeves or insulation and sleeves.

B. Provide chrome-plated brass escutcheon plates where exposed pipe passes through walls, floors, or ceiling in finished areas.

C. Furnish and install dielectric or isolation fittings at all points where copper pipe connects to steel pipe.

D. Adjustable wrought clevis type hanger and rods: Anvil or equivalent. Provide copper hangers for copper piping.

E. Install water hammer arrestors as shown on the Drawings and where required by codes.

2.5 VALVES

A. Ball Valves: 125 lb., bronze ball valve.

2.6 TRAPS

A. For Lavatories and Sinks: Fully Cast Brass, 17ga., chrome plated.

2.7 TRAP PRIMERS

A. 1/2 automatic trap primers: all bronze body with integral vacuum breaker and gasketed service cover.

PART 3 -– EXECUTION

3.1 INSTALLATION OF PIPING

A. Condensate piping shall be sloped same as sanitary waste and vent.

B. On vertical sanitary drain lines, connect all soil and waste inlets through sanitary tees, wyes, or wyes and eighth bends. Short radius fittings may be used for vent piping. On horizontal lines connect all waste and soil connections through wyes or wyes and eighth bends. Double branch fittings may be used on vertical lines and horizontal runs, providing proper grades can be maintained.

C. Make joints in PVC plastic pipe with solvent cement in accordance with pipe manufacturer's instructions.

D. Lay horizontal drain pipes to uniform grade; riser pipes, vertical. Make changes in directions of drain pipes with long bends. No screwed joints permitted in drain pipes, except as described herein.

E. Lay all sewers and branches, where practicable, on undisturbed earth cut at proper grade. Where laid on fill, provide adequate supports to maintain pitch of the line.

F. Sizes of risers and mains of water system piping shall be as designated on the Drawings. Verify any omitted sizes before installation.

G. Cover pipe openings at times the work is not in progress.

H. Cut brass and copper pipe by means of hacksaw. Remove all burrs and metal chips, dirt, etc., before joining pipe. Chrome plated pipe shall show no wrench marks after installation; no threads shall show.

I. Adequately support all piping above floors inside the building from or on the building structure. Support piping suspended from the building structure by means of the specified pipe hangers and rods. Support interval shall be per FBC Plumbing Table 308.5.

J. Sanitary and storm drain piping shall be supported by at least one hanger on each full length of pipe close to hub where possible and at least one within 24 inches of each fitting, and wherever else required to prevent tendency toward deflection due to load. Provide a hanger at upper angle at each drop. Locate hangers adjacent to hubs on multiple fittings not more than four feet on centers.

K. For support spacing of all other horizontal piping refer to MSS-SP-69 and provide additional supports at valves, strainers, in line pumps and other heavy components. Provide a support within one foot of each elbow.

L. Vertical Pipe Supports: Up to 6 inch 60 feet long or not over 12-inch pipe up to 30 feet long, Riser clamps bolted to pipe below couplings, or welded to pipe and resting securely on the building structure. Vertical pipe larger than the foregoing, support on base elbows or tees, or substantial pipe legs extending to the building structure. Vertical runs less than 15 feet long may be supported by the hangers on the connecting horizontal runs.

M. Bases of drain stacks: If not buried in earth support on concrete, brick in cement mortar, or metal brackets permanently attached to building structure.

N. Make joints in PVC plastic pipe with solvent cement in accordance with pipe manufacturer's instructions.

O. Yard supply main piping: Piping shall be installed in strict accordance with the manufacturer’s recommendations. Provide 6” clean sand fill for pipe bedding. Insure minimum 18” of cover. Provide concrete thrust blocks at all changes of direction. Hand dig thrust block area just behind fittings. Bevel ends of PVC piping. Test piping in accordance with manufactures instruction.

3.2 INSTALLATION OF VALVES

A. Isolate all major piping assemblies as shown on the Drawings and as required for proper operation and maintenance. All valves shall be accessible. Provide valve boxes and access panels where required for accessibility.

B. Install service valve for hot and cold water at each plumbing fixture.

3.3 INSTALLATION OF TRAPS

A. Trap each fixture by water sealing trap placed as near the fixture as possible.

B. Vent all traps and place within 5 feet of the fixture which it serves unless otherwise noted.

3.4 INSTALLATION OF PIPE SLEEVES

A. Install pipe sleeves at all locations where pipe passes through walls, floors, or ceilings above or below grade. Sleeves shall extend above floor a minimum of 1". Seal floor sleeves in concrete floors with mortar. Coordinate sleeve size with piping and firestopping requirements in advance.

B. Where subject to moisture or weather, seal sleeves with watertight sealant.

3.5 INSTALLATION OF FIXTURES, TRIM, AND FITTINGS

A. Install the fixtures, trim and fittings specified, taking care to properly anchor each fixture.

B. Installation of carriers shall comply with manufacturers' maximum recommendations. Carriers shall be bolted to floor slab using all bolt holes or slots provided on carrier. Bolt size shall match hole or slot. Provide lock washer on each bolt. Use "Red Head" self-drilling anchors as manufactured by Phillips Drill Co. or approved equal product to set bolts.

C. When the use of a wrench is necessary on chrome plated piping, protect the pipe from marring by use of felt or cloth wrapping beneath wrench jaws.

3.6 INSULATION

A. Insulate all domestic hot water lines.

B. Insulate all interior condensate piping with ¾" thick elastomeric closed cell foam insulation. Insulation shall have a flame spread of less than 25 and a smoke developed rating of 50 or less as tested by ASTM C534, E84, UL-723 and NFPA 255.

C. Hot water pipe insulation shall be rigid glass fiber insulation with a nominal density of 3 pounds per cubic foot with a thermal conductivity of not more than 0.23 at 75 deg F mean temperature. Insulation cover shall be an all-service jacket with double self-sealing laps, with self-sealing butt strips. Insulation thickness shall be per FBC Energy Conservation Table C403.2.10 and as follows:

1. 1" thick for pipe sizes 1-1/4" and smaller.

2. 1-1/2" thick for pipe sizes 1-1/2" and larger.

D. Insulate all domestic cold-water lines subject to ambient conditions. Use closed-cell elastomeric thermal insulation, minimum density of 5.5 pounds per cubic foot with a thermal conductivity of not more than 0.27 at 75 deg F mean temperature. The material shall have a flame spread of 25 or less and a smoke-developed rating of 50 or less as tested by ASTM C534, E84 (25/50) UL-723 (25-50) and NFPA 255 (25-50). Seal all joints, seams, etc. air tight. Insulation thickness shall be per FBC Energy Conservation Table C403.2.10 and as follows:

1. 1/2" thick for pipe sizes 1-1/4" and smaller.

2. 1” thick for pipe sizes 1-1/2” and larger.

E. Pipe insulation is not required in crawl spaces where located more than 10’ from a ventilation opening.

F. Install insulation in accordance with manufacturer's recommendations.

3.7 TESTS AND INSPECTIONS

A. Make all water and air tests of the piping systems in the presence of and to the satisfaction of the Architect/Engineer or his designated representative. Conduct these tests at such places and with timing to permit work to proceed with as little interruption as possible. Make tests before work is concealed.

B. Test water piping to hydrostatic pressure at 125 psi and hold for 4 hours.

C. After the installation of sanitary piping and before the pipe is concealed or the fixtures are installed, cap or plug the ends of the system and fill all lines with water to top of vents above roof and allow to stand until a thorough inspection has been made. Should leaks appear, repeat the tests until the system is tight.

3.8 STERILIZATION

A. The sterilization process shall comply with all governing regulations and with the sterilization procedures recommended by the American Water Works Association. The chlorination process may be simplified by first flushing the system thoroughly clean, then charging with water containing a minimum of 50 parts per million of chlorine, allowing this to stand for 24 hours, then thoroughly flushing. After sterilization and final flushing, the local health authority is to be notified and their approval obtained in writing. Provide copies to the Construction Manager, engineer, and Owner. Include a copy in the close out manual.

END OF SECTION 22 05 00

# SECTION 23 01 00 - MECHANICAL GENERAL PROVISIONS

## PART 1 -– GENERAL

### 1.1 GENERAL CONDITIONS

A. The work described hereunder shall be installed subject to the Contractual Conditions for the entire Specifications.

### 1.2 CORRELATION

A. This Section of the Specifications and its accompanying Drawings are made separate for the convenience of the General Contractor in preparing his bid and in no way relieves the General Contractor of his responsibility to correlate the work under this Section with that of all other trades as regards the items to be furnished by various Subcontractors, the exact location of all equipment and materials and the necessity of planning the work of all trades to avoid interference.

### 1.3 PLANS AND SPECIFICATIONS

A. Drawings and Specifications are intended to clearly set forth all work, and the detailed description is added to assist in establishing the scope and the location of the several parts of the work. Collectively, they shall govern and control the scope, character, and design of the Work, and any item called for in any one of the documents shall be as though mentioned in all.

B. Failure to refer in the Specifications to any items of the work shown on the Drawings, but necessary to the completion of the Work shall not relieve the Contractor of the full responsibility to furnish the materials and perform the work of such items, in a manner comparable to other items of similar nature for which detailed Specifications are included.

### 1.4 PROJECT FAMILIARIZATION

A. The bidder is expected to visit the site and familiarize himself with conditions at the site before submitting his bid. He shall familiarize himself with the work required throughout the entire project and shall make allowances for contingencies which may occur in the interconnection of the various systems.

### 1.5 ALTERNATES AND ADDENDA

A. The Contractor shall investigate all Alternates, Addenda and Allowances as they relate to the Work of this Section.

### 1.6 TESTING

A. The Work shall include complete testing of all equipment and piping at the completion of the Work and making any connection changes or adjustments necessary for the proper functioning of the system and equipment.

### 1.7 WORK INCLUDED

A. Work covered under this Section consists of furnishing all labor, materials, tools, equipment, transportation, scaffolding, services, supervision, and performing of all operations required to properly complete all mechanical work in accordance with this Division of the Specifications and as indicated on the applicable Drawings, subject to terms and conditions of the Contract.

### 1.8 SUPERVISION OF WORK

A. The Mechanical Contractor shall have a qualified and experienced superintendent on the job when any related work is in progress.

1.9 RELATED WORK SPECIFIED ELSEWHERE

A. The Contractor is cautioned to note carefully other Sections of the project Specifications with their cross references to other specific standard specifications, standard detail, etc., describing work to be furnished under these Specifications as well as any mechanical work that may be shown on electrical, structural, architectural, or other drawings, in order that he may fully understand the requirements and work to be provided under this Section of the Specifications.

1.10 ORDINANCES AND REGULATIONS

A. All work shall conform with all local and State ordinances or regulations governing the installation of such equipment. If work as laid out, indicated or specified is recognized to be contrary to or conflicting with local ordinances or regulations, the Subcontractor shall report same to the Architect/Engineer before submitting a bid. The Architect/Engineer will then issue instructions as to procedure.

1.11 CODES AND STANDARDS

A. The currently adopted standards of the following organizations, and individual standards named, shall be followed the same as if they were fully written herein and constitute a part of the Specification requirements except where otherwise specified:

1. NFPA 70, National Electric Code
2. NFPA 101, Life Safety Code
3. NFPA 90-A, Installation of Air Conditioning and Ventilating Systems.
4. FL Building Code
5. FL Mechanical Code
6. FL Gas Code
7. FL Plumbing Code
8. Florida Fire Prevention Code
9. National Board of Fire Underwriters
10. SMACNA HVAC Duct Construction Standard
11. ANSI/ASME B31.1, Power Piping
12. ANSI/ASME B31.9, Building Services Piping

B. The foregoing rules, standards, regulations, specifications, recommendations and requirements shall be followed by the Contractor as minimum requirements. They shall not relieve the Contractor from furnishing and installing higher grades of materials and workmanship which are specified herein or indicated on the Drawings.

C. Any material, equipment or workmanship specified by reference to the number, symbol or title of Specification or detail, or other standard rules, codes, regulations, etc., shall comply with the latest edition amendments and revisions thereto in effect on the date of these Specifications.

D. The Contractor shall submit proof, if requested by the Engineer or his representative, that the materials, appliances, equipment or devices that he furnishes and installs under this Contract meet the requirements of the Underwriters' Laboratories, Inc., or Factory Mutual, as regards fire and casualty hazards.

1.12 PERMITS, INSPECTIONS AND UTILITY FEES

A. Coordinate costs of taps with the Owners Representative & the CM.

B. The Contractor shall obtain necessary permits and inspections required for work and pay all charges incidental thereto. Contractor shall coordinate all utility taps and shall pay all associated fees, impact charges, etc. Upon completion of the work the Contractor shall deliver to the Engineer a certificate of inspection and approval from the local inspection department, if required.

1.13 MINOR DEVIATIONS

A. The Contractor shall note that the Mechanical Drawings are intended to indicate only the extent diagrammatically, general character and location of the work included. Work intended, but having minor details obviously omitted or not shown, shall be furnished and installed complete to perform the functions intended.

B. Arrangements of piping, ductwork, and equipment that differ materially from the obvious intent of the Drawings will not be permitted except where necessary to avoid interferences, and only where specifically approved by the Architect/Engineer. Drawings shall be furnished showing all changes. Any change resulting in a saving in labor and materials shall be made in accordance with a Contract change order.

1.14 BASIC MATERIALS AND METHODS

A. The materials and methods specified in this article are to be used for work specified throughout this Section of the Specifications.

B. All materials and workmanship shall be of the highest quality.

C. The installation shall be made in a workmanlike manner in accordance with acceptable industry standards except where specific procedures are called for in these Specifications, in which case they shall be followed.

D. All materials shall be new, free of defects and of the manufacturers latest standard design.

E. Reference to a particular material or specific equipment by name, make or catalog number is to describe equipment which will meet the requirements of the project and is not intended to restrict bidding.

F. It is the intent that all of the equipment of a similar type shall be the products of the same (one) manufacturer when practicable, providing unit responsibility for each group.

1.15 REVIEW OF MATERIALS

A. Submittals shall be made in compliance with the General Conditions of the Contract for Construction and the following:

1. Submittals shall be identified by items numbers as listed in the pertinent section of the specifications and shall be accompanied by a letter of transmittal.

2. Materials and other items subject to approval shall not be purchased or incorporated in the work before receipt of written approval.

1.16 SHOP DRAWINGS

A. Shop Drawings are drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are prepared by the Contractor or any subcontractor, manufacturer, supplier, or distributor and which illustrates some portion of the Work.

B. All shop drawings submitted shall bear the stamps of approval of the Contractor as evidence that the drawings have been checked by the Contractor. If the shop drawings show variances from the other requirements of the contract because of standard shop practice or other reason, the Contractor shall make specific mention of such variation in his letter of transmittal in order that, if acceptable, suitable action may be taken for proper adjustment. Otherwise, the Contractor will not be relieved of the responsibility for executing the work even though such shop drawings have been approved.

C. Submit electronic copies of the shop drawings to be retained and additional copies as required by the Contractor, all items required under appropriate sections of the Specifications.

1.17 PROJECT CLOSEOUT

A. The Contractor shall remove all temporary work and temporary facilities prior to final pay request.

B. The Contractor shall clean spaces that were occupied by temporary work and temporary facilities. Remove debris, rubbish, and excess materials from the sites. Burning or burying is not permitted on the sites.

C. Repair damages caused by installation or use of temporary facilities. Restore to original condition.

D. Restore grass, landscaping, hardscaping to original condition.

1.18 GUARANTEES, BONDS AND AFFIDAVITS

A. Warranties:

1. The Contractor shall submit to the Owner all manufacturer's warranties on equipment furnished and installed under this Contract.

2. In addition, to the guarantee of equipment by the manufacturer of each piece specified herein, the Contractor shall also guarantee such equipment and shall be held for a period of one year from final acceptance test to make good any defects of the materials or workmanship occurring during this period, without expense to the Owner.

B. Affidavits:

1. The Contractor shall provide affidavits as required in the non-technical portion of these Specifications.

C. Provide Warranty Labels:

1. All warrantied mechanical equipment see: Mechanical Identification requirements.

1.19 OPERATION AND MAINTENANCE DATA

A. Manuals and Instructions:

1. The Contractor shall deliver to the Owner, upon substantial completion of the Work, two copies of descriptive literature related to the equipment installed under this Contract, including parts lists, wiring diagrams, maintenance and operation manuals and warranties customarily supplied by manufacturers for equipment incorporated in this work. The literature shall be neatly bound in a 3-ring binder and delivered to the Engineer prior to final acceptances. Each manual shall include a copy of the Control Diagrams and a complete description of the operation of the control systems.

2. The Contractor shall give physical demonstration and verbal instructions for proper operation and maintenance of equipment to the Owner or his designated representative. Schedule these demonstrations and instructions at the Owner's convenience.

3. Provide four (4) hours of tour and demonstration of all equipment installed under this project.

1.20 AS-BUILT DRAWINGS

A. As-Built Drawings are required. Maintain a current and legible record set (full size set) on the job. Final record prints will be drafted by the Engineer and signed off by the contractor. The Contractor is solely responsible for providing accurate as-builts. HEADING

PART 2 -– PRODUCTS

2.1 CRITERIA

A. Standard Products: Material and equipment shall be the standard products of a manufacturer regularly engaged in the manufacture of the products. Items of equipment shall essentially duplicate equipment that has been in satisfactory use at least two (2) years prior to bid opening. Provide list of users upon request.

B. Equipment having less than a two-year use record, which in the opinion of the Engineer, provided significant benefits to the Owner such as improved energy efficiency, will be acceptable if it is a product of a manufacturer who has been regularly engaged in the manufacture of that specific type of product which has been used in similar applications for a period of two years. The Engineer reserves the right to require the Contractor to submit evidence to this effect for his approval.

C. Equipment Service: Products shall be supported by a service organization which maintains an adequate inventory of repair parts and is located, in the opinion of the Engineer, reasonably close to the site.

D. Manufacturer's Nameplates: Nameplate bearing manufacturer's name or identifiable trademark shall be securely affixed in a conspicuous place on equipment, or name or trademark cast integrally with equipment, stamped or otherwise permanently marked on each item of equipment.

E. Welding: Before any welding is performed submit a copy of the Welding Procedure Specification (WPS) together with the Procedure Qualification Record as required by Section IX of the ASME Boiler and Pressure Vessel Code.

F. Before any welder performs any welding, submit a copy of the Manufacturer's Record of Welder or Welding Operator Qualification Tests as required by Section IX of the ASME Boiler and Pressure Code. The letter or symbol (as shown on the qualification test form) shall be used to identify the work of that welder and shall be affixed, in accordance with appropriate construction code, to each completed weld.

G. The types and extent of non-destructive examinations required for pipe welds are shown in Table 136.4 of the Code for Pressure Piping, ANSI/ASME B 31.1.

PART 3 -– EXECUTION

3.1 GENERAL

A. Manufacturer's Recommendations: Where installation procedures or any part thereof are required to be in accordance with the recommendations of the manufacturer of the material being installed, printed copies of these recommendations shall be furnished to the Engineer prior to installation. Installation of the item will not be allowed to proceed until the recommendations are received. Failure to furnish these recommendations can be cause for rejection of the material.

3.2 FIRESTOPPING

A. Provide for firestopping of all mechanical systems. UL listed methods conforming to the situations present shall be utilized. Submit shop drawings of intended methods, including installation instructions and proof of UL Listing.

3.3 WALL, FLOOR AND CEILING PLATES

A. Material and Type: Chrome plated brass or chrome plated steel. Use plates that fit tight around pipes, cover openings around pipes, and cover the entire pipe sleeve projection.

B. Thickness: Not less than 3/32 inch for floor plates. For wall and ceiling plates, not less than 0.025 for up to 3-inch pipe, 0.035 for larger pipe.

C. Locations: Use where pipe penetrates floors, walls and ceilings in exposed locations, except mechanical rooms or chases. Use also where insulation ends on exposed water supply pipe drop from overhead. Provide a watertight joint in spaces where brass or steel pipe sleeves are specified.

3.4 INSTALLATION

A. Coordinate location of piping, sleeves, inserts, hangers, ductwork and equipment. Locate piping, sleeves, inserts, hangers, ductwork and equipment clear of windows, doors, openings, light outlets, and other services and utilities. Follow manufacturer's published recommendations for installation methods not otherwise specified.

B. Protection and Cleaning:

1. Equipment and materials shall be carefully handled, properly stored, and adequately protected to prevent damage before and during installation, in accordance with the manufacturer's recommendations and as approved by the Engineer. Damaged or defective items, in the opinion of the Engineer, shall be replaced.

2. Protect all finished parts of equipment, such as shafts and bearings, where accessible, from rust prior to operation by means of protective grease coating and wrapping. Close pipe openings with caps or plugs during installation. Tightly cover and protect fixtures and equipment against dirt, water, chemical or mechanical injury. At completion of all work thoroughly clean fixtures, exposed materials and equipment.

C. Concrete and Grout: Use concrete and shrink-compensating grout, 3000 psi minimum.

D. Install gauges, thermometers, valves and other devices with due regard for ease in reading or operating and maintaining said devices. Locate and position thermometers and gauges to be easily read by operator or staff standing on floor or walkway provided. Servicing shall not require dismantling adjacent equipment or pipe work.

3.5 PAINTING

A. Paint all bare steel pipe, supports, hangers, fabricated parts, etc. with two coats of enamel paint. Prepare surfaces in accordance with the manufacturer’s recommendations. Coordinate colors with existing like components or per the Owner.

B. Paint all cut or heat affected galvanized steel components with two coats of cold galvanizing spray paint, ZRC Cold Galvanizing compound or equal. Prepare surfaces per the manufacturer’s recommendations.

3.6 PIPE AND EQUIPMENT SUPPORTS

A. Generally, support in accordance with industry standards and as described in Section 23 15 00.

B. Use of chain, wire or strap hangers, wood for blocking, stays and bracing, nor hangers suspended from piping above will not be permitted.

C. Use hanger rods that are straight and vertical. Turnbuckles for vertical adjustments may be omitted where limited space prevents use. Provide a minimum of 1” clearance between pipe or pipe covering and adjacent work.

3.7 LUBRICATION

A. Field check and lubricate equipment requiring lubrication prior to initial operation.

END OF SECTION 23 01 00

# SECTION 23 05 29 – SUPPORTS AND ANCHORS

## PART 1 -– GENERAL

### 1.1 DESCRIPTION OF WORK

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

B. This section is a Division 23 Basic Materials and Methods section, and is part of each Division 22 & 23 section referring to or requiring supports, anchors, and seals specified herein.

C. Extent of supports, anchors and seals required by this section is indicated on drawings and/or specified in other Division 23 sections.

D. Code Compliance: Comply with applicable codes pertaining to product materials and installation of supports, anchors, and seals.

E. MSS Standard Compliance:

F. Provide pipe hangers and supports of which materials, design and manufacture comply with ANSI/MSS SP-58.

G. Select and apply pipe hangers and support, complying with MSS SP-69.

H. Fabricate and install pipe hangers and supports, complying with MSS SP-89.

I. Terminology used in this section is defined in MSS SP-90.

J. UL Compliance: Provide products which are Underwriters Laboratories listed.

## PART 2 -– PRODUCTS

### 2.1 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with requirements, provide supports and hangers by Anvil, Michigan Hanger Company, B-Line Systems, or approved equal.

### 2.2 HORIZONTAL PIPING HANGERS AND SUPPORTS

A. Except as otherwise indicated, provide factory fabricated horizontal piping hangers and supports complying with ANSI/MSS SP-58, of one of the following MSS types listed, selected by Installer to suit horizontal piping systems, in accordance with MSS SP-69 and manufacturer’s published product information. Use only one type by one manufacturer for each piping service. Select size of hangers and support to exactly fit pipe size for bare piping, and to exactly fit around piping insulation with saddle or shield for insulating piping. Provide copper plated hangers and support for copper piping systems.

1. Adjustable Steel Clevises: MSS Type 1.
2. Steel Double Bolt Pipe Clamps: MSS Type 3.
3. Adjustable Steel Band Hangers: MSS Type 7.
4. Steel Pipe Clamps: MSS Type 4.
5. Pipe Stanchion Saddles: MSS Type 37, including steel pipe base support and cast-iron floor flange.

B. Vertical Piping Clamps: Except as otherwise indicated, provide factory fabricated vertical piping clamps complying with ANSI/MSS SP-58, of one of the following MSS types listed, selected by Installer to suit vertical piping systems, in accordance with MSS SP-69 and manufacturer's published product information. Select size of vertical piping clamps to exactly fit pipe size of bare pipe. Provide copper plated clamps for copper ping systems.

1. Two-Bolt Riser Clamps: MSS Type 8.

2. Four-Bolt Riser Clamps: MSS Type 42.

2.3 HANGER-ROD ATTACHMENTS

A. Except as otherwise indicated, provide factory fabricated hanger-rod attachments complying with ANDI/MSS SP-58, of one of the following MSS types listed, selected by Installer to suit horizontal piping hangers and building attachments, in accordance with MSS-69 and manufacturer's published product information. Use only one type by one manufacturer for each piping service. Select size of hanger-rod attachments to suit hanger rods. Provider copper plated hanger-rod attachments for copper piping systems.

B. Steel Turnbuckles: MSS Type 13.

C. Malleable Iron Sockets: MSS Type 16.

2.4 BUILDING ATTACHMENTS

A. Except as otherwise indicated, provide factory fabricated building attachments complying with ANSI/MSS SP-58, of one of the following MSS types listed, selected by Installer to suit building substrate conditions, in accordance with MSS SP-69 and manufacturer's published product information. Select size of building attachments to suit hanger rods.

1. Center Beam Clamps: MSS Type 21.

2. C-Clamps: MSS Type 23.

3. Malleable Beam Clamps: MSS Type 30.

4. Side Beam Brackets: MSS Type 34.

5. Concrete Inserts: MSS Type 18.

2.5 SADDLES AND SHIELDS

A. Except as otherwise indicated, provide saddles or shields under piping hangers and supports, factory fabricated, for all insulated piping. Size saddles and shields for exact fit to mate with pipe insulation.

B. Protection Shields: MSS Type 40; of length recommended by manufacturer to prevent crushing of insulation.

C. Protection Saddles: MSS Type 39; use with rollers, fill interior voids with segments of insulation adjoining insulation.

2.6 MISCELLANEOUS MATERIALS

A. Metal Framing: Provide products complying with NEMA STD ML 1.

B. Steel Plates, Shapes and Bars: Provide products complying with ANSI/ASTM A 36.

C. Cement Grout: Portland cement (ANSI/ASTM C 150, Type I or Type III) and clean uniformly graded, natural sand (ANSI/ATM C 404, Size No. 2). Mix at a ratio of 1.0 part cement to 3.0 parts sand, by volume, with minimum amount of water required for placement and hydration.

D. Heavy Duty Steel Trapezes: Fabricate from steel shapes or continuous channel struts selected for loads required; weld steel in accordance wit AWS standards.

PART 3 -– EXECUTION

3.1 PREPARATION

A. Proceed with installation of hangers, supports and anchors only after required building structural work has been completed in areas where the work is to be installed. Correct inadequacies including (but not limited to) proper placement of inserts, anchors and other building structural attachments.

B. Prior to installation of hangers, supports, anchors and associated work, Installer shall meet at project site with Contractor, installer of each component of associated work, and installers of other work requiring coordination with work of this section for purpose of reviewing material selection and procedures to followed in performing the work in compliance with requirements specified.

3.2 INSTALLATION OF BUILDING ATTACHMENTS

A. Install building attachments as required locations within concrete or structural steel for proper piping support. Space attachments within maximum piping span length indicated in MSS SP-69. Install additional building attachments where support is required for additional concentrated loads, including valves, flanges, guides, strainers, expansion joints, and at changes in direction of piping. Install concrete inserts before concrete is places; fasten insert securely to forms. Where concrete with compressive strength less than 2500 psi is indicated, install reinforcing bars through openings at top of inserts.

B. In areas of work requiring attachments to existing concrete, use self-drilling rod inserts, Phillips Drill Co., “Red-Head” or equal.

3.3 INSTALLATION OF HANGERS AND SUPPORTS

A. General: Install hangers, supports, clamps and attachments to support piping properly from building structure; comply with MSS SP-69. Arrange for grouping of parallel runs of horizontal piping to be supported together on trapeze type hangers where possible. Install supports with maximum spacings complying with MSS SP-69 or as listed herein, whichever is most limiting. Where piping of various sizes is to be supported together by trapeze hangers, space hangers for smallest pipe size or install intermediate supports for smaller diameter pipe. Do not use wire of perforated metal to support piping, and do not support piping from other piping.

1. Horizontal steel pipe and copper tube 1-½” diameter and smaller: support on 6-foot centers.

2. Horizontal steel pipe and copper tube over 1-½” diameter: support on 10-foot centers.

3. Locate pipe hangers/supports within 1’ of elbow when pipe turns up or down, e.g. for supply/return piping to AHU coils/headers.

4. Support piping to not bear on coil headers or on flexible piping connections.

5. Vertical steel pipe and copper: support at each floor.

6. Plastic pipe: support in accordance with manufacturer’s recommendations.

7. Fire protection piping: support in accordance with NFPA 13.

B. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers, and other accessories.

C. Paint all black steel hangers with black enamel. Galvanized steel and copper clad hanger do not require paint.

D. Prevent electrolysis in support of copper tubing by use of hangers and supports which are copper plated, or by other recognized industry methods.

E. Provision for Movement:

1. Install hangers and supports to allow controlled movement of piping systems and to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends and similar units.

2. Load Distribution: Install hangers and supports so that piping live and dead loading and stresses from movement will not be transmitted to connected equipment.

3. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes, and so that maximum pipe deflections allowed by ANSI B31 are not exceeded.

F. Insulated Piping: Comply with the following installation requirements.

1. Shields: Where low compressive strength insulation or vapor barriers are indicated, install noncompressible insert and use a coated protective insulation shield.

2. Clamps: Attach clamps, including spacers (if any) to piping projecting through insulation; do not exceed pipe stresses allowed by ANSI B31.

G. Support fire protection piping independently of other piping.

3.4 INSTALLATION OF ANCHORS:

A. Install anchors at proper locations to prevent stresses from exceeding those permitted by ANSI B31, and to prevent transfer of loading and stresses to connected equipment.

B. Fabricate and install anchors by welding steel shapes, plates and bars to piping and to structure. Comply with ANSI B31 and with AWS standards.

C. Anchor Spacing: Where not otherwise indicated, install anchors at ends of principal pipe runs, at intermediate points in pipe runs between expansion loops and elbows. Make provisions for present of anchors as required to accommodate both expansion and contraction of piping.

D. Where expansion compensators are indicated, install anchors in accordance with expansion unit manufacturer’s written instructions to limit movement of piping and forces to maximums recommended by manufacturer for each unit.

3.5 EQUIPMENT BASES

A. Where specified, provide concrete housekeeping bases for all floor-mounted equipment furnished as part of the work of Division 23. Size bases to extend minimum of 4” beyond equipment base in any direction; and 4” above finished floor elevation unless otherwise specified. Construct of reinforced concrete, roughen floor slab beneath base for bond, and provide steel rod anchors between floor and base. Locate anchor bolts using equipment manufacturer’s templates. Chamfer top edge or corners ¾” on all sides.

B. Provide structural steel stands to support equipment not floor mounted or hung from structure. Construct of structural steel members or steel pipe fittings. Provide factory fabricated tank saddles for tanks mounted on steel stands. Prime and paint with black enamel.

END OF SECTION 23 05 29

# SECTION 23 05 53 - MECHANICAL IDENTIFICATION

## PART 1 -– GENERAL

### 1.1 RELATED DOCUMENTS:

A. Drawings and general provisions of contract, including General and Supplementary Conditions and Division-23 Specification sections, apply to work of this section.

### 1.2 DESCRIPTION OF WORK:

A. Provide identification of the following:

1. Mechanical Equipment (air handlers, condensing units, terminals, VFDs, etc.)
2. Mechanical Controls (panels, equipment, devices, sensors, etc.)
3. Mechanical Piping (chilled water, hot water, etc.)

B. Extent of mechanical identification work required by this section is indicated on drawings and/or specified in other Division 23 sections.

C. Types of identification devices specified in this section include the following:

1. Laminated Self-adhesive Identification Materials.
2. Self-Adhering Pipe Identification Materials

### 1.3 QUALITY ASSURANCE:

A. Manufacturer's Qualifications: Firms regularly engaged in manufacturer of identification devices of types and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.

B. Codes and Standards:

1. ANSI Standards: Comply with ANSI A13.1 for lettering size, colors, and viewing angles of identification devices.

### 1.4 SUBMITTALS

A. Product Data: Submit electronic copies of manufacturer's technical product data and installation instructions for each identification material and device required.

## PART 2 -– PRODUCTS

### 2.1 ACCEPTABLE MANUFACTURES:

A. Manufacturer: Subject to compliance with requirements, provide mechanical identification materials of one of the following:

1. Allen Systems, Inc.
2. Brady (W. H.) Co.; Signmark Div.
3. Industrial Safety Supply Co., Inc.
4. Seton Name Plate Corp.

### 2.2 MECHANICAL IDENTIFICATION MATERIALS:

A. General: Provide manufacturer's standard products of categories and types required for each application. Where more than one type is specified for application, selection is Installer's

option, but provide single selection for each product category. Labels and lettering shall be neat and machine made.

2.3 EQUIPMENT IDENTIFICATION MATERIALS:

A. Plastic or phenolic self-adhesive labels with 3/8” high stenciled letters. Label shall be black color with white stenciling.

2.4 PAINTED IDENTIFICATION MATERIALS:

A. Stencils: Standard fiberboard stencils, prepared for required applications with letter sizes generally complying with recommendation of ANSI A13.1

B. Stencil Paint: Standard exterior type stenciling enamel; black, except as otherwise indicated; either brushing grade or pressurized spray-can form and grade.

C. Identification Paint: Standard identification enamel to match existing systems elsewhere in the building.

2.5 PLASTIC PIPE MARKERS:

A. Snap-On Type: Provide manufacturer's standard pre-printed, semi-rigid snap-on, color-coded pipe markers, complying with ANSI A13.1 and matching existing.

B. Pressure-Sensitive Type: Provide manufacturer’s standard pre-printed, permanent adhesive, color-coded, pressure-sensitive vinyl pipe markers, complying with ANSI A13.1 and matching existing.

C. Small Pipes: For external diameters less than 6" (including insulation if any), provide full-band pipe markers, extending 360 degrees around pipe at each location.

D. Large Pipes: For external diameters 6" and larger (including insulation if any), provide either full-band or strip-type pipe markers, but not narrower than 3 times letter height.

E. Lettering: Comply with piping system nomenclature to match existing systems elsewhere in the building.

F. Arrows: Apply printed pipe markers with arrows indicating direction of flow.

PART 3 -– EXECUTION

3.1 EQUIPMENT IDENTIFICATION:

A. General: Coordinate names, abbreviations with the schedules on the plans.

B. Install equipment labels on all new and affected panels, and equipment. Place labels in conspicuous location. Ensure label does not interfere with access.

3.2 PIPING SYSTEM IDENTIFICATION:

A. General: Coordinate names, abbreviations, pipe colors and other designations used in mechanical identification work, with existing corresponding designations with plans and existing equipment. Consult with the engineer regarding conflicts with existing equipment names.

B. 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:

1. Plastic pipe markers, with application system as indicated under "Materials" in this section.

2. Stenciled marker, black or white for best contrast.

3. Locate pipe markers as follows wherever piping is exposed to view in occupied spaces, machine room, accessible maintenance spaces and exterior non-concealed locations.
    a. Near each valve and control device.
    b. 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.
    c. Near locations where pipes pass through walls or floors/ceiling, or enter non-accessible enclosures.
    d. At access doors, manholes and similar access points which permit view of concealed piping.
    e. Near major equipment items and other points of origination and termination.
    f. Spaced intermediately at maximum spacing of 25' along each piping run, except reduce spacing to 15' in congested areas of piping and equipment.
    g. On piping above removable acoustical ceilings, except omit intermediately spaced markers.

END OF SECTION 23 05 53

# SECTION 23 05 93 -TEST AND BALANCE

## PART 1 -– GENERAL

### 1.1 QUALITY ASSURANCE

A. The Testing Contractor shall be independent of the Mechanical Subcontractor, certified by NEBB member of AABC.

B. Codes and Standards:

1. NEBB: “Procedure Standards for Testing, Adjusting, and Balancing of Environmental Systems.”

2. AABC: “National Standards for Total System Balance.”

C. The personnel involved in performing the tests shall be experienced and specifically trained in balancing mechanical systems.

### 1.2 SUBMITTALS:

A. After completion of test, submit one test report to engineer for review and comments.

B. Prior to Contractors request for final completion inspections, submit final test reports.

C. Submit 2 final signed/sealed copies in accordance with general submittal requirements.

D. Submit one final electronic/scanned copy to engineer.

### 1.3 DESCRIPTION OF WORK:

A. The TAB work shall include:

1. Adjust and balance the HVAC systems covered in the construction documents. This includes but is not limited to the ventilation, return, and supply air distribution systems.

2. Record all test data and submit preliminary reports upon substantial completion.

3. Install at each piece of mechanical equipment a "Data Sheet" showing all significant operating temperatures, pressures, amperes, voltage, brake horsepower, etc. "Data Sheet" to be enclosed in vinyl holder securely attached to the equipment or wall in the immediate area.

4. Permanently mark settings on speed controllers, potentiometers, etc. to denote TAB setting.

5. Check all control devices for proper operation, calibration and location.

B. Testing and balancing shall not begin until the systems have been completed and in full working order. The mechanical contractor shall be responsible for putting all heating, ventilating, air conditioning and exhaust systems and equipment into full operation and shall continue the operation of same during each working day of testing and balancing.

C. The Contractor shall furnish the Test and Balance Subcontractor with a full set of Drawings and Specification, applicable submittal data, and manufacturer's performance data.

D. The contractor shall make any changes required for correct balance, as recommended by the balancing contractor, at no additional cost to the owner. Such changes may encompass but are not necessarily restricted to replacement or adjustment of pulleys, belts, ductwork, dampers, or the addition of dampers and access doors.

E. Mark equipment settings, including damper control positions, valve indicators, fan speed control levers, and similar controls and devices, to show final settings. Mark with paint or other suitable, permanent identification materials.

F. Insert text here…

PART 2 -– PRODUCTS

2.1 N/A

PART 3 -– EXECUTION

3.1 GENERAL

A. All systems shall be tested, adjusted, and balanced in accordance with applicable NEBB or AABC standards and the TAB agenda.

B. All instruments will have been calibrated recently and verification of calibration shall be provided with submittal data.

C. Coordinate TAB procedures with any phased construction requirements for the project so that usable increments of finished work may be accepted for beneficial occupancy. Systems serving partially occupied phases of the project may require balancing for each phase prior to final balancing.

D. The agenda shall also include the following detailed narrative procedures, system diagrams and forms for test results.

1. Specific standard procedures required and proposed for each system. Additional procedures for variable flow systems shall be developed by the TAB Agency and included for review and approval.

2. System diagrams for each laboratory system. Diagrams may be single line. In addition to the information recorded for standard AABC or NEBB procedures, report the following information:

E. Report Format: Report forms shall be those standard forms prepared by the referenced standard for each respective item and system to be tested for each lab area, adjusted, and balanced. Bind report forms complete with schematic systems diagrams and other data in reinforced, vinyl, three-ring binders. Provide binding edge labels with the project identification and a title descriptive of the contents. Divide the contents of the binder into the below listed divisions, separated by divider tabs:

1. General Information and Summary

2. Individual Rooms and equipment – HVAC systems: exhaust, supply/return, outside air systems, including temperature control.

3. Calibration Data

F. General Information and Summary: Inside cover sheet to identify testing, adjusting, and balancing agency, Contractor, Owner, Architect, Engineer, and Project. Include addresses, and contact names and telephone numbers. Also include a certification sheet containing the seal and name, address, telephone number, and signature of the Certified Test and Balance Engineer. Include in this division a listing of the instruments used for the procedures along with the proof of calibration.

G. Calibration Reports: Submit proof that all required instrumentation has been calibrated to tolerances specified in the referenced standards, within a period of six months prior to starting the project.

3.2 AIR BALANCE:

A. Balance systems to the design flow rates. Record initial fan and pressure drop parameters with all dampers open and successive iterations of flowrates as the system is balanced. Indicate the “final” balance flowrate data column.

B. Record rpm and full load amps at the initial and successive balancing design flowrates. Indicate the “final” balance data column.

C. Make pitot tube traverse of each supply, return, exhaust, and outside air duct system to measure flowrates for each iterative balance and record the results. Seal all penetrations with plastic caps.

D. Record pressure drop readings at primary components in each system, e.g., fans, air handlers, duct systems, etc. Measure pressure readings at fan inlets, outlets, coils, filters, etc. and depict readings on equipment diagrams in the report.

E. Coordinate all work with the mechanical and controls’ contractors.

F. Test function of variable fan speed response, on/off controls, damper interlocks, current transducers, temperature sensors, humidity sensors, etc. Check and report all controls for proper operation.

G. Record all setpoints, dead bands, for both heating and cooling modes.

3.3 EQUIPMENT ELECTRICAL OPERATION:

A. Measure applied voltage, heater sizes, and running load current for all fan motors whether new or existing.

3.4 CONTROLS OPERATION:

A. Verify proper operation of all new control devices.

B. Coordinate work with the mechanical or controls contractor

END OF SECTION 23 05 93

# SECTION 23 07 10 - MECHANICAL INSULATION

## PART 1 -– GENERAL

### 1.1 GENERAL CONDITIONS

A. The work described hereunder shall be installed in accordance with the "Mechanical General Conditions," Section 23 01 00.

### 1.2 DESCRIPTION OF WORK:

A. Extent of the mechanical insulation required by this section is indicated on the Drawings and schedules, and by the requirements of this section.

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

1. Ductwork Systems Insulation:

a. Fiberglass duct wrap

b. Semi-rigid board

c. Closed-cell elastomeric

### 1.3 QUALITY ASSURANCE:

A. Manufacturer's Qualifications: Firms regularly engaged in the manufacture of mechanical insulation products, of types required, whose products have been in satisfactory use in similar service for not less than three (3) years.

B. Installer's Qualifications: Installer shall be an insulation specialty sub-contractor. A professional insulator with adequate experience and ability shall install all insulation. Firm with at least 5 years successful installation experience on projects with mechanical insulations like that required for this project.

C. Flame/Smoke Ratings: Provide composite mechanical insulation (insulation, jackets, coverings, sealers, mastics, and adhesives) having flame spread index of 25 or less, and smoke developed index of 50 or less, as tested by ASTM E 84 (NFPA 255) methods.

D. Comply with the manufacturer’s recommendations for installation of insulation materials.

### 1.4 SUBMITTALS

A. Submit to the Architect/Engineer for approval electronic copies of brochures, technical data and/or shop drawings of the following, and as many additional copies as required for Contractor use:

1. Each type of insulation material, performance data, etc.

2. Mastics, tapes, mechanical fasteners, etc.

3. Jacketing materials

4. Schedule of insulation systems that includes materials, insulation thickness, mastics, tapes, etc. for each type of system included in the project.

### 1.5 DELIVERY, STORAGE, AND HANDLING:

A. Deliver insulation, coverings, cements, adhesives and coatings to the site in containers with manufacturer's stamp or label, affixed and showing fire hazard indexes of products.

B. Protect insulation against dirt, water, and chemical and mechanical damage. Do not install damaged or wet insulation; remove from project site.

PART 2 -– PRODUCTS

2.1 DUCTWORK INSULATION MATERIALS:

A. Fiberglass Duct Wrap: Federal Specification HH-1-558B, 1 pcf density, k=0.24, 2.2” thick (out of package), 1-5/8” thick (installed), R-value = 6.0 (installed), rated to 450 degrees F operating temperature. FSK reinforced foil vapor retarder. Owens / Corning SoftR or an approved equivalent.

B. Fiberglass Duct Board: Federal Specification HH-1-558B, 3.8 pcf density, k=0.23, 1-1/2” thick, R-value = 6.50, rated to 450 degrees F operating temperature. FSK reinforced foil vapor retarder. Owens / Corning Quiet R, Manville Type 814 or an approved equivalent.

2.2 REFRIGERANT & CONDENSATE PIPING INSULATION MATERIALS:

A. Closed Cell Elastomeric Insulation: ASTM C 534, k=0.27, rated to 200 degrees F operating temperature, maximum permeability = 0.20 perm-in. Armaflex AP or an approved equivalent.

2.3 INSULATION JACKETING, EXTERIOR

A. Aluminum roll jacketing conforming to ASTM B209, 3003 alloy, H-14 temper, 0.016” thick, with preformed aluminum elbows.

PART 3 -– EXECUTION

3.1 INSULATION SYSTEMS:

A. General Duct Systems: Insulate concealed supply, return, outside air, and transfer air ductwork with fiber glass duct wrap unless otherwise specified herein. Duct that is in exposed ceilings and beyond the reach normal wear-and-tear, can be insulated with duct wrap.

B. Air Handler Duct Systems: Insulate new supply, return, and outside air ducts in mechanical rooms with rigid fiberglass board up to a height of 7 feet and then transition to flexible duct wrap. If all duct is below 7 feet, extend rigid insulation to 6” beyond the mechanical room walls.

C. Interior Refrigerant Piping: Insulate with 3/4" closed-cell elastomeric insulation.

D. Exterior Refrigerant Piping: Insulate with 3/4" elastomeric foam. Cover hard piping with aluminum jacketing and soft piping with 13-ply Venture Tape (or equal) with aluminum foil cover.

E. Miscellaneous Cold Drain Piping: Interior: Insulate with 3/4" closed cell elastomeric insulation. Seal all seams joints, etc. Exterior: No insulation is required.

3.2 GENERAL INSTALLATION REQUIREMENTS:

A. Examine areas and conditions under which mechanical insulation is to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to Installer.

B. Surfaces shall be clean and dry before attempting to apply insulation. Mechanical systems shall be turned off and the system shall be at room temperature before insulating. A professional insulator with adequate experience and ability shall install insulation.

C. Install insulation products in accordance with manufacturer's written instructions, and in accordance with recognized industry practices to ensure that insulation serves its intended purpose. Seal all joints, seams, etc. air and water tight.

D. Rated floors and partitions shall be penetrated only with insulation materials and techniques UL listed to maintain rated assembly. Consult with firestopping product vendors and technicians in advance. Any questions shall be referred to the Architect/Engineer.

E. Exposed/exterior piping shall be finished with an aluminum jacketing.

3.3 INSTALLATION OF DUCT WRAP

A. Application: The insulation shall be applied over 4" wide brushed strips of Foster's 85-20 adhesive spaced 12" on center. The insulation shall be overlapped approximately 2” and stapled in place. All ducts 24" or larger in width shall have the insulation additionally secured with mechanical fasteners spaced approximately 18" on center. Mechanical fasteners shall be bonded to the duct with the appropriate mastic/adhesive. Self-stick type pins are prohibited.

B. Insulation shall be cut and applied to the ductwork with not less than 2" overlap of backing on each edge and on the linear seams. Insulation shall be removed from all overlapping tabs.

C. On rectangular ducts install so insulation is not excessively compressed at corners.

D. Seams shall be stapled approximately 6" on center with outward clinching staples.

E. Seal all seams, tears, punctures, penetrations for hanger straps, or any other breaches of duct wrap facing with tape or mastic to provide a vapor tight system.

3.4 INSTALLATION OF FIBERGLASS DUCT BOARD INSULATION

A. Application: The insulation joints shall be lapped, butted, or mitered and taped in place. All ducts 24" or larger in width shall have the insulation additionally secured with mechanical fasteners spaced approximately 18" on center. Tape all joints and staple with outward clinching staples. Final tape over staples.

B. Seal all seams, joints, tears, punctures, penetrations or any other breaches of insulation facing with tape to provide a vapor-tight permanent system.

C. Use mastic over final taped joints for the connections to air handlers, fan coil units, etc.

3.5 INSTALLATION OF FIBERGLASS AND ELASTOMERIC PIPING INSULATION:

A. Insulation is not to be installed until the piping systems have been checked and found free of all leaks, and piping is dry (achieved room temperature) and free of debris.

B. Provide hanger type and support shields of 18-gauge galvanized steel over or embedded in the insulation. Shield shall extend halfway up the pipe insulation cover and at least 6" on each side of the hanger. Insulation shield edges shall be hemmed. Use incompressible inserts at each hanger/support to prevent compressing insulation due to weight of pipe.

C. Provide standoffs and clamps for wall/floor mounted piping to accommodate insulation thickness. Insulate over clamp and seal all joints, gaps, etc. air and water tight. Use incompressible inserts at each hanger/support to prevent compressing insulation due to weight of pipe.

D. Securely fasten shield with straps at each end. Insulate anchors adequately to prevent moisture condensation problems.

E. Install insulation materials with smooth and even surfaces. Insulate each continuous run of piping with full-length units of insulation, with single cut piece to complete run. Do not use pieces or scraps abutting each other.

F. Clean and dry pipe surfaces prior to insulating. Butt insulation joints firmly together to ensure complete and tight fit over surfaces to be covered.

G. Maintain integrity of vapor-barrier jackets, and protect to prevent puncture or other damage. Gaps and openings in chilled water insulation vapor barrier will not be tolerated.

H. Cover valves, fittings and similar items in each piping system with equivalent thickness and composition of insulation applied to adjoining pipe. Optional: install factory molded, precut or job fabricated units.

I. Extend piping insulation without interruption through walls, floors and similar piping penetrations, except where otherwise indicated.

J. Exposed/outdoor piping with elastomeric insulation shall be protected by aluminum jacketing.

3.6 INSTALLATION OF ALUMINUM JACKETING:

A. Install aluminum jacketing only after insulation installation is completed. Install full-length sections and overlap joints 2” minimum. Orient longitudinal seams at bottom of piping. Install aluminum or stainless-steel bands to secure insulation on 2’ maximum centers. Install prefabricated aluminum fittings at elbows/offsets. Seal all seams joints, openings, etc. water tight with clear/gray silicone sealant.

3.7 PROTECTION AND REPLACEMENT:

A. Replace damaged insulation which cannot be repaired satisfactorily, including units with vapor barrier damage and moisture saturated units.

B. Protection: Insulation installer shall advise Contractor of required protection for insulation work during remainder of construction period, to avoid damage and deterioration.

3.8 SEALING WALL & FLOOR PENETRATIONS

A. Seal rated wall/floor penetrations to maintain fire rating. Coordinate firestopping in advance of installation.

B. Seal all wall/floor penetrations water tight.

END OF SECTION 23 07 10

# SECTION 23 31 13 - METAL AND FLEXIBLE DUCTWORK AND ACCESSORIES

## PART 1 - GENERAL

### GENERAL CONDITIONS

The work described hereunder shall be installed in accordance with the "Mechanical General Conditions," Section 23 01 00.

### DESCRIPTION OF WORK:

Extent of metal ductwork is indicated on drawings and in schedules, and by requirements of this section. In general, the work consists of, but is not limited to, the following:

A system of heating and air-conditioning supply and return air ductwork.

Smoke/fire dampers, air diffusers, and miscellaneous accessories.

Miscellaneous volume/control dampers.

Ventilation air ductwork.

Exhaust air ductwork.

### RELATED WORK

Insulation is specified under Section 23 07 10.

### QUALITY ASSURANCE:

Manufacture's Qualifications: Firms regularly engaged in manufacture of metal ductwork products of types, materials, and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.

Installer's qualifications: Firm with at least three (3) years of successful installation experience on projects with metal ductwork systems similar to that required for project.

Codes and Standards:

SMACNA Standards: Comply with SMACNA's "HVAC Duct Construction Standards, Metal and Flexible" for fabrication and installation of metal ductwork.

NFPA Compliance: Comply with NFPA 90A "Standard for the Installation of Air Conditioning and Ventilation Systems".

NFPA Compliance: Comply with NFPA 96 "Standard for the Installation of Equipment for the Removal of Smoke and Grease-Laden Vapors from Commercial Cooking Equipment".

### SUBMITTALS:

Submit to the Architect/Engineer for approval electronic copies of brochures, technical data and/or shop drawings of the following, and as many additional copies as required for Contractor use:

Ductwork and materials

Mastics

Grilles & accessories

Smoke and fire dampers, miscellaneous dampers and installation instructions

DELIVERY, STORAGE AND HANDLING:

Handle ductwork and equipment carefully to prevent damage. Do not install damaged sections or components; replace with new.

Store ductwork and equipment in clean dry place. Protect from weather, dirt, fumes, water, construction debris, and physical damage.

PART 2 - PRODUCTS

DUCTWORK MATERIALS:

Sheet Metal: Except as otherwise indicated, fabricate ductwork from galvanized sheet steel complying with ASTM A 527, lock forming quality; with G-90 zinc coating in accordance with ASTM A 525.

Single-Wall Spiral Round Duct: Round duct with mechanical fastening, spiral flat seams, complying with ASTM A527, with G-90 zinc coating in accordance with ASTM A 525.

MISCELLANEOUS MATERIALS:

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 connections of ductwork and equipment.

Duct Sealant: Non-hardening, non-migrating mastic or liquid elastic sealant, type applicable for fabrication/installation detail, as compounded and recommended by manufacturer specifically for sealing joints and seams in ductwork.

Ductwork Support Materials: Except as otherwise indicated, provide hot-dipped galvanized steel fasteners, anchors, rods, straps, trim and angles for support of ductwork.

Flexible Ducts: Insulated spiral-wound spring steel with flame proof vinyl sheathing complying with UL 181, Class I air duct (duct connectors will not be accepted).

Smoke Dampers: Dampers shall meet the requirements listed in NFPA 90A, 92A and 92B and shall be classified as leakage rated dampers for use in smoke control systems in accordance with the UL555S. Provide factory installed electric actuators qualified under UL555S. For each damper provide an access door 4" smaller than sheet metal size in width (up to 18") and 18" in length.

Fire Dampers: Dampers shall meet UL 555 for dynamic systems and shall be provided with angles, hardware, etc. Dampers shall be airfoil blade type or Style “B” out of the airstream type. Damper procurement and installation shall accommodate existing conditions. Provide damper access either via the duct or grille.

Smoke Damper Actuators: Actuators to be normally closed (powered open), spring return (selectable), 120 VAC with end position indication (two built in auxiliary switches), overload protection with disconnect switch. It will meet UL555 and UL555S requirements and be factory mounted to the smoke damper.

Grilles & Registers: Provide as scheduled on the drawings or an approved equivalent.

FABRICATION:

Duct sizes are internal free area unless otherwise noted.

Shop fabricate ductwork of gages and reinforcement complying with SMACNA "HVAC Duct Construction Standards".

Construct supply duct for 2” static pressure.

Construct return ducts for 2” negative static pressure.

Construct exhaust ducts for 1” negative static pressure and outside air ducts for 1” positive static pressure.

Construct rectangular taps with mitered fittings.

Limit angular tapers to 30 degrees for contracting tapers and 20 degrees for expanding tapers.

PART 3 - EXECUTION

PART 1 -– GENERAL

1.1 GENERAL CONDITIONS

A. The work described hereunder shall be installed in accordance with the "Mechanical General Conditions," Section 23 01 00.

1.2 DESCRIPTION OF WORK:

A. Extent of metal ductwork is indicated on drawings and in schedules, and by requirements of this section. In general, the work consists of, but is not limited to, the following:

1. A system of heating and air-conditioning supply and return air ductwork.
2. Smoke/fire dampers, air diffusers, and miscellaneous accessories.
3. Miscellaneous volume/control dampers.
4. Ventilation air ductwork.
5. Exhaust air ductwork.

1.3 RELATED WORK

A. Insulation is specified under Section 23 07 10.

1.4 QUALITY ASSURANCE:

A. Manufacture's Qualifications: Firms regularly engaged in manufacture of metal ductwork products of types, materials, and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.

B. Installer's qualifications: Firm with at least three (3) years of successful installation experience on projects with metal ductwork systems like that required for project.

C. Codes and Standards:

1. SMACNA Standards: Comply with SMACNA's "HVAC Duct Construction Standards, Metal and Flexible" for fabrication and installation of metal ductwork.
2. NFPA Compliance: Comply with NFPA 90A "Standard for the Installation of Air Conditioning and Ventilation Systems".
3. NFPA Compliance: Comply with NFPA 96 "Standard for the Installation of Equipment for the Removal of Smoke and Grease-Laden Vapors from Commercial Cooking Equipment".

1.5 SUBMITTALS:

A. Submit to the Architect/Engineer for approval electronic copies of brochures, technical data and/or shop drawings of the following, and as many additional copies as required for Contractor use:

1. Ductwork and materials
2. Mastics
3. Grilles & accessories
4. Smoke and fire dampers, miscellaneous dampers, and installation instructions

1.6 DELIVERY, STORAGE AND HANDLING:

A. Handle ductwork and equipment carefully to prevent damage. Do not install damaged sections or components; replace with new.

B. Store ductwork and equipment in clean dry place. Protect from weather, dirt, fumes, water, construction debris, and physical damage.

PART 2 -– PRODUCTS

2.1 DUCTWORK MATERIALS:

A. Sheet Metal: Except as otherwise indicated, fabricate ductwork from galvanized sheet steel complying with ASTM A 527, lock forming quality; with G-90 zinc coating in accordance with ASTM A 525.

B. Single-Wall Spiral Round Duct: Round duct with mechanical fastening, spiral flat seams, complying with ASTM A527, with G-90 zinc coating in accordance with ASTM A 525.

2.2 MISCELLANEOUS MATERIALS:

A. 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 connections of ductwork and equipment.

B. Duct Sealant: Non-hardening, non-migrating mastic or liquid elastic sealant, type applicable for fabrication/installation detail, as compounded and recommended by manufacturer specifically for sealing joints and seams in ductwork.

C. Ductwork Support Materials: Except as otherwise indicated, provide hot-dipped galvanized steel fasteners, anchors, rods, straps, trim and angles for support of ductwork.

D. Flexible Ducts: Insulated spiral-wound spring steel with flame proof vinyl sheathing complying with UL 181, Class I air duct (duct connectors will not be accepted).

E. Smoke Dampers: Dampers shall meet the requirements listed in NFPA 90A, 92A and 92B and shall be classified as leakage rated dampers for use in smoke control systems in

accordance with the UL555S. Provide factory installed electric actuators qualified under UL555S. For each damper provide an access door 4" smaller than sheet metal size in width (up to 18") and 18" in length.

F. Fire Dampers: Dampers shall meet UL 555 for dynamic systems and shall be provided with angles, hardware, etc. Dampers shall be airfoil blade type or Style “B” out of the airstream type. Damper procurement and installation shall accommodate existing conditions. Provide damper access either via the duct or grille.

G. Smoke Damper Actuators: Actuators to be normally closed (powered open), spring return (selectable), 120 VAC with end position indication (two built in auxiliary switches), overload protection with disconnect switch. It will meet UL555 and UL555S requirements and be factory mounted to the smoke damper.

H. Grilles & Registers: Provide as scheduled on the drawings or an approved equivalent.

2.3 FABRICATION:

A. Duct sizes are internal free area unless otherwise noted.

B. Shop fabricate ductwork of gages and reinforcement complying with SMACNA "HVAC Duct Construction Standards".

C. Construct supply duct for 2” static pressure.

D. Construct return ducts for 2” negative static pressure.

E. Construct exhaust ducts for 1” negative static pressure and outside air ducts for 1” positive static pressure.

F. Construct rectangular taps with mitered fittings.

G. Limit angular tapers to 30 degrees for contracting tapers and 20 degrees for expanding tapers.

PART 3 -– EXECUTION

3.1 INSTALLATION OF METAL DUCTWORK

A. Examine areas and conditions under which metal ductwork is to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to installer.

B. Install metal ductwork in accordance with SMACNA HVAC "Duct Construction Standards". Assemble and install ductwork in accordance with recognized industry practices, which will achieve airtight and noiseless systems, capable of performing each indicated service. Install each run with minimum number of joints. Support ducts rigidly with suitable ties, braces, hangers and anchors of type which will hold ducts true-to-shape and to prevent buckling.

C. Use single-wall spiral seam round duct where specified and/or as needed to accommodate existing conditions.

D. Duct sizes shown are internal dimensions. Maintain free area equivalence when making transitions or when transforming between round and/or rectangular duct.

E. Seal all transverse and longitudinal joints, seams, etc. regardless of pressure class with approved duct mastic.

F. Routing: Field verify duct route prior to any fabrication. Coordinate layout with existing structure, suspended ceiling and lighting layouts and similar finished work. Hangers for steel ducts shall be fabricated from sheet metal. Ducts shall be supported from the structure.

G. Penetrations: Where ducts pass through interior partitions and exterior walls, conceal space between construction opening and duct or duct insulation with sheet metal flanges/collars two gauges heavier than duct. Minimum width of flanges/collars shall be 1-1/2” or as required to completely seal opening. Overlap opening on rectangular openings by at least 1-1/2". Fasten to duct and substrata. Where ducts pass through fire-rated floors, walls, or partitions, provide in accordance with approved UL listed details and accepted industry practice.

H. Hard Ceiling or Sidewall Connections: Provide insulated sheet metal boots sized to fit the grille size as indicated. Secure boot to ceiling structure. Boot insulation shall be semi-rigid foil faced where exposed to the air stream and sealed with tape.

3.2 INSTALLATION OF SMOKE/FIRE DAMPERS:

A. General: Install dampers in accordance with the manufacturers’ installation instructions to maintain the UL listing. Fire dampers shall be out of the air stream as specified on the plans.

3.3 INSTALLATION OF FLEXIBLE DUCTS:

A. Maximum Length: For any duct run using flexible ductwork, do not exceed ten (10) feet extended length – use round spiral seam steel duct for longer runs. Install shortest possible length.

B. Installation: Install in accordance with Section III of SMACNA “HVAC Duct Construction Standards, Metal and Flexible". No bends shall be made with center-line radius of less than one duct diameter.

C. Flexible duct hangers shall be constructed from hanger wire and 3” wide sheet metal saddles. Wire gauge shall be per SMACNA and saddles shall have hemmed edges and corners. Support as needed to avoid kinks and flow obstructions.

END OF SECTION 23 31 13

# SECTION 23 34 10 - FANS

## PART 1 -– GENERAL

### 1.1 GENERAL CONDITIONS

A. The work described hereunder shall be installed in accordance with the "Mechanical General Conditions," Section 23 01 00.

### 1.2 DESCRIPTION OF THE WORK

A. The extent of the work is indicated on the Drawings. In general, the work consists of, but is not limited to, the following:

1. In-line Direct-Drive Cabinet Fans
2. Ceiling-mount Exhaust Fans

### 1.3 RELATED WORK

A. Electrical wiring is specified in the Electrical Sections.

B. Control wiring is specified under other sections, provide any control devices as described on the schedule.

### 1.4 QUALITY ASSURANCE

A. Rate fans according to appropriate Air Moving and Conditioning Association, Inc. (AMCA) approved test codes and procedures. Supply fans with sound ratings below the maximums permitted by AMCA standards. All fans provided must be licensed to bear the Certified Ratings Seal.

### 1.5 WARRANTY

A. Provide a full parts warranty for one year from start-up or 18 months from shipment, whichever occurs first.

### 1.6 SUBMITTALS

A. Submit to the Architect/Engineer for approval electronic copies of brochures, technical data and/or shop drawings of the following, and as many additional copies as required for Contractor use:

1. Fans
2. Fan accessories/options, etc.

### 1.7 MAINTENANCE DATA:

A. Submit operation and maintenance data. Include manufacturer's descriptive literature, start-up instructions, and maintenance procedures.

### 1.8 DELIVERY, STORAGE AND HANDLING:

A. Handle equipment carefully to prevent damage. Do not install damaged sections or components; replace with new.

B. Store equipment in clean dry place. Protect from weather, dirt, fumes, water, construction debris, and physical damage.

C. Comply with manufacturer's rigging and moving instructions for equipment unloading and moving to final location.

PART 2 -– PRODUCTS

2.1 FAN SCHEDULE

A. Provide fan type, arrangement, rotation, capacity, size, motor horsepower, and motor voltage accessories as scheduled on the Drawings or specified hereafter.

B. Provide fan accessories as scheduled on the Drawings or required in these specifications.

2.2 IN-LINE DIRECT-DRIVE CABINET FANS

A. Provide in-line direct-drive cabinet centrifugal fans with forward curved dynamically balanced fan wheel and square galvanized steel housing with venturi throat inlet. The housing interior shall be lined with ½" thick acoustical insulation. The outlet duct collar shall include an aluminum backdraft damper and be adaptable to horizontal or vertical discharge. The access for wiring shall be external. The motor disconnect shall be internal and of the plug type. The motor shall be mounted on vibration isolators.

2.3 FAN ACCESSORIES

A. Provide fan accessories as scheduled on the Drawings or required in these specifications.

B. Wall caps shall include insect screens and backdraft dampers.

PART 3 -– EXECUTION

3.1 Install fans in accordance with manufacturer's installation instructions.

3.2 Verify existing roof construction prior to compiling shop drawings for curbs and/or adapters.

3.3 Coordinate the installation with the controls' contractor.

3.4 Locate inline fans directly above a single lay-in tile for motor/fan access/replacement. Support fan from structure. Install flexible duct connectors to ductwork. Install axial restraints across flexible connector on fans with over ½ hp motors.

3.5 Ensure that fans are wired properly, with correct motor rotation, and includes electrical motor grounding.

3.6 Verify motor amperage and voltage.

3.7 Verify proper operation of backdraft dampers.

3.8 Verify control functions of fan.

END OF SECTION 23 34 10

# SECTION 23 74 13 – PACKAGED VAV HEAT PUMP

## PART 1 - GENERAL

### 1.1. SUMMARY

A. This section includes units with integral heating and cooling for outdoor installation. Integral heat source shall be air-source heat pump with electric heat. Integral cooling source shall be packaged DX. Airflow arrangement shall be Outdoor Air.

B. Related Sections include the following:

1. Section 23 01 00: General Provisions
2. Section 23 07 10: Insulation
3. Section 22 05 00: Plumbing
4. Section 26 00 00: Electrical

### 1.2. SUBMITTALS

A. Product Data: For each type or model include the following:

1. Complete fan performance curves for both Supply Air and Exhaust Air, with system operating conditions indicated, as tested in an AMCA certified chamber.
2. Sound performance data for both Supply Air and Exhaust Air, as tested in an AMCA certified chamber.
3. Motor ratings, electrical characteristics and motor and fan accessories.
4. Performance ratings for all chilled water or DX coils.
5. Dimensioned drawings for each type of installation, showing isometric and plan views, to include location of attached ductwork and service clearance requirements.
6. Estimated gross weight of each installed unit.
7. Installation, Operating and Maintenance manual (IOM) for each model.
8. Microprocessor Controller (DDC) specifications to include available options and operating protocols.

### 1.3. QUALITY ASSURANCE

A. Product Options: Drawings must indicate size, profiles and dimensional requirements of unit and are to be based on the specific system indicated. Refer to Division 1 Section "Product Requirements".

B. End of line test with full report available upon request.

C. Certifications

1. Entire unit shall be ETL Certified per U.L. 1995 and bear an ETL sticker.
2. Coils shall be Recognized Components for ANSI/UL 1995, CAN / CSA C22.2 No 236.05.
3. Indirect gas-fired furnace shall be ETL Certified as a component of the ERU. Indirect gas-fired furnace shall be an ETL Recognized Component of the ERU per ANSI Z83.8.

### 1.4. COORDINATION

A. Coordinate size and location of all building penetrations required for installation of each unit and associated plumbing and electrical systems.

B. Coordinate location of water system fittings to ensure correct positioning for connection to the condensate drain pipe.

C. Coordinate sequencing of construction of associated plumbing, HVAC, electrical supply, roofing contractor.

PART 2 - PRODUCTS

2.1. MANUFACTURED UNITS

A. Unit shall be fully assembled at the factory and consist of an insulated metal cabinet, downturn outdoor air intake with 2" aluminum mesh filter assembly, evaporator coil, hot gas reheat coil (if scheduled), indirect gas-fired furnace, packaged DX system, phase and brownout protection, motorized dampers, barometric relief damper, motorized recirculating damper, curb assembly, filter assembly intake air, supply air blower assembly, and an electrical control center. All specified components and internal accessories factory installed are tested and prepared for single-point high voltage connection.

2.2. CABINET

A. Materials: Formed, double wall insulated metal cabinet, fabricated to permit access to internal components for maintenance.
   1. Unit's exterior shall be G60 galvaneal steel with pre-painted material in the manufacturer's standard finish color. This has been subjected to a salt spray test per ASTM-B117 and evaluated using ASTM-D714 and ASTM-D610 showing no observable signs of rust or blistering until reaching 2,500 hours.
   2. Internal assemblies: 24-gauge, galvanized steel except for motor supports which shall be minimum 14 gauge galvanized steel.

B. Cabinet Insulation: Comply with NFPA 90A and NFPA 90B and erosion requirements of UL 181.
   1. Materials: Rigid urethane injected foam.
      a. Thickness: 2 inch (50.8 mm)
      b. Thermal Resistance R13
      c. Thermally broken
      d. Meets UL94HF-1 flame requirements.
      e. Location and application: Full coverage of entire cabinet exterior to include walls, roof of unit, unit base, and doors.
   2. Materials: Fiberglass insulation. If insulation other than fiberglass is used, it must also meet the Fire Hazard Classification shown below.
      a. Thickness: 2 inch (50.8 mm)
      b. Thermal Resistance R8
      c. Fire Hazard Classification: Maximum flame spread of 25 and smoke developed of 50, when tested in accordance with ASTM C 411.
      d. Location and application: Divider panels between outdoor air and return air/exhaust air streams.

C. Roof Insulation: 2-inch (50.8 mm) fiberglass located above the 1-inch (25.4 mm) foam panel.

D. Access panels / doors: Unit shall be equipped with insulated, hinged doors or removable access panels to provide easy access to all major components.

E. Supply Air blower assemblies: Blower assembly shall consist of an electric motor and direct-drive fans. Assembly shall be mounted on heavy gauge galvanized steel rails and further mounted on neoprene vibration isolators. Blower motors shall be capable of continuous speed modulation and controlled by a VFD.

F. Evaporator Coil: Evaporator coil shall be soldered or brazed into the compressed refrigerant system. Coil shall be constructed of copper tubing, permanently bonded to aluminum fins and enclosed in a galvanized steel frame. If two compressors are used as components of the unit, then the evaporator coil shall be of "interlaced" configuration, permitting independent operation of either compressor without conflict with the other compressor.

G. Control panel / connections: Units shall have an electrical control center where all high and low voltage connections are made. Control center shall be constructed to permit single-point high voltage power supply connections. RTU shall be equipped with a Unit Disconnect Switch.

H. Condensate drain pan: Pan shall be formed of welded austenitic stainless steel sheet material and provided with a welded stainless steel drain connection at the front for connection to a P trap. Drain pan shall be sloped in two directions to provide positive draining and drain connector shall be sealed at penetration through cabinet wall.

I. P trap: If the unit is equipped with a condensate drain pan, contractor shall provide, or fabricate, and install an appropriate P trap, in accordance with plans and Best Practices.

J. Reheat coil with factory installed modulating hot gas reheat valve, only if indicated on equipment schedule.

K. Packaged DX System: Unit shall have an integral compressor(s) and evaporator coil located within the weather-tight unit housing. Condenser coils and appurtenant condenser fan assemblies shall be factory installed as integral subassemblies of the unit and mounted on the exterior of the unit. Lead condenser fan shall have EC motor to maintain condenser pressure at part load conditions. Motors shall be UL Recognized and CSA Certified. The lead refrigerant compressor(s) shall be inverter hermetic scroll-type and shall be equipped with liquid line filter drier, thermostatic expansion valves (TXV)(s), manual reset high pressure and low-pressure cutouts and all appurtenant sensors, service ports and safety devices. Compressed refrigerant system shall be fully charged with R-454B refrigerant. Compressors shall be mounted within an insulated access compartment and on a raised cabinet shelf to reduce sound and vibration. Each compressor shall be factory-equipped with an electric crankcase heater to boil off liquid refrigerant from the oil.

L. Condenser Fans: Fan blades must be constructed of aluminum or a composite material and have a geometry designed and documented to reduce sound and energy when compared to a traditional rectangular blade fan. Traditional rectangular blade fans are not allowed due to increased noise generated and increase power utilized. Condenser fan motors shall be three phase, external rotor, type 56 frame, open air over and shaft up. Each condenser fan motor shall have a vented frame, rated for continuous duty and be equipped with an automatic reset thermal protector.

M. Packaged DX Control and Diagnostics: The Packaged DX system shall be controlled by an onboard digital controller (DDC) that indicates both owner-supplied settings and fault conditions that may occur. The DDC shall be programmed to indicate the following faults:

1. Global alarm condition (active when there is at least one alarm)
2. Supply Air Proving alarm
3. Compressor Trip alarm
4. Compressor Locked Out alarm
5. Supply Air Temperature Low Limit alarm
    a. Sensor #1 Out of Range (outside air temperature)
    b. Sensor #2 Out of Range (supply air temperature)
    c. Sensor #3 Out of Range (cold coil leaving air temperature)

N. Phase and brownout protection: Unit shall have a factory-installed phase monitor to detect electric supply phase loss and voltage brown-out conditions. Upon detection of a fault, the monitor shall disconnect supply voltage to all motors.

O. Motorized dampers / Intake Air, Motorized dampers of low leakage type shall be factory installed.

P. Motorized Recirculating Air Damper designed to permit 100% recirculation of exhaust air shall be factory installed.

Q. Curb Assembly: A curb assembly made of 14-gauge galvanized steel shall be provided by the factory for assembly and installation as part of this division. The curb assembly shall provide

perimeter support of the entire unit and shall have duct adapter(s) for supply air. Curb assembly shall enclose the underside of the unit and shall be sized to fit into a recess in the bottom of the unit. Contractor shall be responsible for coordinating with roofing contractor to ensure curb unit is properly flashed to provide protection against weather/moisture penetration. Contractor shall provide and install appropriate insulation for the curb assembly.

R. Service receptacle (if indicated on equipment schedule): 120 VAC GFCI service outlet shall be factory-provided and installed by this contractor in a location designated by the A / E. Service outlet requires a dedicated single phase electric circuit. Unit contains a 120 VAC transformer to provide power to service outlet.

2.3. BLOWER

A. Blower section construction, Supply Air: direct drive motor and blower shall be assembled on a 14 gauge galvanized steel platform and shall be equipped with neoprene vibration isolation devices.

B. Blower assemblies: Shall be statically and dynamically balanced and designed for continuous operation at maximum rated fan speed and horsepower.

C. Fan: Direct drive, airfoil plenum fan with aluminum wheel statically and dynamically balanced. Prop or belt-drive fan not acceptable due to low static capabilities.

D. Blades: Welded aluminum blades only.

E. Blower section motor source quality control: Blower performance shall be factory tested for flow rate, pressure, power, air density, rotation speed and efficiency. Ratings are to be established in accordance with AMCA 210, "Laboratory Methods of Testing Fans for Rating".

2.4. MOTORS

A. General: Motors shall be heavy-duty, permanently lubricated type to match the fan load and furnished at the specified voltage, phase and enclosure.

2.5. UNIT CONTROLS

A. The unit shall be constructed so that it can function as a stand-alone heating and cooling system controlled by factory-supplied controllers, thermostats and sensors or it can be operated as a heating and cooling system controlled by a Building Management System (BMS). This unit shall be controlled by a factory-installed microprocessor programmable controller (DDC) that is connected to various optional sensors.

B. Unit shall incorporate a DDC controller with integral LCD screen that provides text readouts of status. DDC controller shall have a built-in keypad to permit operator to access read-out screens without the use of ancillary equipment, devices or software. Alarm readouts consisting of flashing light codes are not acceptable. Owner-specified ventilating conditions can be input by means of pushbuttons.

C. Unit supply fan shall be configured for Single Zone VAV.

D. Outside Air / Return Air damper control shall be CO2 sensor by factory.

E. Economizer control shall be temperature / enthalpy.

F. Operating protocol: The DDC shall be factory-programmed for BACNetMSTP.

G. Variable Frequency Drive (VFD): unit shall have factory installed variable frequency drive for modulation of the exhaust air blower assembly. The VFD shall be factory-programmed for unit-specific requirements and shall not require additional field programming to operate.

H. Unit shall be provided with a space thermostat measuring temperature. Thermostat shall have an LCD display and push buttons allowing for setpoint adjustments.

I. Secondary heating source shall not be capable of simultaneous operation with the air-source heat pump.

2.6. FILTERS

a. Unit shall have permanent 2-inch aluminum filters located in the outdoor air intake and shall be accessible from the exterior of the unit. MERV 8 disposable pleated filters shall be provided in the supply air stream. MERV 13 disposable pleated filters shall be provided in the supply final air stream.

PART 3 - EXECUTION

3.1. EXAMINATION

A. Prior to start of installation, examine area and conditions to verify correct location for compliance with installation tolerances and other conditions affecting unit performance. See unit IOM.

B. Examine roughing-in of plumbing, electrical and HVAC services to verify actual location and compliance with unit requirements. See unit IOM.

C. Proceed with installation only after all unsatisfactory conditions have been corrected.

3.2. INSTALLATION

A. Installation shall be accomplished in accordance with these written specifications, project drawings, manufacturer's installation instructions as documented in manufacturer's IOM, Best Practices and all applicable building codes.

3.3. CONNECTIONS

A. In all cases, industry Best Practices shall be incorporated. Connections are to be made subject to the installation requirements shown above.

B. Piping installation requirements are specified in Division 22 (Plumbing). Drawings indicate general arrangement of piping, fittings, and specialties.

C. Duct installation and connection requirements are specified in Division 23 of this document.

D. Electrical installation requirements are specified in Division 26 of this document.

3.4. FIELD QUALITY CONTROL

A. Inspect field assembled components and equipment installation, to include electrical and piping connections. Inspection must include a complete startup checklist to include the following: Completed Start-Up Checklists as found in manufacturer's IOM.

3.5. START-UP SERVICE

A. Engage a factory authorized service representative to perform startup service. Clean entire unit, comb coil fins as necessary, install clean filters. Measure and record electrical values for voltage and amperage. Refer to Division 23 "Testing, Adjusting and Balancing" and comply with provisions therein.

3.6. DEMONSTRATION AND TRAINING

A. Engage a factory authorized service representative to train owner's maintenance personnel to adjust, operate and maintain the entire unit. Refer to Division 01 Section Closeout Procedures and Demonstration and Training

END OF SECTION 23 74 16

# SECTION 23 8126 - SPLIT-SYSTEM HEAT PUMPS

## PART 1 -– GENERAL

### 1.1 GENERAL CONDITIONS

A. The work described hereunder shall be installed in accordance with the "Mechanical General Conditions," Section 23 01 00.

### 1.2 DESCRIPTION OF THE WORK

A. The extent of the work is indicated on the Drawings.

B. In general, the work consists of, but is not limited to, the following:

C. Ducted Heat Pump units consisting of separate evaporator/fan and compressor/condenser components

### 1.3 SUBMITTALS

A. Submit product data indicating rated capacities, required clearances, field connections weight, specialties and accessories, electrical nameplate data, and wiring diagrams.

B. Submit manufacturer's installation instructions.

C. Submit operation and maintenance data. Include manufacturer's descriptive literature, start-up instructions, installation instructions, and maintenance procedures.

D. Submit to the Architect/Engineer for approval electronic copies of brochures, technical data and/or shop drawings of the following, and as many additional copies as required for Contractor use:

1. Split-System Air Conditioning

### 1.4 COORDINATION

A. Coordinate sizes and locations of equipment, equipment supports, penetrations, and accessories with actual equipment supplied.

### 1.5 DELIVERY, STORAGE, AND HANDLING:

A. Comply with manufacturer's installation instructions for rigging, unloading, and transporting units.

B. Protect units on site from physical damage. Protect coils.

### 1.6 WARRANTY:

A. Manufacturer's standard form in which manufacturer agrees to repair or replace components of split-system air-conditioning units that fail in materials or workmanship within specified warranty period.

B. Warranty Period:

1. For Compressor: Five year(s) from date of Substantial Completion.

2. For Parts: One year(s) from date of Substantial Completion.

3. For Labor: One year(s) from date of Substantial Completion.

PART 2 -– PRODUCTS

2.1 INDOOR UNIT

A. General:

1. Air handling units shall be draw through type with 2" thick, standard size, disposable type filters and shall have DX cooling coils and electric heating coils as scheduled on drawings with minimum unit capacities as indicated.

B. Fan:

1. Fan capacities shall be as scheduled on drawings. Fans shall be direct drive with variable speed motors as scheduled. Fans and motors shall be mounted on vibration isolators.

C. Casing:

1. Casing shall be constructed of heavy duty, factory painted, galvanized sheet steel adequately reinforced with structural members. Removable panels in front of unit shall provide access to all internal parts. Units shall have filter access panel and filter rack. All unit panels shall be internally insulated to meet requirements of the Florida Energy Code. All insulating materials shall meet the requirements of NFPA 90-A. Units shall be equipped with duct collars on intake and discharge of unit and single point power connection.

D. Refrigerant Coils:

1. The coils shall have aluminum plate fins mechanically bonded to seamless copper tubes internally enhanced (grooved) with all joints brazed.

E. Electric Coils:

1. Helical, nickel-chrome, resistance-wire heating elements; with refractory ceramic support bushings, automatic-reset thermal cutout, built-in magnetic contactors, manual-reset thermal cutout, airflow proving device, and one-time fuses in terminal box for overcurrent protection.

F. Filter:

1. One-piece cleanable type that filters supply air. Thickness and efficiency per schedule.

2.2 OUTDOOR UNIT:

A. General:

1. Unit shall have all operating components assembled on one common base, including: compressor, condenser coil, condenser fan and motor, charging valves, all controls, and a holding charge of refrigerant. Units shall be designed for outdoor installation with all exterior surfaces factory painted with primer and enamel for weather protection. Drain holes shall be provided for elimination of rain. Provide removable panels for access to components.

B. Compressor:

1. The scroll compressor shall be 2-speed, hermetically sealed, with internal and external vibration isolation.

C. Condenser Coil:

1. Condenser coil shall be of the continuous aluminum plate fin and copper tube type and shall be circuited for integral sub-cooler. The coil shall be tested with refrigerant and sealed with a holding charge of refrigerant.

D. Refrigerant Components:

1. Refrigeration circuit components shall include liquid line service valve, suction line service valve, and full charge of compressor oil.

E. Controls and Safeties:

1. Controls shall consist of low-voltage thermostat to control compressor and evaporator fan, with OFF/FAN/HEAT/COOL selector, adjustable thermostat with upper and lower limits, VENT OPEN/CLOSE and FAN CYCLE switches. Thermostat to be 7-day programmable with LCD display; wifi connectivity for access from smartphone, tablet, or computer.

2. Safeties shall consist of automatic reset overtemperature and overcurrent protection for compressor; inherent, automatic reset overtemperature protection for fan motor; 2 overtemperature protectors for heater.

F. Electrical Requirements:

1. Per equipment schedule on drawings. Unit shall be prewired with one plug to use with appropriate wall receptacle as specified on unit nameplate.

## PART 3 -– EXECUTION

### 3.1 INSTALLATION

A. Entire installation shall be in accordance with the Drawings, Specifications and applicable requirements of the manufacturers of the equipment and shall perform satisfactorily at the completion of the work.

### 3.2 NOISE AND VIBRATION

A. Equipment shall operate quietly and the design of the base shall be such that the operation of the equipment shall cause no perceptible vibration in the structure adjacent to the equipment, nor cause, directly or indirectly, vibration or objectionable noise in any other portion of the building and/or in the building structure itself.

### 3.3 SUPPORTS

A. Furnish all supports for equipment covered in this Specification, as a part of this Section, unless otherwise indicated on the Drawings.

### 3.4 PAINTING

A. Equipment with a factory applied finish shall have scratches, chips, etc., primed and touched up with materials which will protect the surface and match the adjacent areas.

### 3.5 CLEANING AND ADJUSTMENTS

A. Upon completion of work, clean, oil, and grease all fans, motors, other running equipment, and apparatus and make certain that all such apparatus and mechanisms are in proper working order.

END SECTION 23 81 26

# SECTION 23 8127 - SPLIT-SYSTEM COOLING ONLY VRF

## PART 1 - GENERAL

### 1.1 SUMMARY

A. Section includes complete single-zone, cooling-only HVAC system(s) which may include, but not limited to, the following components:

1. Outdoor, air-source cooling-only units.
2. Indoor, exposed, wall-mounted units.
3. HVAC system controllers.
4. HVAC system refrigerant piping.

### 1.2 QUALITY ASSURANCE

A. Manufacturer Qualifications:

1. Nationally recognized manufacturer of HVAC systems and products having shipped HVAC systems with similar requirements to U.S. market for a continuous period of five years within time of bid.
2. Having complete published online catalog literature, installation, and operation and maintenance manuals for all products intended for use. Resources must be publicly available without login or sign-in as registered account.

B. ISO Compliance: System equipment and components furnished by HVAC system manufacturer shall be manufactured in an ISO 9001 and ISO 14001 facility.

### 1.3 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store products in a clean and dry place. Protect products from weather, dirt, dust, water, construction debris, and physical damage.

1. Retain factory-applied coverings on equipment to protect finishes during construction and remove just prior to operating unit.

B. Cover unit openings before installation to prevent dirt and dust from entering inside of units. If required to remover coverings during unit installation, reapply coverings over openings after unit installation and remove just prior to operating unit.

C. Comply with manufacturer's written rigging and installation instructions for unloading and moving to final installed location.

### 1.4 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to repair or replace equipment and components that fail(s) in materials or workmanship within specified warranty period.

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

a. Structural failures.
b. Faulty operation.
c. Deterioration of metals, metal finishes, and other materials beyond normal

weathering and use.

2. Warranty Period:

   a. For Compressor, five years from date of Substantial Completion.
   b. For Parts, five years from date of Substantial Completion.

B. Installer's Labor Warranty: Installer agrees to repair or replace equipment and components that fail(s) in materials or workmanship within specified warranty period.

   1. Warranty Period: One year from date of substantial completion.

## PART 2 - PRODUCTS

### 2.1 SINGLE-ZONE, COOLING-ONLY HVAC SYSTEMS

A. Manufacturers: Basis of design product series is SMART MULTI. Subject to compliance with requirements, provide products by one of the following brands only:

   1. Mitsubishi
   2. Daikin
   3. Toshiba
   4. LG
   5. Any other manufacturer with equivalent equipment, upon acceptance

### 2.2 SYSTEM DESCRIPTION

A. Single-zone HVAC system(s) with variable capacity in response to varying cooling loads. System shall consist of outdoor unit, indoor unit, piping, controls, and electrical power to make complete operating system(s) complying with requirements indicated.

B. 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.

C. AHRI Compliance: System and equipment performance certified according to AHRI 210/240-2024 and AHRI 1380.

D. UL Compliance: Comply with UL 60335-2-40.

### 2.3 OUTDOOR, AIR-SOURCE COOLING-ONLY UNITS

A. Description: Factory-assembled and tested complete unit module designed for use in systems with all cooling demands.

B. Cabinet:

   1. Galvanized steel and coated with a corrosion-resistant finish.

      a. Coating with documented salt spray test performance of 2000 hours according to ASTM B117 surface scratch test (SST) procedure.

   2. Internal Access: Removable panels or hinged doors of adequate size for field access to internal components for inspection, cleaning, service, and replacement.

C. Compressor and Motor Assembly:

1. Positive-displacement, direct-drive and hermetically sealed rotary or scroll compressor with inverter drive. Non-inverter compressors—where LRA applies—are not allowed.
2. Protection: Integral protection against the following-

    a. High and low refrigerant pressure.
    b. High refrigerant and oil temperature.
    c. Thermal and overload.
    d. Voltage fluctuations.
    e. Short cycling.

3. Vibration Control: Integral isolation to dampen vibration transmission.
4. Crankcase heater.
5. Accumulator.
6. Fusible plug.

D. Heat-Exchanger Assembly: Documented salt spray test performance of 2000 hours according to ASTM B117 surface test (SST) procedure.

1. Plate Fin Coils:

    a. Casing: Aluminum, galvanized, or stainless steel.
    b. Fins: Aluminum or copper, mechanically bonded to tubes, with arrangement required by performance.
    c. Tubes: Copper, of diameter and thickness required by performance.

E. Heat-Exchanger Fan and Motor Assembly:

1. Fan(s): Propeller type.

    a. Horizontal discharge.
    b. Direct-drive arrangement.
    c. Fabricated from non-ferrous components.
    d. Statically and dynamically balanced.

2. Fan Guards: Removable safety guards complying with OSHA regulations. If using metal materials, coat with corrosion-resistant coating to match performance indicated for heat exchanger.
3. Motor(s): Brushless DC or electronically commutated with permanently lubricated bearings and rated for outdoor duty.
4. Motor Protection: Integral protection against thermal, overload, and voltage fluctuations.

F. DX Capacity Control: Electronic modulating type expansion valve with linear or proportional characteristics.

G. Unit Controls:

1. Factory-Installed Sensors:

    a. Refrigerant suction temperature.
    b. Refrigerant discharge temperature.
    c. Compressor surface temperature.
    d. Refrigerant high pressure.
    e. Outdoor air temperature.

f. Outdoor coil heat sink temperature.
g. Outdoor coil two-phase pipe temperature.

H. Refrigerant:

1. R-454b, or equivalent.
2. Precharged refrigerant supplied within unit for up to 100 feet line length.

I. Refrigerant Piping Allowances: System shall operate up to maximum limits without need for line size changes, traps or additional oil.

J. Unit Electrical:

1. Field Connection: Single point connection to power each outdoor unit and integral controls.
2. Disconnecting Means: Field-installed circuit breaker or switch, complying with NFPA 70.

2.4 INDOOR, EXPOSED, WALL-MOUNTED UNITS

A. Description: Factory-assembled and tested complete unit with components, piping, wiring, and controls required for mating to piping, power, and controls field connections.

B. Cabinet:

1. Material: Painted steel, or coated steel frame covered by a plastic cabinet, with an architectural acceptable finish suitable for tenant occupancy on exposed surfaces.
2. Insulation: Closed-cell internal insulation to provide thermal resistance and prevent condensation.
3. Internal Access: Removable panels of adequate size for field access to internal components for inspection, cleaning, service, and replacement.

Coil Assembly:

4. Coil Casing: Aluminum, galvanized, or stainless steel.
5. Coil Fins: Aluminum, mechanically bonded to tubes, with arrangement required by performance.
6. Coil Tubes: Copper, of diameter and thickness required by performance.
7. Unit Internal Tubing: Copper tubing with brazed joints.
8. Unit Internal Tubing Insulation: Closed-cell, of thickness to prevent condensation.
9. Factory Charge: Dehydrated air or nitrogen.
10. Testing: Factory pressure tested and verified to be without leaks.

C. Drain Assembly:

1. Pan: Non-ferrous material, with bottom sloped to low point drain connection.
2. Condensate Removal: Gravity or pump, see schedule.
3. Field Piping Connection: Non-ferrous material.

D. Fan and Motor Assembly:

1. Fan(s):

a. Direct-drive arrangement.
b. Single or multiple fans connected to a common motor shaft and driven by a single motor.

c. Fabricated from non-ferrous components or ferrous components with corrosion protection finish.
d. Wheels statically and dynamically balanced.

2. Motor: Brushless DC or electronically commutated with permanently lubricated bearings.
3. Motor Protection: Integral protection against thermal, overload, and voltage fluctuations.
4. Speed Settings and Control: Multiple or variable speed with speed setting adjustable via central or wall controllers when present.
5. Vibration Control: Integral isolation to dampen vibration transmission.

E. Filter Assembly:

1. Access: Front, to accommodate filter replacement without the need for tools.
2. Media: Manufacturer's standard washable filter with antimicrobial treatment.

F. Grille Assembly: Manufacturer's standard discharge grille within front face of unit cabinet.

1. Motorized Vane: Adjustable or oscillating flow pattern.

G. Unit Controls:

1. Factory-Installed Sensors:

a. Unit inlet air temperature.
b. Coil entering refrigerant temperature.

2. Interlock control sequence: Dry (volt-free contacts) contacts shall be provided to achieve interlock function; relay adapter kits may be required. Required interlock sequence(s) include-

a. Shutdown on high condensate

H. Unit Electrical:

1. Field Connection: Single point connection from outdoor unit provides power for indoor unit and signal for integral controls.

a. 3-wire plus ground 14 AWG copper wire for wire length unit up to 148 feet. Consult manufacturer installation manuals for wire sizes for longer lengths.

2. Disconnecting Means: Field-installed 3-pole switch, complying with NFPA 70.

2.5 HVAC SYSTEM CONTROLLERS

A. Wired Controllers for Indoor Units

1. Simple Controllers for Indoor Units:

a. Single controller capable of controlling multiple indoor units as group.
b. Integral room temperature sensor
c. Temperature Units: Fahrenheit and Celsius.
d. On/Off: Turns indoor unit on or off.
e. Operation Mode: Cool, Heat, Auto, Dehumidification, Fan Only.
f. Temperature Display and Set-Point: Separate set points for Cooling, Heating.

Adjustable in 1-degree Fahrenheit increments between.
g. Fan Speed Setting: Select between available options furnished with unit.
h. Airflow Direction Setting: If applicable to indoor unit style, select between available options furnished with the unit.
i. Service Notification Display: "Filter".
j. Error Code Notification Display: Used by service personnel to troubleshoot abnormal operation and equipment failure.
k. Low-voltage power required for controller shall be powered through non-polar connections to indoor unit.

B. Wireless Controllers for Indoor Units:

1. Wireless Wall-Mounted Controllers for Indoor Units:

a. Wall-mounted controller with integral room temperature sensor and receiver providing connection to indoor unit.
b. Temperature sensing shall be integral sensor within controller
c. Temperature Units: Fahrenheit and Celsius.
d. On/Off: Turns indoor unit on or off.
e. Hold: Hold operation settings until hold is released.
f. Operation Mode: Cool, Heat, Auto, Dehumidification, Fan Only, and Setback.
g. Temperature Display and Set-Point: Separate set points for Cooling, Heating. Adjustable in 1-degree Fahrenheit increments between.
h. Fan Speed Setting: Select between available options furnished with unit.
i. Airflow Direction Setting: If applicable to indoor unit style, select between available options furnished with the unit.
j. Seven-day programmable operating schedule with up to five events per day. Operations shall include On/Off, Operation Mode, and Temperature Set-Point.
k. Service Notification Display: "Filter".
l. User and Service Passwords: Capable of preventing adjustments by unauthorized users.
m. Setting stored in nonvolatile memory to ensure that settings are not lost if power is lost.
n. Two AA alkaline batteries (supplied with controller) required for controller power.
o. Receiver connects to indoor unit control board with 1 m cable.
p. Limits central control (when present) to monitor-only functionality.

2.6 HVAC SYSTEM REFRIGERANT PIPING

A. Refrigerant Piping:

1. Copper Tube: ASTM B280, Type ACR.
2. Wrought-Copper Fittings: ASME B16.22.
3. Brazing Filler Metals: AWS A5.8/A5.8M.

B. Refrigerant Tubing Kits:

1. Factory-rolled and -bundled, soft-copper tubing with tubing termination fittings at each end.
2. Standard one-piece length for connecting to indoor units.
3. Pre-insulated with flexible elastomeric insulation of thickness to comply with governing energy code and sufficient to eliminate condensation.
4. Factory Charge: dehydrated air or nitrogen.

PART 3 - EXECUTION

3.1 EQUIPMENT INSTALLATION, GENERAL

A. Clearance:

1. Maintain manufacturer's recommended clearances for service and maintenance.
2. Maintain clearances required by governing code.

3.2 INSTALLATION OF INDOOR UNITS

A. Install units to be level and plumb while providing a neat and finished appearance.

B. Unless otherwise required by HVAC system manufacturer, support ceiling-mounted units from structure above using threaded rods.

C. Adjust supports of exposed and recessed units to draw units tight to adjoining surfaces.

D. Protect finished surfaces of ceilings, floors, and walls that come in direct contact with units. Refinish or replaced damaged areas after units are installed.

E. In rooms with ceilings, conceal piping and tubing, controls, and electrical power serving units above ceilings.

F. In rooms without ceiling, arrange piping and tubing, controls, and electrical power serving units to provide a neat and finished appearance.

G. Provide lateral bracing if needed to limit movement of suspended units to not more than

3.3 INSTALLATION OF OUTDOOR UNITS

A. Install units to be level and plumb while providing a neat and finished appearance.

B. Attachment to pad, bracket, or equipment supports: Install anchor bolts to elevations required for proper attachment to supported equipment.

3.4 GENERAL REQUIREMENTS FOR PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping and tubing systems. Install piping and tubing as indicated unless deviations to layout are approved on coordination drawings.

B. Install piping and tubing in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

C. Install piping and tubing at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

D. Install piping and tubing above accessible ceilings to allow sufficient space for ceiling panel removal.

E. Install piping and tubing to permit valve servicing.

F. Install piping and tubing free of sags.

G. Install piping and tubing to allow application of insulation.

H. Install groups of pipes and tubing parallel to each other, spaced to permit applying insulation with service access between insulated piping and tubing.

I. Install sleeves for piping and tubing penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 230500 "Common Work Results for HVAC."

J. Install escutcheons for piping and tubing penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 230500 "Common Work Results for HVAC."

3.5 INSTALLATION OF SYSTEM CONDENSATE DRAIN PIPING

A. General Requirements for Drain Piping and Tubing:

1. Install a union in piping at each threaded unit connection.
2. Install an adjustable stainless steel hose clamp with adjustable gear operator on unit hose connections. Tighten clamp to provide a leak-free installation.
3. If required for unit installation, provide a trap assembly in drain piping to prevent air circulated through unit from passing through drain piping. Comply with more stringent of the following:

    a. Details indicated on Drawings.
    b. Manufacturer's requirements.
    c. Governing codes.
    d. In the absence of requirements, comply with requirements of ASHRAE handbooks.

4. Extend drain piping from units with drain connections to drain receptors as indicated on Drawings. If not indicated on Drawings, terminate drain connection at nearest accessible location that is not exposed to view by occupants.
5. Provide each 90-degree change in direction with a Y- or T-fitting. Install a threaded plug connection in the dormant side of fitting or future use as a service cleanout.

B. Gravity Drains:

1. Slope piping from unit connection toward drain termination at a constant slope of not less than one percent.

C. Pumped Drains:

1. If unit condensate pump or lift mechanism is not included with an integral check valve, install a full-size check valve in each branch pipe near unit connection to prevent backflow into unit.

3.6 INSTALLATION OF REFRIGERANT PIPING

A. Refrigerant Tubing Kits:

1. Unroll and straighten tubing to suit installation. Deviations in straightness of exposed tubing shall be unnoticeable to observer.
2. Support tubing as specified by manufacturer
3. Prepare tubing ends and make mating connections to provide a pressure tight and leak-free installation.

B. Install piping as short and direct as possible, with a minimum number of joints and fittings.

C. Install refrigerant piping and tubing in protective conduit where installed below ground.

D. Unless otherwise required by HVAC system manufacturer, slope refrigerant piping and tubing as follows:

1. Install horizontal hot-gas discharge piping and tubing with a uniform slope downward away from compressor.
2. Install horizontal suction lines with a uniform slope downward to compressor.
3. Traps to entrain oil in vertical runs are not allowed.
4. Liquid lines may be installed level.

E. When brazing, remove or protect components that could be damaged by heat. Braze pipes with a dry nitrogen purge to avoid oxidation.

F. Before installation, clean piping, tubing, and fittings to cleanliness level required by HVAC system manufacturer.

G. Joint Construction:

1. Brazed Joints

a. Ream ends of tubes and remove burrs.
b. Remove scale, slag, dirt, and debris from inside and outside of tube and fittings before assembly.
c. Construct joints in accordance with AWS's "Brazing Handbook," "Pipe and Tube" Chapter.

2. Mechanically Pressed Joints

a. The installing contractor shall be fully trained and qualified by the manufacturer of the mechanically pressed joints to install the selected piping connections.
b. Mechanical joints shall be installed in accordance with the manufacturer’s instructions.

3. Flared Joints

a. Flared fittings shall be installed in accordance with the manufacturer’s instructions. The fitting shall be used with the tube material specified by the fitting manufacturer. The flared tube end shall be made by a tool designed for that operation and refrigerant classification.

4. Soldered Joints

a. Use of soldered joints is prohibited within systems.

H. Elbows: Only long-radius 90 degree elbows are allowed. Up to 15 are allowed per system; sweeping bends with 24 inch or greater radius do not count as elbow.

3.7 INSTALLATION OF PIPING AND TUBING INSULATION

A. Seal longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated. Installation to maintain a continuous vapor barrier.

B. Insulation Installation on Pipe Fittings and Elbows:

1. Install mitered sections of pipe insulation.
2. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

C. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed valve covers manufactured of same material as pipe insulation when available.
2. When preformed valve covers are unavailable, install cut sections of pipe and sheet insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Secure insulation to valves and specialties and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

D. Where PVC jackets are indicated, install with 1-inch overlap at longitudinal seams and end joints, for horizontal applications. Seal with manufacturer's recommended adhesive.

1. Apply two continuous beads of adhesive to seams and joints, one bead under lap and the finish bead along seam and joint edge.

E. Where metal jackets are indicated, install with 2-inch overlap at longitudinal seams and end joints. Overlap longitudinal seams arranged to shed water. Seal end joints with weatherproof sealant recommended by insulation manufacturer. Secure jacket with stainless steel bands 12 inches o.c. and at end joints.

3.8 IDENTIFICATION

A. Identify system equipment, piping, tubing, and valves.

3.9 STARTUP SERVICE

A. Installer shall complete system startup service according to manufacturer's written instructions.

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

1. Check control communications of equipment and each operating component in system(s).
2. Check each outdoor unit’s power supply is connected.
3. Check each indoor unit's response to demand for cooling and changes to airflow settings.
4. Check each indoor unit and outdoor unit for proper condensate removal.

3.10 ADJUSTING

A. Adjust equipment and components to function smoothly and lubricate as recommended by manufacturer.

B. Adjust initial temperature set points. Adjust initial airflow settings and discharge airflow patterns in accordance with Drawings or manufacturer specifications.

END OF SECTION 23 81 27

# SECTION 26 00 00 – ELECTRICAL GENERAL REQUIREMENTS

## PART 1 - GENERAL

### 1.1 APPLICATION

A. The work described hereunder shall be installed subject to the Contractual Conditions for the entire Specifications.

B. These provisions apply to all sections of Division 26 of this project except as specified otherwise in each individual section. Codes, standards, policies and requirements contained in this Section are applicable to all contract documentation.

### 1.2 CORRELATION

A. This Section of the Specifications and its accompanying Drawings are made separate for the convenience of the Contractor in preparing his bid and in no way relieves the Contractor of his responsibility to correlate the work under this Section with that of all other trades as regards the items to be furnished by various Subcontractors, the exact location of all equipment and materials and the necessity of planning the work of all trades to avoid interference.

### 1.3 DESCRIPTION OF WORK

A. Furnish all labor, materials, equipment and incidentals required to complete all electrical work as specified in this Division and as shown on the Contract Drawings. Division 26 work shall include the installation of a complete and properly operating electrical system.

B. Refer to other Divisions of this specification for electrical requirements of factory installed motors, controllers, power supplies, etc. Electrical connections to equipment furnished as specified in other sections of these Specifications or shown on other than the Electrical Drawings shall be governed by this Division of the Specifications.

C. The bidder shall inspect the present jobsite conditions before preparing his bid. The submission of a bid will be considered evidence that such a visit and inspection was performed by the bidder and that he takes full responsibility for all factors governing his work.

D. The electrical work shall be complete, fully operational, and suitable in every way for the service required. Drawings are generally diagrammatic in nature and do not show all details, devices and incidental materials necessary to accomplish their intent. Therefore, it shall be understood that such devices and incidental materials required shall be furnished at no cost to the Owner.

### 1.4 RELATED WORK

1. Drawings and general provisions of Contract, including General Conditions, Supplementary General Conditions, and Special Conditions sections apply to work specified in Division 26.

2. The Contractor shall be aware that other divisions of these Specifications may apply to related work required to perform Division 26 requirements. All related work shall be performed in accordance with those divisions.

### 1.5 CONFORMANCE

A. If the Contractor takes no exceptions to these Specifications in the Submitted Bid, the Contractor will be held totally responsible for failure to comply.

B. Any exception to the Specification shall reference the affected paragraph(s), subject(s), and list benefit to the Owner.

C. The Owner reserves the right to have the Contractor replace installed material or equipment which does not comply with these Specifications at the Contractor's expense.

1.6 SUBMITTALS

A. Obtain approval before procurement, fabrication, or delivery of items to the job site. Submit manufacturers' data on the equipment listed below and as directed in other Sections of Division 26. Follow the procedures required in Division 1 of this specification. Data shall be in the form of manufacturer's descriptive data sheets and engineering drawings and will be reviewed by the Engineer before materials and equipment are delivered to the work site. Review of the submittal by the Engineer is to check for general conformance to the design intent and will not relieve the Contractor of the responsibility for the correctness of all dimensions, conformance and the proper fitting of all parts of the work.

1. Panelboards and Circuit Breakers
2. Surge Protection Devices
3. Generator
4. Docking Station
5. Automatic Transfer Switch
6. Disconnect Switches
7. Receptacles
8. Lighting Fixtures
9. Lighting Controls and Installation Drawings*
10. Fire Alarm System and Devices and Installation Drawings*

* prepared by Manufacturer or System Supplier

B. Submit manufacturers' names and catalog numbers for the following materials:

1. Conduit, Fittings, and Couplings
2. Boxes and Fittings
3. 600 Volt Wire and Cables
4. Grounding Equipment

C. The Contractor shall thoroughly check the submittal for accuracy and compliance with the contract requirements. Shop drawings and data sheets shall bear the date checked and shall be accompanied by the Contractor's statement that they have been checked for conformity to the Specifications and Drawings. Submittals not so checked and noted will be returned without review.

D. Deliver the entire electrical submittal to the Engineer complete and in one package. An incomplete submittal will be returned to the Contractor without review.

1.7 EQUIPMENT SUBSTITUTIONS

A. Substitutions that do not increase installation value will not be accepted.

B. Contractor proposed substitutions may result in necessary changes to the construction documents. Coordination effort due to Contractor proposed substitutions shall be the complete responsibility of the Contractor. All potential conflicts are to be addressed. The Contractor shall also be responsible for any work of any other trades made necessary by the substitution. All potential conflicts with other trades are to be addressed.

C. The Engineer's review of the proposed substitutions and coordination documents is for the benefit of the Owner and not the Contractor and does not relieve the Contractor of responsibility for making any corrections necessary to ensure the Owner receives full benefit of the original design intent.

D. Detailed coordination documents shall be provided for any equipment that, in the opinion of the Engineer, materially differs from the design documents. This difference includes but is not limited to any equipment having:

1. access requirements that differ from the design / specification
2. operating characteristics that differ from the design / specification
3. footprints or elevations that differ from the design / specification
4. connection requirements or locations that differ from the design / specification
5. venting or combustion air requirements that differ from the design / specification
6. electrical characteristics that differ from the design / specification
7. control requirements that differ from the design / specification
8. hydronic characteristics that differ from the design / specification
9. plumbing requirements that differ from the design / specification

E. Documentation shall include a detailed listing of all differences from the design / specification. Also included will be a detailed explanation as to why these differences should be considered equal or an improvement.

F. Any physical differences shall be coordinated with drawings. All Coordination Drawings shall be produced by a competent drafts person and shall be equivalent in quality, detail, and scope to the Construction Drawings.

G. Acceptance of the substitution as an equal will be the sole discretion of the Engineer. Items of necessary coordination or review omitted from the documentation shall be grounds for rejection of the substitution.

H. No cost increase to the Owner for any changes due to coordination will be considered. The Engineer shall be compensated for any and all efforts associated with review and coordination of non-conforming equipment

1.8 CODES, INSPECTIONS, AND FEES

A. Comply with the indicated edition of the following codes and ordinances. Where specific edition is not indicated, comply with the latest published edition.

1. American National Standards Institute - ANSI
2. C2 – The National Electrical Safety Code
3. ANSI/IEEE C37.90.1 Surge Withstand Capability (Swc) Tests For Relays And Relay Systems Associated With Electric Power Apparatus

4. C62.41 - Transient Voltage Surge Suppressors
5. American Society for Testing and Materials - ASTM
6. National Fire Protection Association - NFPA
    a. NFPA 70; The National Electrical Code
    b. NFPA 72; The National Fire Alarm Code
    c. NFPA 90A; Standard for the Installation of Air Conditioning and Ventilating Systems
    d. NFPA 101; The Life Safety Code
7. Florida Building Code
    a. FBC-B 2023; The Florida Building Code 8th Edition
    b. FPC 2023; The Florida Fire Prevention Code 8th Edition
    c. FBC-M 2023; The Florida Mechanical Code 8th Edition
    d. FBC-P 2023; The Florida Plumbing Code 8th Edition
    e. FBC-A 2023; The Florida Accessibility Code 8th Edition
8. Electronic Industries Association/Telecommunications Industries Association - EIA/TIA
    a. 568C - Commercial Buildings Telecommunications Cabling Standards
    b. 569 - Commercial Buildings Standard for Telecommunications Pathways and Spaces
    c. 606 - Administrative Standard for Telecommunications Infrastructure of Commercial Buildings
    d. 607B - Commercial Building Grounding and Bonding Requirements for Telecommunications
9. Federal Communications Commission - FCC
10. Insulated Cable Engineers Association - ICEA
11. Institute of Electrical and Electronic Engineers – IEEE (latest edition)
    a. 383 Vertical Flame Test
    b. 587 Transient Voltage Surge Suppressors
    c. 802 Specifications for Local Area Networks
    d. 1547 Interconnecting Distributed Resources with Electric Power Systems
    e. 1547.1 Standard Conformance Test Procedures for Equipment Interconnecting Distributed Resources with Electric Power Systems
12. National Electrical Manufacturers Association
    a. NEMA ICS 1 – Industrial Control and Systems General Requirements
    b. NEMA ICS 2 – Industrial Control and Systems Controllers, Contactors and Overload Relays Rated 600 Volts
    c. NEMA AB3 - “Molded Case Circuit Breakers”.

13. Serving Utility Company Policies
14. City of Tallahassee Municipal Codes and Requirements
15. Underwriters Laboratories - UL
    a. 444 Communications Cable
    b. 467 Electrical Grounding and Bonding Equipment
    c. 506 Enclosures 514A Outlet Boxes and Fittings
    d. 514C Non-metallic Outlet Boxes and Fittings
    e. 1449 Transient Voltage Surge Suppressors
    f. 1863 Communications Devices

B. Obtain all permits required. Contractor shall pay all fees for permits and inspections.

1.9 COMPLIANCE AND REVIEW

A. Within two weeks of the awarding of the contract, and before any work is commenced, the Contractor shall meet with all legal authorities having jurisdiction, review all materials and details of this project, and agree on any required revisions. A letter shall be forwarded to the Engineer listing the names, dates and place of such review and the revisions required. A copy of the letter shall also be sent to the reviewing authority.

B. The Contractor shall also meet with each serving utility and repeat the above procedure. A letter certifying each meeting shall also be written with the information as described above.

1.10 TEMPORARY LIGHTING AND POWER

A. Provide temporary lighting and power during construction. The Contractor may utilize existing building distribution power for temporary and construction power. Temporary power shall be 120/208 volt, single phase.

B. Temporary wiring shall be done in a safe and neat manner. See Article 590 of the NEC.

C. Provide a minimum of one (1) 100 watt incandescent lamp for every 300 square feet of interior space being constructed.

D. Provide 30 amp, 120/240 volt single phase power points throughout the construction area such that a power point will be within fifty feet of where any saws, drills, or other electrical tool is being used. Each power point shall have a disconnecting safety switch.

E. Provide 20 amp receptacles with ground fault interrupting circuitry. Outdoor or otherwise exposed receptacles shall have weatherproof covers. Provide any necessary special outlets required.

F. Size temporary power conductors so that voltage drop is kept below 5% at maximum designed load at the delivery point.

1.11 RECORD DOCUMENTS

A. Prepare record documents in accordance with Division 1 requirements. Record documents shall be complete and accurate and clearly show deviations to the Contract Drawings. Additionally, indicate major raceway sizes and routings, locations of all control devices, all equipment and locations to scale, and fuse and circuit breaker ratings and arrangements.

B. Record documents shall reflect the complete contract record, including all changes, supplements and addenda as issued. All drawings, sketches and notations describing the work and as issued by the Engineer shall be incorporated.

C. Prepare bound sets of equipment Operation and Maintenance Instructions. These instructions shall include the name and location of the system, the name and telephone number of the Contractor, and all subcontractors installing the system or equipment, and the name and telephone number of each local manufacturer's representative for the system or equipment. Routine maintenance actions shall be clearly identified and include a listing of approved disposable materials necessary.

D. Furnish bound copies of all test results required in other sections of this division.

1.12 GUARANTEES

A. Equipment: one (1) year from final acceptance by the Owner. Materials and labor: one (1) year from final acceptance by the Owner.

B. All equipment shall be warranted to be free from defects in workmanship, design and materials. If any part of the equipment should fail during the warranty period, it shall be replaced and the unit(s) restored to service at no expense to the Owner.

C. In addition to the guarantee of equipment by the manufacturer the Contractor shall also guarantee such equipment for a period of one (1) year from final acceptance by the Owner. The Contractor's one (1) year guarantee shall be for equipment, materials, and labor.

D. The manufacturer's warranty period shall run concurrently with the Contractor's warranty period. No exception to this provision will be allowed.

E. Additional guarantee requirements specific to certain parts or assemblies or installations may be in the General and Special Conditions, or other Sections of these Specifications.

PART 2 - PRODUCTS

2.1 EQUIPMENT AND MATERIALS

A. Furnish materials or equipment specified by manufacturers named.

B. Materials furnished shall be new, undamaged and packed in the original manufacturer's packing.

C. All equipment and apparatus shall bear the seal of approval of the Underwriter's Laboratory where testing and listing performance criteria has been established for like items.

D. Protect equipment and materials from mechanical and water damage during construction. Suitable storage facilities shall be provided. Equipment shall not be stored out-of-doors except as follows:

1. Concrete items, plastic conduit if protected from sunlight, rigid metal conduit if protected from water and debris, pad-mounted equipment for outdoor installation if maintained in a normal weathertight condition, ground rods, and large spools of cables with ends properly sealed. In no case will materials be stored directly on the ground. Provide suitable timbers or billets on which items will be stored out of direct contact with the earth.

E. All items to be installed shall be free of rust and dirt. Damaged materials and equipment shall be replaced by the Contractor at no cost to the Owner.

F. All electrical panels, enclosures, raceways, conduit, and boxes shall be fabricated of metal unless indicated otherwise.

2.2 EQUIPMENT AND MATERIALS STANDARDS

A. Design and fabrication of electrical equipment and materials:

1. The American National Standards Institute (ANSI)
2. The American Society of Mechanical Engineers (ASME)
3. The American Society for Testing and Materials (ASTM)
4. The Institute of Electrical and Electronic Engineers (IEEE)
5. The National Electrical Manufacturers Association (NEMA)
6. The Occupational Safety and Health Administration (OSHA)
7. The Underwriters Laboratories (UL)
8. The National Fire Protection Association (NFPA)

B. Comply with the latest edition and revisions of these codes and standards.

2.3 EQUIPMENT RATINGS

A. Horsepower and wattages of equipment shown on the Drawings are estimated and comply with a certain basis of design. It is the Contractor's responsibility to coordinate with, and furnish proper connections to equipment substituted and accepted as equivalent to the basis of design.

B. Conduit, wire, disconnects, fuses, and circuit breakers shall be sized to suit the horsepower and wattage of equipment actually furnished. However, conduit, boxes, wire or disconnects shall not be sized smaller than shown on the Drawings.

PART 3 - EXECUTION

3.1 QUALITY ASSURANCE

A. Installer's Qualifications: At least three years of successful installation experience on projects with electrical work similar to that required for this project.

B. Manufacturer's Qualifications: Manufacturers regularly engaged in the manufacture of electrical components and equipment of the types and sizes required, whose products have been in satisfactory use in similar service for not less than five years.

C. Electrical work shall be performed by experienced persons skilled in the trade.

D. Work shall be supervised by a licensed journeyman or master electrician who shall be on the job site at all times while work is in progress.

E. Work shall be done neatly and in keeping with good practice and conventions of the trade. The electrical installation shall be of high quality, and of the performance level associated with top level commercial electrical installations as determined by the Engineer and the National Electrical Code.

3.2 IDENTIFICATION

A. Provide laminated plastic nameplates for each panelboard, automatic transfer switch, safety disconnect, equipment enclosure and all other major pieces of equipment installed or modified as part of this contract.

B. Furnish all starters, disconnect switches and control panels with engraved name plates identifying the equipment served. Attach nameplates to equipment, aligned with structural features of equipment, with two pressure pins or #4 stainless steel screws, nuts, and lockwashers.

C. Identification of flush mounted panelboards and other cabinets shall be on the inside of the cabinet only.

D. Panelboards shall have typewritten directories with all loads thoroughly described for each circuit. Update existing panelboards and their directories to reflect new work.

3.3 CLEANING AND PAINTING

A. Clean all equipment and boxes thoroughly inside and outside at the completion of installation. Do not leave dirt and debris inside panelboard and equipment cabinets, device and junction boxes, etc.

B. All painting shall be done according to the Finishes Section of these specifications.

C. Paint all exposed conduit and wiremold installed on painted surfaces to match surrounding surface. Paint exposed threads on conduits and touch up all scratches in galvanized pipe and fittings with a high quality cold galvanizing compound.

D. Touchup scratched or marred surfaces of lighting fixtures, panelboards, motor control centers, switchboards, etc. with paint furnished by the equipment manufacturer specifically for the purpose.

E. Telecom backboards shall be of fire retardant plywood, painted with two coats of fire-resistive finish.

3.4 EXCAVATION, TRENCHING, AND BACKFILLING

A. Perform all excavation and trenching to install raceways indicated on the drawings.

B. No tunneling shall be allowed unless written permission is received by the Engineer.

C. Excavated material not suitable for backfill shall be removed from the job site.

D. Ensure that the bottom of trenches are uniform, without large rocks or lumps of dirt which could damage the raceway or conductors.

E. Backfill with material that will compact readily. Compact backfill material from bottom of excavation up, to within 2” of surrounding undisturbed material.

F. Cover shall not be less than surrounding grade and no greater than 2" above surrounding grade.

G. All trenching in and around rooted areas shall be by hand. Contractor shall take all steps necessary to protect existing root growth from damage by trenching or digging. Trenching in proximity to trees and other growth shall be directed radially away from the main trunk so as not to cut across major roots.

H. All trenching routing shall be coordinated with and approved by the Engineer before digging. Contractor shall contact the Engineer twenty four hours before work is scheduled to begin.

Conduit routing shall be clearly laid out with paint or staking before inspection takes place. The Engineer reserves the right to specify final routing before digging begins, or at any point during the operation.

3.5 TESTS

A. Contractor shall test all wiring for shorts and all equipment for proper grounding before energizing. Equipment shall be thoroughly checked and adjusted for proper operation. Check motors for proper rotation before energizing and adjust if necessary.

END OF SECTION 26 00 00

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# SECTION 26 05 00 – BASIC ELECTRICAL MATERIALS AND METHODS

## PART 1 -– GENERAL

### 1.1 SCOPE OF WORK

A. Furnish all labor, materials and equipment and incidentals required to construct and install the complete electrical systems as indicated on the Drawings and as specified in this Section.

### 1.2 STANDARD OF MATERIALS

A. All materials, equipment and apparatus covered by this specification shall be new, of current manufacture and shall bear the seal of approval of the Underwriters' Laboratories.

B. All equipment and materials shall have ratings established by a recognized independent agency or laboratory. The Contractor shall apply the items used on this project within the ratings and subject to any stipulations or exceptions established by the independent agency or laboratory.

C. All conduits and raceways, wire, devices, panelboards, switches, etc. of a given type shall be the product of one manufacturer.

### 1.3 SUBMITTALS

A. Manufacturer's data and shop drawings for all components, fixtures, assemblies and accessories indicated in this Division. Submit in accordance with Division 1.

## PART 2 - PRODUCTS

### 2.1 HOUSEKEEPING PADS

A. Housekeeping pads shall be provided for all floor-mounted equipment such as switchgear, motor control centers, transformers, etc. Pads shall be made of concrete extending 3 to 4 inches vertically above finished floor and extending 6 inches horizontally around equipment.

### 2.2 CONDUCTORS

A. Compliance: Provide wires, cables and connectors that comply with the following standards as applicable:

1. UL Standard 83 Thermoplastic Insulated Wires and Cables
2. UL Standard 486A Wire Connectors and Soldering Lugs for Use with Copper Conductors
3. UL Standard 854 Service Entrance Cable
4. NEMA/ICEA WC-5 Thermoplastic Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy
5. NEMA/ICEA WC-8 Ethylene Propylene Rubber Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy
6. IEEE Standard 82 Test procedures for Impulse Voltage Tests on Insulated Conductors

B. Wire and cable manufactured more than twelve months before delivery to the jobsite shall not be used.

C. All conductors shall be soft-drawn copper of not less than ninety-eight percent (98%) conductivity, with NEC Type THW, THHN, or THWN for No. 4 and smaller, and Type RHW, THW, or THWN for No. 2 and larger, 600 volt insulation.

D. Jackets: Factory applied nylon or PVC external jacketed wires and cables for installation in raceways and where indicated.

E. Color coding of all ungrounded service, feeder, and branch circuits conductors shall be required according to the following convention:

1. 120/208 Volt, 3 phase: black, red, and blue

F. Ground wires shall be green and neutrals shall be white or gray or other combination per NEC. Isolated grounding conductors shall be green with yellow stripe or green with applied yellow tape to indicate isolated ground. Ground and grounded wire colors shall be used for these purposes only. Where grounded conductors of different systems are installed in the same raceway, box, auxiliary gutter, or other type of enclosure, each grounded conductor shall be individually identified by system. Additional grounded conductors shall be white with a readily distinguishable colored stripe, other than green, running along the insulation.

G. Conductors No. 12 AWG through No. 10 AWG shall be solid and No. 8 AWG and larger shall be stranded. No conductors smaller than No. 12 AWG shall be used except as otherwise noted.

H. Acceptable manufacturers: Anaconda Wire and Cable Co., General Electric Co., Okonite Co., Southwire Co., or Rome Cable Co.

2.3 RECEPTACLES

A. Receptacles shall be furnished and installed where shown on the drawings and shall conform to the following requirements:

B. Grounding type duplex receptacle: rated 20 amperes, 125 volt, 2 wire, 3 pole with grounded shunt (yoke permanently grounded to third clip), NEMA Configuration No. 5-20R, and conforming to Federal Specification W-C-596F (submit proof of compliance).

C. All receptacles listed on the drawings shall be specification grade receptacles.

D. Tamper resistant receptacles shall be in compliance with the intent of the NEC. The design of the tamper resistant receptacle shall not incorporate any switching mechanism.

E. All exterior devices shall be designed for the application and shall be installed in a waterproof enclosure with proper cover.

F. Acceptable manufacturer: Eagle, GE, Hubbell, Leviton or Pass and Seymour.

2.4 SWITCHES

A. Flush, enclosed type, specification grade, rated at 20 amperes, 120/277 volts, alternating current only, quiet operation, and shall comply with Federal Specification W-S-896F (submit proof of compliance). Switch housing shall be color coded for current rating.

B. Acceptable manufacturer: Eagle, GE, Hubbell, Leviton or Pass and Seymour.

C. Motor switches with inherent thermal overload protection shall be Square D, Type F for flush or surface mounting as required by the location of the unit. Units shall be furnished with pilot lights as indicated.

2.5 DEVICE PLATES

A. All plates for switch, receptacles and telephone outlets located on finished walls shall be UL listed with the number of gangs required for the application. Nylon or plastic plates shall match device color. All plates for outlets located on unfinished walls or on condulet type fittings shall be zinc coated sheet metal with rounded or beveled edges.

B. Weatherproof receptacle covers shall be of impact resistant plastic, gasketed, in-use type. Switch covers shall be gasketed metal.

C. Device plates shall be factory engraved where indicated on the drawings. Letters shall be black filled.

2.6 TIME CLOCK

A. The electronic time switch shall be a solid state digital type capable of distributing set points on independent daily schedules throughout a 7 day time period. The time switch shall provide for 5 weekday programming, 2 weekend day programming or all 7 day programming to simplify program entry for typical 5/2 day load control. A copy feature shall be provided for duplicating full daily schedules where the 5/2 day scheduling is not applicable. The time and set points shall be programmable to the nearest minute with a minimum ON duration of 1 minute and a maximum of 6 days, 23 hours and 59 minutes. The time switch shall have a digital LED readout and prompt LEDs for each function to further simplify program entry. Each load control shall include an ON/OFF pushbutton, an ENABLE/DISABLE switch and an LED load status indicator. The time switch shall provide an operating temperature range of 40F (40C) to 122F (50C).

B. The time switch shall provide astronomic programming and momentary or interval programming for any or all circuits independently. Astronomic control shall automatically calculate center of time zone times for both sunrise and sunset, and allow user selectable offset of actual times. Pulse output shall be programmable for any duration of 1 to 127 seconds and interval output for up to 6 days, 23 hours and 59 minutes. Interval output shall also provide for user selectable override to turn load(s) on for a limited programmed time period up to 6 days, 23 hours and 59 minutes.

C. The time switch shall provide full year control by providing automatic leap year and daylight saving time adjustment. A user selectable override shall be provided for states not observing daylight saving time. The time switch shall also provide holiday or special day control requirements by providing up to 99 holiday schedules. Each of the holiday schedules shall be programmable for a single day or any duration as required. Each holiday schedule shall provide automatic no load activity and shall be independently programmable for a unique load schedule if required.

D. A non volatile memory shall maintain all program data for the life of the time switch without the need for battery backup. The time switch shall include a factory installed lithium battery backup which shall maintain clock time and calendar data for 8 years minimum. The single coin cell backup shall be user replaceable without removing the field wiring.

E. The time switch logic control circuitry shall be isolated and shielded to prevent EMI and RFI interference, for reliable operation in electrically noisy environments. The power board circuitry shall provide protection for transients up to 6,000 volts. All control times shall be accurate to the minute and synchronized to the 50 or 60 Hz input. The time switch shall provide user selectable 12 hour AM/PM or 24 hour clock formats.

F. The time switch shall be enclosed in a lockable steel NEMA 1 enclosure. The time switch shall be powered by a user selectable 120, 208, 240 or 277 VAC 50 or 60 Hz source. Switch configuration to be SPDT for each circuit with a UL 916 Energy Management Equipment listed rating of:

1. Normally Open Contacts C
    a. 20 amp resistive/general purpose, 120/277 VAC
    b. 20 amp resistive/general purpose, 28 volts DC
    c. 20 amp ballast, 120/277 VAC
    d. 1 HP, 120 VAC 60 Hz; 2HP, 240 VAC 60 Hz
    e. 5 amp tungsten, 120/240 VAC
    f. 470 VA pilot duty, 12/240 VAC
2. Normally Closed Contacts C
    a. 10 amp resistive/general purpose, 120/277 VAC
    b. 10 amp resistive/general purpose, 28 volts DC
    c. 3 amp ballast, 120/277 VAC
    d. 1/4 HP, 120 VAC 60 Hz.; 1/2 HP, 240 VAC 60 Hz
    e. 275 VA pilot duty, 120/240 VAC

G. The time switch shall be (single circuit) (two independent circuits with 15 sec. soft start between circuits) (four independent circuits with 15 sec. soft start between circuits)(eight independent circuits with 15 sec. soft start between circuits)(sixteen independent circuits with 15 sec. soft start between circuits).

H. The time switch shall provide local or remote selection of load override. Remote override shall be initiated by a momentary or maintained switch closure connected to the time switch override connections using bell wire up to 1,000 feet. Four override terminals shall be provided to allow independent override selection in addition to independent to the minute override durations.

I. The time switch shall include a remote override for (4) (12) additional circuits.

2.7 GROUNDING AND BONDING

A. Conductors: type THW, THHN/THWN, or RHW to match power supply wiring.

B. Bonding Jumper Braid: copper braided tape, constructed of 30 gage bare copper wires and properly sized for application.

C. Flexible Jumper Strap: flexible flat conductor, 48,250 circular mils, with copper bolt hole ends sized for 3/8” diameter bolts.

D. Grounding Electrodes: solid steel core with a heavy uniform covering of electrolytic copper, 5/8" X 10'. Provide sectional rods if required. Threads, on sectional rods, shall be rolled (not cut) into the composite metal after the copper covering has been applied. Sectional rod couplings shall be of a corrosion resistant alloy.

E. Plate Electrodes: plate electrodes are not permitted. If sufficiently low resistance cannot be obtained with driven rods, the Architect shall be notified and will provide written instruction on grounding methodology.

2.8 NAMEPLATES

A. Nameplates: 0.125 inch thick laminated plastic; white and black finish; rectangular shaped; minimum of 1.0 X 2.5 inches with 0.25 inch high block style engraved lettering.

PART 3 –– EXECUTION

3.1 WIRING

A. All conductors shall be carefully handled to avoid kinks or damage to insulation.

B. All wires, cables and each conductor of multi-conductor cables shall be uniquely identified at each end by color or with wire and cable markers. Lighting and receptacle wiring shall be distinctly differentiated and junction boxes marked.

C. Lubrications shall be used, if required, to facilitate wire pulling. Lubricants shall be UL approved for use with the insulation specified.

D. Neutral wires shall be pigtailed to receptacles so that a receptacle can be removed for replacement without the neutral connection to other receptacles on the circuit being disconnected.

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

F. All 600 Volt wire insulation shall be tested with a "megger" after installation. Tests shall be made at not less than 500 Volts.

3.2 DEVICES

A. Unless indicated otherwise on the drawings all light switches shall be mounted with the centerline of the device 48" above the finished floor.

B. Unless indicated otherwise on the drawings or in the specifications all receptacles shall be mounted with the centerline of the device 18" above the finished floor.

C. Receptacles shall be installed with the grounding contact at the top. Where receptacles are required to be mounted horizontally they shall be installed with the neutral contact at the top.

D. Receptacles above counters shall have major axis horizontal to counter surface and device centerline 6" above counter surface or backsplash (if present).

E. Mount all devices so that the cover plate edges are in contact with the wall and are parallel to building features.

3.3 GROUNDING

A. Ground all non-current carrying metal parts of the electrical system to provide a low impedance path for ground fault current. Route ground connections and conductors to ground and protective devices in shortest and straightest paths as possible.

B. Insulated grounding bushings shall be required for all raceways, service entrance panels, distribution panels, all raceways one inch and larger and any raceway entering a concentric knock-out.

C. In general a ground wire shall be installed in every conduit. The conduit installation itself shall serve as an additional grounding means.

D. Where there are parallel feeders installed in more than one raceway, each raceway shall have a ground conductor.

E. Where conduits terminate without mechanical connection (i.e., locknuts and bushings) to panelboards, and for all terminations of conduit sizes one inch and larger; and for all sizes of metallic conduit (rigid or flexible) terminating in concentric knockouts, the following procedure shall be followed: Each conduit shall be provided with an insulated grounding bushing and each bushing connected with a bare copper conductor to the ground bus in the electrical equipment. The ground conductor shall be in accordance with Article 250 of the NEC.

F. Install ground rods as necessary to provide an earth ground having a test resistance of no more than 25 ohms.

G. Test ground rods for ground resistance value before any wire is connected. A portable ground testing megger shall be used to test each ground rod or group of rods. The instrument shall be equipped with a meter reading directly in ohms or fractions thereof to indicate the ground value of the electrode tested. Where tests show resistance to ground is over 25 ohms, reduce resistance to 25 ohms, or less, by driving additional ground rods; then retest.

H. Grounding connections shall be made by exothermal weld or by using a compatible mechanical connector and brazing completely over. Exothermal welds shall be made strictly in accordance with the weld manufacturer's written recommendations. Welds that have puffed up or which show convex surfaces, indicating improper cleaning, are not acceptable. No mechanical connector is required at exothermal welds.

I. Connect together system neutral, service equipment enclosures, exposed non-current carrying metal parts of electrical equipment, metal raceway systems, grounding conductor in raceways and cables, receptacle ground connectors, and plumbing system.

J. The neutral conductor(s) of the incoming electrical service shall be grounded to the ground rod system, metal cold water piping system, and structural steel using Table 250-66 of the NEC for conductor sizing. Grounding conductors shall be run in rigid non-metallic conduit.

K. Grounding conductors shall be attached to equipment with a bolt-on lug or approved tapered screw used for no other purpose. Use crimp-on spade lugs for stranded conductors.

3.4 IDENTIFICATION

A. Equipment

1. Equipment identification shall be made using engraved laminated plastic plates (indented tape labels will not be permitted). Characters shall be white on a black background and 1/4" high minimum. Plates shall be secured to the panels by means of screws or metal pressure pins. Cement, by itself, will not be acceptable. All nameplates shall be mounted on the outside surface of the piece of equipment.

2. Individually enclosed safety switches, circuit breakers, and motor starters, pull boxes, control cabinets and other such items shall be identified indicating load, electrical characteristics, and source. For example, a disconnect switch for a 7-1/2 horsepower, 208 volt, 3 phase air handling unit, Number 8 feed from Panel "MDP", Circuit Number 2 shall be labeled as follows:

a. AHU-8

b. 7-1/2 HP, 208V, 3Ø

c. Cir: MDP-2

3. Service entrance panel, distribution panels, panelboards, and transformers shall be identified indicating panel designation from the drawings, electrical characteristics and

source. For example, a 277/480 volt 3 phase panel "LPA" feed from "MDP" Circuit No. 3 shall be labeled as follows:

a. LP-A

b. 277/480V, 3Ø

c. (Feeder: MDP-3)

B. All enclosures containing energized components shall be marked with mylar labels identifying hazards. Such warning messages as "WARNING-HAZARDOUS VOLTAGE", “480 VOLTS", "240 VOLTS", etc. are acceptable. Labels shall be EZ-Code by Thomas & Betts or similar product.

C. Junction Box Identification: Each junction box cover shall be labeled with a permanent "magic" marker or other means to identify the circuits within. For example, a junction box containing lighting circuits 21, 23, 25 from Panel L2A would be labeled "L2A-21,23,25". Telephone junction boxes shall be labeled "T". Fire alarm system junction boxes shall be labeled “FA”. Public address, nurse call, and other system junction boxes shall be labeled accordingly.

D. Conductor Identification: All cables and wires shall be color coded as to phase per convention. See color coding above.

E. Raceway Identification: All raceways leaving the service entrance panel and distribution panels shall be clearly marked as to their circuit number. For example, a conduit containing conductors for Panel MDP, Circuit No. 5 would be marked MDP-5. Empty conduits shall be marked "empty".

F. Device Identification: When it is not clear what a wall switch or what a receptacle is dedicated for then the device plate shall be engraved appropriately. Blank plates for future devices shall be engraved "FUTURE". All plates shall be factory-engraved.

3.5 FIREPROOFING

1. All conduit and boxes passing through or installed within fire walls and smoke walls shall be installed so as to maintain the integrity and rating of the wall through which it passes. Boxes shall be installed within 1/8" of wall surface. Conduits penetrating rated floors shall be installed to maintain the fire rating of the floor using UL approved sealing materials.

**END OF SECTION 26 05 00**

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# SECTION 26 05 05 – ELECTRICAL SELECTIVE DEMOLITION

## PART 1 -– GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

A. This Section includes all labor, material, equipment and services necessary and incidental to complete all the demolition and removal of electrical work as shown on the Drawings or as required.

B. The demolition drawings do not necessarily indicate all the conditions, details, or work required. The Contractor shall examine the building to determine the actual conditions and extent of the work. Any details not clear to this Contractor shall be referred to the Engineer for clarification prior to bidding.

C. The Contractor shall be responsible for demolition and removal of all existing electrical systems where shown for demolition. No portion of electrical systems shown for demolition may be abandoned in place.

### 1.3 SUBMITTALS

A. Shop Drawings: Indicate demolition and removal sequence and location of salvageable items.

B. Schedules: Submit schedule showing time and detailed sequence of demolition, removal of materials and arranged coordination of anticipated electrical interruptions.

1. Schedule demolition and removal work to ensure uninterrupted progress of Owner's on-site operations.

C. Project Record Documents: Submit in accordance with Section 16010.

1. Accurately record actual locations of abandoned or dead ended utilities.

### 1.4 QUALITY ASSURANCE

A. Contractor shall verify the extent of the demolition work. Any questions as to which systems are to be removed versus which systems are to remain shall be referred to the Engineer for clarification prior to commencing demolition work.

B. The demolition work shall be a phased operation and shall comply with the construction sequence schedule.

C. Do not close or obstruct egress width of fire exits or access.

D. Do not disable or disrupt building fire or life safety systems without written permission from the Owner. In all cases, permission shall have been granted not less than ten (10) working days prior to the intended interruption.

### 1.5 PROJECT CONDITIONS

A. Owner will vacate demolition area prior to start of demolition work.

B. Owner will continuously occupy areas of building immediately adjacent to selective demolition areas.

C. Conduct selective demolition work in manner that will minimize need for disruption of Owner's normal operations.

D. Provide minimum of ten (10) working days advanced notice to Owner of demolition activities which will severely impact Owner's normal operations.

E. Maintain free and safe passage to and from Owner occupied areas.

F. Condition of Structures: Owner assumes no responsibility for actual condition of areas to be demolished.

G. Traffic and Passageways: Maintain accessibility for fire fighting apparatus.

1. Conduct demolition operations and debris removal to avoid interference with adjacent occupied facilities.

2. Obtain written permission from authorities having jurisdiction prior to closing or obstructing adjacent occupied facilities.

3. Provide alternate routes when closing or obstructing traffic ways when required by governing authorities.

4. Ensure safe passage of persons around area of demolition. Provide and maintain temporary covered passageways; comply with requirements of governing authorities.

H. Protection: Perform work in manner to eliminate hazards to persons or property and avoid interference with adjacent areas.

1. Maintain existing utilities that are to remain in service and protect from damage during demolition operations.

2. Do not interrupt existing utilities serving occupied facilities, except when authorized by Owner in writing. Provide temporary services during interruptions.

3. Coordinate in advance with Owner electrical interruptions.

4. Protect existing floors with suitable coverings when necessary.

1.6 COORDINATION

A. The Contractor shall be responsible for coordinating demolition of all affected electrical systems to prevent disruption to the Owner and minimize downtime.

B. The Contractor shall be responsible for coordinating demolition by other Divisions of the Specifications to prevent disruption to the Owner and minimize downtime.

PART 2 - PRODUCTS

2.1 NOT USED.

PART 3 -– EXECUTION

3.1 EXAMINATION

A. Beginning alterations to existing building systems means the installer accepts existing conditions.

3.2 PREPARATION

A. Provide, erect, and maintain temporary barriers, warning notifications (signs) and other security devices as may be required for personnel safety.

B. Inventory each panelboard where circuits are indicated to be reused. Sequentially consolidate existing circuits within each panelboard with regard to area served. Maximize capacity for service to the project area by including existing spares with the group of circuits breakers to be disconnected as a result of this selective demolition. Prepare a current directory, post demolition, for each panelboard as the base upon which the final directories will be compiled.

C. Temporarily tag every circuit breaker serving systems outside the demolition area. The tag shall be an OSHA compliant, commercially preprinted, 3¼ inch by 5-5/8 inch, accident prevention card with write on matte finish plastic surface, ¼ inch reinforced grommet and attachment string loop. The message on the card front shall read: “DANGER, DO NOT OPEN” and the message on the reverse side shall read: “DANGER, DO NOT REMOVE THIS TAG. NECESSARY DISCIPLINARY ACTION WILL BE TAKEN IF THESE ORDERS ARE DISREGARDED. SEE OTHER SIDE.” The tags shall remain in place until the demolition and renovation are complete.

3.3 TEMPORARY CONDITIONS

A. The Contractor shall include all temporary connections necessary to permit the Owner to occupy areas of the building during the various construction phases.

3.4 SALVAGEABLE MATERIAL AND EQUIPMENT

A. Carefully remove, store and protect the salvage materials and equipment shown on the Drawings for Owner's use. Deliver to location directed by Owner.

B. Carefully salvage, remove and store, and protect for re-installation the materials and equipment shown on the Drawings.

C. Materials Retained by Contractor:

1. Items of salvageable value not indicated as Owner salvaged or scheduled for reinstallation may be removed as work progresses.

2. Salvaged items must be removed from site as they are removed. Storage or sale of salvaged items on site will not be permitted.

3.5 REMOVAL OF DEMOLITION MATERIAL

A. Contractor shall remove existing systems, shown or specified, necessary or reasonably inferred, for completion of his/her work. Owner will have the option of retaining any item of material removed under this contract. Item or materials not retained by Owner will become the property of the Contractor, removed from the premises and legally disposed off-site.

B. Contractor shall dispose of fluorescent lamps, ballasts, and other hazardous materials in accordance with all Local, State and Federal regulations.

C. Contractor shall remove all wiring determined to be disconnected and abandoned, and remove all conduit and junction boxes determined to be empty and not intended to be used during the reconstruction phase.

D. Remove abandoned wiring to source of supply.

E. Remove all exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes. Remove all junction boxes and conduit supports associated with conduit being removed.

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

G. Maintain continuity of circuits, which remain in service.

H. Remove all existing luminaires, switches, receptacles, and other electrical equipment and devices and associated wiring from walls, ceilings floors, and other surfaces scheduled for demolition unless specifically shown as retain or relocate on drawings.

I. Remove auxiliary and signal systems (IE: fire alarm, security, telephone, data, sound/paging and the like) not scheduled for reuse or relocation. Remove associated devices, appliances and cabling complete.

J. Remove electrical systems associated with equipment (IE: Elevators, motorized doors/shades/gates/ dampers, mechanical HVAC and plumbing equipment, landscape, civil, kitchen and other equipment served by the electrical systems) not scheduled for reuse or relocation on the drawings. Remove switchboards, motor control centers, panelboards, busway, electrical junctions boxes, pull boxes, conduit, raceway systems (IE: bus gutter, cable tray, plugmold), wiring, safety switches, enclosed circuit breakers, control panels, Energy management systems, relays and contactors associated with equipment scheduled for removal.

3.6 PERFORMANCE

A. Perform drilling, cutting, block-offs, and demolition work required for removal of necessary portions of electrical system. Do not cut joists, beams, girders, trusses, or columns without prior written permission from Engineer.

3.7 CLEANING

A. Broom clean demolition areas of dust, dirt, and debris caused by demolition operations. Return adjacent areas to condition existing prior to start of work.

B. Remove temporary work and protection when no longer needed.

C. Unless noted otherwise, existing fixtures that are to remain shall be cleaned and lamps and ballasts replaced with new lamps and ballasts

END OF SECTION 26 05 05

# SECTION 26 05 30 – RACEWAY SYSTEMS

## PART 1 -– GENERAL

### 1.1 SCOPE OF WORK

A. Furnish all labor, materials and equipment and incidentals required to construct and install the complete electrical systems as indicated on the Drawings and as specified in this Section.

### 1.2 STANDARD OF MATERIALS

A. All materials, equipment and apparatus covered by this specification shall be new, of current manufacture and shall bear the seal of approval of the Underwriters' Laboratories.

B. All equipment and materials shall have ratings established by a recognized independent agency or laboratory. The Contractor shall apply the items used on this project within the ratings and subject to any stipulations or exceptions established by the independent agency or laboratory.

C. All conduits and raceways, wire, devices, panelboards, switches, etc. of a given type shall be the product of one manufacturer.

### 1.3 SUBMITTALS

A. Manufacturer's data and shop drawings for all components, fixtures, assemblies and accessories indicated in this Division. Submit in accordance with Division 1.

## PART 2 -– PRODUCTS

### 2.1 RIGID CONDUIT, TUBING AND FITTINGS

A. Rigid steel conduit: zinc coated, threaded type conforming to the requirements of UL 6 and ANSI C80.1 standards. Zinc coating shall be applied to both inner and outer surfaces.

B. Intermediate metal conduit: hot-dipped galvanized, threaded type conforming to the requirements of UL 1242 and ANSI C80.6 standards.

C. A fitted thread protector shall protect threaded ends from damage during shipment and handling.

D. Fittings for rigid steel and IMC conduit: zinc coated, threaded type, conforming to Federal Specification W-F-408.

E. Electrical Metallic Tubing (EMT): UL 797 and ANSI C80.3 standards.

F. Fittings for electrical metallic tubing: Federal Specification W-F-408. Steel compression or set-screw type, galvanized or cadmium plated, and suitable for location of installation. Conduit bushings shall be metallic with insulated throats. Insulating grounding type bushings shall be provided where required under "Grounding". EMT connectors shall be similar to T&B "Insuline" with completely insulated throats. Field applied insulated throats are not acceptable.

G. Rigid aluminum conduit: UL 6 and ANSI C80.5 standards.

H. Couplings, fittings, pipe straps and spacers used with aluminum conduit shall be fabricated of aluminum.

I. Fittings for rigid aluminum conduit: threaded type, fabricated of aluminum.

J. Plastic conduit for direct burial: UL labeled Schedule 40 PVC manufactured to NEMA TC-2 specifications, and UL 651 specifications. Plastic conduit concrete encased may be Type EB.

K. Plastic interduct for installation in PVC conduits: UL labeled and listed for installation of inside/outside communication cable.

L. Couplings, fittings, pipe straps and spacers used with rigid plastic conduit shall be fabricated of plastic.

M. Fittings for plastic conduit: manufactured to NEMA TC-3 specifications.

N. Acceptable Metal Conduit and Tubing Manufacturers:

1. EMT:

a. Allied Tube & Conduit Co.

b. Wheatland Tube Co.

c. Triangle PWC, Inc.

2. Fittings:

a. Steel City

b. Thomas & Betts (T&B)

c. Raco Inc.

2.2 FLEXIBLE METAL CONDUIT, COUPLINGS AND FITTINGS

A. Flexible metal conduit for dry interior applications: Federal Specification WW-C-566 and UL 1, continuous, spiral wound galvanized steel type.

B. Fittings (connectors) for flexible metal conduit: UL E 23018. Squeeze Type of galvanized steel or malleable iron zinc plated.

C. Flexible metal conduit for damp or exterior applications: liquid tight, UL listed, spiral wound galvanized steel with PVC outer jacket.

D. Fittings for liquid tight conduit: Federal Specification W-F-406. Provide cadmium plated, malleable iron fittings with compression type steel ferrule and gasket sealing rings and insulated throats.

E. Acceptable Metal Conduit and Fittings Manufacturers:

1. FMC:

a. Alflex Corp.

b. American Flexible Conduit Co.

c. Anaconda Metal Hose, ANAMET Inc.

2. FMC Fittings:

a. Steel City

b. Thomas & Betts (T&B)

c. Raco Inc.

2.3 CONDUIT MOUNTING EQUIPMENT

A. Hangers, rods, backplates, beam clamps etc. shall be hot-dipped galvanized iron or steel. They shall be as manufactured by the Appleton Electric Co., Thomas and Betts Co., Unistrut Corp., or approved equal.

2.4 JUNCTION BOXES

A. Sheet Steel Outlet Boxes: conform to UL 514A, “Metallic Outlet Boxes, Electrical”, UL 514B, “Fittings for Conduit and Outlet Boxes, Covers, and Box Supports”, and NEMA OS1, “Sheet Steel Outlet Boxes, Device Boxes, Covers, and Box Supports”.

B. Sheet Steel: Flat-rolled, code gauge galvanized steel.

C. Acceptable Manufacturers: Sheet-steel boxes shall be manufactured by RACO, Steel City or equal.

D. All junction boxes and pull boxes shall be sized per NEC requirements and be of the proper NEMA classification for the locations where they are installed. Where boxes occur above other than lift-out ceilings, access panels must be provided.

E. Wet location covers shall meet NEC wet location requirements (shall comply with NEC). Covers shall be “in-use” type and shall mount vertically or horizontally and be of gasketed heavy-duty polycarbonate construction with clear cover with lockable hasp for 1/8" shank lock.

2.5 OUTLET BOXES

A. Switch, receptacle and wall or ceiling mounted junction boxes shall be the 4" X 2 1/8" square type. Tile, dry wall, or flat cover plates for one or two devices shall be furnished for each box as required.

2.6 TELEPHONE AND DATA SYSTEM OUTLETS

A. Wall outlets shall in general consist of four inch (4") square boxes with single gang switch ring. Conduits shall be supplied turned out of wall above ceiling assembly. Conduits shall be 1” or larger, with insulated bushing installed on all bare ends.

B. Install finished blank plates on all unused openings.

2.7 OUTDOOR BOXES

A. Cast Aluminum Boxes: exposed, exterior locations; copper free aluminum, threaded raceway entries, and features and accessories suitable for each location including mounting ears, threaded screw holes for devices, and closure plugs.

B. Boxes shall have a rear opening in addition to necessary top and bottom openings. Boxes shall be provided complete with a minimum of two closure plugs and self-threading ground screw. Boxes shall have a thermoset, baked enamel silver gray finish. Weatherproof cover plates for one or two devices shall be furnished for each box as required.

C. Covers shall be of heavy duty die-cast construction. Mounting screws shall be stainless steel. Covers shall have a thermoset, baked enamel silver gray finish and be equipped with a sealing gasket. Covers shall be equipped with a hasp-type locking tab.

D. Nonmetallic boxes shall be thermoplastic or polyester fiberglass types as manufactured by Carlon or Pass & Seymour.

2.8 LOCATION OF OUTLETS

A. The approximate locations of outlets, etc. are shown on the drawings. The exact locations shall be determined at the building.

B. It is the responsibility of the Contractor to note the locations and heights of cabinets, counters, shelving units, etc. before the installation of outlets.

2.9 CONDUIT BODIES

A. Conduit bodies shall be constructed of galvanized or cadmium plated malleable iron or copper-free aluminum. Galvanized steel or aluminum covers and gaskets shall be supplied.

B. LB's 3" and greater shall be mogul type with domed covers.

PART 3 –– EXECUTION

3.1 RACEWAY INSTALLATION

A. All interior and above grade exterior wiring shall be installed in a metal conduit and all embedded in concrete or below grade wiring shall be in PVC conduit unless indicated otherwise on the drawings.

B. Exterior low voltage (less than 50 volts) wiring may be installed in liquid tight, non-metallic flexible conduit ("Sealtite") where installation is above grade and not subject to damage.

C. No conduit smaller than 3/4 inch electrical trade size shall be used, nor shall any have more than three 90 degree bends in any one run. Pull boxes shall be provided as required or directed.

D. No wire shall be pulled until the conduit system is complete in all details.

E. The ends of all conduits shall be tightly plugged to exclude dust and moisture during construction.

F. Conduit support shall be spaced at intervals of 8 ft. or less, as required to obtain rigid construction.

G. Single conduits shall be supported by means of two-hole pipe clamps. Multiple runs of conduits shall be supported on trapeze type hangers with steel horizontal members and threaded hanger rods. The rods shall be not less than 3/8 inch diameter. The channel shall be not less than 1 1/2" nominal size.

H. Conduit hangers shall be attached to structural steel by means of beam or channel clamps.

I. All conduits on exposed work shall be run at right angles to and parallel with the surrounding walls and shall conform to the form of the ceiling. No diagonal runs will be allowed. Bends in parallel conduit runs shall be concentric. All conduit shall be run straight and true.

J. Conduit terminating in sheet steel boxes shall have double locknuts and insulated bushings.

K. Flexible metal conduit shall be used for all motor terminations and other equipment where vibration is present. Flexible conduit length shall not exceed 1'-6" in length for this application.

L. Provide expansion coupling every 100 feet for long runs of conduit and at concrete expansion joints. Provide ground bonding jumpers around expansion couplings, used on metallic conduit, sized according to Table 250-122 of the NEC.

M. Transitions from below grade to above grade shall be with rigid galvanized steel long sweep nineties with a bituminous coating where in contact with earth or concrete. Area of transition shall not be subject to standing puddles of water.

N. Seal all wall penetrations to watertight condition. Finish as applicable to location.

O. Steel conduit, when buried in soil, shall be treated with a protective coating of bitumastic or asphalt-base paint, or wrapped with plastic tape.

P. Approval by the Architect shall be required to install conduit in structural members.

Q. In general, the conduit installation shall follow the layout shown on the plans. This layout is, however, diagrammatic only, and where changes are necessary due to structural conditions, other apparatus or other causes, such changes shall be made without additional cost to the Owner. It is recognized that branch circuit routing shown on the drawings may not always be the most economical or the most feasible method. Routing may be changed by the Contractor subject to the following provisions:

R. Conduits shown routed overhead may not be installed in or below slabs or in walls.

S. Not more than three circuits may be installed in any one conduit. Care must be taken to provide the appropriate number of neutrals where two or three circuits are on the same phase.

T. All conduit shall be concealed unless otherwise noted on the drawings.

U. Exposed conduit will be permitted only as shown on the drawings. Exposed conduit shall be run parallel with or at right angles to the building walls.

V. All empty conduits shall be provided with a plastic pull wire rated for a minimum of 200 lbs.

W. Conduit stub-ups at panels shall be secured in place by use of Unistrut and clamps.

X. Telephone and data raceways shall be 1” minimum. This includes conduits stubbed up into ceiling cavity.

Y. Where exposed connections to motors and equipment from overhead conduits are made without benefit of a wall for conduit mounting, the connection shall consist of vertical conduit (minimum size 1") from Type "LL", "LR" or “TT” Unilet to floor flange. Connection to equipment shall be with flexible liquid-tight from Type FDT boxes located in the vertical conduit.

Z. Flexible conduit in all areas subject to moisture shall be liquid-tight flexible conduit.

AA. All electrical connections to vibration isolated equipment shall be made with flexible conduit.

BB. Connections to indoor dry type transformers shall be made with weatherproof flexible conduit.

CC. All conduit entering the building shall be suitably sealed to prevent the entrance of moisture.

DD. All conduit passing through a structural expansion joint shall be provided with a UL approved expansion joint fitting and bonded as required by the National Electrical Code.

EE. Conduit in hazardous locations (as defined and classified by the National Electrical Code) shall be sealed with sealing fittings. Where hazardous locations exist, all conduit, fittings and installation shall comply with Article 500 of the NEC.

FF. Any wiring in a finished area which cannot be concealed in conduit shall be installed in a surface metal raceway system as manufactured by Wiremold or equal. Utilization of surface

metal raceway, if not indicated as such on the plans, will be accomplished only with the written approval of the Architect.

GG. Conduit run in areas with hung ceilings shall be installed in the space above the hung ceiling as close to the structure as possible. Conduits shall be supported from the structure.

HH. Where flex conduit is used from junction box to light fixture it shall be supported such that it does not touch ceiling tiles or interfere with their placement.

II. Flexible metal conduit connections to light fixtures shall be at least 4 feet but not more than 6 feet in length per NEC.

JJ. Where raceways are indicated installed under slabs, they shall be placed not less than 2" below surface of prepared fill. Under no circumstances shall raceways be laid directly on vapor barrier or in or on reinforcing.

KK. Raceways concealed in ground outside building shall be a minimum of 2 feet below grade and topped with a two inch concrete cap before backfilling. Install plastic warning tape 12 inches above raceway, buried in backfill.

3.2 RACEWAY INSTALLATION - CONDITIONS

A. Conduit raceways shall be installed as indicated herein. Where more than one type of raceway is listed under one condition, the Contractor may exercise his option of the raceway used. Conditions of raceway installation are as follows:

B. Exposed Raceway Below 8'-0" from Finish Floor and in Areas Subject to Moisture: Rigid galvanized steel conduit.

C. Raceway Concealed Overhead, or in Walls: Rigid galvanized steel conduit, intermediate metallic conduit or electrical metallic tubing (EMT).

D. Raceway Concealed in Ground Outside Building: Schedule 40 PVC or rigid steel. Rigid steel conduits installed below slab-on-grade or in the earth shall have a factory-applied PVC coating, two coats of a coal-tar system, or shall be field-wrapped with 0.010 inch thick pipe-wrapping plastic tape applied with a 50-percent overlay.

E. Final Raceway Connection to Recessed Fixtures in Accessible Locations: Flexible steel conduit maximum of 6'-0" long.

F. Final Raceway Connection to Pumps, Motors, Transformers, Etc.: Liquid-tight flexible steel conduit maximum of 1'-6" long.

G. Raceway That Extend Through the Slab or Above Finish Grade: 90° elbows, nipples and couplings of rigid galvanized steel or IMC shall be used where any raceway extends through the slab or above finished grade. In general PVC conduit shall not be allowed above finished slab inside the building or within 1 1/2' of finished grade outside the building.

3.3 OUTLET BOXES

A. Outlet boxes for flush mounted lighting fixtures shall be accessible. If lighting fixture is in a non-accessible ceiling the box shall be accessible when the fixture is removed.

B. Set boxes plumb and such that their device mounting plane is within 1/8" of the finished wall.

C. Surface mounted boxes and wiremold boxes, both new or existing, shall be painted to match surrounding surfaces.

D. Above ceiling sub-system boxes shall be labeled and color coded. Junction box covers shall be color coded. The following conventions shall be used:

1. Emergency Power YELLOW
2. Fire alarm RED
3. Telephone/Network BLUE

E. The location of boxes on the electrical plans is approximate. Review architectural drawings for specific location or if not shown center and align within architectural detail. The Architect shall reserve the right to move boxes during rough in.

END OF SECTION 26 05 30

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# SECTION 26 05 73 - COORDINATION STUDY AND ARC FLASH LABELS

The following is included as supplementary information to the drawings. Refer to drawings for additional details.

## ARC FLASH LABELS

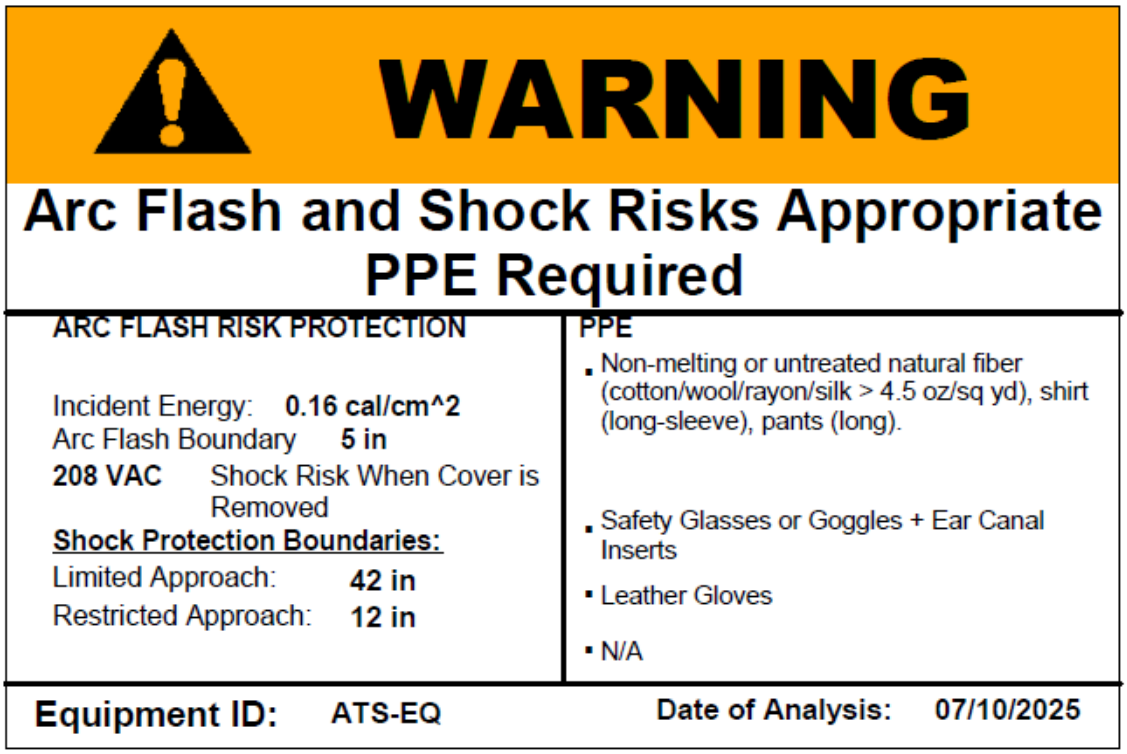
Note: arc flash labels were created using skm powertools© as the arc flash analysis program. Overcurrent protective device modeling files for specific device manufacturer and model were provided by SKM library.

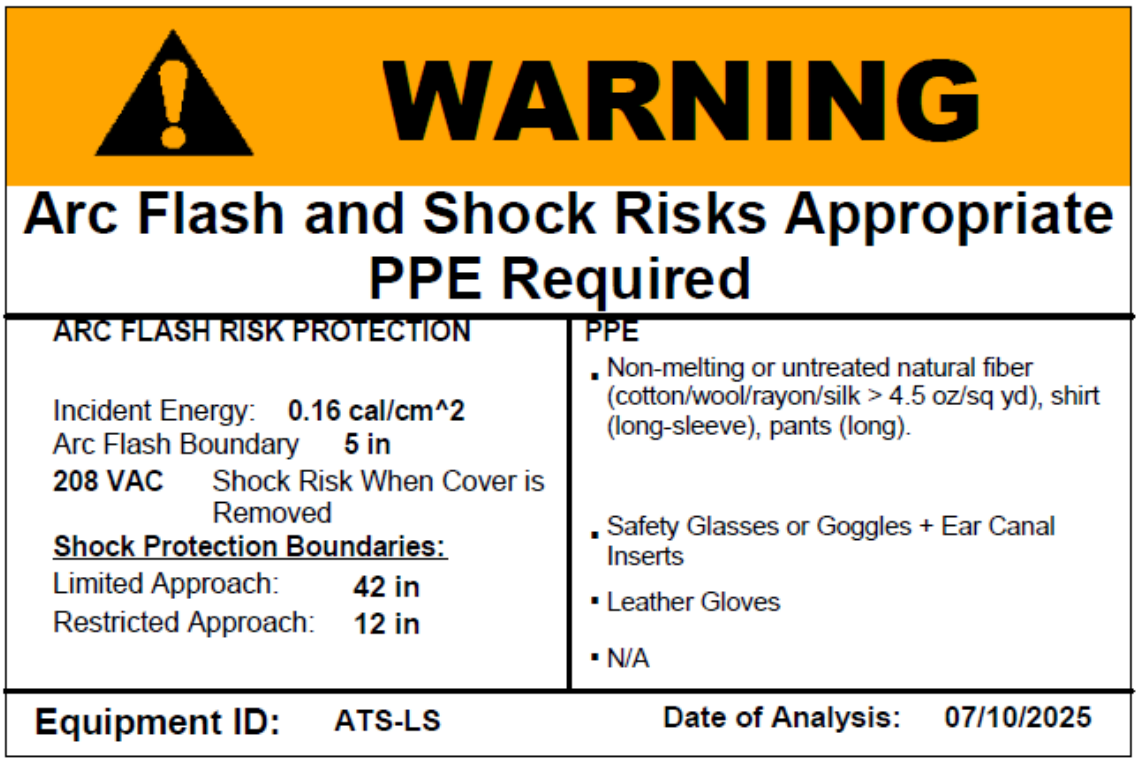
The equations used for the calculation of the estimated maximum incident energy and the estimated arc flash boundary distance are based upon measured incident energy under a specific set of test conditions and on theoretical work. Actual arc flash exposures may be more or less severe than calculated by the arc flash analysis program. Calculations are based on the installation and configuration of the electrical distribution system as initially constructed. Any changes to the electrical distribution system may cause these calculations to be invalid. All short circuit and overcurrent protective devices (OCPD) are assumed to operate as originally intended by manufacturer.

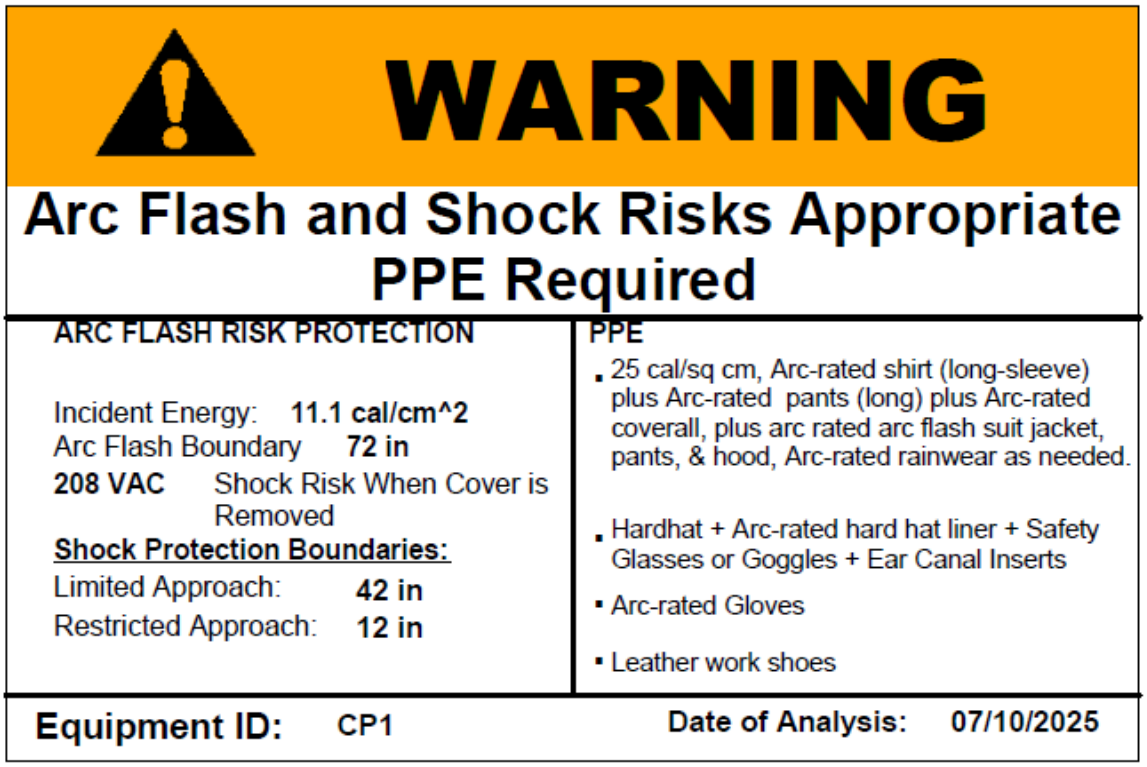
It should be noted that the personal protective equipment (ppe) for the arc flash hazard is the last line-of-defense. It is not intended nor will it prevent all injuries. NFPA 70E PPE levels are intended to reduce the impact of an arc flash to 2nd degree burns for the torso and head only. Nfpa 70E states that the incident energy exposure shall be based on the working distance of the employee's face and head. Objects closer to the arc flash will be exposed to much greater levels of incident energy. Fire rated (FR) clothing and ppe shall be used based upon the incident energy exposure. This means injuries to hands and arms may be expected if an arc at the level calculated and protected against occurs.

Incident energy levels are directly related to the clearing time of the upstream ocpd. Operation of the ocpd within the manufacturers design specifications is essential for limiting the incident energy due to arc flash hazards. Failure of the OCPD components to operate within the manufacturer's time current curves will compromise the results of this arc flash study and will result in higher levels of incident energy to electrical workers. NFPA 70E standards recommend regularly scheduled maintenance and testing be performed on the electrical distribution system components to assure proper operation of all overcurrent protective devices. Regular testing is required to protect electrical workers from greater arc flash energy hazards than are calculated in this study.

Labels below is shown for reference. Labels will be provided to contractor by engineer in pdf format. Contractor shall have labels printed and applied to equipment.


WARNING
Arc Flash and Shock Risks Appropriate PPE Required
ARC FLASH RISK PROTECTION
Incident Energy: 0.16 cal/cm^2
Arc Flash Boundary 5 in
208 VAC Shock Risk When Cover is Removed
Shock Protection Boundaries:
Limited Approach: 42 in
Restricted Approach: 12 in
PPE
Non-melting or untreated natural fiber (cotton/wool/rayon/silk > 4.5 oz/sq yd), shirt (long-sleeve), pants (long).
Safety Glasses or Goggles + Ear Canal Inserts
Leather Gloves
N/A
Equipment ID: ATS-EQ
Date of Analysis: 07/10/2025


WARNING
Arc Flash and Shock Risks Appropriate PPE Required
ARC FLASH RISK PROTECTION
Incident Energy: 0.16 cal/cm^2
Arc Flash Boundary 5 in
208 VAC Shock Risk When Cover is Removed
Shock Protection Boundaries:
Limited Approach: 42 in
Restricted Approach: 12 in
PPE
Non-melting or untreated natural fiber (cotton/wool/rayon/silk > 4.5 oz/sq yd), shirt (long-sleeve), pants (long).
Safety Glasses or Goggles + Ear Canal Inserts
Leather Gloves
N/A
Equipment ID: ATS-LS
Date of Analysis: 07/10/2025

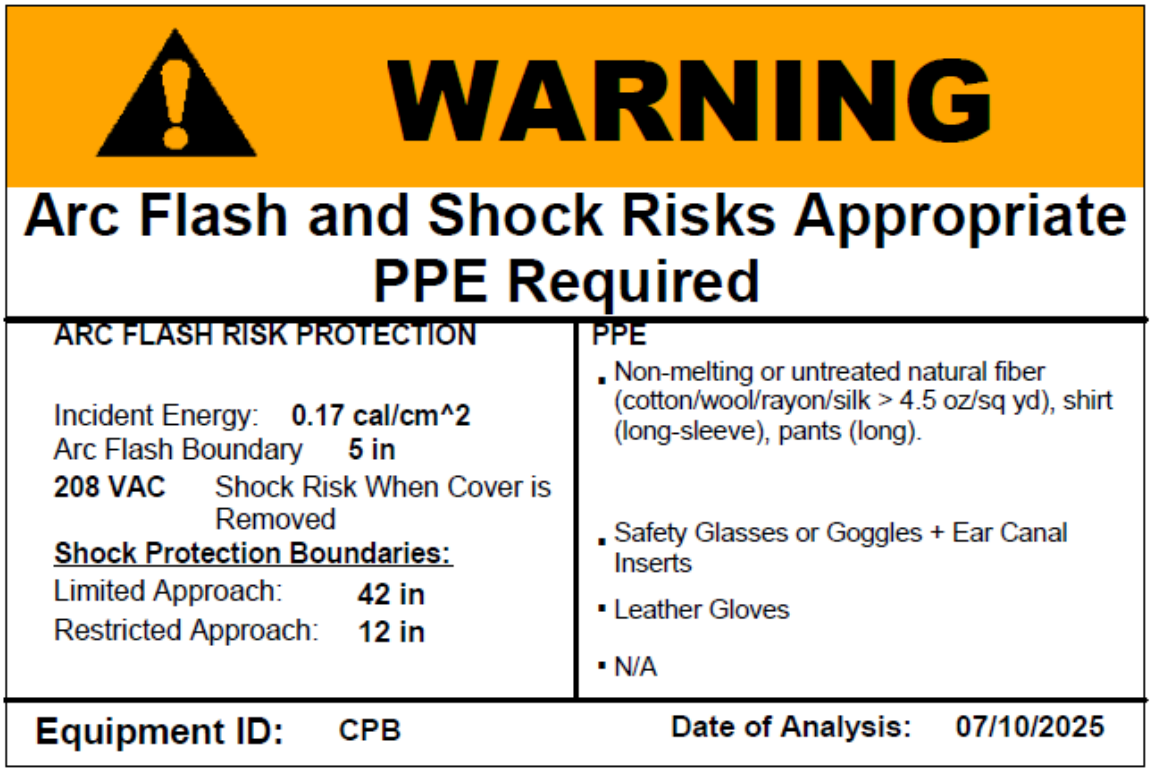


**WARNING**

**Arc Flash and Shock Risks Appropriate PPE Required**

| ARC FLASH RISK PROTECTION | PPE |
|---|---|
| Incident Energy: **11.1 cal/cm^2**<br>Arc Flash Boundary **72 in**<br>**208 VAC** Shock Risk When Cover is Removed<br>**Shock Protection Boundaries:**<br>Limited Approach: **42 in**<br>Restricted Approach: **12 in** | ▪ 25 cal/sq cm, Arc-rated shirt (long-sleeve) plus Arc-rated pants (long) plus Arc-rated coverall, plus arc rated arc flash suit jacket, pants, & hood, Arc-rated rainwear as needed.<br>▪ Hardhat + Arc-rated hard hat liner + Safety Glasses or Goggles + Ear Canal Inserts<br>▪ Arc-rated Gloves<br>▪ Leather work shoes |

**Equipment ID:** CP1 **Date of Analysis:** 07/10/2025

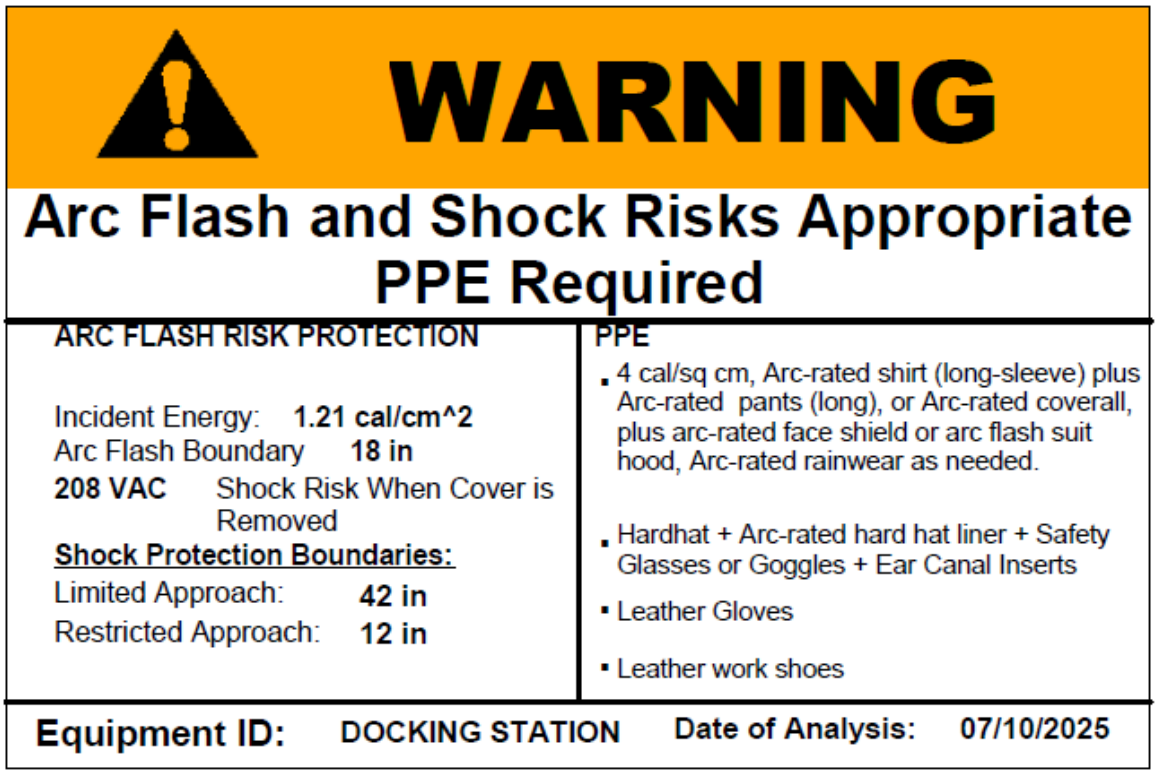


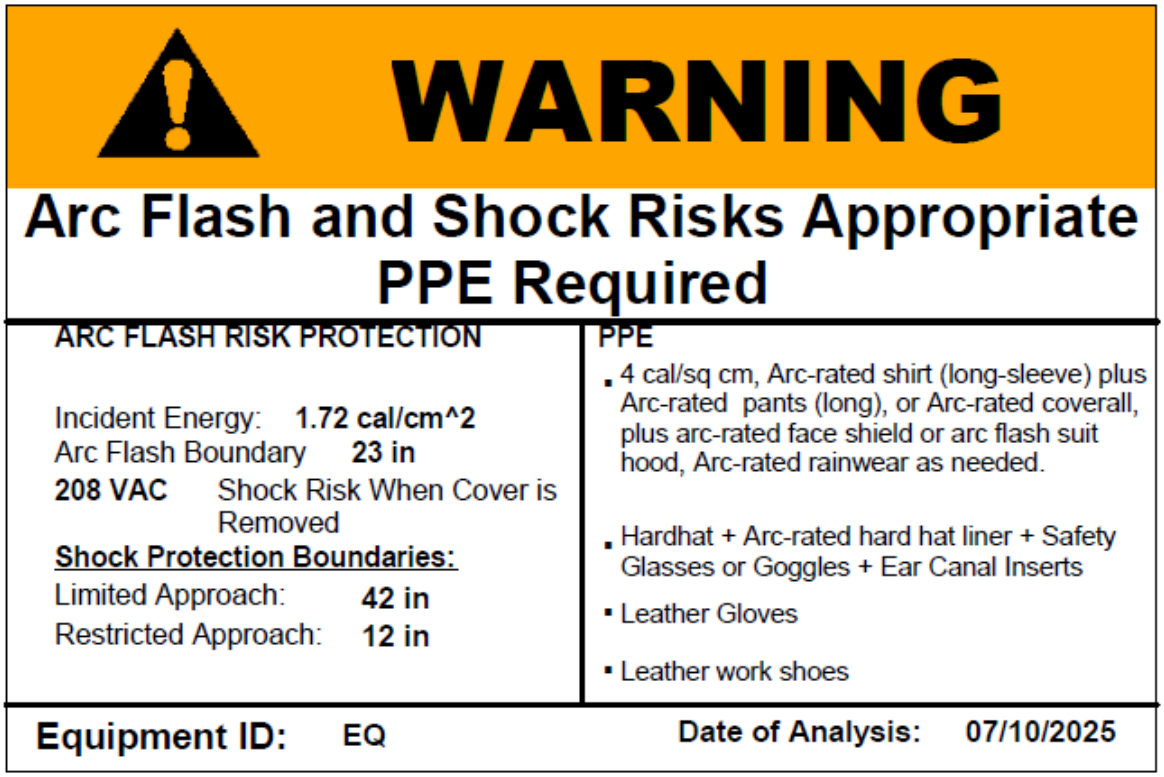
**WARNING**

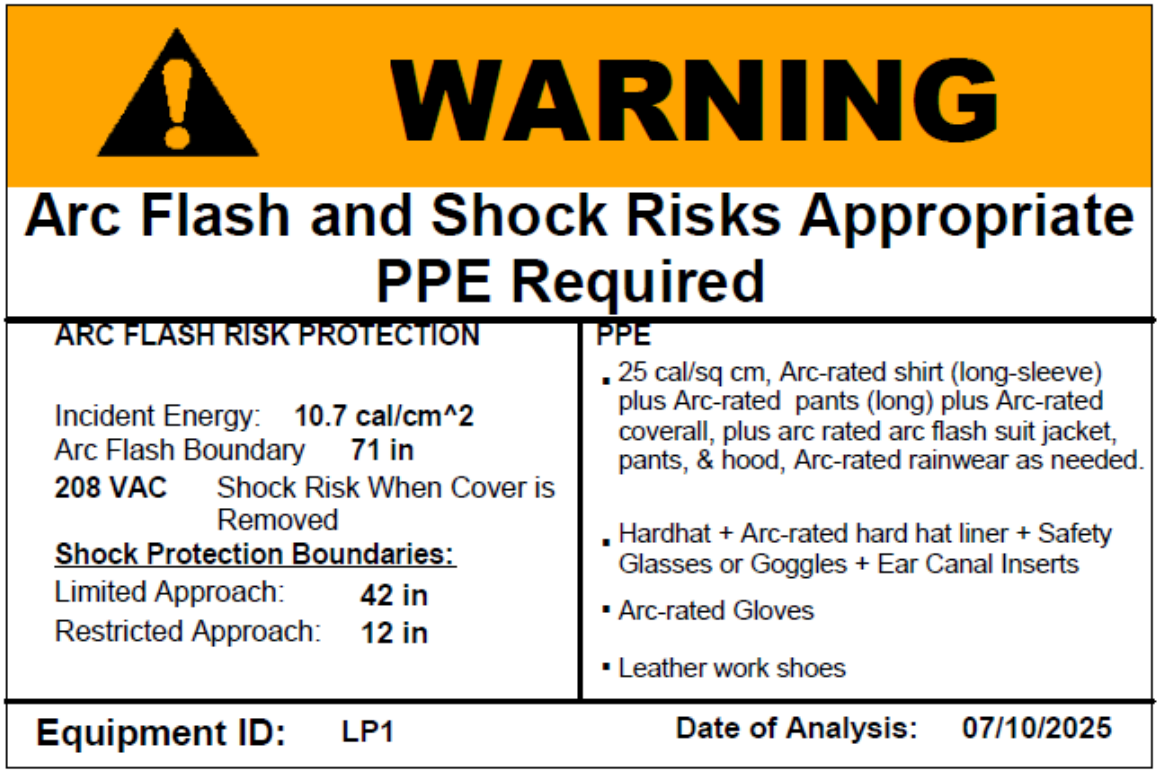
**Arc Flash and Shock Risks Appropriate PPE Required**

| ARC FLASH RISK PROTECTION | PPE |
|---|---|
| Incident Energy: **0.17 cal/cm^2**<br>Arc Flash Boundary **5 in**<br>**208 VAC** Shock Risk When Cover is Removed<br>**Shock Protection Boundaries:**<br>Limited Approach: **42 in**<br>Restricted Approach: **12 in** | ▪ Non-melting or untreated natural fiber (cotton/wool/rayon/silk > 4.5 oz/sq yd), shirt (long-sleeve), pants (long).<br>▪ Safety Glasses or Goggles + Ear Canal Inserts<br>▪ Leather Gloves<br>▪ N/A |

**Equipment ID:** CPB **Date of Analysis:** 07/10/2025


WARNING
Arc Flash and Shock Risks Appropriate PPE Required
ARC FLASH RISK PROTECTION
Incident Energy: 1.21 cal/cm^2
Arc Flash Boundary 18 in
208 VAC Shock Risk When Cover is Removed
Shock Protection Boundaries:
Limited Approach: 42 in
Restricted Approach: 12 in
PPE
4 cal/sq cm, Arc-rated shirt (long-sleeve) plus Arc-rated pants (long), or Arc-rated coverall, plus arc-rated face shield or arc flash suit hood, Arc-rated rainwear as needed.
Hardhat + Arc-rated hard hat liner + Safety Glasses or Goggles + Ear Canal Inserts
Leather Gloves
Leather work shoes
Equipment ID: DOCKING STATION
Date of Analysis: 07/10/2025


WARNING
Arc Flash and Shock Risks Appropriate PPE Required
ARC FLASH RISK PROTECTION
Incident Energy: 1.72 cal/cm^2
Arc Flash Boundary 23 in
208 VAC Shock Risk When Cover is Removed
Shock Protection Boundaries:
Limited Approach: 42 in
Restricted Approach: 12 in
PPE
4 cal/sq cm, Arc-rated shirt (long-sleeve) plus Arc-rated pants (long), or Arc-rated coverall, plus arc-rated face shield or arc flash suit hood, Arc-rated rainwear as needed.
Hardhat + Arc-rated hard hat liner + Safety Glasses or Goggles + Ear Canal Inserts
Leather Gloves
Leather work shoes
Equipment ID: EQ
Date of Analysis: 07/10/2025

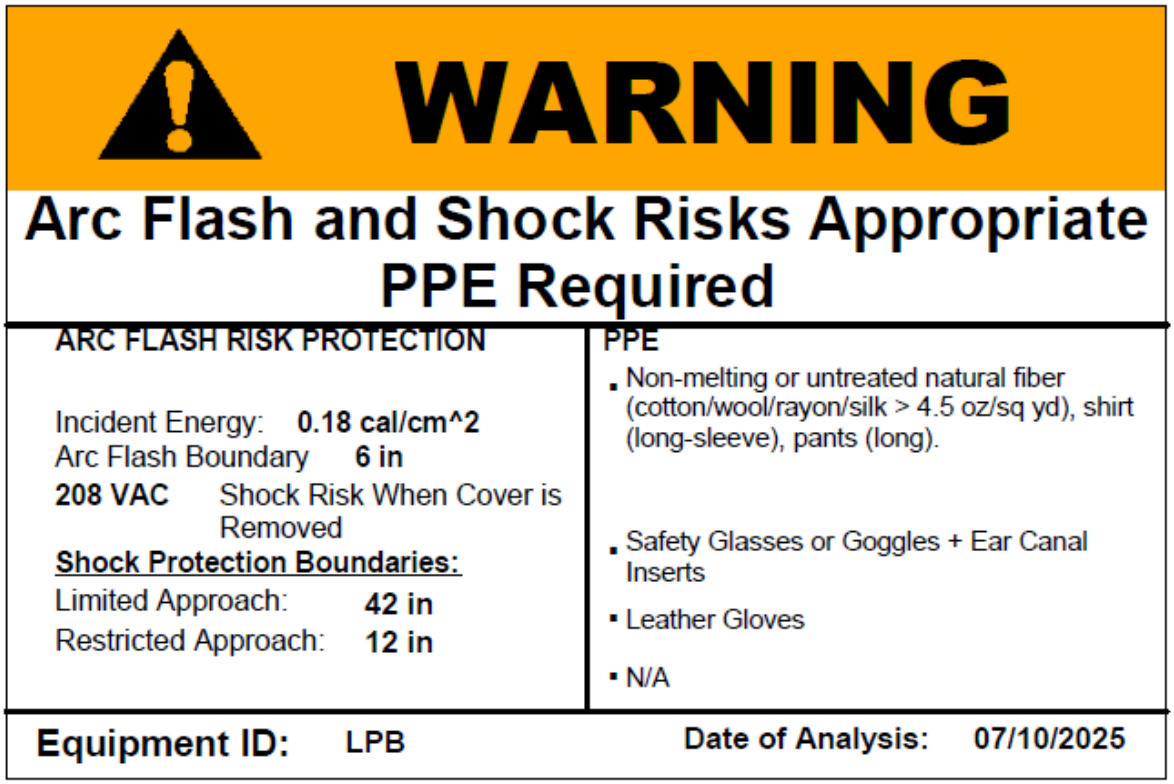


# WARNING

## Arc Flash and Shock Risks Appropriate PPE Required

| ARC FLASH RISK PROTECTION | PPE |
|---|---|
| Incident Energy: **10.7 cal/cm^2**<br>Arc Flash Boundary **71 in**<br>**208 VAC** Shock Risk When Cover is Removed<br>**Shock Protection Boundaries:**<br>Limited Approach: **42 in**<br>Restricted Approach: **12 in** | ▪ 25 cal/sq cm, Arc-rated shirt (long-sleeve) plus Arc-rated pants (long) plus Arc-rated coverall, plus arc rated arc flash suit jacket, pants, & hood, Arc-rated rainwear as needed.<br>▪ Hardhat + Arc-rated hard hat liner + Safety Glasses or Goggles + Ear Canal Inserts<br>▪ Arc-rated Gloves<br>▪ Leather work shoes |

**Equipment ID:** LP1 **Date of Analysis:** 07/10/2025

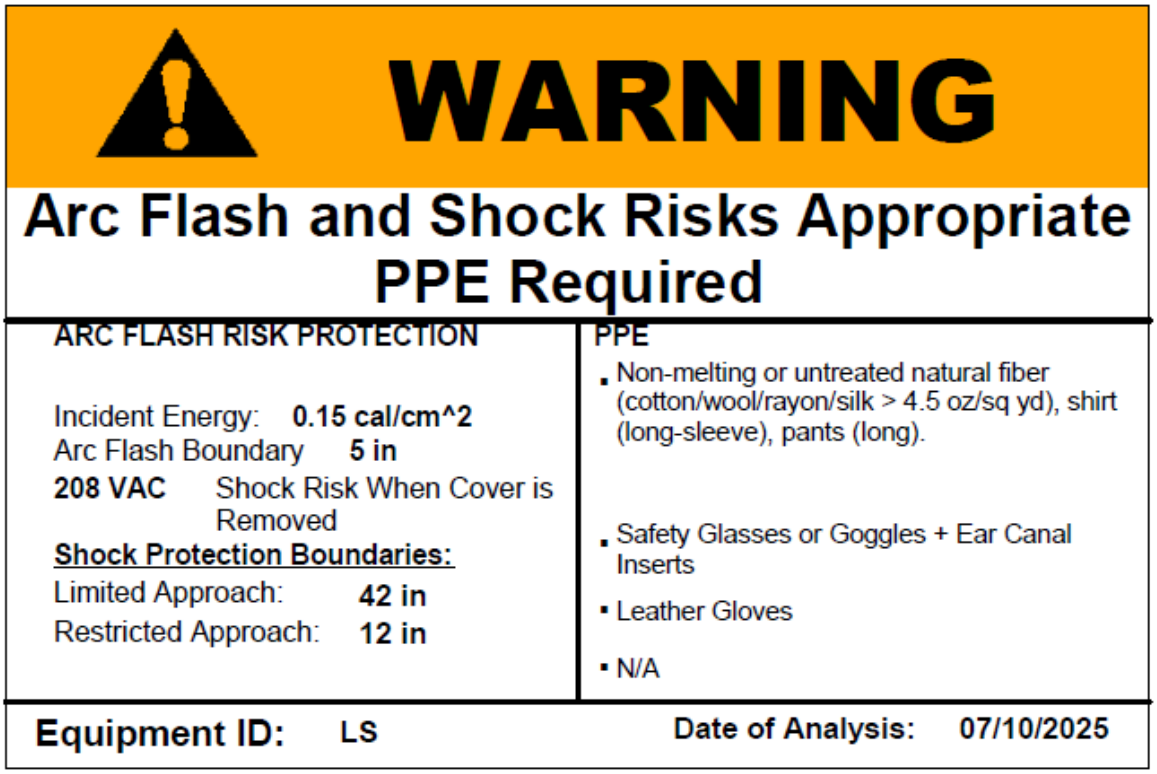


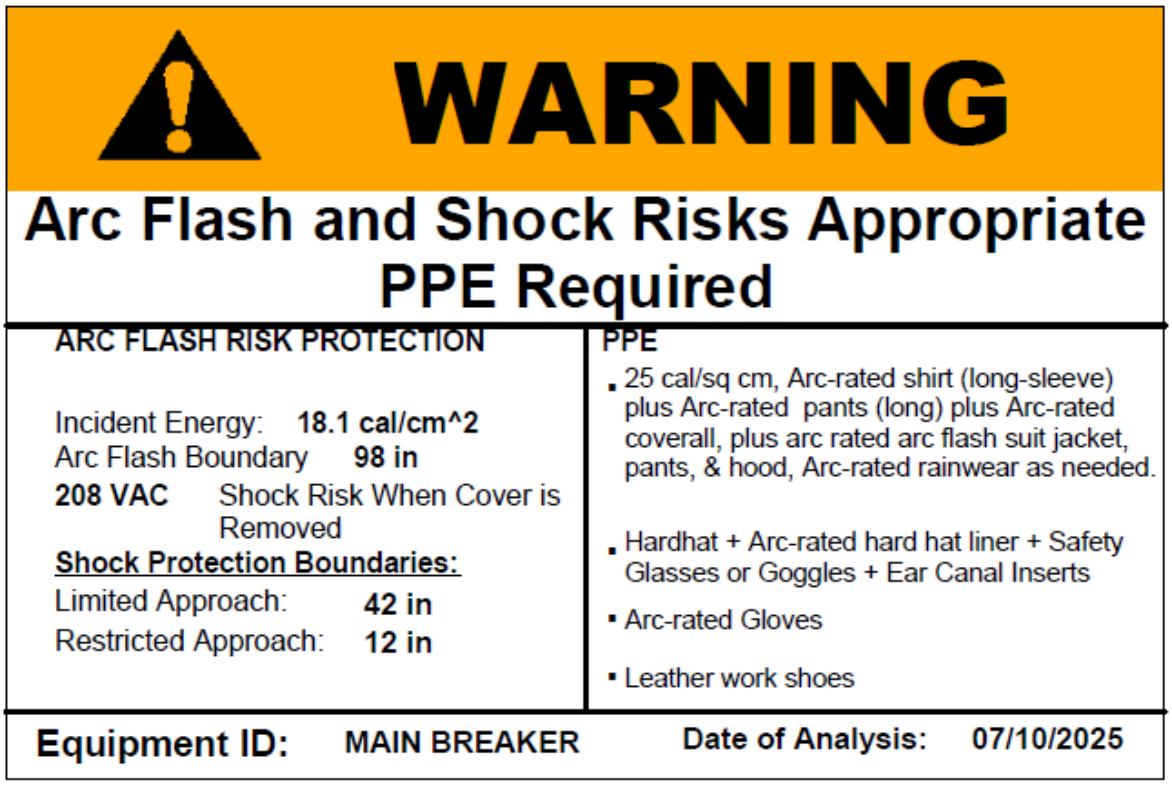
# WARNING

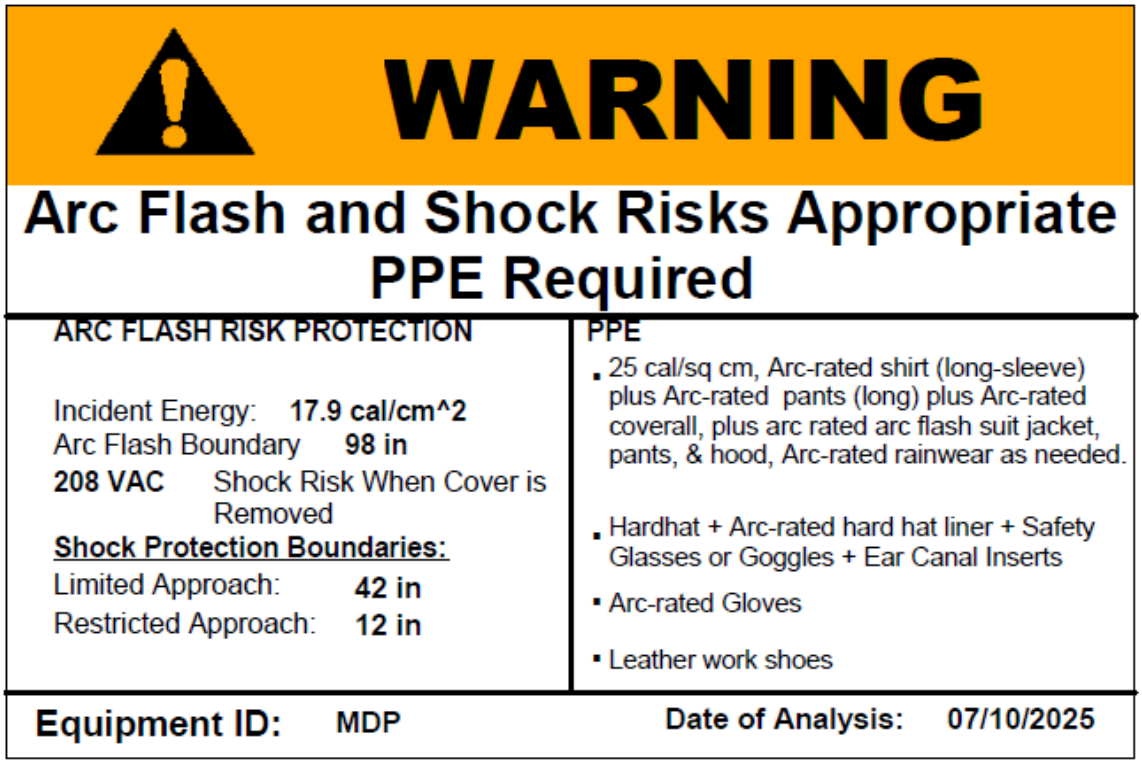
## Arc Flash and Shock Risks Appropriate PPE Required

| ARC FLASH RISK PROTECTION | PPE |
|---|---|
| Incident Energy: **0.18 cal/cm^2**<br>Arc Flash Boundary **6 in**<br>**208 VAC** Shock Risk When Cover is Removed<br>**Shock Protection Boundaries:**<br>Limited Approach: **42 in**<br>Restricted Approach: **12 in** | ▪ Non-melting or untreated natural fiber (cotton/wool/rayon/silk > 4.5 oz/sq yd), shirt (long-sleeve), pants (long).<br>▪ Safety Glasses or Goggles + Ear Canal Inserts<br>▪ Leather Gloves<br>▪ N/A |

**Equipment ID:** LPB **Date of Analysis:** 07/10/2025


WARNING
Arc Flash and Shock Risks Appropriate PPE Required
ARC FLASH RISK PROTECTION
Incident Energy: 0.15 cal/cm^2
Arc Flash Boundary 5 in
208 VAC Shock Risk When Cover is Removed
Shock Protection Boundaries:
Limited Approach: 42 in
Restricted Approach: 12 in
PPE
Non-melting or untreated natural fiber (cotton/wool/rayon/silk > 4.5 oz/sq yd), shirt (long-sleeve), pants (long).
Safety Glasses or Goggles + Ear Canal Inserts
Leather Gloves
N/A
Equipment ID: LS
Date of Analysis: 07/10/2025


WARNING
Arc Flash and Shock Risks Appropriate PPE Required
ARC FLASH RISK PROTECTION
Incident Energy: 18.1 cal/cm^2
Arc Flash Boundary 98 in
208 VAC Shock Risk When Cover is Removed
Shock Protection Boundaries:
Limited Approach: 42 in
Restricted Approach: 12 in
PPE
25 cal/sq cm, Arc-rated shirt (long-sleeve) plus Arc-rated pants (long) plus Arc-rated coverall, plus arc rated arc flash suit jacket, pants, & hood, Arc-rated rainwear as needed.
Hardhat + Arc-rated hard hat liner + Safety Glasses or Goggles + Ear Canal Inserts
Arc-rated Gloves
Leather work shoes
Equipment ID: MAIN BREAKER
Date of Analysis: 07/10/2025

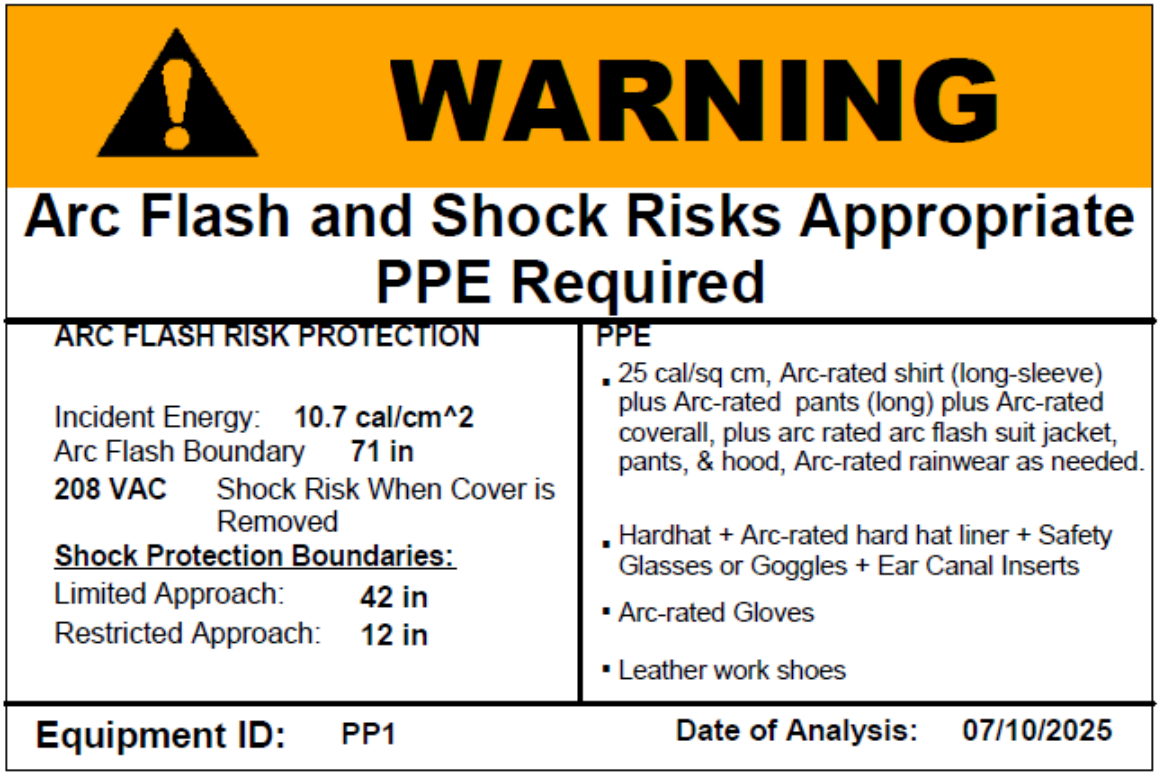


**WARNING**

**Arc Flash and Shock Risks Appropriate PPE Required**

| ARC FLASH RISK PROTECTION | PPE |
|---|---|
| Incident Energy: **17.9 cal/cm^2**<br>Arc Flash Boundary **98 in**<br>**208 VAC** Shock Risk When Cover is Removed<br>**Shock Protection Boundaries:**<br>Limited Approach: **42 in**<br>Restricted Approach: **12 in** | ▪ 25 cal/sq cm, Arc-rated shirt (long-sleeve) plus Arc-rated pants (long) plus Arc-rated coverall, plus arc rated arc flash suit jacket, pants, & hood, Arc-rated rainwear as needed.<br>▪ Hardhat + Arc-rated hard hat liner + Safety Glasses or Goggles + Ear Canal Inserts<br>▪ Arc-rated Gloves<br>▪ Leather work shoes |

**Equipment ID:** MDP **Date of Analysis:** 07/10/2025

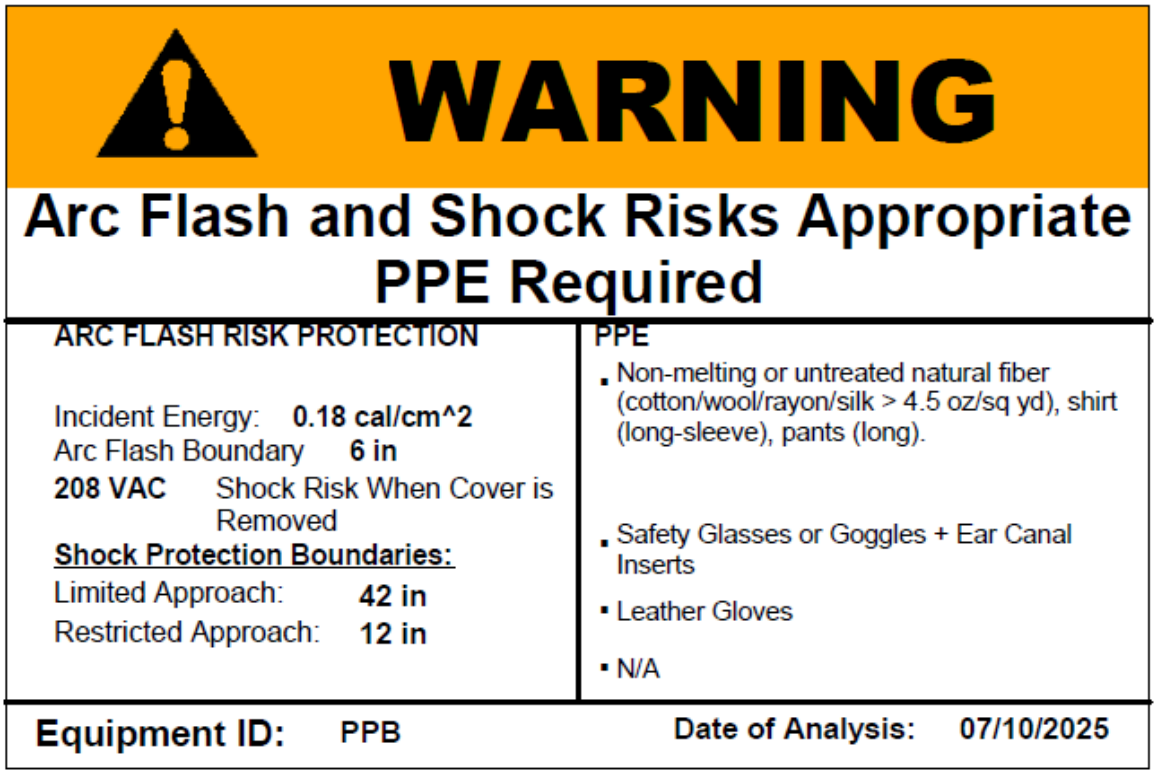


**WARNING**

**Arc Flash and Shock Risks Appropriate PPE Required**

| ARC FLASH RISK PROTECTION | PPE |
|---|---|
| Incident Energy: **10.7 cal/cm^2**<br>Arc Flash Boundary **71 in**<br>**208 VAC** Shock Risk When Cover is Removed<br>**Shock Protection Boundaries:**<br>Limited Approach: **42 in**<br>Restricted Approach: **12 in** | ▪ 25 cal/sq cm, Arc-rated shirt (long-sleeve) plus Arc-rated pants (long) plus Arc-rated coverall, plus arc rated arc flash suit jacket, pants, & hood, Arc-rated rainwear as needed.<br>▪ Hardhat + Arc-rated hard hat liner + Safety Glasses or Goggles + Ear Canal Inserts<br>▪ Arc-rated Gloves<br>▪ Leather work shoes |

**Equipment ID:** PP1 **Date of Analysis:** 07/10/2025



# WARNING

## Arc Flash and Shock Risks Appropriate PPE Required

| ARC FLASH RISK PROTECTION | PPE |
|---|---|
| Incident Energy: **0.18 cal/cm^2**<br>Arc Flash Boundary **6 in**<br>**208 VAC** Shock Risk When Cover is Removed<br>**Shock Protection Boundaries:**<br>Limited Approach: **42 in**<br>Restricted Approach: **12 in** | ▪ Non-melting or untreated natural fiber (cotton/wool/rayon/silk > 4.5 oz/sq yd), shirt (long-sleeve), pants (long).<br>▪ Safety Glasses or Goggles + Ear Canal Inserts<br>▪ Leather Gloves<br>▪ N/A |

**Equipment ID:** PPB **Date of Analysis:** 07/10/2025

Coordination Study:

| Project: 2519 FAIA | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Scenario: Base Project | | | | | | | | | |
| | | | | | | | | | |
| LV Breakers | | | | | | | | | |
| Name/Type | LTPU | LTD | STPU | STD | INST | INST Delay | GFPU | GFD | GF INST |
| 800A MAIN BREAKER | | | | | HI (8000A) | 0 | | | |
| Thermal Magnetic | | | | | | | | | |
| | | | | | | | | | |
| ATS-EQ E ECB | 100 (100A) | 16 | 10 (1000A) | 0.4 (I^s T Off) | 15 (1500A) OR Fixed (1520A) | | | | |
| Static Trip | | | | | | | | | |
| | | | | | | | | | |
| ATS-LS E ECB | 100 (100A) | 16 | 10 (1000A) | 0.4 (I^s T Off) | 15 (1500A) OR Fixed (1520A) | | | | |
| Static Trip | | | | | | | | | |
| | | | | | | | | | |
| ATS-LS FDR BKR | 100 (100A) | 16 | 10 (1000A) | 0.4 (I^s T Off) | 15 (1500A) OR Fixed (1520A) | | | | |
| Static Trip | | | | | | | | | |
| | | | | | | | | | |
| ATS-LS FDR BKR0 | 100 (100A) | 16 | 10 (1000A) | 0.4 (I^s T Off) | 15 (1500A) OR Fixed (1520A) | | | | |
| Static Trip | | | | | | | | | |
| | | | | | | | | | |
| CPB FDR BKR | | | | | | | | | |
| Thermal Magnetic | | | | | | | | | |
| | | | | | | | | | |
| EQ MB | 100 (100A) | 16 | 10 (1000A) | 0.4 (I^s T Off) | 15 (1500A) OR Fixed (1520A) | | | | |
| Static Trip | | | | | | | | | |
| | | | | | | | | | |
| LP1 FDR BKR | | | | | | | | | |
| Thermal Magnetic | | | | | | | | | |
| | | | | | | | | | |
| LPB FDR BKR | | | | | | | | | |
| Thermal Magnetic | | | | | | | | | |
| | | | | | | | | | |
| LS MB | 100 (100A) | 16 | 10 (1000A) | 0.4 (I^s T Off) | 15 (1500A) OR Fixed (1520A) | | | | |
| Static Trip | | | | | | | | | |
| | | | | | | | | | |
| PD-0010 | 150 (150A) | 16 | 10 (1500A) | 0.4 (I^s T Off) | 15 (2250A) OR Fixed (2277A) | | | | |
| Static Trip | | | | | | | | | |
| | | | | | | | | | |
| PP1 FDR BKR | | | | | | | | | |
| Thermal Magnetic | | | | | | | | | |
| | | | | | | | | | |
| PPB FDR BKR | | | | | | | | | |
| Thermal Magnetic | | | | | | | | | |

END OF SECTION

# SECTION 26 27 13 – SERVICE AND DISTRIBUTION

## PART 1 -– GENERAL

### 1.1 SCOPE OF WORK

A. Furnish all labor, materials and equipment and incidentals required to construct and install the complete electrical systems as indicated on the Drawings and as specified in this Section.

### 1.2 STANDARD OF MATERIALS

A. All materials, equipment and apparatus covered by this specification shall be new, of current manufacture and shall bear the seal of approval of the Underwriters' Laboratories.

B. All equipment and materials shall have ratings established by a recognized independent agency or laboratory. The Contractor shall apply the items used on this project within the ratings and subject to any stipulations or exceptions established by the independent agency or laboratory.

C. All conduits and raceways, wire, devices, panelboards, switches, etc. of a given type shall be the product of one manufacturer.

### 1.3 SUBMITTALS

A. Manufacturer's data and shop drawings for all components, fixtures, assemblies and accessories indicated in this Division. Submit in accordance with Division 1.

## PART 2 -– PRODUCTS

### 2.1 PANELBOARDS

A. Compliance: NFPA 70 National Electrical Code, UL 67, “Electric Panelboards”, NEMA Publication PB1, “Panelboards”, Federal W-P-115a Type 1, Class 1 specifications and NEMA PB 1.1, “Instructions for Safe Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less”.

B. Provide factory assembled panelboards in sizes and rating as indicated. Panelboards shall be UL listed and labeled.

C. Acceptable manufacturers: panelboards shown on the drawings shall be manufactured by Cutler-Hammer, Eaton, Square D, or Siemens.

D. Provide dead front safety type lighting and appliance panelboards as indicated, with panelboard switching and protective devices in quantities, ratings, types, and with arrangement shown; with anti-turn solderless pressure type main lug connectors approved for use with copper conductors.

E. Refer to the drawings to determine each panelboards pertinent characteristics such as bus rating, main circuit breaker or lugs only, voltage rating, number of phases, number of positions required, etc.

F. Select unit with feeders connecting at the top of the panel. Equip with copper bus bars with not less than 98 percent conductivity, and with full size neutral bus; provide suitable lugs on neutral bus for outgoing feeders requiring neutral connections.

G. Interrupting ratings shall be coordinated with the available short circuit current. Provide molded case main and branch circuit breaker types for each circuit, with toggle handles that

indicate when tripped. Where multiple pole breakers are indicated, provide with common trip so overload on any pole will trip all poles simultaneously.

H. All panels shall be provided with an equipment grounding bus similar to, but isolated from the solid-neutral bus. Provide panelboards with bare uninsulated grounding bars suitable for bolting to enclosures.

I. Panels shall be carefully aligned and rigidly secured in place with the top of the cabinets located 78 inches above the finished floor.

J. Each panel shall be furnished with an identification plate as specified in the "Equipment Identification" section of this specification.

K. Distribution panels which are flush mounted must have door on front of panel.

L. Circuit Breakers:

1. Panelboards shall be equipped with thermal-magnetic molded case circuit breakers with trip ratings as shown on the drawings.

2. Circuit breakers shall be quick-make and quick-break units with positive trip indicating mechanism and common trip on all multi-pole breakers.

3. Single pole 15 and 20 amp circuit breakers shall be UL listed as "Switching Breakers" and be marked SWD.

4. Circuit breakers shall be the bolt-on type.

M. Bus Assembly:

1. Bus bar connections to the branch circuit breakers shall be the "phase sequence" type.

2. Bus bars shall be of copper construction. All current carrying parts of the bus shall be plated.

3. Buses shall be full length with constant cross sectional area, designed for the bus current indicated.

4. Cable lugs shall be furnished in the quantity and size required for the size and number of conductors indicated.

N. Mains ratings: as shown on the drawings.

O. Short circuit current rating: as shown on the drawings. Panelboards, as a complete unit, shall have a short circuit current rating equal to or greater than that indicated. It shall be understood that the minimum rating for 240 and 480 volt rated panelboards shall be 10,000 and 14,000 RMS symmetrical amperes respectively.

P. Cabinet construction:

1. Panel enclosures: UL 50. Enclosures shall be furnished without knockouts. All knockouts shall be field cut.

2. The panelboard bus assembly shall be enclosed in a dead front safety constructed steel cabinet.

3. The size of the wiring gutters and gauge of steel shall be in accordance with NEMA and UL standards; except that the thickness of steel shall not be less than 16 gauge.

4. The box shall be fabricated from galvanized steel. Boxes intended for outdoor duty, or where indicated, shall be rated NEMA 3R.

5. Select enclosures which are fabricated by same manufacturer as panelboards, which mate and match properly with panelboards.
6. Construction shall be such that circuit breaker mounting hardware is not required when circuit breakers are added in the future.
7. The panelboard front cover shall be hinged 1-piece with integral door. The integral door shall have completely concealed hinges and door swings, flush lock and key mechanism, and steel door pull.
8. A circuit directory frame and card with a clear plastic covering shall be provided on the inside of the door. Typed directory cards shall be furnished in each panel.
9. All panelboards throughout project shall be keyed alike.

2.2 CIRCUIT BREAKERS INSTALLED IN EXISTING PANELS

A. Circuit breakers installed in existing panels shall have an A.I.C. rating equal to that of the panel in which they are installed.

2.3 SAFETY DISCONNECT SWITCHES

A. Compliance: NFPA 70 National Electrical Code, UL 98, “Enclosed and Dead Front Switches”, NEMA Publication KS1, “Enclosed Switches”, and NEMA KS 250, “Enclosures for Electrical Equipment (1000 Volts Maximum)”.

B. Safety switches shall be provided for all motors and equipment indicated or required by the National Electrical Code.

C. Safety switches shall be Type "HD" (heavy duty) unless noted otherwise, fused or non-fusible as indicated with number of poles as shown or required. Safety switches for equipment may be non-fused only if equipment is UL tested with circuit breaker protection.

D. Fuses: general use, dual element time-delay, current limiting. Manufactured by Bussman, Littlefuse, Edison, or equivalent.

E. Safety switches for indoor general purpose application shall be NEMA 1 and for exterior application shall be NEMA 3R.

F. Acceptable manufacturer: provide safety switches manufactured by Cutler-Hammer, Square D, or Siemens.

G. Construction: Gray baked enamel finish. NEMA 3R enclosures shall be manufactured from galvanized steel. NEMA 4X enclosures shall be manufactured from 304 stainless steel. Corners shall be ground smooth and polished to overall finish quality. NEMA 4X enclosures shall be fitted with a condensate drain at the bottom and a vent at the top that is rated for NEMA 4X service.

H. Ratings: Fusible disconnects shall be 240 or 600 volt rated depending on the service voltage.

I. Fusible disconnects shall be furnished with Class R fuses of the indicated ampere rating (up to 600 amps) and be equipped with rejection clips.

J. Fusible disconnects shall be UL listed for 200,000 RMS symmetrical ampere short circuit current when equipped with Class R or Class L fuses.

K. Lugs shall be front removable and be UL listed for aluminum or copper conductors at 60 degrees C or 75 degrees C.

L. Disconnect switches shall be horsepower rated.

2.4 SURGE PROTECTION DEVICES

A. The SPD shall be Listed in accordance with UL 1449, Fourth Edition. The product and ratings shall be included in the database of the UL.com website.

B. The surge protective device (SPD) shall be designated a location Type 1 or Type 2 device intended for installation on the load side of the service equipment overcurrent device, including SPDs located at the branch panel.

C. The SPD shall be connected in parallel with the facility's electrical system.

D. The SPD shall be made up of metal oxide varistors (MOV's), or a combination of MOV's with selenium cells or silicon avalanche diodes, ensuring that all of the performance requirements are met. Gas tubes shall not be used.

E. The entire SPD shall be enclosed in a metal or ABS enclosure, NEMA rated for the location. SPDs at main service equipment shall be mounted outside the switchboard or panelboard, not integral to, or installed within the switchboard or panelboard. SPDs for branch panelboard (2nd tier) locations may be mounted outside of, or integral to, the branch panelboard. SPDs installed internal to the distribution equipment shall be of the same manufacturer as the equipment.

F. The SPD shall have a maximum continuous operating voltage (MCOV) rating not less than 115% of nominal voltage of the system it is protecting.

G. Protection Modes:

1. The SPD shall have line to neutral (L-N), line to ground (L-G), line to line (L-L) and neutral to ground (N-G) protection modes for three-phase grounded wye configured systems. For a three-phase delta configured system, the device shall have line to line (L-L) and line to ground (L-G) protection modes.

H. Voltage Protection Rating (VPR):

1. The UL 1449 Voltage Protection Rating (VPR) for the device shall not exceed the following:

a. 208Y/120 volt applications: 800V L-N, L-G, N-G; 1200V L-L

b. 480Y/277 volt applications: 1200V L-N, L-G, N-G; 2000V L-L

I. Nominal Discharge Current (In):

1. The UL 1449 Nominal Discharge Current Rating (In) shall not be less than the following:

a. 20kA for service entrance, switchboard, and main distribution panel locations

b. 10kA for branch panelboard (2nd tier) locations

J. Short Circuit Current Rating (SCCR):

1. The SPD shall have a UL 1449 Short Circuit Current Rating (SCCR) of not less than 200kA.

K. Surge Current Rating:

1. The single-pulse (8 X 20 microsecond waveform as specified in ANSI/IEEE Standard C62.41) surge current capacity shall not be less than the following:

a. 100kA per mode (200kA per phase) for service entrance, switchboard, and main distribution panel locations

b. 50kA per mode (100kA per phase) for branch panelboard (2nd tier) locations

L. Each SPD shall include externally-mounted LED visual status indicators that indicate the on-line status of the unit, for each phase.

M. At service entrance, switchboard, and main distribution panel locations each SPD shall include the following features:

1. audible diagnostic monitoring by way of an audible alarm function

2. one set of NO/NC dry contracts for alarm conditions

N. The manufacturer shall provide a minimum 5 year warranty from the date of shipment of the SPD.

PART 3 –– EXECUTION

3.1 PANELBOARDS

A. Mount panelboards such that top most circuit breaker handles shall not be more than 6'-6" above finished floor.

B. Where panelboards are to be installed on masonry unit walls, including poured reinforced concrete or brick veneer type, install two vertical sections of galvanized steel channel between enclosure and mounting surface. Channel shall be lagged to wall in three places (each length) and the enclosure bolted to the secured channel using stainless steel or galvanized steel hardware. Galvanized channel shall run the entire length of the enclosure, but shall not be exposed at either the top or bottom of the enclosure.

C. Only one conductor shall be allowed under each terminal of circuit breakers. No splices are permitted in panelboards. Tighten connectors and terminals in accordance with equipment manufacturer’s published torque tightening values for equipment connectors.

D. Complete and install a typewritten directory for each panelboard that accurately indicates all loads being served by each breaker.

3.2 DISCONNECTS

A. Motor circuit disconnects shall be mounted within fifty feet and in sight of the load being served.

B. Disconnects shall be labeled in accordance with Section 26 00 00.

3.3 SURGE PROTECTION DEVICES

A. Install SPD units in accordance with manufacturer's written instructions, applicable requirements of NEC and NEMA standards, and recognized industry practices.

B. The SPD units shall be installed at the locations shown on the drawings, or as indicated in the one-line diagram. They shall be parallel-connected to, and located adjacent to the switchboard or panelboard being protected. Locate as close as practical to the bus, keeping lead length as short as possible (less than 3 feet preferred to ensure optimum performance).

C. SPDs shall be connected through a multi-pole circuit breaker or fused disconnect switch, not into main lugs. Circuit breaker or fused disconnect switch shall be 60A for main service device, 30A for branch panelboard device or as recommended by the manufacturer.

D. Use schedule 40 PVC conduit or metallic conduit between the SPD and the switchboard or panelboard as recommended by the manufacturer. Avoid sharp bends, excess length, and splices in the wires. Where possible, use a close-nippled connection with wires going directly to a circuit breaker within the switchboard or panelboard.

E. Setup and test per the manufacturer's recommendations.

END OF SECTION 26 27 13

# SECTION 26 32 13 –GENERATOR AND TRANSFER SWITCHES

## PART 1 - GENERAL

### 1.1 SCOPE OF WORK

A. Furnish and install engine-generator sets of the kW rating indicated, with accessories, auxiliary equipment, and associated work as specified.

B. Put into operation and field test the engine driven generator units and appurtenances as shown on the Drawings and specified here.

C. These Specifications are intended to give a general description of what is required, but do not cover all details which will vary in accordance with the requirements of the equipment as offered. It is, however, intended to cover the furnishing, the shop testing, and delivery and complete installation and field testing of all materials, equipment and appurtenances for the complete units as specified, whether precisely mentioned in these Specifications or not.

D. For all units there shall be furnished and installed all necessary and desirable accessory equipment and auxiliaries whether specifically mentioned in these Specifications or not. This installation shall incorporate the highest standards for the type of service shown on the Drawings. The Contractor is responsible for field testing of the entire installation and instruction of the regular operating personnel in the care, operation and maintenance of all equipment.

E. Pipe and Fittings for fuel gas is included in Division 23.

### 1.2 DESCRIPTION OF SYSTEMS

A. The generator unit shall be mounted as shown on the Drawings and shall be arranged for automatic starting and stopping, and load transfer upon failure of the normal source of power. The unit controls shall provide for automatic exercising on a weekly basis.

### 1.3 QUALIFICATIONS

A. The engine-generator set shall be the standard product, as modified by these Specifications, of a manufacturer regularly engaged in the production of this type of equipment. The unit to be furnished shall be of proven ability and shall be designed, constructed, and installed in accordance with best practices and methods. To qualify as a manufacturer, the engine must be the principal item manufactured and the completed engine generator set shall be supplied by that manufacturer's authorized distributor only.

B. The unit must be of such physical dimensions as to make a good installation in the opinion of the Engineer, in the space provided as indicated on the Drawings.

C. The unit shall be assembled in the U.S. with over 50% of the components such as the engine, generator, auxiliary equipment, etc., manufactured in the U.S. by a manufacturer currently engaged in the production of such equipment.

D. The unit shall be shipped to the jobsite by an authorized engine distributor having a parts and service facility within a 200-mile radius of the jobsite. In addition, and in order not to penalize the Owner for unnecessary or prolonged periods of time for service or repairs to the emergency system, the engine generator set supplier must have no less than eighty percent (80%) of all engine replacement parts locally available at all times. Certified proof of this replacement shall be furnished to the Engineer upon request.

E. All materials and parts comprising the units shall be new and unused, of current manufacture, and of the highest grade, free from all defects or imperfections. Workmanship shall conform

to the best modern practices. Only new and current models will be considered. The units offered under these Specifications shall be the product of a firm regularly engaged in the production of engine-generator equipment and shall meet the requirements of the Specifications set forth here. Major exceptions to these Specifications will be considered sufficient cause for rejection of the machine.

F. All equipment furnished under this Specification shall be new, unused, and the standard product of a manufacturer having a successful record of manufacturing and servicing the equipment and systems specified here for a minimum of five (5) years. The supplier shall furnish all installation and test supervision necessary for final approval and acceptance.

G. Installer's Qualifications: Firm with at least 3 years of sucessful installation experience on projects with engine driven generator units similar to that required for this project. Engage Installer who is willing and capable to execute with the Owner required agreement for continued maintenance of engine-driven generator units.

1.4 SUBMITTALS

A. Submit to the Engineer for approval in a number as required in Division 1, complete sets of installation drawings, schematics, and wiring diagrams which shall show details of installation and connections to the work of other Sections, including foundation drawing showing location and size of foundation bolts for the spring type vibration isolators and brochures covering each item of equipment.

B. In the event that it is impossible to conform with certain details of the Specifications due to different manufacturing techniques, describe completely all nonconforming aspects.

C. The submittal data for each unit shall include, but not necessarily be limited to, the following:

1. Installation drawings showing plan and elevations of the complete generator unit; foundation plan; exhaust silencer; starting battery; battery charger; fuel piping; and all other items requiring space for installation.

2. Engine Data:

a. Manufacturer

b. Model

c. Number of cylinders

d. RPM

e. Bore x stroke

f. BMEP at full rated load

g. Piston speed, FPM

h. Make and model and descriptive literature of electronic governor

i. Fuel consumption rate curves at various loads

j. Engine maximum continuous pump drive duty rating (w/fan HP)

k. Gross engine horsepower to produce generator standby rating (including fan and all parasitic loads)

l. Battery sizes and cranking time calculations

m. Critical speed calculations

n. Emissions

- NOx g/hp-hr
- CO g/hp-hr
- HC g/hp-hr
- PM g/hp-hr

3. Generator Data:

a. Manufacturer

b. Model

c. Rated KVA

d. Rated kw

e. Voltage

f. Temperature rise above 40 degree C ambient

- Stator by thermometer
- Field by resistance
- Class of insulation

g. g. Generator efficiency, including excitation losses, at 80 percent power factor.

- Full load
- 3/4 Load
- 1/2 Load

4. Generator Unit Control Data:

a. Actual electrical diagrams including schematic diagrams, and interconnection wiring diagrams for all equipment to be provided.

b. Legends for all devices on all diagrams.

c. Sequence of operation explanations for all portions of all schematic wiring diagrams.

5. Generator Unit and Accessories:

a. Weight of skid mounted unit

b. Overall length

c. Overall width

d. Overall height

e. Exhaust pipe size

f. CFM of air required for combustion and ventilation

g. Heat rejected to jacket water and lubricating oil in BTU/hr

h. Heat rejected to room by engine and generator in BTU/hr.

6. Manufacturer’s equipment data sheets for the following shall be submitted for approval:

a. Engine silencer

b. Battery Charger

c. Cranking battery(ies)

d. Automatic Transfer Switch

D. Furnish the number of copies required of the manufacturers certified shop test record of the complete engine driven generator unit. Provide test record of the following final production testing:

1. Single-step load pickup.

2. Transient and steady-state governing.

3. Safety shutdown device testing.

4. Voltage regulation.

5. Rated power.

6. Maximum power.

E. Provide test record prior to engine-driven generator set being shipped from factory to project location.

1.5 SAFETY REQUIREMENTS

A. Comply with ANSI B15.1.

1.6 OPERATING INSTRUCTIONS

A. Operating and maintenance manuals shall be furnished. The manuals shall be prepared specifically for this installation and shall include all required cuts, drawings, equipment lists, descriptions, etc. that are required to instruct operation and maintenance personnel unfamiliar with such equipment. The number of manuals to be furnished and any special requirements shall be as specified in Division 1.

B. A factory representative of the generator unit manufacturer, who has complete knowledge of proper operation and maintenance, shall be provided for one day per unit supplied to instruct representatives of the Owner and the Engineer on proper operation and maintenance. With the Owner's permission, this work may be conducted in conjunction with the inspection of the installation and test run as provided under PART 3 - EXECUTION. If there are difficulties in operation of the equipment due to the manufacturer's design or fabrication, additional service shall be provided at no cost to the Owner.

1.7 SPECIAL TOOLS AND SPARE PARTS

A. The manufacturer shall furnish any special tools required for normal operation and maintenance of the equipment being furnished.

1.8 PRODUCT HANDLING

A. All parts shall be properly protected so that no damage or deterioration will occur during a prolonged delay from the time of shipment until installation is completed and the units and equipment are ready for operation.

B. All equipment and parts must be properly protected against any damage during a prolonged period at the site.

C. Factory assembled parts and components shall not be dismantled for shipment unless permission is received in writing from the Engineer.

D. Finished surface of all exposed openings (exhaust, etc.) shall be protected.

E. Finished iron or steel surfaces not painted shall be properly protected to prevent rush and corrosion.

F. Proper care shall be taken to protect parts from the entrance of water during shipment, storage and handling.

G. Each box or package shall be properly marked to show its net weight in addition to its contents.

1.9 WARRANTY

A. All equipment supplied under this section shall be warranted for a period of one (1) year by the contractor and the equipment manufacturers. Warranty period shall commence on Final Completion Date as outlined in Division 1.

B. The equipment shall be warranted to be free from defects in workmanship, design and materials. If any part of the equipment should fail during the warranty period, it shall be replaced in the machine(s) and the unit(s) restored to service at no expense to the Owner.

C. The manufacturer's warranty period shall run concurrently with the Contractor's warranty period. No exception to this provision shall be allowed.

PART 2 - PRODUCTS

2.1 RATINGS

A. The rating of the generator set shall not exceed the manufacturer's published standby rating. The gross engine horsepower required to produce the standby rating shall not exceed the manufacturer's published continuous duty rating by more than 150 percent. Continuous duty rating shall be as defined in BS649 or DIN6270 but in no case shall it exceed the manufacturer's published continuous duty rating for the engine as used in continuous rated pump drive applications at 1800 rpm output speed. The gross engine horsepower described above shall include all parasitic demands such as generator inefficiencies, water pumps, radiator fan (for fan cooled models) and all accessories necessary to the unit's proper operation while operating at rated load and at a rotative speed not to exceed 1800 rpm.

B. Each engine driven generator set shall be capable of producing the specified standby KW rating for continuous electrical service during interruption of the normal utility source and shall be certified to this effect by the manufacturer for the actual unit supplied.

C. The Engine-Generator Unit shall be rated for not less than 40 kW (120/208 volts, 3-Phase, 60 Hertz) at 0.8 power factor, with full load amps of 139A at 208V, 3Ø.

2.2 ENGINES

A. The engine shall be multi-cylinder, spark ignition, four cycle, either vertical or "V" type. Speed shall not exceed 1800 revolutions per minute at normal full load operation. The engine governor shall maintain frequency regulation not to exceed 3 percent (1.8 Hertz) from no load to full rated load and shall have a Vernier control with positive locking mechanism for manual operation and adjustment.

B. The engine shall be water cooled.

C. The engine shall be equipped with fuel inlet strainer/seperator, lube oil filters, intake air filters, lube oil cooler, engine driven water pump, and unit mounted instruments. Unit mounted instruments shall include a water temperature gauge, and lubrication oil pressure gauge. The engine shall be provided with low oil pressure, high water temperature and overspeed safety shutdowns of the manual reset type.

D. The engine shall have a gear-type lubricating oil pump for supplying oil under pressure to main bearings, crank pin bearings, pistons, piston pins, timing gears, camshaft bearings, valve rocker mechanism and governor.

E. Lubricating oil filter shall be provided and so located and connected that all oil being circulated is continuously filtered and cleaned. Filter shall be accessible, easily removed and shall be equipped with a by-pass mechanism as an insurance against stopping of lubricating oil circulation in the event the filter(s) become clogged.

F. Lubricating Oil Filters: Shall be the full-flow type (throw-away) and shall be capable of filtering the full rate of oil flow of the oil pump at maximum engine speed.

G. Crankcase Ventilation: provide an open crankcase ventilator with replaceable filter and integral oil drainline return to crankcase. Unit shall have a molded glass reinforced epoxy head and powder coated steel filter canister. Filters shall be throw-away. Size unit to correspond to manufacturer’s recommendation for ventilation gas flowrate.

H. The flywheel shall be balanced, and shall be capable of being rotated fifty per cent above the maximum rated engine speed without danger of breaking or exploding. Flywheel housing shall be provided with a drain hole at the lowest point.

2.3 ENGINE AIR INDUCTION SYSTEM

A. The air induction system shall be equipped with heavy-duty dry type air cleaners of adequate capacity to effectively remove the dirt and abrasives from the combustion air to the engine.

B. Turbocharger (if supplied) shall be a combination centrifugal blower driven by an exhaust gas turbine, with the air blower directly connected to the intake air manifold. Systems that require cooling of the intake air below ambient air temperature ahead of the turbocharger or scavenger air blower will not be acceptable. Lubrication may be from the engine pressure lubrication system or as recommended by the manufacturer. All necessary supports and connections shall be provided.

C. Intercooler: Intercooling of induction air is not acceptable. Provide unit which meets the requirements without requiring intercooling.

2.4 COOLING SYSTEMS

A. The engine shall be furnished with a unit mounted radiator-type cooling system having sufficient capacity for cooling the engine when the generator set is delivering full rated load in an ambient temperature of 110 degrees F. The engine shall be provided with a thermostatic valve placed in the jacket water outlet, between the engine and the cooling source. This

valve shall maintain the proper jacket water temperature under all load conditions. A coolant overflow container shall be provided.

B. Unit shall be delivered with adequate antifreeze for protection at 0 degrees F.

C. Closed circuit jacket water systems shall be treated with a rust inhibiter as recommended by the engine manufacturer.

D. Unit mounted thermal circulation type water heaters incorporating a thermostatic switch shall be furnished to maintain engine jacket water to 70 degrees F. The heaters shall be 120 volt, single phase, 60 Hertz.

2.5 EXHAUST SYSTEMS

A. A suitable silencer shall be furnished. Silencers shall be constructed with inlet and outlet, required number of appropriate mounting brackets and 1/2-inch min. N.P.T. drain connection. Silencers shall be steel, finished with high temperature paint or aluminized coating.

B. Silencer performance required:

| Frequency (Hz) | Attenuation (not less than) |
|---|---|
| 50 | 10dB |
| 250 | 40dB |
| 1K | 25db |
| 5K | 20dB |

C. Silencers for turbo applications shall be manufactured specifically for use with turbocharged engines.

D. A flexible stainless steel pipe connection shall be provided between the engine exhaust stack and exhaust piping. One silencer raincap with counter weight shall be provided for the unit. All exhaust equipment must be rated to withstand temperatures of approximately 1,000 degrees F. Lagging of all exposed interior piping and silencer shall be furnished.

2.6 AUTOMATIC STARTING SYSTEM

A. A DC electric starting system with positive engagement shall be furnished. The starting motor voltage shall be as recommended by the engine manufacturer.

B. An engine control shall be furnished as an integral part of the electric set to start and stop the engine as signaled by the automatic transfer switch on the generator unit. The control shall start the engine by adjustable timed cranking cycles for a total period of not less than one minute. The crank and rest cycles shall be individually adjustable. The starting circuit shall open, and the control shall activate an alarm circuit if the engine does not start. The control shall be equipped with automatic safety shutdowns so that upon signal of a low oil pressure, high water temperature, or overspeed condition of the engine, the control shall immediately stop the engine. The control shall be equipped with signal lights to indicate any of the engine failures and also with a 3-position control switch identified for "automatic-off-manual" to be externally mounted.

C. Engine Cranking Battery:

1. The battery shall be of the lead acid type, and shall be of domestic manufacture. The battery shall be designed for engine cranking service, of the size supplied for three 20-second cranking periods without being recharged. The battery shall be mounted in

suitable free standing covered rack. Battery rack location will be as shown on the Shop Drawings. The electrical contractor shall provide the required lengths of all interconnecting battery cables. Minimum wire size and type shall be 4/0 welding cable.

2. There shall be furnished for each battery system, a transistor control mag amp design wall mounted battery charger with float equalize ability, an equalizing timer, a low DC voltage alarm relay, and on/off circuit breaker type switches. Chargers shall be suitable for and sized for use with lead acid type batteries. Input shall be 115 volt AC, single phase. A DC ammeter, DC voltmeter,and other control devices, switches, etc., shall be door mounted for good visual reference. Charger shall have rated output of not less than 10 amps. Battery charger malfunction (status) indication shall be provided.

2.7 GENERATORS

A. The generators shall be heavy duty three-phase, 60 Hertz, ball bearing construction, rotating field, synchronous type built to NEMA MG-1 standards. A voltage regulator shall be provided to match the characteristics of the generator and engine. Voltage regulation shall be plus or minus 1.5% from no load to full rated load. Readily accessible voltage droop, voltage level and voltage gain controls shall be provided. Voltage level adjustment shall be a minimum of plus or minus 5%. Generator and exciter shall be inherently capable of parallel operation with other power sources of equivalent electrical characteristics. The generator shall be a single bearing type, 4 pole revolving field, connected directly to the flywheel housing, brushless type, temperature rise not to exceed 105 degrees C over a 40 degree C ambient when operating at its rated capacity as specified herein.

B. The generator shall be of open drip-proof construction, self-ventilated and air cooled, furnished with single row ball bearing sized for a minimum of 40,000 hours life, and furnished with a grease fitting.

C. The generator shall utilize a permanent magnet excitation system capable of sustaining at least 300% rated current for 10 seconds under a symmetrical fault.

D. Other features shall include volts per hertz regulator, TIF less than 50, provide 300 percent short circuit sustaining capability, suitable for external SCR controlled equipment, and a large terminal box with bus bar terminal strips for load lead connections. A current transformer shall be installed in the Generator Terminal Box for connecting to a ground sensor relay in the control panel.

2.8 GENERATOR CONTROL PANEL

A. A generator mounted NEMA 1, 14 gauge steel control panel, shall be furnished for the generator unit. The panel shall contain, but not be limited to, the following equipment:

1. Frequency Meter.

2. Voltmeter, 2 percent accuracy.

3. Ammeter, 2 percent accuracy.

B. Automatic starting controls as specified.

C. Voltage level adjustment rheostat.

D. Dry contracts for remote alarms wired to terminal strips, minimum (4).

E. Individual fault indicator lights for low oil pressure, high water temperature, overspeed, and overcrank, with prealarm and remote alarm contacts.

F. Four position function switch marked "auto," "manual," "off/reset," and "stop."

G. Running time meter, oil pressure and water temperature gauges.

H. Panel lights, transformers, fuses, etc., as required.

I. A main-line, molded case circuit breaker shall be installed for the generator unit and sized as 150A, 3P. The trip unit for each pole shall have elements providing inverse time delay during overload conditions and instantaneous electronic tripping for short circuit protection. The trip unit shall be three function (LSI) electronic type.

J. Level 1 Safety Indications and Shutdowns. Engine and accessories monitor and status with individual fault indicator relay signals and lights, and common external alarm contact for:

1. engine run, overcrank and shutdown, low water temperature, high temperature with pre-alarm, high temperature shutdown, low oil pressure with pre-alarm, low oil pressure shutdown, engine overspeed, engine overspeed shutdown, low engine coolant level, control switch in OFF position, high battery voltage, low battery voltage, battery charger status/AC failure.

2.9 REMOTE ANNUNCIATOR

A. A remote annunciator shall be furnished and installed where shown on the Drawings.

B. The remote annunciator shall have the individual visual and audible alarms listed above and lamp and tone test button.

2.10 AUTOMATIC LOAD TRANSFER SWITCH

A. Conformance: UL 1008 - Standard for Automatic Transfer Switches; NFPA 70 - National Electrical Code; NFPA 110 - Standard for Emergency and Standby Power Systems; IEEE Standard 446 - Recommended Practice for Emergency and Standby Power Systems; IEEE Standard 241 - Recommended Practice for Electric Power Systems in Commercial Buildings; NEMA Standard ICS 2-447 - Automatic Transfer Switches.

B. Operation: electrical operation shall be accomplished by a non-fused momentarily energized solenoid direct operating. The automatic transfer switch shall be mechanically held on both the emergency and the normal side. Power for transfer shall be taken from the source to which the Transfer Switch is transferring. The Transfer Switch shall be double-throw, mechanically and electrically interlocked. No hydraulic or pneumatic mechanisms shall be allowed.

C. Ratings: ATS shall be rated for all classes of loads when installed in an non-ventilated enclosure. ATS shall be the double-throw type and shall be electrically operated but mechanically held in both positions, with the operator momentarily receiving power from the source to which the load is to be transferred. ATS constructed with either automatic or non-automatic circuit breakers are unacceptable. ATS equipped with protective devices to interrupt fault currents are also unacceptable.

D. There shall be (2) two ATS's provided for this project, one for life safety loads and one for optional standby loads. The amperage rating, characteristics, and enclosure type of both automatic load transfer switches shall be rated for 100A, 120/208V, 3Ø, 60Hz, 3-pole, 65kA. The enclosure shall be furnished with a padlockable door handle.

E. The Transfer Switch shall employ standard industrial relays that plug into suitable sockets on a single common printed-circuit board. All controls shall be accessible from the front of the control board. All control wiring shall be permanently marked along the full length of the wire and shall be neatly harnessed. All control circuitry shall be 120 VAC nominal. Internal components shall be rated for continuous duty.

F. Automatic load transfer switch shall include the following accessories:

G. Engine starting contacts to provide for generator starting.

H. Test switch, momentary type, to simulate a power outage.

I. Adjustable time delay on engine starting to over-ride momentary outages and nuisance voltage dips.

J. Adjustable time delay on transfer of load to emergency source.

K. Adjustable time delay to retransfer to normal source after removing generator from load.

L. Adjustable time delay after retransfer of load to normal engine cool-down timer wherein the generator set runs unloaded after retransfer to line.

M. A digital seven day programmable plant exerciser to start and run the generator set with or without load (selectable) each 168 hours for a 30 minute interval. Program settings shall be maintained by replaceable battery.

N. One auxiliary contact closed on emergency and one auxiliary contact open on emergency, connected to main shaft.

O. Pilot lights to indicate the normal and emergency position of the transfer switch.

P. Indicating Lights to indicate power source acceptable: A green indicating light shall supervise the normal power source and shall have a nameplate engraved NORMAL AVAILABLE. A red indicating light shall supervise the emergency power source and shall have a nameplate engraved EMERGENCY AVAILABLE.

Q. Isolated (ungrounded) neutral bar.

R. Service Conditions: ATS shall be suitable for performance under the following service conditions:

1. Altitude: 100 feet above mean sea level.
2. Relative Humidity: 90 percent maximum, continuous.
3. Temperature: From 10 degrees F. to 110 degrees F.
4. Seismic Zone: 0

S. Enclosure:

1. The switch and accessories shall be in a wall mounted and unventilated NEMA ICS 6, NEMA 1, smooth sheet metal enclosure constructed in accordance with UL 1008. Metal shall be not less than US Standard Gauge No. 14. Doors shall have hinges, locking handle latch, and gaskets at jamb, sill, and head.
2. The enclosure shall be constructed for convenient removal and replacement of contacts, coils, springs and control devices from the front without the removal of main power conductors or removal of major components.
3. Ferrous surfaces shall be cleaned and painted. Surfaces to be painted shall be free of all oil, grease, welding slag and spatter, mill scale, deleterious corrosion, dirt, and other foreign substances. Painting shall include at least one coat of rust-inhibiting primer and one coat of finish enamel. The rust-inhibiting primer shall be applied to a clean, dry surface as soon as practicable after cleaning. Painting shall be manufacturer's standard material and process, except the total dry film thickness shall be not less than 2.5 mils.

2.11 BASE ASSEMBLY

A. Engine-Generator: Shall be NEMA ICS 6 and mounted on a fabricated steel skid base suitable for supporting, transporting, and skidding engine and generator without damage to equipment or alignment.

B. Vibration Isolators: The engine-generator shall be provided with spring-type vibrator isolators.

2.12 WEATHERPROOF ENCLOSURE

A. The complete engine-generator set shall be enclosed in a modular weatherproof shelter. The shelter shall be constructed of removable side panels and end panels and shall be skid base or slip-over mounted.

B. The enclosure shall be adequately insulated and baffled such that sound pressure levels shall not exceed 89dBA @ 1 meter / 76dBA @ 7 meters when generator is running and producing full rated output.

C. Side panels shall be easy to remove, lockable and shall give unrestricted access to the engine for routine service and maintenance. Louvers shall be provided at the radiator and generator ends large enough to allow ample air flow for cooling.

D. The enclosure shall be designed and braced to resist 150 MPH winds.

E. Unit shall have sufficient area such that intake air velocity through free area of louver shall not exceed 300 FPM at manufacturer's published air delivery and exhaust quantities.

2.13 REMOTE MONITORING AND CONTROL SYSTEM

A. Each generator and automatic transfer switch shall be remotely monitored via a web-based user interface. Communication path may be via UTP, RS485 or wireless. Monitor shall connect to Owner's LAN via standard TCP/IP connection. Additional connectivity options shall include Wi-Fi (WPA2PSK), 4G LTE cellular with 3G fallback. SIM shall be pre-loaded and pre-activated.

B. System shall allow for User remote start/stop of generator(s), remote transfer/retransfer of automatic switch(es) and remote acknowledgement and reset of warning annunciator alarms.

C. Monitoring system shall provide real time site monitoring of engine and annunciator data, and transfer switch data. At a minimum the following functions shall be supported:

1. Engine running
2. Engine high temperature warning
3. Engine oil pressure warning
4. Engine overcrank warning
5. Transfer switch position
6. Transfer switch not in auto
7. Standby source available
8. Utility source available

D. Monitoring software shall be web-based and shall be compatible with Windows Internet Explorer, Google Chrome, and Firefox. A mobile app shall be available.

E. Data Logging: Provide data storage containing alternator load, engine coolant temperature, engine oil pressure, duration of run time, and other desirable metrics.

F. Event Storage: Store in retrievable format all starts/shutdowns, faults, warning, transfer operations, etc. time and date. Event storage shall be for a minimum of 365 days.

G. Software shall allow for firmware updates over ethernet, with built-in authentication security.

H. All data transfer shall be over encrypted (128-bit) communication pathway. All system access shall be secured by user name and password. Read only authorization shall be a feature of the access security system.

I. Physical package shall allow for flexible installation locations. Housing design shall be rated IP69K for direct outdoor applications.

J. Additionally, generator and automatic transfer switch shall be connected to fire alarm system for monitoring in accordance with NFPA 72.

2.14 ACCESSORY EQUIPMENT

A. All accessories necessary for a complete operating unit shall be furnished. These accessories shall include all those described herein and those necessary for the proper functioning of the particular unit(s) supplied.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Installation shall conform to the requirements of NFPA 70 and NFPA 110.

B. Fuel connections shall be made in accordance with Division 23 of these Specifications.

C. Install unit on a concrete foundation as indicated.

D. The generator manufacturer shall supply the services of a factory representative to check over the completed generator installation, who will certify in writing to the Engineer that the installation meets the approval of the manufacturer.

E. The Contractor shall install suitable jacket water additives as recommended by the engine manufacturer and approved by the Engineer, for prevention of both scale formation and corrosion in the water jackets and cooling system components which are in contact with the engine jacket water. These additives shall be added to the cooling system prior to running the field acceptance test.

3.2 PAINTING

A. The engine generator set and associated equipment shall be shop primed and finish coated in accordance with the manufacturer's standard practice prior to shipment. Color shall be selected by the Engineer and an adequate supply of touch-up paint shall be supplied by the manufacturer.

3.3 INSPECTION AND TESTING

A. The Contractor shall perform all field tests and trial operations, and conduct all field inspections (except final field inspection). The Contractor shall provide all labor, equipment, lubricants and incidentals required for the tests.

B. The Engineer will witness all field tests and trial operations, and conduct final field inspections. The Contractor shall give the Engineer ample notice of the dates and times scheduled for tests, trial operations, and inspections which require the presence of the Engineer.

C. A qualified factory representative shall assist the Contractor with the field checkout, startup, and test.

D. Prior to acceptance of the installation, equipment shall be tested to show it is free of any defects and will start automatically to be subjected to full load test through the use of portable dry type load banks supplied for this purpose at the jobsite by generator set supplier. Conduct four hour load run as follows:

50% 1 hour

100% 3 hours

E. The load bank will be capable of definite and precise incremental loading and shall not be dependent on the generator control instrumentation to read amperage and voltage of each phase. Rather, the test instrumentation will serve as a check of the generator set meters. Readings will be taken and recorded at 30 minute intervals during the test and at each occurrence of a load change.

F. Salt water brine tanks or those load banks requiring water as a source for cooling are not acceptable for this purpose and shall not be utilized for this test.

G. Load bank testing shall be done in the presence of the Owner and the Engineer only after the unit is permanently installed in accordance with the plans and Specifications.

H. Prior to acceptance of the installation, equipment shall be tested in accordance with NFPA 110 to show it is free of any defects and will start automatically to be subjected to load test through the use of portable dry type load banks supplied for this purpose at the jobsite by generator set supplier. Test shall demonstrate that all alarms and shutdowns operate properly. Demonstrate cranking cycle battery capability with engine controls set such that generator unit will not crank. Demonstrate that transfer switch can start engine. Also, engine shall be run with full building load connected to demonstrate capacity of engine-generator.

3.4 JOB CLOSE OUT

A. Manuals: Provide three sets of operation and maintenance manuals for equipment. Identification symbols for all replaceable parts and assemblies shall be included. Information in manuals shall be comprehensive and specific.

B. At job closeout perform the following:

C. Perform all service checks.

D. Clean all equipment, enclosures, and accessories thoroughly

E. Touchup any scratches and nicks with paint provided by the manufacturer for that purpose.

END OF SECTION 26 32 13

# SECTION 26 36 13 – MANUAL TRANSFER SWITCH AND DOCKING STATION

## PART 1 - GENERAL

### 1.1 Scope

A. Furnish and install manual transfer switch with number of poles, amperage, voltage, and withstand current ratings as follows: 3-pole, 150A, 208V, 3Ø, 65kA. Each manual transfer shall consist of a 3 position center off mechanically held power transfer switch unit and a mechanical operating mechanism to provide complete manual operation. All transfer switches and mechanical operating mechanism shall be the product of the same manufacturer. Refer to drawings for additional information.

### 1.2 Manufacturers

A. Guide: ASCO Series 300 MTDQ or Equal.

### 1.3 Codes and Standards

A. The manual transfer switches and accessories shall conform to the requirements of:

B. UL 1008 Listed for Optional Standby Transfer Switches (Manual Transfer Switches)

C. UL 891 Switch Boards

D. CSA C22.2 No.178 –1978

E. IEC 60947-6-1 Low – Voltage Switchgear and Controller

F. NFPA 70 - National Electrical Code

G. IEEE Standard 446 - IEEE Recommended Practice for Emergency and Standby Power Systems for Commercial and Industrial Applications

H. UL 508 Industrial Control Equipment

I. NEC Article 700.3 (F)

## PART 2 - PRODUCTS

### 2.1 Mechanically Held Transfer Switch

A. The transfer switch unit shall be manually operated and mechanically held. The switch shall be mechanically interlocked to ensure only one of three possible positions, Source 1, Source 2, or Center Off. Fused disconnect type switches shall not be acceptable.

B. The switch shall be positively locked and unaffected by momentary outages so that contact pressure is maintained at a constant value and temperature rise at the contacts is minimized for maximum reliability and operating life.

C. All main contacts shall be silver composition.

D. Inspection of all contacts shall be possible from the front of the switch without disassembly of operating linkages and without disconnection of power conductors.

E. Designs utilizing components of molded-case circuit breakers, contactors, or parts thereof which are not intended for continuous duty, repetitive switching or transfer between two active power sources are not acceptable.

F. Where neutral conductors are to be solidly connected, a neutral terminal plate with fully-rated AL-CU pressure connectors shall be provided.

G. The manual transfer switch shall be tested in accordance with UL 1008 for transfer switches. Switch ratings of 260 amperes and less shall have endurance rating of 6000 cycles.

PART 3 - EXECUTION

3.1 Manual Operations Provisions

A. The transfer switch shall be arranged for manually actuated manual operation.

B. The manual transfer shall be actuated via a mechanical operating mechanism.

C. The manual operating handle shall be capable of external operation without opening the enclosure door.

D. It shall have the same contact to contact speed as automatic operation.

E. There shall be three positions for manual operation:

1. Connected to Source 1 (building generator)

2. Connected to Source 2 (temporary generator)

3. Connected to center off (disconnected position)

F. Switch position when connected to Source 1, or Source 2 shall be pad – lockable.

3.2 ENCLOSURE

A. The manual transfer switch shall be furnished in a NEMA type 3R or a 3RX enclosure unless otherwise shown on the plans.

B. Enclosures shall be either free standing, floor mounted, or wall-mounted. Drawings indicate wall-mount type with support structure.

C. 3R enclosures shall be code gauge steel as per UL 50 with ANSI #61 powder coat finish.

D. 3RX enclosures shall be available in 304 or 316 stainless steel.

E. Provide strip heater with thermostat for Type 3R and 3RX enclosure requirements.

3.3 ADDITIONAL FEATURES

A. Mechanical position indicators (yellow) visible to the operator shall be included for Source 1, Source 2, and Center Off.

B. Optional LED indicators shall be available for Source 1 and Source 2.

C. Auxiliary position indicating contacts, rated 10 amps, 250 Vac shall be provided consisting of one closed when the switch is connected to Source 1, and one contact closed when the switch is connected to Source 2.

D. A form A contact shall be provided to indicate switch is in the Center Off (disconnected) position.

E. Auto Start Destination Toggle Switch shall be provided to allow for the user to select which generator the ATS will start when the engine start signal is sent from the ATS.

F. Dual Purpose Manual Transfer Switch with Integrated Quick Connects contains 16 Series quick connects which provides a connecting means for connecting a portable generator and a load bank.

G. Generator quick connects are located on the front or back side of this manual transfer switch.

H. Load Bank connects are located on the front side of this manual transfer switch. Neutral connections are not provided for Load Bank connections.

I. All electrical connectors shall be 16 Series cam type single pole connectors, available color coded as per industry standard practice:

1. 208V: phase 1 = black, phase 2 = red, phase 3 = blue.
2. Ground shall always be green.
3. Neutral shall be white.

3.4 ACCESSORIES

A. A 120v strip heater with thermostat and terminal block shall be provided for outdoor installations where type 3R, enclosures are specified. External 120v power source required.

B. Two form C contacts shall be connected to customer terminal block that operate when Source 1 and Source 2 voltage is present at transfer switch terminals. The following indicators shall be provided:

1. Load Connected to Source 1 (Green).
2. Load Connected to Source 2 (Red).
3. Source 1 Available (Green).
4. Source 2 Available (Red).
5. Load Disconnect (Yellow)

C. Phase rotation monitor.

D. Source available / Connected to / Disconnected LEDs and contacts.

E. Tests and Certification

1. The complete manual transfer switch and docking station shall be factory tested to ensure proper operation of the individual components and correct overall sequence of operation and to ensure compliance with the specification requirements.
2. The manual transfer switch and docking station manufacturer shall be certified to ISO 9001: 2008 International Quality Standard and the manufacturer shall have third party certification verifying quality assurance in design/development, production, installation and servicing in accordance with ISO 9001: 2008.
3. For ease of maintenance, the transfer switch nameplate shall include drawing numbers and serviceable part numbers.

END OF SECTION 26 36 13

# SECTION 28 31 00 – FIRE DETECTION AND ALARM

## PART 1 - GENERAL

### 1.1 DESCRIPTION

A. This section of the specifications includes the furnishing, installation, and connection of the microprocessor controlled, intelligent reporting fire alarm equipment, required to form a complete coordinated system ready for operation. It shall include, but not be limited to, alarm initiating devices, alarm notification appliances, control panel(s), auxiliary control and monitoring devices, annunciators, communicators and wiring as shown on the drawings and specified here.

B. The fire alarm system installation shall comply with requirements of NFPA Standard No. 72 requirements for protected premises signaling systems except as modified and supplemented by this specification. The system shall be electrically supervised and monitor the integrity of all conductors.

C. The fire alarm manufacturer shall be of the highest caliber and insist on the highest quality. The system shall be manufactured by an ISO 9001 certified company.

D. The FACP and peripheral devices shall be manufactured 100% by a single manufacturer (or division thereof).

E. The ability for selective input/output control functions based on ANDing, ORing, NOTing, timing and special coded operations is to also be incorporated in the resident software programming of the system.

F. To accommodate and facilitate job site changes, initiation circuits shall be individually configurable on-site to provide either alarm/supervisory/trouble operation, alarm only, supervisory only, trouble only, current limited alarm, no alarm, normally closed device monitoring, a non-latching circuit or an alarm verification circuit.

G. To accommodate and facilitate job site changes, notification appliance circuits shall be individually configurable on-site to provide, upon activation, a temporal code until reset upon any output circuit.

### 1.2 BASIC PERFORMANCE

A. Alarm, trouble and supervisory signals from all intelligent reporting devices shall be encoded onto an NFPA Class B signaling line circuit. No T-taps will be permitted in system wiring.

B. Initiation Device Circuits (IDC) shall be wired Class B.

C. Notification Appliance Circuits (NAC) shall be wired Class B.

D. Alarm signals arriving at the main FACP shall not be lost following a power failure (or outage) until the alarm signal is processed and recorded.

1.3 BASIC SYSTEM FUNCTIONAL OPERATION

A. When a fire alarm condition is detected and reported by one of the system initiating devices, the following functions shall immediately occur:

1. The System Alarm LED shall flash.
2. A local audible signal in the control panel and remote annunciator panel shall sound.
3. A backlit LCD display shall indicate all information associated with the Fire Alarm condition, including the type of alarm point and its location within the protected premises.
4. History storage equipment shall log the information associated with each new fire alarm control panel condition, along with time and date of occurrence.
5. All system output programs assigned via control by event equations to be activated by the particular point in alarm shall be executed, and the associated System Outputs (alarm notification appliances and/or relays) shall be activated.
6. A supervised signal to notify the local fire department or an approved central station is to be activated. This circuit shall be configured as required to properly interface with the existing digital communicator.
7. The mechanical controls shall activate the air handling systems for shutdown and/or fan control.
8. Refer to fire alarm matrix for additional site specific alarm actions.

B. When a supervisory condition is detected and reported by the system, such as a tamper switch, the following functions shall immediately occur:

1. Activate the system supervisory service audible signal and illuminate the LED at the control unit and the remote annunciator.
2. Pressing the Supervisory Acknowledge Key will silence the supervisory audible signal while maintaining the Supervisory LED "on" indicating off-normal condition.
3. Record the event in the FACP historical log.
4. Transmission of supervisory signal to the supervising station.
5. Restoring the condition shall cause the Supervisory LED to clear and restore the system to normal.
6. Refer to fire alarm matrix for additional site specific supervisory actions.

C. When a trouble condition is detected and reported by the system, such as a loss of AC power at control panel, the following functions shall immediately occur:

1. Activate the system trouble service audible signal and illuminate the LED at the control unit and the remote annunciator.
2. Pressing the Trouble Acknowledge Key will silence the trouble audible signal while maintaining the Trouble LED "on" indicating off-normal condition.

3. Record the event in the FACP historical log.
4. Transmission of trouble signal to the supervising station.
5. Restoring the condition shall cause the Trouble LED to clear and restore the system to normal.
6. Refer to fire alarm matrix for additional site specific trouble actions.

D. Priority of Signals: Fire alarm events have highest priority. Subsequent alarm events are queued in the order received and do not affect existing alarm conditions. Supervisory and Trouble events have second-, and third-level priority, respectively. Signals of a higher-level priority take precedence over signals of lower priority even though the lower-priority condition occurred first. Annunciate all events regardless of priority or order received.

E. Fire Suppression Monitoring

1. Water flow: Activation of a water flow switch shall initiate general alarm operations.
2. Sprinkler valve tamper switch: The activation of any valve tamper switch shall activate system supervisory operations.

1.4 SUBMITTALS

A. Submit manufacturer’s data to the Engineer for review in accordance with Division 1 requirements.

B. For equipment other than that specified, the contractor shall supply proof that such substitute equipment equals or exceeds the features, functions, performance, and quality of the specified equipment.

C. Shop Drawings:

1. Shop Drawings shall comply with all NFPA 72 requirements.
2. Sufficient information, clearly presented, shall be included to determine compliance with drawings and specifications.
3. Include manufacturer's name(s), model numbers, ratings, power requirements, and performance in the form of standard data sheets.
4. Provide equipment layout, device arrangement, complete wiring point-to-point diagrams, and conduit layouts drawn to scaled floor plan depiction.
5. Provide system power requirements and battery sizing calculations for review.
6. Indicate each panels maximum connected load data in amperes at the 120V supply power level.
7. Show remote annunciator or secondary panel layout, configurations, and terminations.
8. Indicate interface of Owner furnished equipment and existing equipment to remain.

1.5 Manuals:

A. Submit simultaneously with the shop drawings, complete operating and maintenance manual listing the manufacturer's name(s) including technical data sheets.

B. Wiring diagrams shall indicate internal wiring for each item of equipment and the interconnections between the items of equipment.

C. Provide a clear and concise description of operation that gives, in detail, the information required to properly operate the equipment and system.

1.6 Software Modifications:

A. Provide the services of a factory trained and authorized technician to perform all system software modifications, upgrades or changes. Response time of the technician to the site shall not exceed 4 hours.

B. Provide all hardware, software, programming tools and documentation necessary to modify the fire alarm system on site. Modification includes addition and deletion of devices, circuits, zones and changes to system operation and custom label changes for devices or zones. The system structure and software shall place no limit on the type or extent of software modifications on-site. Modification of software shall not require power-down of the system or loss of system fire protection while modifications are being made.

C. The Contractor’s base bid shall include all programming and software modifications necessary to provide a fully functioning and properly operating system. Any modifications necessary for component additions or deletions to the system prior to system acceptance, and any modifications during the warranty period shall be included unconditionally in the base bid.

1.7 Certifications:

A. Together with the shop drawing submittal, submit a certification from the major equipment manufacturer indicating that the proposed supervisor of installation and the proposed performer of contract maintenance is an authorized representative of the major equipment manufacturer. Include names and addresses in the certification.

B. Installing contractors shall have NICET Level 2 certification.

1.8 GUARANTY

A. All work performed and all material and equipment furnished under this contract shall be free from defects and shall remain so for a period of at least one (1) year from the date of acceptance. The full cost of maintenance, labor, programming, materials, and testing required to correct any defect during this one year period shall be included in the submittal bid.

B. The fire alarm control panel manufacturer shall certify that the control panel and components will be supported for a minimum of 10 years following the project.

1.9 APPLICABLE STANDARDS AND SPECIFICATIONS

A. The specifications and standards listed below form a part of this specification. The system shall fully comply with all relevant standards currently adopted by the Florida Fire Prevention Code.

B. National Fire Protection Association (NFPA) - USA:

1. No. 15 Water Spray Systems.
2. No. 70 National Electric Code.
3. No. 72 National Fire Alarm Code.
4. No. 101 Life Safety Code.

C. Underwriters Laboratories Inc. (UL) - USA:

1. No. 268 Smoke Detectors for Fire Protective Signaling Systems.
2. No. 864 Control Units for Fire Protective Signaling Systems.
3. No. 268A Smoke Detectors for Duct Applications.
4. No. 521 Heat Detectors for Fire Protective Signaling Systems
5. No. 464 Audible Signaling Appliances.
6. No. 38 Manually Actuated Signaling Boxes.
7. No. 346 Waterflow Indicators for Fire Protective Signaling Systems.
8. No. 1971 Visual Notification Appliances.

D. Local and State Building Codes

E. All requirements of the Authority Having Jurisdiction (AHJ).

F. The system shall be listed by the national agencies as suitable for extinguishing release applications.

1.10 APPROVALS

A. The system shall have proper listing and/or approval from the following nationally recognized agencies:

1. UL Underwriters Laboratories Inc.

PART 2 -– PRODUCTS

2.1 EQUIPMENT AND MATERIAL, GENERAL

A. All equipment and components shall be new, and the manufacturer's current model. The materials, appliances, equipment and devices shall be tested and listed by a nationally recognized approvals agency for use as part of a protective signaling system, meeting the National Fire Alarm Code.

B. All equipment and components shall be installed in strict compliance with manufacturers' recommendations. Consult the manufacturer's installation manuals for all wiring diagrams, schematics, physical equipment sizes, etc., before beginning system installation.

C. All equipment shall be attached to walls and ceiling/floor assemblies and shall be held firmly in place (e.g., detectors shall not be supported solely by suspended ceilings). Fasteners and supports shall be adequate to support the required load. Ceiling mounted equipment shall be installed tight and flush up against ceiling. Gaps between devices and ceiling will not be accepted.

2.2 CONDUIT AND WIRE

A. Conduit shall be in accordance with The National Electrical Code (NEC), local and state requirements, and Section 26 05 30 of these specifications.

B. All wiring shall be installed in a metal conduit or raceway. Conduit fill shall not exceed 40 percent of interior cross sectional area where three or more cables are contained within a single conduit.

C. Power limited circuits must be separated from any open conductors of Power, or Class 1 circuits, and shall not be placed in any conduit, junction box or raceway containing these conductors, as per NEC.

D. All circuits shall be provided with transient suppression devices and the system shall be designed to permit simultaneous operation of all circuits without interference or loss of signals.

E. Conduits shall not enter the Fire Alarm Control Panel, or any other remotely mounted Control Panel equipment or backbox except where conduit entry is specified by the FACP manufacturer. Field modification of Control Panels that differs from manufacturer’s instructions is not permitted.

F. Conduit shall be 3/4 inch minimum.

G. Wire:

1. All fire alarm system wiring shall be new.

2. Wiring shall be in accordance with local, state and national codes (e.g., NEC Article 760) and as recommended by the manufacturer of the fire alarm system. Number and size of conductors shall be as recommended by the fire alarm system manufacturer.

3. All wire and cable shall be listed and/or approved by a recognized testing agency for use with a protective signaling system.

4. Wiring used for the multiplex communication loop shall be twisted and shielded and support a minimum wiring distance of 10,000 feet. Initiating device circuits and notification appliance circuits shall not be laid along the same pathways or installed in the same conduit with each other, or with the communication loop (if applicable). This requirement does not apply specifically to junction boxes, device boxes or terminal cabinets where terminations or taps are made.

5. All field wiring shall be completely supervised by the Control Panel.

2.3 Terminal Boxes, Junction Boxes and Cabinets:

A. All boxes and cabinets shall be UL listed for their use and purpose.

2.4 Initiating circuits shall be arranged to serve like categories (manual, smoke, water flow). Mixed category circuitry shall not be permitted except on signaling line circuits connected to intelligent reporting devices.

2.5 The Fire Alarm Control Panel shall be connected to a separate dedicated branch circuit, maximum 20 amperes. This circuit shall be labeled at the Power Distribution Panel as FIRE ALARM CONTROL PANEL. The Control Panel Cabinet shall be grounded securely to service ground bus in main electrical panel. The control panel cabinet shall have the power circuit designation labeled inside the control panel door.

2.6 MAIN FIRE ALARM CONTROL PANEL

A. The FACP shall contain a microprocessor based Central Processing Unit (CPU) and integrated voice evacuation system. The CPU shall communicate with and control the following types of equipment used to make up the system: intelligent detectors, addressable modules, annunciators, and other system controlled devices.

B. System Capacity and General Operation

C. The control panel shall support 1024 device addresses and be capable of expansion to 2048 intelligent/addressable devices.

D. The system shall include capability for at least thirty-two (32) form C alarm and trouble relays rated at a minimum of 2.0 amps @ 30 VDC. It shall also include sixteen (16) Class B programmable Notification Appliance Circuits.

E. The system shall support up to 96 programmable EIA-485 driven relays.

F. The Fire Alarm Control Panel shall include a full featured operator interface control and annunciation panel that shall include a backlit Liquid Crystal Display, individual, color coded system status LEDs, and an alphanumeric keypad for the field programming and control of the fire alarm system.

G. All programming or editing of the existing program in the system shall be achieved without special equipment and without interrupting the alarm monitoring functions of the Fire Alarm Control Panel.

H. The FACP shall provide the following features:

1. Drift Compensation to extend detector accuracy over life.

2. Sensitivity Test, meeting requirements of NFPA 72.

3. Maintenance Alert to warn of excessive smoke detector dirt or dust accumulation.

4. System Status Reports to display or printer.

5. Alarm Verification, with verification counters.

6. Rapid manual station reporting (under 3 seconds).
7. Non-Alarm points for general (non-fire) control.
8. Periodic Detector Test, conducted automatically by software.
9. Cross Zoning with the capability of: counting two detectors in alarm, two software zones in alarm, or one smoke detector and one thermal detector.
10. Check for two detectors set to same address.
11. UL 1076 Security Monitor Points.
12. Control-By-Time for non-fire operations, with holiday schedules.
13. Day/Night automatic adjustment of detector sensitivity.
14. Walk Test or Service Groups

2.7 Central Microprocessor:

A. The Microprocessor unit shall communicate with, monitor, and control all external interfaces with the control panel. It shall include EPROM for system program storage; non-volatile memory for building specific program storage; and a "watch dog" circuit to detect and report microprocessor failure.

B. The Microprocessor Unit shall contain and execute all control-by-event programs for specific action to be taken if an alarm condition is detected by the system. Such control-by-event programs shall be held in non-volatile programmable memory, and shall not be lost even if system primary and secondary power failure occurs.

C. The Microprocessor Unit shall also provide a real-time clock for time annotation of system displays, printer, and history file. The time-of-day and date shall not be lost if system primary and secondary power supplies fail. The real time clock may also be used to control non-fire functions at programmed time-of-day, day-of-week, and day-of-year.

2.8 Display:

A. The display shall provide all the controls and indicators used by the system operator and may also be used to program all system operational parameters.

B. The display shall include status information and custom alphanumeric labels for all intelligent detectors, addressable modules, and software zones.

C. The Display shall provide a minimum 80-character back-lit alphanumeric Liquid Crystal Display (LCD). It shall also provide Light Emitting Diodes (LEDs), that indicate the status of the following system parameters: AC POWER, SYSTEM ALARM, SYSTEM TROUBLE, SIGNAL SILENCED, SUPERVISORY.

D. The Display shall provide a key-pad with control capability to command all system functions, entry of any alphabetic or numeric information, and field programming. Two different access (password) levels shall be provided, one to prevent unauthorized system control, one to prevent programming.

E. The Display shall include the following operator functions: SIGNAL SILENCE, RESET, DRILL, and ACKNOWLEDGE.

2.9 Signaling Line Circuits (SLC):

A. The SLC Interface shall provide power to and communicate with up to 99 intelligent detectors (Ionization, Photoelectric, or Thermal) and 99 intelligent modules (monitor or control) for a system capacity of 198 devices. This shall be accomplished over a single SLC loop. System shall have capability to support up to twelve (12) SLC's and include a minimum of two (2) spare SLC's for future use. System shall be configured with one (1) building floor per single SLC.

B. The Loop Interface Board shall receive analog information from all intelligent detectors that shall be processed to determine whether normal, alarm, or trouble conditions exist for each detector. The software shall automatically maintain the detector's desired sensitivity level by adjusting for the effects of environmental factors, including the accumulation of dust in each detector. The analog information shall also be used for automatic detector testing and for the automatic determination of detector maintenance requirements.

C. The detector software shall meet NFPA 72, chapter 14 requirements and be certified by UL as a calibrated sensitivity test instrument.

D. The detector software shall allow manual or automatic sensitivity adjustment.

2.10 Serial Interfaces:

A. An EIA RS-485 port for the serial connection of the Annunciators and remote LCD displays shall be provided.

B. The EIA RS-232 interface shall include special protocol methods that allow off-site monitoring of the FACP over standard dial-up phone lines. This ancillary capability shall allow remote readout of all status information, including analog values, and shall not interfere with or degrade FACP operations when used. It shall allow remote FACP Acknowledge, Reset, or Signal Silence in this mode. It shall also allow adjustment of detector sensitivity and readout of the history file.

C. The EIA RS-485 interface may be used for network connection to a Proprietary Receiving Unit.

2.11 Modular Network Interfaces:

A. A modular network connection shall be provided with provisions for Fiber Optic and Wired media card adapter.

B. Fiber optic media card shall be provided.

C. Media card shall be compatible with 62.5/125 or 50/125 fiber cable.

2.12 Enclosures:

A. The control panel shall be housed in a UL listed cabinet suitable for surface or recessed mounting – refer to drawings. Cabinet and front shall be corrosion protected, given a rust-resistant prime coat, and manufacturer's standard finish.

B. The door shall provide a key lock and shall include a glass or other transparent opening for viewing of all indicators.

C. All interfaces and associated equipment are to be protected so that they will not be affected by voltage surges or line transients consistent with UL standard 864.

D. A relay module shall provide four (4) form C relays rated at 2.0 amps. The relays shall track programmable software zones and are in addition to the required alarm/trouble contacts.

2.13 Power Supply:

A. The Power Supply shall operate on 120 VAC, 60 Hz; shall be power-limited, and shall provide all necessary power for the FACP.

B. It shall provide notification appliance power using a switching 24 VDC regulator. Power capacity shall be sufficient to drive all audible/visual devices provided within project plus an additional 20% spare capacity. In no case shall capacity be less than 6 amps. An expansion power supply is acceptable to meet the required system capacity.

C. It shall provide a battery charger for 24 hours of standby followed by 15 minutes of alarm using dual-rate charging techniques for fast battery recharge.

D. It shall provide a very low frequency sweep earth detect circuit, capable of detecting earth faults on sensitive addressable modules.

2.14 Field Wiring Terminal Blocks:

A. All panel I/O wiring shall utilize terminal blocks with sufficient capacity for 18 to 12 AWG wire.

2.15 Operators Controls

A. Acknowledge Switch:

B. Activation of the control panel Acknowledge switch in response to new alarms and/or troubles shall silence the local panel audible signal and change the Alarm and Trouble LEDs from flashing mode to steady-ON mode.

C. Where multiple conditions exist, advancement of the LCD display to previous or subsequent Alarm or Trouble conditions shall be a feature.

D. Depression of the Acknowledge switch shall also silence all remote annunciator sounders.

E. Signal Silence Switch: Activation of the Signal silence switch shall cause all programmed alarm notification appliances and relays to return to the normal condition after an alarm condition. The selection of notification circuits and relays that are silenceable by this switch shall be fully field programmable within the confines of all applicable standards. The FACP software shall include silence inhibit and auto-silence timers.

F. System Reset Switch: Activation of the system reset switch shall cause all electronically-latched initiating devices, appliances or software zones, as well as all associated output devices and circuits, to return to their normal condition.

G. A lamp test function shall be available.

H. Drill (Evacuate) Switch.

1. The Drill switch shall activate all notification appliance circuits. The drill function shall latch until the panel is silenced, reset, or until the drill switch is pushed a second time.

I. The fire alarm control panel shall include integrated push buttons and labels for disabling the functions noted on the drawings.

2.16 Field Programming:

A. The system shall be programmable, configurable and expandable in the field without the need for special tools or electronic equipment and shall not require field replacement of electronic integrated circuits.

B. All field defined programs shall be stored in non-volatile memory.

C. The programming function shall be enabled with a password that may be defined specifically for the system when it is installed. Two access levels with password protection shall be provided in addition to a key-lock cabinet

D. Program edit shall not interfere with normal operation and fire detection. If a fire condition is detected during programming operation, the system shall exit programming and perform functions as programmed.

E. An off-line programming function, with batch upload/download, shall also be available.

2.17 Specific System Operations:

A. Smoke Detector Sensitivity Adjust: Means shall be provided for adjusting the sensitivity of any or all analog intelligent smoke detectors in the system from the System keypad. Sensitivity range shall be within the allowed UL window.

B. Alarm Verification: Each of the intelligent addressable smoke detectors in the system may be independently selected and enabled to be an alarm verified detector. The Alarm Verification delay shall be programmable from 5 to 30 seconds and each detector shall be able to be selected for verification. The FACP shall keep a count of the number of times that each detector has entered the verification cycle. These counters may be displayed and reset by the proper operator commands.

C. Point Disable: Any Device in the system may be Enabled or Disabled through the system keypad.

D. Point Read: The system shall be able to display or print the following point status diagnostic functions:

1. Device status

2. Device type

3. Custom device label

4. View analog detector values

5. Device zone assignments

6. All Program Parameters

E. System Status Reports: Upon command from an operator of the system, a status report will be generated, stored, and printed on the integrated control panel system printer, listing all system status.

F. System History Recording and Reporting: The Fire Alarm Control Panel shall contain a History Buffer that will be capable of storing up to 600 system alarms/troubles/operator actions. Each of these actions will be stored and time and date stamped with the actual time of the activation. The contents of the History Buffer may be manually reviewed, one event at a time, or printed on the integrated control panel system printer in its entirety.

G. Although the foreground history buffer may be cleared for user convenience, a background, non-erasable buffer shall be maintained which provides the last 600 system events.

H. The History Buffer shall use non-volatile memory. Systems that use volatile memory for history storage are not acceptable.

I. Automatic Detector Maintenance Alert: The Fire Alarm Control Panel shall automatically interrogate each intelligent smoke detector and shall analyze the detector responses over a period of time.

J. If any intelligent smoke detector in the system responds with a reading that is below or above normal limits, then the system will enter the Trouble Mode, and the particular detector will be annunciated on the system display, and printed on the panel printer. This feature shall in no way inhibit the receipt of alarm conditions in the system, nor shall it require any special hardware, special tools or computer expertise to perform.

K. Software Zones: The FACP shall provide 99 software zones. All addressable devices shall be capable of control-by-zone through field programming for control activation and annunciation purposes.

2.18 SYSTEM COMPONENTS

A. Notification appliances shall have candela setting visible without removing device from wall or ceiling.

B. Devices:

1. Provide devices that are UL listed, with high quality tone reproduction.

2. Ceiling mounted devices shall have white grilles. Provide supports, tile bridges and other installation accessories as required.

3. Devices for exterior use shall be corrosion resistant and listed for the service.

4. Provide exterior device of the double re-entrant horn type, bracket mounted with all purpose, multi-position bracket.

C. Strobe Lights:

1. Shall operate on 24 VDC nominal and shall be LED type.

2. Shall meet the requirements of the ADA as defined in section 702.1 of FBC Accessibility Chapter 7 and shall meet the following criteria:
3. The strobe intensity shall meet the requirements of section 702.1 of FBC Accessibility Chapter 7.
4. The flash rate shall meet the requirements of section 702.1 of FBC Accessibility Chapter 7.
5. The appliance shall be placed 80 inches above the highest floor level within the space, or 6 inches below the ceiling, whichever is the lower.
6. If visual alarm devices are installed in different configuration than as shown on the plans, fire alarm contractor shall confirm spacing is in accordance with NFPA 72 requirements.

D. Audible/Visual Combination Devices:

1. Shall meet the applicable requirements above for audibility.
2. Shall meet the requirements above for visibility.
3. Units shall provide a common enclosure for the fire alarm audible and the visual alarm devices.

E. Addressable Devices - General

1. Addressable Devices shall provide an address-setting means. This may be software coded.
2. Detectors shall be Intelligent and Addressable, and shall connect with two wires to the Fire Alarm Control Panel Signaling Line Circuits.
3. Addressable smoke and thermal detectors shall provide an LED. LEDs shall identify normal, alarm, or trouble conditions. An output connection shall also be provided in the base to connect an external remote alarm LED.
4. Smoke detector sensitivity shall be set through the Fire Alarm Control Panel and shall be adjustable in the field through the field programming of the system. Sensitivity may be automatically adjusted by the panel on a time-of-day basis.
5. Using software in the FACP, detectors shall automatically compensate for dust accumulation and other slow environmental changes that may affect their performance. The detectors shall be listed by UL as meeting the calibrated sensitivity test requirements of NFPA Standard 72, Chapter 7.
6. The detectors shall be ceiling-mount and shall include a separate twist-lock base with tamper proof feature.
7. The detectors shall provide a test means whereby they will simulate an alarm condition and report that condition to the control panel. Such a test may be initiated at the detector itself (by activating a switch) or initiated remotely on command from the control panel.

8. Detectors shall also store an internal identifying type code that the control panel shall use to identify the type of device (PHOTO, THERMAL).

9. Smoke detectors shall be photoelectric type only. Multi-criteria type are not permitted.

F. Addressable Pull Box (manual station)

1. Addressable Pull Boxes shall, on command from the Control Panel, send data to the panel representing the state of the manual switch. They shall use a key operated test-reset lock, and shall be designed so that after actual emergency operation, they cannot be restored to normal use except by the use of a key.

2. Operating stations shall be single acting type.

3. All operated stations shall have a positive, visual indication of operation and utilize a key type reset.

4. Manual Stations shall be constructed with clearly visible operating instructions provided on the cover. The word FIRE shall appear on the front of the stations in raised letters, 1.75 inches or larger.

5. Stations shall be suitable for semi-flush mounting, and shall be installed not less than 42 inches, nor more than 48 inches above the finished floor.

G. Intelligent Photoelectric Smoke Detector:

1. The detectors shall use the photoelectric (light-scattering) principal to measure smoke density and shall, on command from the control panel, send data to the panel representing the analog level of smoke density.

H. Intelligent Thermal Detectors:

1. Thermal Detectors shall be intelligent addressable devices adjustable for activation temperature by software. Initial programming for all units shall be 135 degrees F and have a rate-of-rise element rated at 15 degrees F per minute. It shall connect via two wires to the Fire Alarm Control Panel Signaling Line Circuit. Up to 99 intelligent heat detectors may connect to one SLC loop.

2. The detectors shall use an electronic sensor to measure thermal conditions caused by a fire and shall, on command from the control panel, send data to the panel representing the analog level of such thermal measurements.

I. Intelligent Duct Smoke Detector:

1. In-Duct Smoke Detector Housing shall accommodate either an intelligent ionization sensor or an intelligent photoelectric sensor, of that provides continuous analog monitoring and alarm verification from the panel.

2. When sufficient smoke is sensed, an alarm signal is initiated at the FACP.

3. Provide remote alarm/power LED indicator where noted on the Drawings.

J. Addressable Dry Contact Monitor Module:

1. Addressable Monitor Modules shall be provided to connect one supervised IDC zone of conventional Alarm Initiating Devices (any N.O. dry contact device) to one of the Fire Alarm Control Panel Signaling Line Circuit (SLC) Loops.

2. The Monitor Module shall mount in a 4-inch square, 2-1/8" deep electrical box. An LED shall be provided that shall flash under normal conditions, indicating that the Monitor Module is operational and in regular communication with the control panel.

3. The IDC zone may be wired for Class B operation. An LED shall be provided that shall flash under normal conditions, indicating that the Monitor Module is operational and in regular communication with the control panel.

K. Two Wire Detector Monitor Module:

1. Addressable Monitor modules shall be provided to connect one supervised IDC zone of conventional 2-Wire smoke detectors or alarm initiating devices (any N.O. dry contact device).

2. The Two-Wire Monitor Module shall mount in a 4-inch square, 2-1/8" deep electrical box or with an optional surface backbox. An LED shall be provided that shall flash under normal conditions, indicating that the Monitor module is operational and in regular communication with the control panel.

L. Addressable Control Module:

1. Addressable Control Modules shall be provided to supervise and control the operation of one conventional Notification Appliance Circuit (NAC) of compatible, 24 VDC powered, polarized Audio/Visual Notification Appliances. For fan shutdown and other auxiliary control functions, the control module may be set to operate as a dry contract relay.

2. The Control Module shall mount in a standard 4-inch square, 2-1/8" deep electrical box, or to a surface mounted backbox.

3. The control module NAC circuit may be wired with up to 1 Amp of inductive A/V signal, or 2 Amps of resistive A/V signal operation, or as a dry contact (Form C) relay. The relay coil shall be magnetically latched to reduce wiring connection requirements, and to insure that 100% of all auxiliary relay or NACs may be energized at the same time on the same pair of wires.

M. Audio/visual power shall be provided by a separate supervised power loop from the main fire alarm control panel or from a supervised, UL listed remote power supply.

N. The control module shall provide address-setting means and shall also store an internal identifying code that the control panel shall use to identify the type of device. An LED shall be provided that shall flash under normal conditions, indicating that the control module is operational and is in regular communication with the control panel.

O. The control module shall be suitable for pilot duty applications and rated for a minimum of .5 amps at 30 VDC.

P. Isolator Module:

1. Isolator modules shall be provided to automatically isolate wire-to-wire short circuits on an SLC loop. The isolator module shall limit the number of modules or detectors that may be rendered inoperative by a short circuit fault on the SLC Loop. At least one isolator module shall be provided for each floor or protected zone of the building.
2. If a wire-to-wire short occurs, the isolator module shall automatically open-circuit (disconnect) the SLC loop. When the short circuit condition is corrected, the Isolator Module shall automatically reconnect the isolated section.
3. The Isolator Module shall not require any address-setting, and its operations shall be totally automatic. It shall not be necessary to replace or reset an Isolator Module after its normal operation.
4. The Isolator Module shall mount in a standard 4-inch deep electrical box or in a surface mounted backbox. It shall provide a single LED that shall flash to indicate that the Isolator is operational and shall illuminate steadily to indicate that a short circuit condition has been detected and isolated.

Q. Sprinkler Valve Supervisory Switches:

1. Each sprinkler system water supply control valve riser or zone control valve shall be equipped with a supervisory switch. Standpipe hose valves, and test and drain valves shall not be equipped with supervisory switches.
2. Each Post Indicator Valve (PIV) or main gate valve shall be equipped with a supervisory switch.
3. Mount switch so as not to interfere with the normal operation of the valve and adjust to operate within two revolutions toward the closed position of the valve control, or when the stem has moved no more than one-fifth of the distance from its normal position.
4. The mechanism shall be contained in a weatherproof aluminum housing that shall provide a 3/4 inch tapped conduit entrance and incorporate the necessary facilities for attachment to the valves.
5. Switch housing to be finished in red baked enamel.
6. The entire installed assembly shall be tamper proof and arranged to cause a switch operation if the housing cover is removed, or if the unit is removed from its mounting.
7. Valve supervisory switches shall be provided and connected under this section and installed by mechanical contractor.
8. All valve switches shall have dedicated address. Multiple valve switches sharing a single address is not permitted.

R. Serially Connected Annunciator Requirements

1. The Annunciator shall communicate with the fire alarm control panel via an EIA 485 communications loop and shall annunciate all zones in the system.
2. The annunciator shall be supervised.

3. The annunciator shall provide a red Alarm LED per zone, and a yellow Trouble LED per zone. The annunciator will also have an "ON-LINE" LED, local piezo sounder, local acknowledge/lamp test switch, and custom zone/function identification labels.
4. The annunciator switches may be used for System control such as, Global Acknowledge, Global Signal Silence, and Global System Reset.
5. LCD Alphanumeric Display Annunciator:
6. The Alphanumeric display annunciator shall be a supervised, remotely located back-lit LCD display containing a minimum of eighty (80) characters for alarm annunciation in clear English text.
7. The LCD annunciator shall display all alarm and trouble conditions in the system.
8. The annunciator shall connect to a two-wire EIA- 485 interface. The two-wire connection shall be capable of distances of 6,000 feet.

2.19 TERMINAL CABINETS

A. Provide manufacturer’s standard surface mounted terminal cabinets for termination of circuits as required. Terminate all conductors on designated terminal blocks or strips with identification of each conductor in the cabinet.

B. Use of standard NEMA 1 control enclosure is acceptable. Construction shall be 16 gauge steel with hinged front cover with flush latch operated with coin or screwdriver. Provide units with separate backpanel for mounting terminal blocks. Do not mount terminal block directly to back of enclosure.

C. All terminal cabinets, whether new or existing, shall be painted red and have “Fire Alarm Terminal Cabinet” stenciled in white letters.

2.20 BATTERIES

A. Shall be 12 volt, gel cell (SLA) type (at least two required).

B. Battery shall have sufficient capacity to power the fire alarm system for not less than twenty-four hours plus 15 minutes of alarm upon a normal AC power failure.

C. The batteries are to be completely maintenance free. Liquid electrolytes are not acceptable. To prevent spills and leakage, fluid level checks or refilling shall not be required.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Installation shall be in accordance with the NEC, NFPA 72, local and state codes, as shown on the drawings, and as recommended by the equipment manufacturer. The manufacturer's authorized representative shall provide onsite supervision of installation.

B. All conduit, junction boxes, conduit supports and hangers shall be concealed in finished areas and may be exposed in unfinished areas. Smoke detectors shall not be installed prior to the system programming and test period. If construction is ongoing during this period,

measures shall be taken to protect smoke detectors from contamination and physical damage.

C. All fire detection and alarm system devices, control panels and remote annunciators shall be flush mounted when located in finished areas and may be surface mounted when located in unfinished areas.

3.2 TEST

A. Provide the service of a competent, factory-trained engineer or technician authorized by the manufacturer of the fire alarm equipment to technically supervise and participate during all of the adjustments and tests for the system. All testing shall be in accordance with NFPA 72.

B. Pretesting: Contractor shall determine, through pretesting, the conformance of the system to the requirements of the Drawings and Specifications. Correct deficiencies observed in pretesting. Replace malfunctioning or damaged items with new and retest until satisfactory performance and conditions are achieved.

C. Before energizing the cables and wires, check for correct connections and test for short circuits, ground faults, continuity, and insulation.

D. Close each sprinkler system flow valve and verify proper supervisory alarm at the FACP.

E. Verify activation of all flow switches.

F. Open initiating device circuits and verify that the trouble signal actuates.

G. Open and short signaling line circuits and verify that the trouble signal actuates.

H. Open and short Notification Appliance Circuits and verify that trouble signal actuates.

I. Ground all circuits and verify response of trouble signals.

J. Check presence and audibility of tone at all alarm notification devices.

K. Check installation, supervision, and operation of all intelligent smoke detectors using the Walk Test.

L. Check activation and operation of the agent release sequence.

M. Each of the alarm conditions that the system is required to detect should be introduced on the system. Verify the proper receipt and the proper processing of the signal at the FACP and the correct activation of the control points.

N. When the system is equipped with optional features, the manufacturer's manual should be consulted to determine the proper testing procedures. This is intended to address such items as verifying controls performed by individually addressed or grouped devices, sensitivity monitoring, verification functionality and similar.

O. Verify all signals transmit properly to monitoring center.

P. Retesting: Correct deficiencies indicated by tests and completely retest work affected by such deficiencies. Verify by the system test that the total system meets the Specifications and complies with applicable standards.

3.3 FINAL INSPECTION

A. At the final inspection a factory trained representative of the manufacturer of the major equipment shall demonstrate to the DMS Fire and Safety Personnel, the Engineer, and AHJ that the systems function properly in every respect.

3.4 CLOSEOUT

A. Provide a spare parts kit that shall include one of every type of field device (one pull station, one audible device, one combination a/v, one strobe, one smoke detector, one heat detector, one relay control module, one relay monitor module).

B. Provide any special tools, equipment, programming devices and cables needed to maintain or repair the system shall be provided.

3.5 OPERATION MANUALS

A. General: The manuals shall include installation, operation, and service manuals.

3.6 AS-BUILT DRAWINGS

A. Point-to-point Wiring Diagram: A point-to-point wiring diagram shall be included with the "as-built" drawings.

B. CAD Format As-Built Drawings: All as-built drawings shall be submitted on flash drive (USB) in AutoCAD format (check for latest acceptable release). Contractor is responsible for modifying as-builts during construction and maintaining clear and accurate drawings.

C. Field Devices: All field devices installed in the fire alarm control panel shall be included in all diagrams. These devices include, but are not limited to, air handler shut down relays and remote reporting relays.

D. Function Diagram: A one-line function diagram of the fire alarm control panel shall be provided.

E. Detailed Plan Views: Floor plans shall indicate all detailed conduit routing, all control panels, all terminal cabinets, all junction boxes, all pull boxes, all disconnect switches, all circuit breaker locations serving fire alarm equipment or shunt trip circuits, all fire alarm devices, all surge protection devices, and end of line resistors. Plan views shall indicate device addresses, dB, candela ratings, and other specific device information adjacent to each fire alarm device.

F. Accuracy: As-built drawings shall be verified by contractor and 100% accurate with actual installation conditions in the field.

G. Refer to drawings for additional as-built requirements.

3.7 MAINTENANCE ITEMS

A. All spare parts, special tools, equipment, keys, etc. required for maintenance or operation shall be turned over to the owner when the system is accepted.

B. A copy of the field prints, drawings, etc. shall be given to the owner when the system is accepted.

3.8 INSTRUCTION

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

B. The Contractor and/or the Systems Manufacturer's representatives shall provide a typewritten "Sequence of Operation" to the owner.

END OF SECTION 28 31 00

# SECTION 313116 - TERMITE CONTROL

## 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. Soil treatment.

### 1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components, and profiles for termite control products.
2. Include the EPA-Registered Label for termiticide products.

### 1.4 INFORMATIONAL SUBMITTALS

A. Soil Treatment Application Report: After application of termiticide is completed, submit report for Owner's records and include the following:

1. Date and time of application.
2. Moisture content of soil before application.
3. Termiticide brand name and manufacturer.
4. Quantity of undiluted termiticide used.
5. Dilutions, methods, volumes used, and rates of application.
6. Areas of application.
7. Water source for application.

### 1.5 FIELD CONDITIONS

A. Soil Treatment:

1. Environmental Limitations: To ensure penetration, do not treat soil that is water saturated or frozen. Do not treat soil while precipitation is occurring. Comply with requirements of the EPA-Registered Label and requirements of authorities having jurisdiction.
2. Related Work: Coordinate soil treatment application with excavating, filling, grading, and concreting operations. Treat soil under footings, grade beams, and ground-supported slabs before construction.

1.6 WARRANTY

A. Soil Treatment Special Warranty: Manufacturer's standard form, signed by Applicator and Contractor, certifying that termite control work consisting of applied soil termiticide treatment will prevent infestation of subterranean termites, including Formosan termites (Coptotermes formosanus). If subterranean termite activity or damage is discovered during warranty period, re-treat soil and repair or replace damage caused by termite infestation.

1. Warranty Period: One Insert number years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain termite control products from single source from single manufacturer.

2.2 SOIL TREATMENT

A. Termiticide: EPA-Registered termiticide acceptable to authorities having jurisdiction, in an aqueous solution formulated to prevent termite infestation.

1. Products: Subject to compliance with requirements, provide one of the following:

a. BASF Corporation, Pest Control Solutions; .
b. Bayer Environmental Science; .
c. Ensystex; .
d. Syngenta; Demon Max.

2. Service Life of Treatment: Soil treatment termiticide that is effective for not less than five years against infestation of subterranean termites.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for moisture content of soil per termiticide label, interfaces with earthwork, slab and foundation work, landscaping, utility installation, and other conditions affecting performance of termite control.

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

3.2 PREPARATION

A. General: Prepare work areas according to the requirements of authorities having jurisdiction and according to manufacturer's written instructions before beginning application and installation of termite control treatment(s). Remove extraneous sources of wood cellulose and other edible materials, such as wood debris, tree stumps and roots, stakes, formwork, and construction waste wood from soil within and around foundations.

B. Soil Treatment Preparation: Remove foreign matter and impermeable soil materials that could decrease treatment effectiveness on areas to be treated. Loosen, rake, and level soil to be treated, except previously compacted areas under slabs and footings. Termiticides may be applied before placing compacted fill under slabs if recommended in writing by termiticide manufacturer.

1. Fit filling hose connected to water source at the site with a backflow preventer, according to requirements of authorities having jurisdiction.

## 3.3 APPLYING SOIL TREATMENT

A. Application: Mix soil treatment termiticide solution to a uniform consistency. Distribute treatment uniformly. Apply treatment at the product's EPA-Registered Label volume and rate for maximum specified concentration of termiticide to the following so that a continuous horizontal and vertical termiticidal barrier or treated zone is established around and under building construction.

1. Slabs-on-Grade and Basement Slabs: Under ground-supported slab construction, including footings, building slabs, and attached slabs as an overall treatment. Treat soil materials before concrete footings and slabs are placed.
2. Penetrations: At expansion joints, control joints, and areas where slabs and below-grade walls will be penetrated.

B. Post warning signs in areas of application.

C. Reapply soil treatment solution to areas disturbed by subsequent excavation, grading, landscaping, or other construction activities following application.

## 3.4 PROTECTION

A. Avoid disturbance of treated soil after application. Keep off treated areas until completely dry.

B. Protect termiticide solution dispersed in treated soils and fills from being diluted by exposure to water spillage or weather until ground-supported slabs are installed. Use waterproof barrier according to EPA-Registered Label instructions.

## 3.5 MAINTENANCE SERVICE

A. Maintenance Service: Beginning at Substantial Completion, maintenance service shall include 12 months' full maintenance by skilled employees of termite-control-treatment Installer. Include annual maintenance as required for proper performance according to the product's EPA- Registered Label and manufacturer's written instructions. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.

B. Continuing Maintenance Proposal: Provide from termite-control-treatment Installer to Owner, in the form of a standard yearly (or other period) maintenance agreement, starting on date initial maintenance service is concluded. State services, obligations, conditions, and terms for agreement period and for future renewal options.

1. Include annual inspection for termite activity and effectiveness of termite treatment according to manufacturer's written instructions.

END OF SECTION 313116