



# DLR Group

Architecture

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## **Lockhart Pre K-8 School**

**Virgin Islands Department of Education (VIDE)**

**St. Thomas, U.S. Virgin Islands**

## **Schematic Design**

Volume 1 of 2, Division 01-14

**DLR Group Project No. 68-21103-13**

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## SECTION 011000 - SUMMARY

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section Includes:

- 1. Project information.
- 2. Work covered by Contract Documents.
- 3. Phased construction.
- 4. Contractor's use of site and premises.
- 5. Work restrictions.
- 6. Specification and Drawing conventions.
- 7. Miscellaneous provisions.

- B. Related Requirements:

- 1. Section 015000 "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.

#### 1.3 PROJECT INFORMATION

- A. Project Identification: Lockhart PreK-8 Schematic Design Package. TO#009-13-87039

- 1. Project Location: 83RM+P83, Charlotte Amalie, St. Thomas, 00802 US Virgin Islands

- B. Owner: Virgin Islands Office of Disaster Recovery (ODR) with Virgin Islands Department of Education (VIDE).

- 1. Owner's Representative: Dr. Dionne Wells-Hedrington, Commissioner, VIDE.

- C. Architect/Engineer of Record: DLR Group, Inc., 7290 West 133<sup>rd</sup> Street, Overland Park, KS, 913-897-7811

- 1. Architect/Engineer of Record Consultants: Architect of Record has retained the following design professionals who have prepared designated portions of the Schematic Design:

- a. Civil/Site Engineering: Harris Civil Engineers, LLC, 1200 East Hillcrest Street, Suite 200, Orlando, Florida, 32803, 407-629-4777.
- b. Foodservice Design: Advanced Foodservice Consulting, 6201 South Gateway Drive, Marion, Iowa, 52302, 319-447-3515.

D. Design-Builder:

1. Design-builder will be engaged for this Project to provide final architectural and engineering services and to serve as Project's constructor. The terms "design-builder" and "Contractor" are synonymous.

E. Web-Based Project Software: Project software will be used for purposes of managing communication and documents during the construction stage.

1. See Section 013100 "Project Management and Coordination." for requirements for using web-based Project software.

#### 1.4 WORK COVERED BY CONTRACT DOCUMENTS

A. The Work of Project is defined by the Contract Documents and includes, but is not limited to, the following:

1. The existing approximately 8.0-acre Lockhart Elementary School site is located at west of Ariel Melchoir Junior Drive in Charlotte Amalie, St. Thomas, USVI. The site includes a total of thirteen buildings and five proposed buildings. Ten of the existing buildings are arranged in a "C" shape and will be used for PreK-5 classroom space. The three existing buildings on the east side complete, or close off, the campus to form an enclosed courtyard. The interiors and exterior cladding of the existing buildings will be demolished and new cladding will be added.

The proposed Lockhart PK-8 campus consists of three new buildings. Two of the new buildings are two stories high and will be used for 6-8 learning. There is a new gymnasium that is being constructed along with a teaching pool adjacent to it. A new parking lot will be constructed at the southeast corner of the site. It will include 3 ADA accessible parking spaces and 57 additional parking spaces. There will be a new 20 foot fire access road that will be developed based on the existing road that leads from the northeast part of the site off of Ariel Melchoir Drive and leads to the back of the school.

The proposed parking lot will serve as the dedicated parent and bus drop-off location. This is intended to minimize pedestrian and vehicle interactions and therefore potential conflicts. The proposed vehicle pavements will be a combination of asphalt and concrete pavement sections with design sections adhering to the recommendations of the geotechnical investigation along with the civil engineering design.

In between the buildings are courtyards that will serve as outdoor learning studios for specific grade groups, located in the adjacent buildings. Each outdoor studio located between buildings is covered by an architectural hip roof overhang to protect the users from excessive sun exposure. There are alleyways and streetscapes that are created underneath the shifted roof forms with each having a unique characteristic: play, learning treehouse, and the amphitheater.

The concepts of exploration, progression and discovery are found throughout the campus. Traveling through the site becomes an exploratory journey with pockets of discovery throughout. Examples include the display of mechanical, plumbing, electrical, and structural systems at the forefront of the design. These are featured in both interior and exterior zones such as the cistern level that displays water levels within each of the cisterns. There will be openings with windows for a view into typically “back of house” systems highlighting some of the mechanical and electrical components that allow the buildings to function.

Key drivers for the design included building resiliency to withstand extreme weather conditions while minimizing the building footprint on the site to disrupt as little of the landscape as possible. Design strategies included locating the cisterns and main mechanical units at the base levels of each of the buildings to reduce the overall building footprint and to shield major equipment from extreme conditions. In turn, this allowed for the building’s upper stories to sit above the hilly site and receive ample daylight and air flow.

Materiality throughout the campus further evokes the natural landscape. The materials consist of concrete, structural steel, cold formed metal framing, solar shingles, standing seam metal roof, concrete block, glazed block, and composite panels with colors that reflect the surroundings and brighter colors at the streetways and alleyways.

The exterior walls and interior partitions have been designed to support conditioning requirements for a net zero ready design. Wall types and finishes are informed by conditioning adjacencies, a desire to reduce mass, wall heights, opportunity for mold/mildew, acoustics, and cost/labor/install.

All wall types can be identified in one of the three main categories:

- Exterior Thermal Wall
- Interior Thermal Wall
- Interior Semi-Conditioned Non-Thermal Wall

Careful consideration was given to the level of passive and active building systems as well as the ability to support the students and community in extreme weather events. Buildings and structures are classified to a building risk category based on the risk to human life, health and welfare associated with their damage or failure (loss). Buildings and structures required to maintain the functionality of essential facilities must also be classified as essential facilities. The building has been assigned to the Type IV (Community Refuge) risk category in accordance with ASCE 7 Table 1.5-1.

Resiliency and Systems: the climate of the US Virgin Islands places significant demands on building systems, both during normal operation due to a salt coast environment and high humidity, as well as during extreme weather events. The design approach focuses on reducing the quantity of exposed equipment while utilizing systems that can be maintained and replaced with greater ease. Performance is achieved by the integration of simpler components.

Spaces and Resources: the team has focused on cooling and water demand reduction given the high cost and scarcity of local resources. Buildings are designed to meet a classification of net zero energy ready or net zero energy, with a target site energy use intensity, before renewables, of under 26kBTU per year per gross square foot.

Proposed Grading Plan: the primary goal of the proposed grading is to minimize the amount of cut or fill earthwork on the site. The finished floor elevations for the buildings were studied and selected to minimize the need for retaining walls and will work with the perimeter grades. The proposed landscape plan will increase the coverage with native and sustainable species.

Utilities: The sanitary sewer will utilize 4 to 6-inch laterals from each building, connecting to 8-inch gravity mains with appropriately spaced sanitary manholes. The drainage in the proposed parking lot will tie into the exfiltration system and then lead to the swale/gut in between the existing high school and the project site. The existing drainage system is to be retained as long as it does not interfere with our proposed plans.

On site, two existing cisterns are present, accompanied by a septic tank and pump house. A survey notes two at-grade underground cisterns, nine drainage inlets, and an overgrown drainage swale between the project site and the existing adjacent school. The new work plan involves removing these cisterns, placing a new one under the proposed gymnasium that is sized for potable, fire sprinkler, and hydrant water needs.

B. Type of Contract:

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

1.5 PHASED CONSTRUCTION


A. Construct the Work in phases, with each phase substantially complete as indicated [**on Drawings**] [**below**].

1. Phase <**Insert designation**>: <**Briefly describe work of this phase**>.

- a. Commencement of Construction:

- 1) Notice to Proceed: Work of this phase shall commence within **<Insert number of days>** after the Notice to Proceed.
  - 2) Start Date: Work of this phase shall commence by **<Insert date>**.
- b. Substantial Completion:
- 1) Within **<Insert number of days>** after [commencement of construction of this phase] [after the Notice to Proceed].
  - 2) By **<Insert date>**.
2. Phase **<Insert designation>**: Perform the remaining Work. The remaining Work shall be substantially complete at time of Substantial Completion of the Work.
- B. Before commencing Work of each phase, submit an updated copy of Contractor's construction schedule, showing the sequence, commencement and completion dates[, and move-out and -in dates of Owner's personnel] for all phases of the Work.

#### 1.6 CONTRACTOR'S USE OF SITE AND PREMISES

- A. Unrestricted Use of Site: 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.
- B. Restricted Use of Site: Contractor shall have limited use of Project site for construction operations as indicated on Drawings by the Contract limits and as indicated by requirements of this Section.
- C. Limits on Use of Site: Limit use of Project site to [**Work in areas**] [**areas within the Contract limits**] indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.
1. Limits on Use of Site: Confine construction operations to **<Insert description of areas where work is permitted>**.
  2. 
  3. Driveways, Walkways and Entrances: Keep driveways[ **parking garage,**] [ **loading areas,**] and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or for storage of materials.
    - a. Schedule deliveries to minimize use of driveways and entrances by construction operations.
    - b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

- D. Condition of Existing Grounds: Maintain portions of existing grounds, landscaping, and hardscaping affected by construction operations throughout construction period. Repair damage caused by construction operations.

## 1.7 WORK RESTRICTIONS

- A. Comply with restrictions on construction operations.
  - 1. Comply with limitations on use of public streets, work on public streets, rights of way, and other requirements of authorities having jurisdiction.
- B. On-Site Work Hours: Limit work to between **<Insert time>** a.m. to **<Insert time>** p.m., Monday through Friday, unless otherwise indicated. Work hours may be modified to meet Project requirements if approved by Owner and authorities having jurisdiction.
  - 1. Weekend Hours: **<Insert restrictions on times permitted for weekend work>**.
  - 2. Early Morning Hours: **<Insert restrictions or references to regulations by authorities having jurisdiction for restrictions on noisy work>**.
  - 3. Work in Existing Building: **<Insert restrictions on times permitted and other Owner's restrictions>**.
  - 4. Hours for Utility Shutdowns: **<Insert Owner's restrictions>**.
  - 5. Hours for [**Core Drilling**] **<Insert noisy activity>**: **<Insert Owner's restrictions>**.
- C. On-Site Work Day Restrictions: Do not perform work [**resulting in utility shutdowns**] [**or**] [**resulting in noisy activity**] on-site during work black-out days indicated in Document 003113 "Preliminary Schedules."
- D. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging for temporary utility services according to requirements indicated:
  - 1. Notify [**Architect**] [**Construction Manager**] [**Owner**] not less than [**two**] **<Insert number>** days in advance of proposed utility interruptions.
  - 2. Obtain [**Architect's**] [**Construction Manager's**] [**Owner's**] written permission before proceeding with utility interruptions.
- E. Noise, Vibration, Dust, and Odors: Coordinate operations that may result in high levels of noise and vibration, dust, odors, or other disruption to Owner occupancy with Owner.
  - 1. Notify [**Architect**] [**Construction Manager**] [**Owner**] not less than [**two**] **<Insert number>** days in advance of proposed disruptive operations.
  - 2. Obtain [**Architect's**] [**Construction Manager's**] [**Owner's**] written permission before proceeding with disruptive operations.

- F. Smoking and Controlled Substance Restrictions: Use of tobacco products [, **alcoholic beverages,**] and other controlled substances [**within the existing building**] [**on Project site**] [**on Owner's property**] is not permitted.
- G. Employee Identification: [**Provide**] [**Owner will provide**] identification tags for Contractor personnel working on Project site. Require personnel to use identification tags at all times.
- H. Employee Screening: Comply with Owner's requirements for [**drug**] [**and**] [**background**] screening of Contractor personnel working on Project site.
  - 1. Maintain list of approved screened personnel with Owner's representative.

## 1.8 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. Text Color: Text used in the Specifications, including units of measure, manufacturer and product names, and other text may appear in multiple colors or underlined as part of a hyperlink; no emphasis is implied by text with these characteristics.
  - 3. Hypertext: Text used in the Specifications may contain hyperlinks. Hyperlinks may allow for access to linked information that is not residing in the Specifications. Unless otherwise indicated, linked information is not part of the Contract Documents.
  - 4. Specification requirements are to be performed by Contractor unless specifically stated otherwise.
- B. Division 00 Contracting Requirements: General provisions of the Contract, including General and Supplementary Conditions, apply to all Sections of the Specifications.
- C. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.
- D. 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 scheduled on Drawings.

1.9 CORRELATION AND INTENT OF THE CONTRACT DOCUMENTS

- A. The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the contractor shall be required to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.
- B. In the case of an inconsistency between Drawings and Specifications or within either Document not clarified by Addendum, the better quality or greater quantity of Work shall be provided in accordance with the Architect's interpretation.
- C. If an item is shown on the Drawings but not specified, the Contractor shall provide the item of the same quality as similar items specified, as determined by the Architect. If an item is specified but not shown on the Drawings, it shall be located as directed by the Architect.
- D. The Drawings are indications of the design intent as well as specific instructions. The "details" included on Drawings show the intent of all similar areas. If questions arise about the construction of an area not specifically detailed, consult with the Architect who will provide further "details" and instructions. Such further documentation, if consistent with the Contract Documents, shall not alter the Contract Sum.
- E. If the Contractor, in the course of construction, finds any conflict, error, or discrepancy on or between the Drawings and Specifications or any of the related Contract Documents, such conflict, error, or discrepancy shall be immediately referred to the Architect, in writing. Architect shall issue an interpretation, in writing, to the Contractor within (10) days after receipt of the written request. No additional compensation will be paid to the Contractor as a result of an interpretation of the Contract Documents.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000

## SECTION 012500 - SUBSTITUTION PROCEDURES

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes administrative and procedural requirements for substitutions.
- B. Related Requirements:
  - 1. Section 012300 "Alternates" for products selected under an alternate.
  - 2. 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.
  - 1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
  - 2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required to meet other Project requirements but may offer advantage to Contractor or Owner.

#### 1.3 ACTION SUBMITTALS

- A. Substitution Requests: Submit documentation identifying 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 form that is part of web-based Project management software acceptable to Architect.
  - 2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
    - a. Statement indicating why specified product or fabrication or installation method cannot be provided, if applicable.
    - b. Coordination of 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 substitutions 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. Samples, where applicable or requested.
  - f. Certificates and qualification data, where applicable or requested.
  - g. List of similar installations for completed projects, with project names and addresses as well as names and addresses of architects and owners.
  - h. Material test reports from a qualified testing agency, indicating and interpreting test results for compliance with requirements indicated.
  - i. Research reports evidencing compliance with building code in effect for Project, from ICC-ES.
  - j. Detailed comparison of Contractor's construction schedule using proposed substitutions with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
  - k. Cost information, including a proposal of change, if any, in the Contract Sum.
  - l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents, except as indicated in substitution request, is compatible with related materials and is appropriate for applications indicated.
  - m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
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 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.

1.5 PROCEDURES

- A. Coordination: Revise or adjust affected work as necessary to integrate work of the approved substitutions.

1.6 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. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:

- a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
- b. Substitution request is fully documented and properly submitted.
- c. Requested substitution will not adversely affect Contractor's construction schedule.
- d. Requested substitution has received necessary approvals of authorities having jurisdiction.
- e. Requested substitution is compatible with other portions of the Work.
- f. Requested substitution has been coordinated with other portions of the Work.
- g. Requested substitution provides specified warranty.
- h. 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: Not allowed.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012500

SUBSTITUTION REQUEST FORM

1.1 CONDITIONS OF SUBSTITUTIONS

- A. Substitution indicated on this Form is a proposed substitute to requirements indicated in the Specifications and Drawings. Substitution listed has not been included in an Addendum. Submit one Form for each proposed substitution.
- B. For each proposed Substitution, state difference in price or "No Change" where Substitution is offered.
- C. Attach complete technical data, specifications, and description of substitutions.
- D. Architect reserves the right to accept or reject any or all proposed substitutions.

1.2 SUBSTITUTION REQUEST

The following information is hereby submitted for a substitution to the specified item.

Specification Section and Title: \_\_\_\_\_

Paragraph \_\_\_\_\_ Page \_\_\_\_\_ Specified Item \_\_\_\_\_

Proposed Substitution: \_\_\_\_\_

Manufacturer: \_\_\_\_\_ Address: \_\_\_\_\_ Phone: \_\_\_\_\_

Trade Name: \_\_\_\_\_ Model No: \_\_\_\_\_

Price Difference: \_\_\_\_\_ or No Change \_\_\_\_\_

The Undersigned certifies:

- A. Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
- B. Same warranty will be furnished for proposed substitution as for specified product.
- C. Same maintenance service and source of replacement parts, as applicable is available.
- D. Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
- E. Proposed substitution does not affect dimensions and functional clearances.
- F. Payment will be made for changes to the building design, including A/E design, detailing, and construction costs caused by the substitution.

Submitted by: \_\_\_\_\_

Signed by: \_\_\_\_\_

Firm: \_\_\_\_\_

Address: \_\_\_\_\_

Telephone: \_\_\_\_\_ FAX: \_\_\_\_\_

ARCHITECT'S REVIEW AND ACTION

- Substitution Approved – Make submittals in accordance with Section 013300 – Submittal Procedures.
- Substitution Approved as Noted – Make submittals in accordance with Section 013300 – Submittal Procedures.
- Substitution Rejected – Use specified materials.
- Substitution Request Received Too Late. Use specified materials.

Signed by: \_\_\_\_\_

Supporting Data Attached:  Drawings  Product Data  Samples  Tests  
 Reports  Other \_\_\_\_\_

## SECTION 012600 - CONTRACT MODIFICATION PROCEDURES

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes administrative and procedural requirements for handling and processing Contract modifications.
- B. Related Requirements:
  - 1. Section 012500 "Substitution Procedures" for administrative procedures for handling requests for substitutions made after the Contract award.
  - 2. Section 013100 "Project Management and Coordination" for requirements for forms for contract modifications provided as part of web-based Project management software.

#### 1.2 MINOR CHANGES IN THE WORK

- A. Architect will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on AIA Document G710 or web-based Project management software.

#### 1.3 PROPOSAL REQUESTS

- A. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.
  - 1. Work Change Proposal Requests issued by Architect are not instructions either to stop work in progress or to execute the proposed change.
  - 2. Within time specified in Proposal Request or 20 days, when not otherwise specified, after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
    - a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
    - b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
    - c. Include costs of labor and supervision directly attributable to the change.
    - d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and

finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.

- e. Quotation Form: Use form provided as part of web-based Project management software.

B. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Architect.

1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
4. Include costs of labor and supervision directly attributable to the change.
5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
6. Comply with requirements in Section 012500 "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.
7. Proposal Request Form: Use form provided as part of web-based Project management software.

#### 1.4 CHANGE ORDER PROCEDURES

- A. On Owner's approval of a Work Change Proposal Request, Architect will issue a Change Order for signatures of Owner and Contractor on AIA Document G701 or form provided as part of web-based Project management software.

#### 1.5 CONSTRUCTION CHANGE DIRECTIVE

- A. Construction Change Directive: Architect may issue a Construction Change Directive on AIA Document G714 or form provided as part of web-based Project management software. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.

1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.

- B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.

1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012600

**ARCHITECT'S SUPPLEMENTAL INSTRUCTIONS  
NO. \_\_\_\_\_**

PROJECT:

ARCHITECT'S PROJECT NO.

OWNER:

CONTRACT DATE:

CONTRACTOR:

ASI DATE:

---

The work shall be carried out in accordance with the following supplemental instructions issued in accordance with the Contract Documents without change in Contract Sum or Contract Time. Proceeding with the work in accordance with these instructions indicates your acknowledgement that there will be no change in the Contract Sum or Contract Time.

Where the ASI requires a change to the Contract Sum or Contract Time, submit a detailed breakdown indicating the increased sum or time required. Proceed with the ASI ONLY when the Owner and the Architect give written authorization for the change to the Contract Sum or Contract Time.

Description:

Attachments: *(Here insert listing of documents that support description.)*

---

---

ISSUED BY:

---

Architect

**PROPOSAL REQUEST NO.**

PROJECT:

Date: \_\_\_\_\_

From:  
DLR GROUP  
701 8<sup>th</sup> Street NW, Suite 700  
Washington, DC 20001

Distribution

PR DWG

To:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Please submit an itemized quotation separately indicating labor, material, overhead and profit for changes in the Contract Sum and/or Contract Time incidental to proposed modifications to the Contract Documents described herein.

THIS DOCUMENT IS NEITHER A CHANGE ORDER NOR A DIRECTION TO PROCEED WITH THE WORK DESCRIBED HEREIN.

Drawings, Specifications, and/or Documents issued with this Proposal Request shall be incorporated and become part of the Contract Documents ONLY when a change order is accepted

PROPOSAL REQUEST NO.

- A. Drawings and/or Specifications – Issued for \_\_\_\_\_, dated \_\_\_\_\_:
- B. Revision Description:
- C. Reason:
- D. This Proposal Request supersedes P.R. No. \_\_\_\_\_.

ADD \_\_\_\_\_ DEDUCT \_\_\_\_\_ N/C \_\_\_\_\_ N/A \_\_\_\_\_

If this Proposal Request is accepted, the impact to the Contract Schedule will be \_\_\_\_\_ days. If cost is associated, indicate cost in a detailed breakdown.

Contractor to sign, date, and return this document with the Proposal submittal. The hereinbefore are firm quotations.

\_\_\_\_\_  
Contractor

\_\_\_\_\_  
Date

PROJECT:

ARCHITECT'S PROJECT NO.

OWNER:

CONTRACT DATE:

CONTRACTOR:

CCD DATE:

**You are hereby directed to make the following change(s) in this Contract:**

*(Describe proposed changes or list any attached information here.)*

1. The proposed basis of adjustment to the Contract Sum is:  
 Lum Sum (increase) (decrease) of \$ \_\_\_\_\_  
 Unit Price of \$ \_\_\_\_\_ per \_\_\_\_\_  
 as provided in Subparagraph 7.3.6 of AIA Document A201, 1997 edition.  
 as follows: \_\_\_\_\_
  
2. The Contract Time is proposed to (be adjusted) (remain unchanged). The proposed adjustment, if any, is (an increase of \_\_\_\_\_ days) (a decrease of \_\_\_\_\_ days).

When signed by the Owner and Architect and received by the Contractor, this document becomes effective IMMEDIATELY as a Construction Change Directive (CCD) and the Contractor shall proceed with the change(s) described above.

Signature by the Contractor indicates the Contractor's agreement with the proposed adjustments in Contract Sum and Contract time set forth in this Construction Change Directive.

\_\_\_\_\_  
ARCHITECT *(Company name)*

\_\_\_\_\_  
OWNER *(Company name)*

\_\_\_\_\_  
CONTRACTOR *(Company name)*

\_\_\_\_\_  
*(Signature)*

\_\_\_\_\_  
*(Signature)*

\_\_\_\_\_  
*(Signature)*

\_\_\_\_\_  
*(Printed name and title)*

\_\_\_\_\_  
*(Printed name and title)*

\_\_\_\_\_  
*(Printed name and title)*

\_\_\_\_\_  
DATE

\_\_\_\_\_  
DATE

\_\_\_\_\_  
DATE

## SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes administrative provisions for coordinating construction operations on Project, including, but not limited to, the following:
  - 1. General coordination procedures.
  - 2. Coordination drawings.
  - 3. RFIs.
  - 4. Digital project management procedures.
  - 5. Web-based Project management software package.
  - 6. Project meetings.
- B. Related Requirements:
  - 1. Section 013200 "Construction Progress Documentation" for preparing and submitting Contractor's construction schedule.
  - 2. Section 017300 "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
  - 3. Section 017700 "Closeout Procedures" for coordinating closeout of the Contract.

#### 1.2 DEFINITIONS

- A. BIM: Building Information Modeling.
- B. RFI: Request for Information. Request from Owner, Architect, or Contractor seeking information required by or clarifications of the Contract Documents.

#### 1.3 INFORMATIONAL SUBMITTALS

- A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
  - 1. Name, address, telephone number, and email address of entity performing subcontract or supplying products.
  - 2. Number and title of related Specification Section(s) covered by subcontract.
  - 3. Drawing number and detail references, as appropriate, covered by subcontract.

- B. Key Personnel Names: Within [15] <Insert number> days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses, cellular telephone numbers, and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.
1. Post copies of list in Project meeting room, in temporary field office, in web-based Project software directory, and in prominent location in built facility. Keep list current at all times.

#### 1.4 GENERAL COORDINATION PROCEDURES

- A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations included in different Sections that depend on each other for proper installation, connection, and operation.
1. Schedule construction operations in sequence required to obtain the best results, where installation of one part of the Work depends on installation of other components, before or after its own installation.
  2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
  3. Make adequate provisions to accommodate items scheduled for later installation.
- B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
- C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
1. Preparation of Contractor's construction schedule.
  2. Preparation of the schedule of values.
  3. Installation and removal of temporary facilities and controls.
  4. Delivery and processing of submittals.
  5. Progress meetings.
  6. Preinstallation conferences.
  7. Project closeout activities.
  8. Startup and adjustment of systems.

## 1.5 COORDINATION DRAWINGS

- A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely indicated on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.
1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:
    - a. Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
    - b. Coordinate the addition of trade-specific information to coordination drawings in a sequence that best provides for coordination of the information and resolution of conflicts between installed components before submitting for review.
    - c. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
    - d. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
    - e. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
    - f. Indicate required installation sequences.
    - g. Indicate dimensions shown on Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternative sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.
- B. Coordination Drawing Organization: Organize coordination drawings as follows:
1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire-protection, fire-alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan drawings with section drawings where required to adequately represent the Work.
  2. Plenum Space: Indicate subframing for support of ceiling and wall systems, mechanical and electrical equipment, and related Work. Locate components within plenums to accommodate layout of light fixtures and other components indicated on Drawings. Indicate areas of conflict between light fixtures and other components.
  3. Mechanical Rooms: Provide coordination drawings for mechanical rooms, showing plans and elevations of mechanical, plumbing, fire-protection, fire-alarm, and electrical equipment.
  4. Structural Penetrations: Indicate penetrations and openings required for all disciplines.
  5. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door

floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.

6. Mechanical and Plumbing Work: Show the following:
    - a. Sizes and bottom elevations of ductwork, piping, and conduit runs, including insulation, bracing, flanges, and support systems.
    - b. Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts and electrical distribution equipment.
    - c. Fire-rated enclosures around ductwork.
  7. Electrical Work: Show the following:
    - a. Runs of vertical and horizontal conduit 1-1/4 inches (32 mm) in diameter and larger.
    - b. Light fixture, exit light, emergency battery pack, smoke detector, and other fire-alarm locations.
    - c. Panel board, switchboard, switchgear, transformer, busway, generator, and motor-control center locations.
    - d. Location of pull boxes and junction boxes, dimensioned from column center lines.
  8. Fire-Protection System: Show the following:
    - a. Locations of standpipes, mains piping, branch lines, pipe drops, and sprinkler heads.
  9. Review: Architect will review coordination drawings to confirm that, in general, the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility. If Architect determines that coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, Architect will so inform Contractor, who shall make suitable modifications and resubmit.
  10. Coordination Drawing Prints: Prepare coordination drawing prints according to requirements in Section 013300 "Submittal Procedures."
- C. Coordination Drawing Process: Prepare coordination drawings in the following manner:
1. Schedule submittal and review of Fire Sprinkler, Plumbing, HVAC, and Electrical Shop Drawings to make required changes prior to preparation of coordination drawings.
  2. Commence routing of coordination drawing files with HVAC Installer, who will provide drawing plan files denoting approved ductwork. HVAC Installer will locate ductwork and piping on a single layer, using orange color. Forward drawings to Plumbing Installer.
  3. Plumbing Installer will locate plumbing and equipment on a single layer, using blue color.
  4. Fire Sprinkler Installer will locate piping and equipment, using red color. Fire Sprinkler Installer shall forward drawing files to Electrical Installer.
  5. Electrical Installer will indicate service and feeder conduit runs and equipment in green color. Electrical Installer shall forward drawing files to Communications and Electronic Safety and Security Installer.

6. Communications and Electronic Safety and Security Installer will indicate cable trays and cabling runs and equipment in purple color. Communications and Electronic Safety and Security Installer shall forward completed drawing files to Contractor.
  7. Contractor shall perform the final coordination review. As each coordination drawing is completed, Contractor will meet with Architect to review and resolve conflicts on the coordination drawings.
- D. Coordination Digital Data Files: Prepare coordination digital data files according to the following requirements:
1. File Preparation Format:
    - a. Same digital data software program, version, and operating system as original Drawings.
  2. File Submittal Format: Submit or post coordination drawing files using format same as file preparation format.
  3. BIM File Incorporation: Develop and incorporate coordination drawing files into BIM established for Project.
    - a. Perform three-dimensional component conflict analysis as part of preparation of coordination drawings. Resolve component conflicts prior to submittal. Indicate where conflict resolution requires modification of design requirements by Architect.
  4. Architect will furnish Contractor one set of digital data files of Drawings for use in preparing coordination digital data files.
    - a. Architect makes no representations as to the accuracy or completeness of digital data files as they relate to Drawings.
    - b. Contractor shall execute a data licensing agreement in the form of AIA Document C106.
- 1.6 REQUEST FOR INFORMATION (RFI)
- A. General: Immediately on discovery of the need for additional information, clarification, or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.
    1. Architect will return without response those RFIs submitted to Architect by other entities controlled by Contractor.
    2. Coordinate and submit RFIs in a prompt manner to avoid delays in Contractor's work or work of subcontractors.
  - B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:

1. Project name.
  2. Owner name.
  3. Owner's Project number.
  4. Name of Architect.
  5. Architect's Project number.
  6. Date.
  7. Name of Contractor.
  8. RFI number, numbered sequentially.
  9. RFI subject.
  10. Specification Section number and title and related paragraphs, as appropriate.
  11. Drawing number and detail references, as appropriate.
  12. Field dimensions and conditions, as appropriate.
  13. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
  14. Contractor's signature.
  15. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
    - a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.
- C. RFI Forms: AIA Document G716 or Software-generated form with substantially the same content as indicated above, acceptable to Architect.
1. Attachments shall be electronic files in PDF format.
- D. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow seven days for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received the following working day.
1. The following Contractor-generated RFIs will be returned without action:
    - a. Requests for approval of submittals.
    - b. Requests for approval of substitutions.
    - c. Requests for approval of Contractor's means and methods.
    - d. Requests for coordination information already indicated in the Contract Documents.
    - e. Requests for adjustments in the Contract Time or the Contract Sum.
    - f. Requests for interpretation of Architect's actions on submittals.
    - g. Incomplete RFIs or inaccurately prepared RFIs.
  2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt by Architect of additional information.
  3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Section 012600 "Contract Modification Procedures."

- a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within [5] <Insert number> days of receipt of the RFI response.
- E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly. Use software log that is part of web-based Project management software.
- F. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within three days if Contractor disagrees with response.

#### 1.7 DIGITAL PROJECT MANAGEMENT PROCEDURES

- A. Use of Architect's Digital Data Files: Digital data files of Architect's BIM model will be provided by Architect for Contractor's use during construction.
  1. Digital data files may be used by Contractor in preparing coordination drawings, Shop Drawings, and Project Record Drawings.
  2. Architect makes no representations as to the accuracy or completeness of digital data files as they relate to Contract Drawings.
  3. Digital Drawing Software Program: Contract Drawings are available in Revit.
  4. Contractor shall execute a data licensing agreement in the form of AIA Document C106 Digital Data Licensing Agreement.
    - a. Subcontractors and other parties granted access by Contractor to Architect's digital data files shall execute a data licensing agreement in the form of AIA Document C106.
  5. The following digital data files will be furnished for each appropriate discipline:
    - a. Floor plans.
    - b. Reflected ceiling plans.
    - c. Revit.
- B. Web-Based Project Management Software Package: Provide, administer, and use web-based Project management software package for purposes of hosting and managing Project communication and documentation until Final Completion.
  1. Web-based Project management software includes, at a minimum, the following features:
    - a. Compilation of Project data, including Contractor, subcontractors, Architect, Architect's consultants, Owner, and other entities involved in Project. Include names of individuals and contact information.
    - b. Access control for each entity for each workflow process, to determine entity's digital rights to create, modify, view, and print documents.

- c. Document workflow planning, allowing customization of workflow between project entities.
  - d. Creation, logging, tracking, and notification for Project communications required in other Specification Sections, including, but not limited to, RFIs, submittals, Minor Changes in the Work, Construction Change Directives, and Change Orders.
  - e. Track status of each Project communication in real time, and log time and date when responses are provided.
  - f. Procedures for handling PDFs or similar file formats, allowing markups by each entity. Provide security features to lock markups against changes once submitted.
  - g. Processing and tracking of payment applications.
  - h. Processing and tracking of contract modifications.
  - i. Creating and distributing meeting minutes.
  - j. Document management for Drawings, Specifications, and coordination drawings, including revision control.
  - k. Management of construction progress photographs.
  - l. Mobile device compatibility, including smartphones and tablets.
2. Provide up to six Project management software user licenses for use of Owner, Architect, and Architect's consultants. Provide four hours of software training at Architect's office for web-based Project software users.
  3. At completion of Project, provide digital archive in format that is readable by common desktop software applications in format acceptable to Architect. Provide data in locked format to prevent further changes.
- C. PDF Document Preparation: Where PDFs are required to be submitted to Architect, prepare 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.
  3. Certifications: Where digitally submitted certificates and certifications are required, provide a digital signature with digital certificate on where indicated.

## 1.8 PROJECT MEETINGS

- A. General: Schedule and conduct meetings and conferences at Project site unless otherwise indicated.
1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times a minimum of seven days prior to meeting.
  2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
  3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within three days of the meeting.

- B. Preconstruction Conference: Schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 days after execution of the Agreement.
1. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
  2. Agenda: Discuss items of significance that could affect progress, including the following:
    - a. Responsibilities and personnel assignments.
    - b. Tentative construction schedule.
    - c. Phasing.
    - d. Critical work sequencing and long lead items.
    - e. Designation of key personnel and their duties.
    - f. Lines of communications.
    - g. Use of web-based Project software.
    - h. Procedures for processing field decisions and Change Orders.
    - i. Procedures for RFIs.
    - j. Procedures for testing and inspecting.
    - k. Procedures for processing Applications for Payment.
    - l. Distribution of the Contract Documents.
    - m. Submittal procedures.
    - n. Sustainable design requirements.
    - o. Preparation of Record Documents.
    - p. Use of the premises.
    - q. Work restrictions.
    - r. Working hours.
    - s. Owner's occupancy requirements.
    - t. Responsibility for temporary facilities and controls.
    - u. Procedures for moisture and mold control.
    - v. Procedures for disruptions and shutdowns.
    - w. Construction waste management and recycling.
    - x. Parking availability.
    - y. Office, work, and storage areas.
    - z. Equipment deliveries and priorities.
    - aa. First aid.
    - bb. Security.
    - cc. Progress cleaning.
  3. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.
- C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity when required by other Sections and when required for coordination with other construction.

1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect of scheduled meeting dates.
  2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
    - a. Contract Documents.
    - b. Options.
    - c. Related RFIs.
    - d. Related Change Orders.
    - e. Purchases.
    - f. Deliveries.
    - g. Submittals.
    - h. Sustainable design requirements.
    - i. Review of mockups.
    - j. Possible conflicts.
    - k. Compatibility requirements.
    - l. Time schedules.
    - m. Weather limitations.
    - n. Manufacturer's written instructions.
    - o. Warranty requirements.
    - p. Compatibility of materials.
    - q. Acceptability of substrates.
    - r. Temporary facilities and controls.
    - s. Space and access limitations.
    - t. Regulations of authorities having jurisdiction.
    - u. Testing and inspecting requirements.
    - v. Installation procedures.
    - w. Coordination with other work.
    - x. Required performance results.
    - y. Protection of adjacent work.
    - z. Protection of construction and personnel.
  3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
  4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
  5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.
- D. Project Closeout Conference: Schedule and conduct a project closeout conference, at a time convenient to Owner and Architect, but no later than 90 days prior to the scheduled date of Substantial Completion.

1. Conduct the conference to review requirements and responsibilities related to Project closeout.
  2. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
  3. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:
    - a. Preparation of Record Documents.
    - b. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
    - c. Procedures for completing and archiving web-based Project software site data files.
    - d. Submittal of written warranties.
    - e. Requirements for completing sustainable design documentation.
    - f. Requirements for preparing operations and maintenance data.
    - g. Requirements for delivery of material samples, attic stock, and spare parts.
    - h. Requirements for demonstration and training.
    - i. Preparation of Contractor's punch list.
    - j. Procedures for processing Applications for Payment at Substantial Completion and for final payment.
    - k. Submittal procedures.
    - l. Coordination of separate contracts.
    - m. Owner's partial occupancy requirements.
    - n. Installation of Owner's furniture, fixtures, and equipment.
    - o. Responsibility for removing temporary facilities and controls.
  4. Minutes: Entity conducting meeting will record and distribute meeting minutes.
- E. Progress Meetings: Conduct progress meetings at weekly intervals.
1. Coordinate dates of meetings with preparation of payment requests.
  2. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
  3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
    - a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to

do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.

1) Review schedule for next period.

b. Review present and future needs of each entity present, including the following:

- 1) Interface requirements.
- 2) Sequence of operations.
- 3) Resolution of BIM component conflicts.
- 4) Status of submittals.
- 5) Status of sustainable design documentation.
- 6) Deliveries.
- 7) Off-site fabrication.
- 8) Access.
- 9) Site use.
- 10) Temporary facilities and controls.
- 11) Progress cleaning.
- 12) Quality and work standards.
- 13) Status of correction of deficient items.
- 14) Field observations.
- 15) Status of RFIs.
- 16) Status of Proposal Requests.
- 17) Pending changes.
- 18) Status of Change Orders.
- 19) Pending claims and disputes.
- 20) Documentation of information for payment requests.

4. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.

a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting, where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

F. Coordination Meetings: Conduct Project coordination meetings at weekly intervals. Project coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and preinstallation conferences.

1. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meetings shall be familiar with Project and authorized to conclude matters relating to the Work.
2. Agenda: Review and correct or approve minutes of the previous coordination meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

- a. Combined Contractor's Construction Schedule: Review progress since the last coordination meeting. Determine whether each contract is on time, ahead of schedule, or behind schedule, in relation to combined Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
  - b. Schedule Updating: Revise combined Contractor's construction schedule after each coordination meeting, where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with report of each meeting.
  - c. Review present and future needs of each contractor present, including the following:
    - 1) Interface requirements.
    - 2) Sequence of operations.
    - 3) Resolution of BIM component conflicts.
    - 4) Status of submittals.
    - 5) Deliveries.
    - 6) Off-site fabrication.
    - 7) Access.
    - 8) Site use.
    - 9) Temporary facilities and controls.
    - 10) Work hours.
    - 11) Hazards and risks.
    - 12) Progress cleaning.
    - 13) Quality and work standards.
    - 14) Status of RFIs.
    - 15) Proposal Requests.
    - 16) Change Orders.
    - 17) Pending changes.
3. Reporting: Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013100

# REQUEST FOR INFORMATION

**Client:**  
**Project:**  
**Comm. No.:**  
**File No.:**

DATE:  
INITIATED BY:  
DIRECTED TO:  
RE:  
  
SUBJECT:

RFI NO.:

SIGNED: \_\_\_\_\_

REPLY:

*The Work shall be carried out in accordance with the supplemental information or clarifications included in the Reply and issued in accordance with the Contract Documents without change in the Contract Sum or Contract Time. Proceeding with the Work in accordance with the Reply indicates your acknowledgment that there will be no change in the Contract Sum or Contract Time.*

*Where the Reply requires a change to the Contract Sum or Contract Time, submit a detailed breakdown indicating the increased sum or time required. Proceed with the Reply ONLY when the Owner and the Architect give written authorization for the change to the Contract Sum or Contract Time.*

REPLY ISSUED  
BY:

FIRM:

DATE:

## SECTION 013200 - CONSTRUCTION PROGRESS DOCUMENTATION

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
  - 1. Startup construction schedule.
  - 2. Contractor's Construction Schedule.
  - 3. Construction schedule updating reports.
  - 4. Daily construction reports.
  - 5. Material location reports.
  - 6. Site condition reports.
  - 7. Unusual event reports.
- B. Related Requirements:
  - 1. Section 014000 "Quality Requirements" for schedule of tests and inspections.

#### 1.2 DEFINITIONS

- A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction Project. Activities included in a construction schedule consume time and resources.
  - 1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
  - 2. Predecessor Activity: An activity that precedes another activity in the network.
  - 3. Successor Activity: An activity that follows another activity in the network.
- B. Cost Loading: The allocation of the schedule of values for completing an activity as scheduled. The sum of costs for all activities must equal the total Contract Sum.
- C. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine the critical path of Project and when activities can be performed.
- D. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.
- E. Event: The starting or ending point of an activity.

- F. Float: The measure of leeway in starting and completing an activity.
  - 1. Float time belongs to Owner.
  - 2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
  - 3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.
- G. Resource Loading: The allocation of manpower and equipment necessary for completing an activity as scheduled.

### 1.3 INFORMATIONAL SUBMITTALS

- A. Format for Submittals: Submit required submittals in the following format:
  - 1. Working electronic copy of schedule file.
  - 2. PDF file.
- B. Startup construction schedule.
  - 1. Submittal of cost-loaded startup construction schedule will not constitute approval of schedule of values for cost-loaded activities.
- C. Startup Network Diagram: Of size required to display entire network for entire construction period. Show logic ties for activities.
- D. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.
  - 1. Submit a working digital copy of schedule, using software indicated, and labeled to comply with requirements for submittals.
- E. CPM Reports: Concurrent with CPM schedule, submit each of the following reports. Format for each activity in reports shall contain activity number, activity description, cost and resource loading, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float in calendar days.
  - 1. Activity Report: List of activities sorted by activity number and then early start date, or actual start date if known.
  - 2. Logic Report: List of preceding and succeeding activities for each activity, sorted in ascending order by activity number and then by early start date, or actual start date if known.
  - 3. Total Float Report: List of activities sorted in ascending order of total float.
  - 4. Earnings Report: Compilation of Contractor's total earnings from the Notice to Proceed until most recent Application for Payment.

- F. Construction Schedule Updating Reports: Submit with Applications for Payment.
- G. Daily Construction Reports: Submit at **weekly** intervals.
- H. Material Location Reports: Submit at **monthly** intervals.
- I. Site Condition Reports: Submit at time of discovery of differing conditions.
- J. Unusual Event Reports: Submit at time of unusual event.
- K. Qualification Data: For scheduling consultant.

#### 1.4 QUALITY ASSURANCE

- A. Scheduling Consultant Qualifications: An experienced specialist in CPM scheduling and reporting, with capability of producing CPM reports and diagrams within 24 hours of Architect's request.
- B. Prescheduling Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination." Review methods and procedures related to the preliminary construction schedule and Contractor's Construction Schedule, including, but not limited to, the following:
  - 1. Review software limitations and content and format for reports.
  - 2. Verify availability of qualified personnel needed to develop and update schedule.
  - 3. Discuss constraints, including phasing, area separations, interim milestones, and partial Owner occupancy.
  - 4. Review delivery dates for Owner-furnished products.
  - 5. Review schedule for work of Owner's separate contracts.
  - 6. Review submittal requirements and procedures.
  - 7. Review time required for review of submittals and resubmittals.
  - 8. Review requirements for tests and inspections by independent testing and inspecting agencies.
  - 9. Review time required for Project closeout and Owner startup procedures.
  - 10. Review and finalize list of construction activities to be included in schedule.
  - 11. Review procedures for updating schedule.

#### 1.5 COORDINATION

- A. Coordinate Contractor's Construction Schedule with the schedule of values, submittal schedule, progress reports, payment requests, and other required schedules and reports.
  - 1. Secure time commitments for performing critical elements of the Work from entities involved.

2. Coordinate each construction activity in the network with other activities, and schedule them in proper sequence.

#### 1.6 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.
  1. Use ProCore for current Windows operating system.
- B. Scheduling Consultant: Engage a consultant to provide planning, evaluation, and reporting, using CPM scheduling.
  1. In-House Option: Owner may waive requirement to retain a consultant if Contractor employs skilled personnel with experience in CPM scheduling and reporting techniques. Submit qualifications.
  2. Meetings: Scheduling consultant shall attend all meetings related to Project progress, alleged delays, and time impact.
- C. Time Frame: Extend schedule from date established for the Notice of Award to date of Substantial Completion.
  1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.
- D. Activities: Treat each floor or separate area as a separate numbered activity for each main element of the Work. Comply with the following:
  1. Activity Duration: Define activities so no activity is longer than [20] <Insert number> days, unless specifically allowed by Architect.
  2. Temporary Facilities: Indicate start and completion dates for the following as applicable:
    - a. Securing of approvals and permits required for performance of the Work.
    - b. Temporary facilities.
    - c. Construction of mock-ups, prototypes and samples.
    - d. Owner interfaces and furnishing of items.
    - e. Interfaces with Separate Contracts.
    - f. Regulatory agency approvals.
    - g. Punch list.
  3. Procurement Activities: Include procurement process activities for the following long lead-time items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.

4. Submittal Review Time: Include review and resubmittal times indicated in Section 013300 "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's Construction Schedule with submittal schedule.
  5. Startup and Testing Time: Include no fewer than 15 days for startup and testing.
  6. Commissioning Time: Include no fewer than 15 days for commissioning.
  7. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's administrative procedures necessary for certification of Substantial Completion.
  8. Punch List and Final Completion: Include not more than 30 days for completion of punch list items and Final Completion.
- E. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.
1. Phasing: Arrange list of activities on schedule by phase.
  2. Work under More Than One Contract: Include a separate activity for each contract.
  3. Work by Owner: Include a separate activity for each portion of the Work performed by Owner.
  4. Products Ordered in Advance: Include a separate activity for each product. Include delivery date indicated in Section 011000 "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
  5. Owner-Furnished Products: Include a separate activity for each product. Include delivery date indicated in Section 011000 "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
  6. Work Restrictions: Show the effect of the following items on the schedule:
    - a. Coordination with existing construction.
    - b. Limitations of continued occupancies.
    - c. Uninterruptible services.
    - d. Partial occupancy before Substantial Completion.
    - e. Use-of-premises restrictions.
    - f. Provisions for future construction.
    - g. Seasonal variations.
    - h. Environmental control.
  7. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:
    - a. Subcontract awards.
    - b. Submittals.
    - c. Purchases.
    - d. Mockups.
    - e. Fabrication.
    - f. Sample testing.
    - g. Deliveries.
    - h. Installation.
    - i. Tests and inspections.

- j. Adjusting.
  - k. Curing.
  - l. Building flush-out.
  - m. Startup and placement into final use and operation.
  - n. Commissioning.
8. Construction Areas: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:
- a. Structural completion.
  - b. Temporary enclosure and space conditioning.
  - c. Permanent space enclosure.
  - d. Completion of mechanical installation.
  - e. Completion of electrical installation.
  - f. Substantial Completion.
- F. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and Final Completion.
- 1. Temporary enclosure and space conditioning.
- G. Cost Correlation: Superimpose a cost correlation timeline, indicating planned and actual costs. On the line, show planned and actual dollar volume of the Work performed as of planned and actual dates used for preparation of payment requests.
- H. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:
- 1. Unresolved issues.
  - 2. Unanswered Requests for Information.
  - 3. Rejected or unreturned submittals.
  - 4. Notations on returned submittals.
  - 5. Pending modifications affecting the Work and the Contract Time.
- I. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.
- 1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
  - 2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
  - 3. As the Work progresses, indicate Final Completion percentage for each activity.

- J. Recovery Schedule: When periodic update indicates the Work is 14 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, equipment required to achieve compliance, and date by which recovery will be accomplished.
- K. Distribution: Distribute copies of approved schedule to Architect, Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.
  - 1. Post copies in Project meeting rooms and temporary field offices.
  - 2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

#### 1.7 STARTUP CONSTRUCTION SCHEDULE

- A. Gantt-Chart Schedule: Submit startup, horizontal, Gantt-chart-type construction schedule within seven days of date established for the Notice of Award.
- B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line. Outline significant construction activities for first 90 days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.

#### 1.8 CPM SCHEDULE REQUIREMENTS

- A. Prepare network diagrams using AON (activity-on-node) format.
- B. Startup Network Diagram: Submit diagram within 14 days of date established for the Notice of Award. Outline significant construction activities for the first 90 days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.
- C. CPM Schedule: Prepare Contractor's Construction Schedule using a time-scaled CPM network analysis diagram for the Work.
  - 1. Develop network diagram in sufficient time to submit CPM schedule, so it can be accepted for use no later than 60 days after date established for the Notice of Award.
    - a. Failure to include any work item required for performance of this Contract shall not excuse Contractor from completing all work within applicable completion dates.

2. Conduct educational workshops to train and inform key Project personnel, including subcontractors' personnel, in proper methods of providing data and using CPM schedule information.
  3. Establish procedures for monitoring and updating CPM schedule and for reporting progress. Coordinate procedures with progress meeting and payment request dates.
  4. Use "one workday" as the unit of time for individual activities. Indicate nonworking days and holidays incorporated into the schedule to coordinate with the Contract Time.
- D. CPM Schedule Preparation: Prepare a list of all activities required to complete the Work. Using the startup network diagram, prepare a skeleton network to identify probable critical paths.
1. Activities: Indicate the estimated time duration, sequence requirements, and relationship of each activity in relation to other activities. Include estimated time frames for the following activities:
    - a. Preparation and processing of submittals.
    - b. Mobilization and demobilization.
    - c. Purchase of materials.
    - d. Delivery.
    - e. Fabrication.
    - f. Utility interruptions.
    - g. Installation.
    - h. Work by Owner that may affect or be affected by Contractor's activities.
    - i. Testing and inspection.
    - j. Commissioning.
    - k. Punch list and Final Completion.
    - l. Activities occurring following Final Completion.
  2. Critical Path Activities: Identify critical path activities, including those for interim completion dates. Scheduled start and completion dates shall be consistent with Contract milestone dates.
  3. Processing: Process data to produce output data on a computer-drawn, time-scaled network. Revise data, reorganize activity sequences, and reproduce as often as necessary to produce the CPM schedule within the limitations of the Contract Time.
  4. Format: Mark the critical path. Locate the critical path near center of network; locate paths with most float near the edges.
    - a. Subnetworks on separate sheets are permissible for activities clearly off the critical path.
  5. Cost- and Resource-Loading of CPM Schedule: Assign cost to construction activities on the CPM schedule. Do not assign costs to submittal activities. Obtain Architect's approval prior to assigning costs to fabrication and delivery activities. Assign costs under main subcontracts for testing and commissioning activities, operation and maintenance manuals, punch list activities, Project record documents and demonstration and training (if applicable), in the amount of 5 percent of the Contract Sum.

- a. Each activity cost shall reflect an appropriate value subject to approval by Architect.
  - b. Total cost assigned to activities shall equal the total Contract Sum.
- E. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using a network fragment to demonstrate the effect of the proposed change on the overall Project schedule.
- F. Initial Issue of Schedule: Prepare initial network diagram from a sorted activity list indicating straight "early start-total float." Identify critical activities. Prepare tabulated reports showing the following:
  1. Contractor or subcontractor and the Work or activity.
  2. Description of activity.
  3. Main events of activity.
  4. Immediate preceding and succeeding activities.
  5. Early and late start dates.
  6. Early and late finish dates.
  7. Activity duration in workdays.
  8. Total float or slack time.
  9. Average size of workforce.
  10. Dollar value of activity (coordinated with the schedule of values).
- G. Schedule Updating: Concurrent with making revisions to schedule, prepare tabulated reports showing the following:
  1. Identification of activities that have changed.
  2. Changes in early and late start dates.
  3. Changes in early and late finish dates.
  4. Changes in activity durations in workdays.
  5. Changes in the critical path.
  6. Changes in total float or slack time.
  7. Changes in the Contract Time.
- H. Value Summaries: Prepare two cumulative value lists, sorted by finish dates.
  1. In first list, tabulate activity number, early finish date, dollar value, and cumulative dollar value.
  2. In second list, tabulate activity number, late finish date, dollar value, and cumulative dollar value.
  3. In subsequent issues of both lists, substitute actual finish dates for activities completed as of list date.
  4. Prepare list for ease of comparison with payment requests; coordinate timing with progress meetings.
    - a. In both value summary lists, tabulate "actual percent complete" and "cumulative value completed" with total at bottom.

- b. Submit value summary printouts one week before each regularly scheduled progress meeting.

## 1.9 REPORTS

- A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:
  1. List of subcontractors at Project site.
  2. List of separate contractors at Project site.
  3. Approximate count of personnel at Project site.
  4. Equipment at Project site.
  5. Material deliveries.
  6. High and low temperatures and general weather conditions, including presence of rain or snow.
  7. Testing and inspection.
  8. Accidents.
  9. Meetings and significant decisions.
  10. Unusual events.
  11. Stoppages, delays, shortages, and losses.
  12. Meter readings and similar recordings.
  13. Emergency procedures.
  14. Orders and requests of authorities having jurisdiction.
  15. Change Orders received and implemented.
  16. Construction Change Directives received and implemented.
  17. Services connected and disconnected.
  18. Equipment or system tests and startups.
  19. Partial completions and occupancies.
  20. Substantial Completions authorized.
- B. Material Location Reports: At monthly intervals, prepare and submit a comprehensive list of materials delivered to and stored at Project site. List shall be cumulative, showing materials previously reported plus items recently delivered. Include with list a statement of progress on and delivery dates for materials or items of equipment fabricated or stored away from Project site. Indicate the following categories for stored materials:
  1. Material stored prior to previous report and remaining in storage.
  2. Material stored prior to previous report and since removed from storage and installed.
  3. Material stored following previous report and remaining in storage.
- C. Site Condition Reports: Immediately on discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

- D. Unusual Event Reports: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, responses by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.
1. Submit unusual event reports directly to Owner within one day of an occurrence. Distribute copies of report to parties affected by the occurrence.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013200

## SECTION 013233 - PHOTOGRAPHIC DOCUMENTATION

### PART 1 - GENERAL

#### 1.1 SUMMARY

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

1. Preconstruction photographs.
2. Concealed Work photographs.
3. Periodic construction photographs.
4. Final Completion construction photographs.
5. Preconstruction video recordings.
6. Periodic construction video recordings.
7. Construction webcam.

B. Related Requirements:

1. Section 017700 "Closeout Procedures" for submitting photographic documentation as Project Record Documents at Project closeout.
2. Section 017900 "Demonstration and Training" for submitting video recordings of demonstration of equipment and training of Owner's personnel.
3. Section 024119 "Selective Demolition" for photographic documentation before selective demolition operations commence.

#### 1.2 INFORMATIONAL SUBMITTALS

A. Key Plan: Submit key plan of Project site and building with notation of vantage points marked for location and direction of each photograph. Indicate elevation or story of construction. Include same information as corresponding photographic documentation.

B. Digital Photographs: Submit image files within three days of taking photographs.

1. Submit photos by uploading to web-based Project management software site. Include copy of key plan indicating each photograph's location and direction.
2. Identification: Provide the following information with each image description in web-based Project management software site:
  - a. Name of Project.
  - b. Name and contact information for photographer.
  - c. Name of Architect.
  - d. Name of Contractor.
  - e. Date photograph was taken.

- f. Description of location, vantage point, and direction.
- g. Unique sequential identifier keyed to accompanying key plan.

C. QUALITY ASSURANCE

- D. Construction Webcam Service Provider: A firm specializing in providing photographic equipment, web-based software, and related services for construction projects, with a record of providing satisfactory services similar to those required for Project.

1.3 FORMATS AND MEDIA

- A. Digital Photographs: Provide color images in JPG format, produced by a digital camera with minimum sensor size of **12** megapixels, and at an image resolution of not less than 3200 by 2400 pixels. Use flash in low light levels or backlit conditions.
- B. Digital Video Recordings: Provide high-resolution, digital video in MPEG format, produced by a digital camera with minimum sensor resolution of 12 megapixels and capable of recording in full high-definition mode. Provide supplemental lighting in low light levels or backlit conditions.
- C. Digital Images: Submit digital media as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.
- D. Metadata: Record accurate date and time from camera.
- E. File Names: Name media files with date and sequential numbering suffix.

1.4 CONSTRUCTION PHOTOGRAPHS

- A. Photographer: Engage a qualified photographer to take construction photographs.
- B. General: Take photographs with maximum depth of field and in focus.
  - 1. Maintain key plan with each set of construction photographs that identifies each photographic location.
- C. Preconstruction Photographs: Before commencement of the Work, take photographs of Project site and surrounding properties, including existing items to remain during construction, from different vantage points, as directed by Architect.
  - 1. Flag excavation areas before taking construction photographs.
  - 2. Take 20 photographs to show existing conditions adjacent to property before starting the Work.
  - 3. Take 20 photographs of existing buildings either on or adjoining property, to accurately record physical conditions at start of construction.

4. Take additional photographs as required to record settlement or cracking of adjacent structures, pavements, and improvements.
- D. Concealed Work Photographs: Before proceeding with installing work that will conceal other work, take photographs sufficient in number, with annotated descriptions, to record nature and location of concealed Work, including, but not limited to, the following:
1. Underground utilities.
  2. Underslab services.
  3. Piping.
  4. Electrical conduit.
  5. Waterproofing and weather-resistant barriers.
- E. Periodic Construction Photographs: Take 20 photographs monthly. Select vantage points to show status of construction and progress since last photographs were taken.
- F. Time-Lapse Sequence Construction Photographs: Take 20 photographs as indicated, to show status of construction and progress since last photographs were taken.
1. Frequency: Take photographs monthly, on the same date each month.
  2. Vantage Points: Following suggestions by Architect and Contractor, photographer shall select vantage points. During each of the following construction phases, take not less than two of the required shots from same vantage point each time, to create a time-lapse sequence as follows:
    - a. Commencement of the Work, through completion of subgrade construction.
    - b. Above-grade structural framing.
    - c. Exterior building enclosure.
    - d. Interior Work, through date of Substantial Completion.
- G. Final Completion Construction Photographs: Take 20 photographs after date of Substantial Completion for submission as Project Record Documents. Architect] will inform photographer of desired vantage points.
- H. Additional Photographs: Architect may request photographs in addition to periodic photographs specified. Additional photographs will be paid for by Change Order and are not included in the Contract Sum.
1. Three days' notice will be given, where feasible.
  2. In emergency situations, take additional photographs within 24 hours of request.
  3. Circumstances that could require additional photographs include, but are not limited to, the following:
    - a. Special events planned at Project site.
    - b. Immediate follow-up when on-site events result in construction damage or losses.
    - c. Photographs shall be taken at fabrication locations away from Project site. These photographs are not subject to unit prices or unit-cost allowances.

- d. Substantial Completion of a major phase or component of the Work.
- e. Extra record photographs at time of final acceptance.
- f. Owner's request for special publicity photographs.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013233

## SECTION 013300 - SUBMITTAL PROCEDURES

### PART 1 - GENERAL

#### 1.1 SUMMARY

##### A. Section Includes:

1. Submittal schedule requirements.
2. Administrative and procedural requirements for submittals.

##### B. Related Requirements:

1. Section 013100 "Project Management and Coordination" for submitting coordination drawings and subcontract list and for requirements for web-based Project software.
2. Section 013200 "Construction Progress Documentation" for submitting schedules and reports, including Contractor's construction schedule.
3. Section 013233 "Photographic Documentation" for submitting preconstruction photographs, periodic construction photographs, and Final Completion construction photographs.
4. Section 014000 "Quality Requirements" for submitting test and inspection reports, and schedule of tests and inspections.
5. Section 017700 "Closeout Procedures" for submitting closeout submittals and maintenance material submittals.
6. Section 017823 "Operation and Maintenance Data" for submitting operation and maintenance manuals.
7. Section 017839 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
8. Section 017900 "Demonstration and Training" for submitting video recordings of demonstration of equipment and training of Owner's personnel.

#### 1.2 DEFINITIONS

- A. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."
- 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. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."

### 1.3 SUBMITTAL SCHEDULE

- A. Submittal Schedule: Submit, as an action submittal, a list 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. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
  2. Initial Submittal Schedule: Submit concurrently with startup construction schedule. Include submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
  3. Final Submittal Schedule: Submit concurrently with the first complete submittal of Contractor's construction schedule.
    - a. Submit revised submittal schedule as required to reflect changes in current status and timing for submittals.
  4. Format: Arrange the following information in a tabular format:
    - a. Scheduled date for first submittal.
    - b. Specification Section number and title.
    - c. Submittal Category: Action; informational.
    - d. Name of subcontractor.
    - e. Description of the Work covered.
    - f. Scheduled date for Architect's final release or approval.
    - g. Scheduled dates for purchasing.
    - h. Scheduled date of fabrication.
    - i. Scheduled dates for installation.
    - j. Activity or event number.

### 1.4 SUBMITTAL FORMATS

- A. Submittal Information: Include the following information in each submittal:
1. Project name.
  2. Date.
  3. Name of Architect.
  4. Name of Contractor.
  5. Name of firm or entity that prepared submittal.
  6. Names of subcontractor, manufacturer, and supplier.
  7. Unique submittal number, including revision identifier. Include Specification Section number with sequential alphanumeric identifier and alphanumeric suffix for resubmittals.
  8. Category and type of submittal.

9. Submittal purpose and description.
10. Number and title of Specification Section, with paragraph number and generic name for each of multiple items.
11. Drawing number and detail references, as appropriate.
12. Indication of full or partial submittal.
13. Location(s) where product is to be installed, as appropriate.
14. Other necessary identification.
15. Remarks.
16. Signature of transmitter.

B. Options: Identify options requiring selection by Architect.

C. Deviations and Additional Information: On each submittal, clearly indicate deviations from requirements in the Contract Documents, including minor variations and limitations; include relevant additional information and revisions, other than those requested by Architect on previous submittals. Indicate by highlighting on each submittal or noting on attached separate sheet.

D. Paper Submittals:

1. Place a permanent label or title block on each submittal item for identification; include name of firm or entity that prepared submittal.
2. Provide a space approximately 6 by 8 inches (150 by 200 mm) on label or beside title block to record Contractor's review and approval markings and action taken by Architect.
3. Action Submittals: Submit two paper copies of each submittal unless otherwise indicated. Architect will return one copies.
4. Informational Submittals: Submit one paper copies of each submittal unless otherwise indicated. Architect will not return copies.
5. Additional Copies: Unless additional copies are required for final submittal, and unless Architect observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.
6. Transmittal for Submittals: Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using AIA Document G810 transmittal form.

E. Electronic Submittals: Prepare submittals as PDF package, incorporating complete information into each PDF file. Name PDF file with submittal number.

F. Submittals Utilizing Web-Based Project Software: Prepare submittals as PDF files or other format indicated by Project management software.

## 1.5 SUBMITTAL PROCEDURES

A. Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.

1. Email: Prepare submittals as PDF package and transmit to Architect by sending via email. Include PDF transmittal form. Include information in email subject line as requested by Architect.
    - a. Architect will return annotated file. Annotate and retain one copy of file as a digital Project Record Document file.
  2. Web-Based Project Management Software: Prepare submittals in PDF form, and upload to web-based Project management software website. Enter required data in web-based software site to fully identify submittal.
  3. Paper: Prepare submittals in paper form and deliver to Architect.
- B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
  2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
  3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
  4. Coordinate transmittal of submittals for related parts of the Work specified in different Sections, 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.
  4. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow 21 days for initial review of each submittal.
  5. Concurrent Consultant Review: Where the Contract Documents indicate that submittals may be transmitted simultaneously to Architect and to Architect's consultants, allow 15 days for review of each submittal. Submittal will be returned to Architect before being returned to Contractor.

- a. Submit one copy of submittal to concurrent reviewer in addition to specified number of copies to Architect.
- D. 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.
- E. 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.
- F. 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.

#### 1.6 SUBMITTAL REQUIREMENTS

- A. 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 unsuitable for use, submit as Shop Drawings, not as Product Data.
  2. Mark each copy of each submittal to show which products and options are applicable.
  3. Include the following information, as applicable:
    - a. Manufacturer's catalog cuts.
    - b. Manufacturer's product specifications.
    - c. Standard color charts.
    - d. Statement of compliance with specified referenced standards.
    - e. Testing by recognized testing agency.
    - f. Application of testing agency labels and seals.
    - g. Notation of coordination requirements.
    - h. Availability and delivery time information.
  4. For equipment, include the following in addition to the above, as applicable:
    - a. Wiring diagrams that show factory-installed wiring.
    - b. Printed performance curves.
    - c. Operational range diagrams.
    - d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
  5. Submit Product Data before Shop Drawings, and before or concurrently with Samples.

- B. 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 unless submittal based on Architect's digital data drawing files is otherwise permitted.
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. BIM Incorporation: Develop and incorporate Shop Drawing files into BIM established for Project.
- C. Samples: Submit Samples for review of type, color, pattern, and texture for a check of these characteristics with other materials.
1. Transmit Samples that contain multiple, related components, such as accessories together in one submittal package.
  2. Identification: Permanently attach label on unexposed side of Samples that includes the following:
    - a. Project name and submittal number.
    - b. Generic description of Sample.
    - c. Product name and name of manufacturer.
    - d. Sample source.
    - e. Number and title of applicable Specification Section.
    - f. Specification paragraph number and generic name of each item.
  3. Email Transmittal: Provide PDF transmittal. Include digital image file illustrating Sample characteristics and identification information for record.
  4. Web-Based Project Management Software: Prepare submittals in PDF form, and upload to web-based Project software website. Enter required data in web-based software site to fully identify submittal.
  5. Paper Transmittal: Include paper transmittal, including complete submittal information indicated.
  6. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
    - a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.

- b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
  7. 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 will return submittal with options selected.
  8. 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 two sets of Samples. Architect will retain one Sample set; remainder will be returned. Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
      - 1) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least two sets of paired units that show approximate limits of variations.
- D. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
1. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.
  2. Manufacturer and product name, and model number if applicable.
  3. Number and name of room or space.
  4. Location within room or space.
- E. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.
- F. Design Data: Prepare and submit written and graphic information indicating compliance with indicated performance and design criteria in individual Specification Sections. Include list of assumptions and summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Number each page of submittal.

G. Certificates:

1. Certificates and Certifications Submittals: Submit 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. Provide a notarized signature where indicated.
2. Installer Certificates: Submit written statements on manufacturer's letterhead, certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
3. Manufacturer Certificates: Submit written statements on manufacturer's letterhead, certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
4. Material Certificates: Submit written statements on manufacturer's letterhead, certifying that material complies with requirements in the Contract Documents.
5. Product Certificates: Submit written statements on manufacturer's letterhead, certifying that product complies with requirements in the Contract Documents.
6. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of AWS B2.1/B2.1M on AWS forms. Include names of firms and personnel certified.

H. Test and Research Reports:

1. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for substrate preparation and primers required.
2. 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.
3. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
4. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
5. 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.
6. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
  - a. Name of evaluation organization.
  - b. Date of evaluation.
  - c. Time period when report is in effect.

- d. Product and manufacturers' names.
- e. Description of product.
- f. Test procedures and results.
- g. Limitations of use.

#### 1.7 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 insufficient 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 file 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.
- C. BIM Incorporation: Incorporate delegated-design drawing and data files into BIM established for Project.
  - 1. Prepare delegated-design drawings in the following format: Same digital data software program, version, and operating system as original Drawings.

#### 1.8 CONTRACTOR'S REVIEW

- A. Action Submittals 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. Contractor's Approval: Indicate Contractor's approval for each submittal with indication in web-based Project management software. Include 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.
  - 1. Architect will not review submittals received from Contractor that do not have Contractor's review and approval.

## 1.9 ARCHITECT'S REVIEW

- A. Action Submittals: Architect will review each submittal, indicate corrections or revisions required.
1. Submittals by Web-Based Project Management Software: Architect will indicate, on Project management software website, the appropriate action.
    - a. Actions taken by indication on Project management software website have the following meanings:
      - 1) Reviewed: Where submittal is marked "Reviewed," that part of the Work covered by the submittal may proceed provided it complies with requirements of the Contract Documents; final acceptance will depend upon that compliance.
      - 2) Reviewed – Additional Information Required: Where submittal is marked "Reviewed – Additional Information Required," the information submitted has been reviewed, however, additional information as noted and/or required by the Contract Documents needs to be submitted.
      - 3) Furnish As Corrected: When submittal is marked "Furnish As Corrected," that part of the Work covered by the submittal may proceed provided it complies with notations or corrections on the submittal and requirements of the Contract Documents; final acceptance will depend on that compliance.
      - 4) Revise and Resubmit: When submittal is marked "Revise and Resubmit," do not proceed with that part of the Work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Revise or prepare a new submittal in accordance with the notations; resubmit without delay. Repeat if necessary to obtain a different action mark.
      - 5) Do not permit submittals marked "Revise and Resubmit" to be used at the Project site, or elsewhere where Work is in progress.
      - 6) Rejected: When submittal is marked "Rejected," information submitted is not in compliance with Contract Documents. Resubmit submittal as required by Contract Documents.
      - 7) Not Reviewed: When submittal is marked "Not Reviewed," submittal is incomplete without sufficient information to review as identified above, submittal is not required by Construction Documents, or is not specific to Project.
- B. 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.
- C. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.
- D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.

- E. Architect will discard submittals received from sources other than Contractor.
- F. Submittals not required by the Contract Documents will be returned by Architect without action.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

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 inspection services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
  - 1. Specific quality-assurance and quality-control requirements for individual work results are specified in their respective Specification Sections. Requirements in individual Sections may also cover production of standard products.
  - 2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and quality-control procedures that facilitate compliance with the Contract Document requirements.
  - 3. Requirements for Contractor to provide quality-assurance and quality-control services required by Architect, Owner, Commissioning Authority, or authorities having jurisdiction are not limited by provisions of this Section.

#### 1.2 DEFINITIONS

- A. Experienced: When used with an entity or individual, "experienced," unless otherwise further described, 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.
- B. Field Quality-Control Tests and Inspections: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- C. 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, assembly, and similar operations.
  - 1. Use of trade-specific terminology in referring to a Work result does not require that certain construction activities specified apply exclusively to specific trade(s).
- D. Mockups: Physical assemblies of portions of the Work constructed to establish the standard by which the Work will be judged. Mockups are not Samples.

1. Mockups are used for one or more of the following:
    - a. Verify selections made under Sample submittals.
    - b. Demonstrate aesthetic effects.
    - c. Demonstrate the qualities of products and workmanship.
    - d. Demonstrate successful installation of interfaces between components and systems.
    - e. Perform preconstruction testing to determine system performance.
  2. Product Mockups: Mockups that may include multiple products, materials, or systems specified in a single Section.
  3. In-Place Mockups: Mockups constructed on-site in their actual final location as part of permanent construction.
- E. 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. Unless otherwise indicated, copies of reports of tests or inspections performed for other than the Project do not meet this definition.
- F. Product Tests: Tests and inspections that are performed by a nationally recognized testing laboratory (NRTL) according to 29 CFR 1910.7, by a testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program (NVLAP), or by a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.
- G. Source Quality-Control Tests and Inspections: Tests and inspections that are performed at the source (e.g., plant, mill, factory, or shop).
- H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. The term "testing laboratory" has the same meaning as the term "testing agency."
- I. 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.
- J. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work, to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Contractor's quality-control services do not include contract administration activities performed by Architect.
- 1.3 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 Statement: Submit a statement 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, indicating that the products and systems are in compliance with performance and design criteria indicated. Include list of codes, loads, and other factors used in performing these services.

#### 1.4 CONFLICTING REQUIREMENTS

- A. Conflicting Standards and Other Requirements: If compliance with two or more standards or requirements is specified and the standards or requirements establish different or conflicting requirements for minimum quantities or quality levels, inform the Architect regarding the conflict and obtain clarification prior to proceeding with the Work. Refer conflicting requirements that are different, but apparently equal, to Architect for clarification before proceeding.
- B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified is the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

#### 1.5 ACTION SUBMITTALS

- A. Mockup Shop Drawings:
  1. Include plans, sections, elevations, and details, indicating materials and size of mockup construction.
  2. Indicate manufacturer and model number of individual components.
  3. Provide axonometric drawings for conditions difficult to illustrate in two dimensions.

#### 1.6 INFORMATIONAL SUBMITTALS

- A. Contractor's Quality-Control Plan: For quality-assurance and quality-control activities and responsibilities.
- B. Qualification Data: For Contractor's quality-control personnel.
- C. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility submitted to authorities having jurisdiction before starting work on the following systems:

1. Seismic-force-resisting system, designated seismic system, or component listed in the Statement of Special Inspections.
  2. Primary wind-force-resisting system or a wind-resisting component listed in the Statement of Special Inspections.
- D. 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.
- E. Schedule of Tests and Inspections: Prepare in tabular form and include the following:
1. Specification Section number and title.
  2. Entity responsible for performing tests and inspections.
  3. Description of test and inspection.
  4. Identification of applicable standards.
  5. Identification of test and inspection methods.
  6. Number of tests and inspections required.
  7. Time schedule or time span for tests and inspections.
  8. Requirements for obtaining samples.
  9. Unique characteristics of each quality-control service.
- F. Reports: Prepare and submit certified written reports and documents as specified.
- G. Permits, Licenses, and Certificates: For Owner's record, 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.
- 1.7 CONTRACTOR'S QUALITY-CONTROL PLAN
- A. Quality-Control Plan, General: Submit quality-control plan within 10 days of Notice of Award, and not less than five days prior to preconstruction conference. Submit in format acceptable to Architect. Identify personnel, procedures, controls, instructions, tests, records, and forms to be used to carry out Contractor's quality-assurance and quality-control responsibilities and to coordinate Owner's quality-assurance and quality-control activities. Coordinate with Contractor's Construction Schedule.
- B. Quality-Control Personnel Qualifications: Engage qualified personnel trained and experienced in managing and executing quality-assurance and quality-control procedures similar in nature and extent to those required for Project.
1. Project quality-control manager may also serve as Project superintendent.
- C. Submittal Procedure: Describe procedures for ensuring compliance with requirements through review and management of submittal process. Indicate qualifications of personnel responsible for submittal review.

- D. Testing and Inspection: In quality-control plan, include a comprehensive schedule of Work requiring testing or inspection, including the following:
  - 1. Contractor-performed tests and inspections, including subcontractor-performed tests and inspections. Include required tests and inspections and Contractor-elected tests and inspections. Distinguish source quality-control tests and inspections from field quality-control tests and inspections.
  - 2. Special inspections required by authorities having jurisdiction and indicated on the Statement of Special Inspections.
  - 3. Owner-performed tests and inspections indicated in the Contract Documents.
- E. Continuous Inspection of Workmanship: Describe process for continuous inspection during construction to identify and correct deficiencies in workmanship in addition to testing and inspection specified. Indicate types of corrective actions to be required to bring the Work into compliance with standards of workmanship established by Contract requirements and approved mockups.
- F. Monitoring and Documentation: Maintain testing and inspection reports, including log of approved and rejected results. Include Work Architect has indicated as nonconforming or defective. Indicate corrective actions taken to bring nonconforming Work into compliance with requirements. Comply with requirements of authorities having jurisdiction.

## 1.8 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, telephone number, and email address 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 inspection.
  - 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 Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:

1. Name, address, telephone number, and email address of technical representative making report.
  2. Statement on condition of substrates and their acceptability for installation of product.
  3. Statement that products at Project site comply with requirements.
  4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
  5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
  6. Statement of whether conditions, products, and installation will affect warranty.
  7. Other required items indicated in individual Specification Sections.
- C. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:
1. Name, address, telephone number, and email address of factory-authorized service representative making report.
  2. Statement that equipment complies with requirements.
  3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
  4. Statement of whether conditions, products, and installation will affect warranty.
  5. Other required items indicated in individual Specification Sections.

## 1.9 QUALITY ASSURANCE

- A. 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 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. As applicable, procure products from manufacturers able to meet qualification requirements, warranty requirements, and technical or factory-authorized service representative requirements.
- 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, applying, 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 is similar in material, design, and extent to those indicated for this Project.

- F. Specialists: Certain Specification Sections require that specific construction activities be performed by entities who are recognized experts in those operations. Specialists will satisfy qualification requirements indicated and engage in the activities indicated.
  - 1. Requirements of authorities having jurisdiction supersede requirements for specialists.
- G. Testing and Inspecting Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspection indicated, as documented in accordance with ASTM E329, and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.
- H. Manufacturer's Technical 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. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect, demonstrate, repair, and perform service on installations of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- J. 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 Contractor's responsibilities, including the following:
  - 1. Provide test specimens representative of proposed products and construction.
  - 2. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
  - 3. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
  - 4. Build site-assembled test assemblies and mockups, using installers who will perform same tasks for Project.
  - 5. When testing is complete, remove test specimens and test assemblies, and mockups; do not reuse products on Project.
  - 6. 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.
- K. 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 of size indicated.
2. Build mockups in location indicated or, if not indicated, as directed by Architect.
3. Notify Architect seven days in advance of dates and times when mockups will be constructed.
4. Employ supervisory personnel who will oversee mockup construction. Employ workers who will be employed to perform same tasks during the construction at Project.
5. Demonstrate the proposed range of aesthetic effects and workmanship.
6. Obtain Architect's approval of mockups before starting corresponding Work, fabrication, or construction.
  - a. Allow seven days for initial review and each re-review of each mockup.
7. Promptly correct unsatisfactory conditions noted by Architect's preliminary review, to the satisfaction of the Architect, before completion of final mockup.
8. Approval of mockups by the Architect does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
9. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
10. Demolish and remove mockups when directed unless otherwise indicated.

#### 1.10 QUALITY CONTROL

- A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspection they are engaged to perform.
  2. Costs for retesting and reinspecting construction that replaces or is necessitated by Work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.
- B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities, whether specified or not, to verify and document that the Work complies with requirements.
1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
  2. Engage a qualified testing agency to perform quality-control services.
    - a. Contractor will not employ same entity engaged by Owner, unless agreed to in writing by Owner.

3. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspection will be performed.
  4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
  5. Testing and inspection requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
  6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
- 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.
1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
  2. Determine the locations 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 duties of Contractor.
- D. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 013300 "Submittal Procedures."
- E. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.
- F. Contractor's Associated Requirements and Services: Cooperate with agencies and representatives 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 inspection. 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 inspection equipment at Project site.
- G. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and quality-control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspection.
1. Schedule times for tests, inspections, obtaining samples, and similar activities.
- H. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents. Coordinate and submit concurrently with Contractor's Construction Schedule. Update and submit with each Application for Payment.
1. Schedule Contents: Include tests, inspections, and quality-control services, including Contractor- and Owner-retained services, commissioning activities, and other Project-required services paid for by other entities.
  2. Distribution: Distribute schedule to Owner, Architect, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

#### 1.11 SPECIAL TESTS AND INSPECTIONS

- A. Special Tests and Inspections: Owner will engage a qualified **testing agency** to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner, and as follows:
1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures, and reviewing 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.
  - 1. Submit log at Project closeout as part of Project Record Documents.

3.2 REPAIR AND PROTECTION

- A. General: On completion of testing, inspection, 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 015000 - TEMPORARY FACILITIES AND CONTROLS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.
- B. Related Requirements:
  - 1. Section 011000 "Summary" for work restrictions and limitations on utility interruptions.

#### 1.2 USE CHARGES

- A. Installation, removal, and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities engaged in the Project to use temporary services and facilities without cost, including, but not limited to Architect testing agencies, and authorities having jurisdiction.
- B. Sewer Service: **Pay** sewer-service use charges for sewer usage by all entities for construction operations.
- C. Water Service: **Pay** water-service use charges for water used by all entities for construction operations.
- D. Electric Power Service: **Pay** electric-power-service use charges for electricity used by all entities for construction operations.
- E. Water and Sewer Service from Existing System: Water from Owner's existing water system is available for use [**with metering**] [**without metering and without payment of use charges**]. Provide connections and extensions of services [**and metering**] as required for construction operations.
- F. Electric Power Service from Existing System: Electric power from Owner's existing system is available for use [**with metering**] [**without metering and without payment of use charges**]. Provide connections and extensions of services [**and metering**] as required for construction operations.

### 1.3 INFORMATIONAL SUBMITTALS

- A. Site Utilization Plan: Show temporary facilities, temporary utility lines and connections, staging areas, construction site entrances, vehicle circulation, and parking areas for construction personnel.
- B. Implementation and Termination Schedule: Within 15 days of date established for commencement of the Work, submit schedule indicating implementation and termination dates of each temporary utility.
- C. Project Identification and Temporary Signs: Show fabrication and installation details, including plans, elevations, details, layouts, typestyles, graphic elements, and message content.
- D. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire-prevention program.
- E. Moisture- and Mold-Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage and mold. Describe delivery, handling, storage, installation, and protection provisions for materials subject to water absorption or water damage.
  - 1. Indicate procedures for discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and requirements for replacing water-damaged Work.
  - 2. Indicate sequencing of work that requires water, such as sprayed fire-resistive materials, plastering, and terrazzo grinding, and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.
  - 3. Indicate methods to be used to avoid trapping water in finished work.
- F. Dust- and HVAC-Control Plan: Submit coordination drawing and narrative that indicates the dust- and HVAC-control measures proposed for use, proposed locations, and proposed time frame for their operation. Include the following:
  - 1. Locations of dust-control partitions at each phase of work.
  - 2. HVAC system isolation schematic drawing.
  - 3. Location of proposed air-filtration system discharge.
  - 4. Waste-handling procedures.
  - 5. Other dust-control measures.
- G. Noise and Vibration Control Plan: Identify construction activities that may impact the occupancy and use of existing spaces within the building or adjacent existing buildings, whether occupied by others, or occupied by the Owner. Include the following:
  - 1. Methods used to meet the goals and requirements of the Owner.
  - 2. Concrete cutting method(s) to be used.

3. Location of construction devices on the site.
4. Show compliance with the use and maintenance of quieted construction devices for the duration of the Project.

#### 1.4 QUALITY ASSURANCE

- A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
- B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.
- C. Accessible Temporary Egress: Comply with applicable provisions in the United States Access Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.

#### 1.5 PROJECT CONDITIONS

- A. Temporary Use of Permanent Facilities: Engage Installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

### PART 2 - PRODUCTS

#### 2.1 MATERIALS

- A. Chain-Link Fencing: Minimum 2-inch (50-mm), 0.148-inch- (3.8-mm-) thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet (1.8 m) high with galvanized-steel pipe posts; minimum 2-3/8-inch- (60-mm-) OD line posts and 2-7/8-inch- (73-mm-) OD corner and pull posts, with galvanized barbed-wire top strand.

#### 2.2 TEMPORARY FACILITIES

- A. Field Offices: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.
- B. Field Offices: Owner will provide conditioned interior space for field offices for duration of Project.
- C. Common-Use Field Office: Of sufficient size to accommodate needs of Owner, Architect, and construction personnel office activities and to accommodate Project meetings specified in other Division 01 Sections. Keep office clean and orderly. Furnish and equip offices as follows:

1. Furniture required for Project-site documents, including file cabinets, plan tables, plan racks, and bookcases.
  2. Conference room of sufficient size to accommodate meetings of [10] <Insert number> individuals. Provide electrical power service and 120-V ac duplex receptacles, with no fewer than one receptacle on each wall. Furnish room with conference table, chairs, and 4-foot- (1.2-m-) square tack and marker boards.
  3. Drinking water and private toilet.
  4. Heating and cooling equipment necessary to maintain a uniform indoor temperature of 68 to 72 deg F (20 to 22 deg C).
  5. Lighting fixtures capable of maintaining average illumination of 20 fc (215 lx) at desk height.
- D. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.
1. Store combustible materials apart from building.

## 2.3 EQUIPMENT

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.
- B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.
1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
  2. Heating, Cooling, and Dehumidifying Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.
  3. Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of 8 at each return-air grille in system and remove at end of construction, and clean HVAC system as required in Section 017700 "Closeout Procedures."
- C. Air-Filtration Units: Primary and secondary HEPA-filter-equipped portable units with four-stage filtration. Provide single switch for emergency shutoff. Configure to run continuously.

## PART 3 - EXECUTION

### 3.1 TEMPORARY FACILITIES, GENERAL

- A. Conservation: Coordinate construction and use of temporary facilities with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.

1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. See other Sections for disposition of salvaged materials that are designated as Owner's property.

### 3.2 INSTALLATION, GENERAL

- A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.
  1. Locate facilities to limit site disturbance as specified in Section 011000 "Summary."
- B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.
- C. Isolation of Work Areas in Occupied Facilities: Prevent dust, fumes, and odors from entering occupied areas.
  1. Prior to commencing work, isolate the HVAC system in area where work is to be performed according to coordination drawings.
    - a. Disconnect supply and return ductwork in work area from HVAC systems servicing occupied areas.
    - b. Maintain negative air pressure within work area, using HEPA-equipped air-filtration units, starting with commencement of temporary partition construction, and continuing until removal of temporary partitions is complete.
  2. Maintain dust partitions during the Work. Use vacuum collection attachments on dust-producing equipment. Isolate limited work within occupied areas using portable dust-containment devices.
  3. Perform daily construction cleanup and final cleanup using approved, HEPA-filter-equipped vacuum equipment.

### 3.3 TEMPORARY UTILITY INSTALLATION

- A. General: Install temporary service or connect to existing service.
  1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
- B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.
  1. Connect temporary sewers to municipal system as directed by authorities having jurisdiction.

- C. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.
- D. Water Service: Connect to Owner's existing water service facilities. Clean and maintain water service facilities in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.
- E. Sanitary Facilities: Provide temporary toilets, wash facilities, safety shower and eyewash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
  - 1. Use of Permanent Toilets: Use of Owner's existing or new toilet facilities is not permitted.
- F. Temporary Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.
  - 1. Provide temporary dehumidification systems when required to reduce ambient and substrate moisture levels to level required to allow installation or application of finishes and their proper curing or drying.
- G. Electric Power Service:
  - 1. Where available, connect to Owner's existing electric power service. Maintain equipment in a condition acceptable to Owner.
  - 2. Otherwise, provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.
    - a. Install electric power service [overhead] [underground] unless otherwise indicated.
- H. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
  - 1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
- I. Electronic Communication Service: Provide secure WiFi wireless connection to internet with provisions for access by Architect and Owner.

### 3.4 SUPPORT FACILITIES INSTALLATION

- A. Comply with the following:

1. Provide construction for temporary field offices, shops, and sheds located within construction area or within 30 feet (9 m) of building lines that is noncombustible in accordance with ASTM E136. Comply with NFPA 241.
  2. Utilize designated area within existing building for temporary field offices.
  3. Maintain support facilities until Architect schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.
- B. Temporary Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate for construction operations. Locate temporary roads and paved areas as indicated on Drawings.
1. Provide dust-control treatment that is nonpolluting and nontracking. Reapply treatment as required to minimize dust.
- C. Temporary Use of Planned Permanent Roads and Paved Areas: Locate temporary roads and paved areas in same location as permanent roads and paved areas. Construct and maintain temporary roads and paved areas adequate for construction operations. Extend temporary roads and paved areas, within construction limits indicated, as necessary for construction operations.
1. Coordinate elevations of temporary roads and paved areas with permanent roads and paved areas.
  2. Prepare subgrade and install subbase and base for temporary roads and paved areas in accordance with Section 312000 "Earth Moving."
  3. Recondition base after temporary use, including removing contaminated material, regrading, proofrolling, compacting, and testing.
  4. Delay installation of final course of permanent hot-mix asphalt pavement until immediately before Substantial Completion. Repair hot-mix asphalt base-course pavement before installation of final course in accordance with Section 321216 "Asphalt Paving."
- D. Traffic Controls: Comply with requirements of authorities having jurisdiction.
1. Protect existing site improvements to remain, including curbs, pavement, and utilities.
  2. Maintain access for fire-fighting equipment and access to fire hydrants.
- E. Parking: Use designated areas of Owner's existing parking areas for construction personnel.
- F. Storage and Staging: Use designated areas of Project site for storage and staging needs.
- G. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.
1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.
  2. Remove snow and ice as required to minimize accumulations.

- H. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.
  - 1. Identification Signs: Provide Project identification signs as indicated on Drawings.
  - 2. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.
    - a. Provide temporary, directional signs for construction personnel and visitors.
  - 3. Maintain and touch up signs, so they are legible at all times.
- I. Waste Disposal Facilities: Comply with requirements specified in Section 017419 "Construction Waste Management and Disposal."
- J. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.
  - 1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.
- K. Temporary Stairs: Until permanent stairs are available, provide temporary stairs where ladders are not adequate.
- L. Existing Stair Usage: Use of Owner's existing stairs will be permitted, provided stairs are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore stairs to condition existing before initial use.
  - 1. Provide protective coverings, barriers, devices, signs, or other procedures to protect stairs and to maintain means of egress. If stairs become damaged, restore damaged areas, so no evidence remains of correction work.
- M. Temporary Use of Permanent Stairs: Use of new stairs for construction traffic will be permitted, provided stairs are protected and finishes restored to new condition at time of Substantial Completion.

### 3.5 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.
  - 1. Where access to adjacent properties is required in order to affect protection of existing facilities, obtain written permission from adjacent property owner to access property for that purpose.
- B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

1. Comply with work restrictions specified in Section 011000 "Summary."
- C. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways, according to requirements of authorities having jurisdiction, whichever is more stringent.
1. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross tree- or plant-protection zones.
  2. Inspect, repair, and maintain erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
  3. Clean, repair, and restore adjoining properties and roads affected by erosion and sedimentation from Project site during the course of Project.
  4. Remove erosion and sedimentation controls, and restore and stabilize areas disturbed during removal.
- D. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.
- E. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.
- F. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals, so Project will be free of pests and their residues at Substantial Completion. Perform control operations lawfully, using materials approved by authorities having jurisdiction.
- G. Site Enclosure Fence: Before construction operations begin, furnish and install site enclosure fence in a manner that will prevent people from easily entering site except by entrance gates.
1. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations.
  2. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Furnish one set of keys to Owner.
  3. Provide 24 hour security guards or monitored-security camera systems.
- H. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each workday.
- I. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

- J. Temporary Egress: Provide temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction. Provide signage directing occupants to temporary egress.
- K. Covered Walkway: Erect protective, covered walkway for passage of individuals through or adjacent to Project site. Coordinate with entrance gates, other facilities, and obstructions. Comply with regulations of authorities having jurisdiction.
  - 1. Provide overhead decking, protective enclosure walls, handrails, barricades, warning signs, exit signs, lights, safe and well-drained walkways, and similar provisions for protection and safe passage.
  - 2. Paint and maintain appearance of walkway for duration of the Work.
- L. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.
  - 1. Where heating or cooling is needed and permanent enclosure is incomplete, insulate temporary enclosures.
- M. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire-prevention program.
  - 1. Prohibit smoking in construction areas. Comply with additional limits on smoking specified in other Sections.
  - 2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition in accordance with requirements of authorities having jurisdiction.
  - 3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
  - 4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign, stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

### 3.6 MOISTURE AND MOLD CONTROL

- A. Moisture and Mold Protection: Protect stored materials and installed Work in accordance with Moisture and Mold Protection Plan.
- B. Exposed Construction Period: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect as follows:
  - 1. Protect porous materials from water damage.
  - 2. Protect stored and installed material from flowing or standing water.
  - 3. Keep porous and organic materials from coming into prolonged contact with concrete.

4. Remove standing water from decks.
  5. Keep deck openings covered or dammed.
- C. Partially Enclosed Construction Period: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:
1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
  2. Keep interior spaces reasonably clean and protected from water damage.
  3. Periodically collect and remove waste containing cellulose or other organic matter.
  4. Discard or replace water-damaged material.
  5. Do not install material that is wet.
  6. Discard and replace stored or installed material that begins to grow mold.
  7. Perform work in a sequence that allows wet materials adequate time to dry before enclosing the material in gypsum board or other interior finishes.
- D. Controlled Construction Period: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:
1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
  2. Use temporary or permanent HVAC system to control humidity within ranges specified for installed and stored materials.
  3. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits.
    - a. Hygroscopic materials that may support mold growth, including wood and gypsum-based products, that become wet during the course of construction and remain wet for 48 hours are considered defective and require replacing.
    - b. Measure moisture content of materials that have been exposed to moisture during construction operations or after installation. Record readings beginning at time of exposure and continuing daily for 48 hours. Identify materials containing moisture levels higher than allowed. Report findings in writing to Architect.
    - c. Remove and replace materials that cannot be completely restored to their manufactured moisture level within 48 hours.

### 3.7 OPERATION, TERMINATION, AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
- B. Maintenance: Maintain facilities in good operating condition until removal.
1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.

- C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.
- D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
  - 1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
  - 2. Remove temporary roads and paved areas not intended for or acceptable for integration into permanent construction. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.
  - 3. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 017700 "Closeout Procedures."

END OF SECTION 015000

## 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 012300 "Alternates" for products selected under an alternate.
  - 2. Section 012500 "Substitution Procedures" for requests for substitutions.
  - 3. Section 017700 "Closeout Procedures" for submitting warranties.

#### 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. Salvaged items or items reused from other projects are not considered new products. Items that are manufactured or fabricated to include recycled content materials are considered new products, unless indicated otherwise.
  - 3. Comparable Product: Product by named manufacturer that is demonstrated and approved through the comparable product submittal process described in Part 2 "Comparable Products" Article, 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 single manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation. Published attributes and characteristics of basis-of-design product establish salient characteristics of products.
  - 1. Evaluation of Comparable Products: In addition to the basis-of-design product description, product attributes and characteristics may be listed to establish the significant qualities related to type, function, in-service performance and physical properties, weight,

dimension, durability, visual characteristics, and other special features and requirements for purposes of evaluating comparable products of additional manufacturers named in the specification. Manufacturer's published attributes and characteristics of basis-of-design product also establish salient characteristics of products for purposes of evaluating comparable products.

- C. Subject to Compliance with Requirements: Where the phrase "Subject to compliance with requirements" introduces a product selection procedure in an individual Specification Section, provide products qualified under the specified product procedure. In the event that a named product or product by a named manufacturer does not meet the other requirements of the specifications, select another named product or product from another named manufacturer that does meet the requirements of the specifications; submit a comparable product request or substitution request, if applicable.
- D. Comparable Product Request Submittal: An action submittal requesting consideration of a comparable product, including the following information:
  - 1. Identification of basis-of-design product or fabrication or installation method to be replaced, including Specification Section number and title and Drawing numbers and titles.
  - 2. Data indicating compliance with the requirements specified in Part 2 "Comparable Products" Article.
- E. Basis-of-Design Product Specification Submittal: An action submittal complying with requirements in Section 013300 "Submittal Procedures."
- F. Substitution: Refer to Section 012500 "Substitution Procedures" for definition and limitations on substitutions.

### 1.3 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.
- B. Identification of Products: Except for required labels and operating data, do not attach or imprint manufacturer or product names or trademarks on exposed surfaces of products or equipment that will be exposed to view in occupied spaces or on the exterior.
  - 1. Labels: Locate required product labels and stamps on a concealed surface, or, where required for observation following installation, on a visually accessible surface that is not conspicuous.
  - 2. Equipment Nameplates: Provide a permanent nameplate on each item of service- or power-operated equipment. Locate on a visually accessible but inconspicuous surface. Include information essential for operation, including the following:

- a. Name of product and manufacturer.
  - b. Model and serial number.
  - c. Capacity.
  - d. Speed.
  - e. Ratings.
3. See individual identification Sections in Divisions 21, 22, 23, and 26 for additional equipment identification requirements.

#### 1.4 COORDINATION

- A. Modify or adjust affected work as necessary to integrate work of approved comparable products and approved substitutions.

#### 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 that products are undamaged and properly protected.
- C. Storage:
  1. Provide a secure location and enclosure at Project site for storage of materials and equipment.
  2. Store products to allow for inspection and measurement of quantity or counting of units.
  3. Store materials in a manner that will not endanger Project structure.
  4. Store products that are subject to damage by the elements under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation and with adequate protection from wind.
  5. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.

6. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
7. Protect stored products from damage and liquids from freezing.
8. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

## 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 standard warranty form furnished by individual manufacturer for a particular product and issued in the name of the Owner or endorsed by manufacturer to Owner.
  2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner and issued in the name of the Owner or endorsed by manufacturer to 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 in the Project Manual, prepare a written document, using indicated form properly executed.
  3. See 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 meeting 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.
6. Or Equal: For products specified by name and accompanied by the term "or equal," "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product.
  - a. Submit additional documentation required by Architect in order to establish equivalency of proposed products. Unless otherwise indicated, evaluation of "or equal" product status is by the Architect, whose determination is final.

B. Product Selection Procedures:

1. Sole 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.
  - a. Sole product may be indicated by the phrase "Subject to compliance with requirements, provide the following."
2. Sole 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.
  - a. Sole manufacturer/source may be indicated by the phrase "Subject to compliance with requirements, provide products by the following."
3. Limited List of Products: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered unless otherwise indicated.
  - a. Limited list of products may be indicated by the phrase "Subject to compliance with requirements, provide one of the following."
4. Non-Limited List of Products: 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.
  - a. Non-limited list of products is indicated by the phrase "Subject to compliance with requirements, available products that may be incorporated in the Work include, but are not limited to, the following."

- b. Provision of an unnamed product is not considered a substitution, if the product complies with requirements.
5. Limited List of Manufacturers: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered unless otherwise indicated.
  - a. Limited list of manufacturers is indicated by the phrase "Subject to compliance with requirements, provide products by one of the following."
6. Non-Limited List of Manufacturers: 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.
  - a. Non-limited list of manufacturers is indicated by the phrase "Subject to compliance with requirements, available manufacturers whose products may be incorporated in the Work include, but are not limited to, the following."
  - b. Provision of products of an unnamed manufacturer is not considered a substitution, if the product complies with requirements.
7. 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 may additionally 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.
  - a. For approval of products by unnamed manufacturers, comply with requirements in Section 012500 "Substitution Procedures" for substitutions for convenience.
- C. Visual Matching Specification: Where Specifications require the phrase "match Architect's sample," provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.
  1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Section 012500 "Substitution Procedures" for proposal of product.
- D. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or a similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.
- E. Sustainable Product Selection: Where Specifications require product to meet sustainable product characteristics, select products complying with indicated requirements. Comply with

requirements in Division 01 sustainability requirements Section and individual Specification Sections.

1. Select products for which sustainable design documentation submittals are available from manufacturer.

## 2.2 COMPARABLE PRODUCTS

- A. Conditions for Consideration of Comparable Products: 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 the following requirements:
1. Evidence that proposed product does not require revisions to the Contract Documents, is consistent with the Contract Documents, will produce the indicated results, and is compatible with other portions of the Work.
  2. Detailed comparison of significant qualities of proposed product with those of the named basis-of-design product. Significant product qualities include attributes, such as type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other specific features and requirements.
  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.
- B. Architect's Action on Comparable Products Submittal: If necessary, Architect will request additional information or documentation for evaluation, as specified in Section 013300 "Submittal Procedures."
1. Form of Approval of Submittal: As specified in Section 013300 "Submittal Procedures."
  2. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.
- C. Submittal Requirements, Two-Step Process: Approval by the Architect of Contractor's request for use of comparable product is not intended to satisfy other submittal requirements. Comply with specified submittal requirements.
- D. Submittal Requirements, Single-Step Process: When acceptable to Architect, incorporate specified submittal requirements of individual Specification Section in combined submittal for comparable products. Approval by the Architect of Contractor's request for use of comparable product and of individual submittal requirements will also satisfy other submittal requirements.

PART 3 - EXECUTION (Not Used)

END OF SECTION 016000

## 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.
  
- B. Related Requirements:
  - 1. Section 013233 "Photographic Documentation" for submitting Final Completion construction photographic documentation.
  - 2. Section 017823 "Operation and Maintenance Data" for additional operation and maintenance manual requirements.
  - 3. Section 017839 "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
  - 4. Section 017900 "Demonstration and Training" for requirements to train the Owner's maintenance personnel to adjust, operate, and maintain products, equipment, and systems.

#### 1.2 DEFINITIONS

- A. List of Incomplete Items: Contractor-prepared list of items to be completed or corrected, prepared for the Architect's use prior to Architect's inspection, to determine if the Work is substantially complete.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of cleaning agent.
- B. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.
- C. Certified List of Incomplete Items: Final submittal at Final Completion.

#### 1.4 CLOSEOUT SUBMITTALS

- A. Certificates of Release: From authorities having jurisdiction.
- B. Certificate of Insurance: For continuing coverage.
- C. Field Report: For pest-control inspection.

#### 1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Schedule of Maintenance Material Items: For maintenance material submittal items required by other Sections.

#### 1.6 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, 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 Architect. Label with manufacturer's name and model number.
    - 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 Architect's signature for receipt of submittals.
  - 5. Submit testing, adjusting, and balancing records.
  - 6. Submit sustainable design submittals not previously submitted.
  - 7. 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. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings specified in Section 017900 "Demonstration and Training."
  6. Advise Owner of changeover in utility services.
  7. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
  8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
  9. Complete final cleaning requirements.
  10. Touch up paint 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. 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.

#### 1.7 FINAL COMPLETION PROCEDURES

- A. Submittals Prior to Final Completion: Before requesting final inspection for determining Final Completion, complete the following:
1. Submit a final Application for Payment in accordance with 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.
  5. Submit Final Completion photographic documentation.
- B. Inspection: Submit a written request for final inspection to determine acceptance 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 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. Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

#### 1.8 LIST OF INCOMPLETE ITEMS

- 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, listed by room or space number.
  2. Organize items applying to each space by major element, including categories for ceilings, individual walls, floors, equipment, and building systems.
  3. Include the following information at the top of each page:
    - a. Project name.
    - b. Date.
    - c. Name of Architect.
    - d. Name of Contractor.
    - e. Page number.
  4. Submit list of incomplete items in the following format:
    - a. Web-Based Project Software Upload: Utilize software feature for creating and updating list of incomplete items (punch list).

#### 1.9 SUBMITTAL OF PROJECT WARRANTIES

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

- B. Partial Occupancy: Submit properly executed warranties within **15** days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.
- C. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.
- D. Warranty Electronic File: Provide warranties and bonds in PDF format. Assemble complete warranty and bond submittal package into a single electronic PDF file with bookmarks enabling navigation to each item. Provide bookmarked table of contents at beginning of document.
  - 1. Submit by uploading to web-based project software site.
- E. Warranties in Paper Form:
  - 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 (215-by-280-mm) 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.
- F. 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.
  - 1. Use cleaning products that comply with Green Seal's GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

## 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 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 not planted, mulched, or 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. Clean flooring, removing debris, dirt, and staining; clean according to manufacturer's recommendations.
    - h. Vacuum and mop concrete.
    - i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
    - j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces.
    - k. Remove labels that are not permanent.
    - l. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
    - m. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
    - n. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
    - o. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter on inspection.

- p. Clean luminaires, lamps, globes, and reflectors to function with full efficiency.
  - q. Clean strainers.
  - r. Leave Project clean and ready for occupancy.
- C. Pest Control: Comply with pest control requirements in Section 015000 "Temporary Facilities and Controls." Prepare written report.
- D. Construction Waste Disposal: Comply with waste-disposal requirements in Section 017419 "Construction Waste Management and Disposal."

### 3.2 REPAIR OF THE WORK

- A. Complete repair and restoration operations required by Section 017300 "Execution" before requesting inspection for determination of Substantial Completion.

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 manuals.
  - 2. Emergency manuals.
  - 3. Systems and equipment operation manuals.
  - 4. Systems and equipment maintenance manuals.
  - 5. Product maintenance manuals.
- B. Related Requirements:
  - 1. Section 013300 "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.

#### 1.2 DEFINITIONS

- A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.
- B. Subsystem: A portion of a system with characteristics similar to a system.

#### 1.3 CLOSEOUT SUBMITTALS

- A. Submit operation and maintenance manuals indicated. Provide content for each manual as specified in individual Specification Sections, and as reviewed and approved at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.
  - 1. Architect and Commissioning Authority will comment on whether content of operation and maintenance submittals is acceptable.
  - 2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.
- B. Format: Submit operation and maintenance manuals in the following format:
  - 1. Submit by uploading to web-based project software site. Enable reviewer comments on draft submittals.

2. Submit three paper copies. Architect will return two copies.
- C. Initial Manual Submittal: Submit draft copy of each manual at least 30 days before commencing demonstration and training. Architect and Commissioning Authority will comment on whether general scope and content of manual are acceptable.
- D. Final 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 and Commissioning Authority's comments. Submit copies of each corrected manual within 15 days of receipt of Architect's and Commissioning Authority's comments and prior to commencing demonstration and training.
- E. Comply with Section 017700 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

#### 1.4 FORMAT OF OPERATION AND MAINTENANCE MANUALS

- A. 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: Bookmark 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.
- B. Manuals, Paper Copy: Submit manuals in the form of hard-copy, bound and labeled volumes.
  1. Binders: Heavy-duty, three-ring, vinyl-covered, binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch (215-by-280-mm) paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
    - a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.

- b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents. Indicate volume number for multiple-volume sets.
2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section 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. Enclose title pages and directories in clear plastic sleeves.
  4. Supplementary Text: Prepared on 8-1/2-by-11-inch (215-by-280-mm) white bond paper.
  5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
    - a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
    - b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

#### 1.5 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

- A. Organization of Manuals: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
  1. Title page.
  2. Table of contents.
  3. Manual contents.
- B. Title Page: 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. Name and contact information for Commissioning Authority.
  8. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
  9. Cross-reference to related systems in other operation and maintenance manuals.

- C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.
  - 1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.
- D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.
- E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

#### 1.6 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY MANUAL

- A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals. List items and their location to facilitate ready access to desired information. Include the following:
  - 1. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.
  - 2. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.
  - 3. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.

#### 1.7 EMERGENCY MANUALS

- A. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.
- B. Content: Organize manual into a separate section for each of the following:
  - 1. Type of emergency.
  - 2. Emergency instructions.
  - 3. Emergency procedures.
- C. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:

1. Fire.
  2. Flood.
  3. Gas leak.
  4. Water leak.
  5. Power failure.
  6. Water outage.
  7. System, subsystem, or equipment failure.
  8. Chemical release or spill.
- D. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.
- E. Emergency Procedures: Include the following, as applicable:
1. Instructions on stopping.
  2. Shutdown instructions for each type of emergency.
  3. Operating instructions for conditions outside normal operating limits.
  4. Required sequences for electric or electronic systems.
  5. Special operating instructions and procedures.

#### 1.8 SYSTEMS AND EQUIPMENT OPERATION MANUALS

- A. Systems and Equipment Operation Manual: Assemble a complete set of data indicating operation of each system, subsystem, and piece of equipment not part of a system. Include information required for daily operation and management, operating standards, and routine and special operating procedures.
1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
  2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.
- B. 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 has 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.

C. 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.

D. 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.

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

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

#### 1.9 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

A. Systems and Equipment Maintenance Manuals: Assemble a complete set of data indicating maintenance of each system, subsystem, and piece of equipment not part of a system. Include manufacturers' maintenance documentation, preventive maintenance procedures and frequency, repair procedures, wiring and systems diagrams, lists of spare parts, and warranty information.

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

- B. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranties and bonds as described below.
- C. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.
- D. Manufacturers' Maintenance Documentation: Include the following information for each component part or piece of equipment:
  - 1. Standard maintenance instructions and bulletins; 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.
    - a. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.
  - 2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
  - 3. Identification and nomenclature of parts and components.
  - 4. List of items recommended to be stocked as spare parts.
- E. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:
  - 1. Test and inspection instructions.
  - 2. Troubleshooting guide.
  - 3. Precautions against improper maintenance.
  - 4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
  - 5. Aligning, adjusting, and checking instructions.
  - 6. Demonstration and training video recording, if available.
- F. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
  - 1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
  - 2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.

- G. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.
- H. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.
- I. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
  - 1. Include procedures to follow and required notifications for warranty claims.
- J. 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 maintenance manuals.

#### 1.10 PRODUCT MAINTENANCE MANUALS

- 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. 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.
- C. 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 and drawing or schedule designation or identifier where applicable.
- D. 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.
- E. 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.
- F. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.
- G. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
1. Include procedures to follow and required notifications for warranty claims.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 017823

## SECTION 017839 - PROJECT RECORD DOCUMENTS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 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 017300 "Execution" for final property survey.
  - 2. Section 017700 "Closeout Procedures" for general closeout procedures.
  - 3. Section 017823 "Operation and Maintenance Data" for operation and maintenance manual requirements.

#### 1.3 CLOSEOUT SUBMITTALS

- A. Record Drawings: Comply with the following:
  - 1. Number of Copies: Submit one set of marked-up record prints.
  - 2. Number of Copies: Submit copies of Record Drawings as follows:
    - a. Initial Submittal:
      - 1) Submit one paper-copy set of marked-up record prints.
      - 2) Submit PDF electronic files of scanned record prints and one set of file prints.
      - 3) Submit Record Digital Data Files and one set of plots.
      - 4) Architect will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.
    - b. Final Submittal:

- 1) Submit three paper-copy sets of marked-up record prints.
  - 2) Submit PDF electronic files of scanned Record Prints and three sets of file prints.
  - 3) Print each drawing, whether or not changes and additional information were recorded.
- c. Final Submittal:
- 1) Submit one paper-copy set of marked-up record prints.
  - 2) Submit Record Digital Data Files and three sets of Record Digital Data File plots.
  - 3) Plot each drawing file, whether or not changes and additional information were recorded.
- B. Record Specifications: Submit annotated PDF electronic files of Project's Specifications, including addenda and Contract modifications.
- C. Record Product Data: Submit annotated PDF electronic files and directories of each submittal.
1. Where record Product Data are required as part of operation and maintenance manuals, submit duplicate marked-up Product Data as a component of manual.
- D. Reports: Submit written report weekly indicating items incorporated into Project Record Documents concurrent with progress of the Work, including revisions, concealed conditions, field changes, product selections, and other notations incorporated.

#### 1.4 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. Accurately record information in an acceptable drawing technique.
    - c. Record data as soon as possible after obtaining it.
    - d. Record and check the markup before enclosing concealed installations.
    - e. Cross-reference record prints to corresponding photographic documentation.
  2. Content: Types of items requiring marking include, but are not limited to, the following:
    - a. Dimensional changes to Drawings.
    - b. Revisions to details shown on Drawings.

- c. Depths of foundations.
  - d. Locations and depths of underground utilities.
  - e. Revisions to routing of piping and conduits.
  - f. Revisions to electrical circuitry.
  - g. Actual equipment locations.
  - h. Duct size and routing.
  - i. Locations of concealed internal utilities.
  - j. Changes made by Change Order or Construction Change Directive.
  - k. Changes made following Architect's written orders.
  - l. Details not on the original Contract Drawings.
  - m. Field records for variable and concealed conditions.
  - n. Record information on the Work that is shown only schematically.
3. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
  4. Mark record prints with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
  5. Mark important additional information that was either shown schematically or omitted from original Drawings.
  6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.
- B. 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: Same digital data software program, version, and operating system as for the original Contract Drawings.
  2. Format: DWG, Version, Microsoft Windows operating system.
  3. Format: Annotated PDF electronic file with comment function enabled.
  4. Incorporate changes and additional information previously marked on record prints. Delete, redraw, and add details and notations where applicable.
  5. Refer instances of uncertainty to Architect for resolution.
  6. Architect will furnish Contractor with one set of digital data files of the Contract Drawings for use in recording information.
    - a. See Section 013100 "Project Management and Coordination" for requirements related to use of Architect's digital data files.
    - b. Architect will provide data file layer information. Record markups in separate layers.
- C. Format: Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
1. Record Prints: Organize record prints into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.

2. Format: Annotated PDF electronic file.
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.

#### 1.5 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. For each principal product, indicate whether Record Product Data has been submitted in operation and maintenance manuals instead of submitted as Record Product Data.
  5. Note related Change Orders, Record Product Data, and Record Drawings where applicable.
- B. Format: Submit record specifications as annotated PDF electronic file.

#### 1.6 RECORD PRODUCT DATA

- 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. 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.

- C. Format: Submit Record Product Data as annotated PDF electronic file.
  - 1. Include Record Product Data directory organized by Specification Section number and title, electronically linked to each item of Record Product Data.

#### 1.7 MAINTENANCE OF RECORD DOCUMENTS

- A. Maintenance of Record Documents: Store Record Documents 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.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 017839

## SECTION 017900 - DEMONSTRATION AND TRAINING

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:
  - 1. Instruction in operation and maintenance of systems, subsystems, and equipment.
  - 2. Demonstration and training video recordings.

#### 1.2 INFORMATIONAL SUBMITTALS

- A. Instruction Program: Submit outline of instructional program for demonstration and training, including a list of training modules and a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.
  - 1. Indicate proposed training modules using manufacturer-produced demonstration and training video recordings for systems, equipment, and products in lieu of video recording of live instructional module.
- B. Qualification Data: For facilitator, instructor, and videographer.
- C. Attendance Record: For each training module, submit list of participants and length of instruction time.
- D. Evaluations: For each participant and for each training module, submit results and documentation of performance-based test.

#### 1.3 CLOSEOUT SUBMITTALS

- A. Demonstration and Training Video Recordings: Submit two copies within seven days of end of each training module.
  - 1. Identification: On each copy, provide an applied label with the following information:
    - a. Name of Project.
    - b. Name and address of videographer.
    - c. Name of Architect.
    - d. Name of Construction Manager.
    - e. Name of Contractor.

- f. Date of video recording.
2. Transcript: Prepared and bound in format matching operation and maintenance manuals. Mark appropriate identification on front and spine of each binder. Include a cover sheet with same label information as the corresponding video recording. Include name of Project and date of video recording on each page.
3. Transcript: Prepared in PDF electronic format. Include a cover sheet with same label information as the corresponding video recording and a table of contents with links to corresponding training components. Include name of Project and date of video recording on each page.
4. At completion of training, submit complete training manual(s) for Owner's use prepared in same paper and PDF file format required for operation and maintenance manuals specified in Section 017823 "Operation and Maintenance Data."

#### 1.4 QUALITY ASSURANCE

- A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.
- B. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Section 014000 "Quality Requirements," experienced in operation and maintenance procedures and training.
- C. Videographer Qualifications: A professional videographer who is experienced photographing demonstration and training events similar to those required.
- D. Preinstruction Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination." Review methods and procedures related to demonstration and training including, but not limited to, the following:
  1. Inspect and discuss locations and other facilities required for instruction.
  2. Review and finalize instruction schedule and verify availability of educational materials, instructors' personnel, audiovisual equipment, and facilities needed to avoid delays.
  3. Review required content of instruction.
  4. For instruction that must occur outside, review weather and forecasted weather conditions and procedures to follow if conditions are unfavorable.

#### 1.5 COORDINATION

- A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations and to ensure availability of Owner's personnel.

- B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.
- C. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data have been reviewed and approved by Architect.

#### 1.6 INSTRUCTION PROGRAM

- A. Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections.
- B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following as applicable to the system, equipment, or component:
  - 1. Basis of System Design, Operational Requirements, and Criteria: Include the following:
    - a. System, subsystem, and equipment descriptions.
    - b. Performance and design criteria if Contractor is delegated design responsibility.
    - c. Operating standards.
    - d. Regulatory requirements.
    - e. Equipment function.
    - f. Operating characteristics.
    - g. Limiting conditions.
    - h. Performance curves.
  - 2. Documentation: Review the following items in detail:
    - a. Emergency manuals.
    - b. Systems and equipment operation manuals.
    - c. Systems and equipment maintenance manuals.
    - d. Product maintenance manuals.
    - e. Project Record Documents.
    - f. Identification systems.
    - g. Warranties and bonds.
    - h. Maintenance service agreements and similar continuing commitments.
  - 3. Emergencies: Include the following, as applicable:
    - a. Instructions on meaning of warnings, trouble indications, and error messages.
    - b. Instructions on stopping.
    - c. Shutdown instructions for each type of emergency.
    - d. Operating instructions for conditions outside of normal operating limits.

- e. Sequences for electric or electronic systems.
  - f. Special operating instructions and procedures.
4. Operations: Include the following, as applicable:
- a. Startup procedures.
  - b. Equipment or system break-in procedures.
  - c. Routine and normal operating instructions.
  - d. Regulation and control procedures.
  - e. Control sequences.
  - f. Safety procedures.
  - g. Instructions on stopping.
  - h. Normal shutdown instructions.
  - i. Operating procedures for emergencies.
  - j. Operating procedures for system, subsystem, or equipment failure.
  - k. Seasonal and weekend operating instructions.
  - l. Required sequences for electric or electronic systems.
  - m. Special operating instructions and procedures.
5. Adjustments: Include the following:
- a. Alignments.
  - b. Checking adjustments.
  - c. Noise and vibration adjustments.
  - d. Economy and efficiency adjustments.
6. Troubleshooting: Include the following:
- a. Diagnostic instructions.
  - b. Test and inspection procedures.
7. Maintenance: Include the following:
- a. Inspection procedures.
  - b. Types of cleaning agents to be used and methods of cleaning.
  - c. List of cleaning agents and methods of cleaning detrimental to product.
  - d. Procedures for routine cleaning.
  - e. Procedures for preventive maintenance.
  - f. Procedures for routine maintenance.
  - g. Instruction on use of special tools.
8. Repairs: Include the following:
- a. Diagnosis instructions.
  - b. Repair instructions.
  - c. Disassembly; component removal, repair, and replacement; and reassembly instructions.

- d. Instructions for identifying parts and components.
- e. Review of spare parts needed for operation and maintenance.

#### 1.7 PREPARATION

- A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a training manual organized in coordination with requirements in Section 017823 "Operation and Maintenance Data."
- B. Set up instructional equipment at instruction location.

#### 1.8 INSTRUCTION

- A. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.
- B. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
  - 1. Architect will furnish an instructor to describe basis of system design, operational requirements, criteria, and regulatory requirements.
  - 2. Owner will furnish an instructor to describe Owner's operational philosophy.
  - 3. Owner will furnish Contractor with names and positions of participants.
- C. Scheduling: Provide instruction at mutually agreed-on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.
  - 1. Schedule training with Owner with at least seven days' advance notice.
- D. Training Location and Reference Material: Conduct training on-site in the completed and fully operational facility using the actual equipment in-place. Conduct training using final operation and maintenance data submittals.
- E. Evaluation: At conclusion of each training module, assess and document each participant's mastery of module by use of performance-based test.
- F. Cleanup: Collect used and leftover educational materials and remove from Project site. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

## 1.9 DEMONSTRATION AND TRAINING VIDEO RECORDINGS

- A. General: Engage a qualified commercial videographer to record demonstration and training video recordings. Record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice.
1. At beginning of each training module, record each chart containing learning objective and lesson outline.
- B. Digital Video Recordings: Provide high-resolution, digital video in MPEG format, produced by a digital camera with minimum sensor resolution of 12 megapixels and capable of recording in full HD mode.
1. Submit video recordings by uploading to web-based Project software site.
  2. File Hierarchy: Organize folder structure and file locations according to Project Manual table of contents. Provide complete screen-based menu.
  3. File Names: Utilize file names based on name of equipment generally described in video segment, as identified in Project specifications.
  4. Contractor and Installer Contact File: Using appropriate software, create a file for inclusion on the equipment demonstration and training recording that describes the following for each Contractor involved on the Project, arranged according to Project Manual table of contents:
    - a. Name of Contractor/Installer.
    - b. Business address.
    - c. Business phone number.
    - d. Point of contact.
    - e. Email address.
- C. Recording: Mount camera on tripod before starting recording, unless otherwise necessary to adequately cover area of demonstration and training. Display continuous running time.
1. Film training session(s) in segments not to exceed 15 minutes.
    - a. Produce segments to present a single significant piece of equipment per segment.
    - b. Organize segments with multiple pieces of equipment to follow order of Project Manual table of contents.
    - c. Where a training session on a particular piece of equipment exceeds 15 minutes, stop filming and pause training session. Begin training session again upon commencement of new filming segment.
- D. Light Levels: Verify light levels are adequate to properly light equipment. Verify equipment markings are clearly visible prior to recording.
1. Furnish additional portable lighting as required.
- E. Narration: Describe scenes on video recording by audio narration by microphone while video recording is recorded. Include description of items being viewed.

- F. Transcript: Provide a transcript of the narration. Display images and running time captured from videotape opposite the corresponding narration segment.
- G. Preproduced Video Recordings: Provide video recordings used as a component of training modules in same format as recordings of live training.

PART 2 - PRODUCTS

PART 3 - EXECUTION

END OF SECTION 017900

## **SECTION 024100 DEMOLITION**

### **PART 1 - GENERAL**

#### **1.1 DESCRIPTION**

##### **A. Scope of Work:**

1. This section includes furnishing all labor, materials, equipment and incidentals required for the demolition, relocation and/or disposal of all building materials and equipment to be removed from the site.
2. This specification covers all site demolition to within 5 feet of building envelopes.
3. This section provides for the complete or partial removal and disposal of specified existing foundations, slabs, piping, roadways (including surface and base courses) and miscellaneous appurtenances encountered during construction operations.
4. These specifications call attention to certain activities necessary to maintain and facilitate operation during and immediately following construction. Demolition includes:
  - a. Demolition, partial removal and cutting of existing roadways and sidewalk as required for the new construction.
  - b. Demolition of landscape area
  - c. Demolition of underground utilities.
  - d. Distribution of salvageable and excess unacceptable material as specified below.
  - e. Off-site disposal of excess and unacceptable materials.

#### **1.2 RULES AND REGULATIONS**

- A. The Standard Building Codes shall control the demolition, modification or alteration of the existing buildings or structures.
- B. No blasting shall be done on site. The Contractor shall not bring or store any explosives on site.

#### **1.3 DISPOSAL OF MATERIAL**

- A. Salvageable material shall become the property of the Owner, if the Owner requests any specific item. The Contractor shall dismantle all material to such a size that it can be readily handled, and deliver any of this salvageable material requested by the Owner to a designated storage area.
- B. Any materials that the Owner rejects shall become the Contractor's property and must be removed from the site.
- C. Concrete, concrete block, asphalt, unsalvageable bricks and piping shall be hauled to a waste disposal site by the Contractor.
- D. All other materials shall be hauled to a waste disposal site by the Contractor.
- E. The storage of or sale of removed items on the site will not be allowed.

#### **1.4 SUBMITTALS**

- A. Sequence of Demolition and Removal activities. Refer to the Site Plans for items and extents of demolition. Contractor to submit a sequence of demolition activities

## **1.5 DAMAGE**

- A. Promptly repair damage caused to adjacent facilities by demolition operations as directed by the Engineer and at no cost to the Owner.

## **1.6 UTILITIES**

- A. Maintain existing utilities to remain in service and protect against damage during demolition operations.
- B. Do not interrupt existing utilities serving occupied or used facilities, except when authorized by the Engineer. Provide temporary services during interruptions to existing utilities as acceptable to the Engineer.
- C. The Contractor shall cooperate with the Owner to shut off utilities as required by demolition operations.
- D. The Contractor shall be solely responsible for making all necessary arrangements and for performing any necessary work involved in connection with the discontinuance or interruption of all public and private utilities or services under the jurisdiction of the utility companies.
- E. All utilities being abandoned shall be disconnected and terminated at the service mains in conformance with the requirement of the utility companies or the municipality owning or controlling them.

## **PART 2 - MATERIALS**

### **2.1 CONTAMINATED MATERIALS**

- A. Any contaminated materials identified on site are to be properly removed or disposed of by the Contractor according to EPA and governing body regulations.
  - 1. Lead Based Paint (LBP) has been identified as existing in excess amounts on the interior walls of the building to be demolished. Contractor to review testing results and dispose/remove materials as necessary.

## **PART 3 - EXECUTION**

### **3.1 SEQUENCE OF WORK**

- A. Contractor will prepare a Sequence of Demolition and Removal.
- B. The Sequence of Demolition and Removal of existing facilities will be in accordance with the approved Sequence of Demolition and Removal.

**3.2 REMOVAL OF EXISTING PAVING, PIPING AND APPURTENANCES**

- A. Existing non-buried valving and piping, appurtenances and asphaltic pavement shall be removed as shown or indicated on the Drawings.
- B. All piping and appurtenances shall be cleaned, flushed and drained.

**3.3 STRUCTURES TO BE COMPLETELY DEMOLISHED**

- A. Refer to Architectural plans for removal of structures.

END OF SECTION 300000

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## SECTION 024119 - SELECTIVE DEMOLITION

### 1.1 SUMMARY

- A. Section Includes:
1. Demolition and removal of selected portions of building or structure.
  2. Demolition and removal of selected site elements.
  3. Salvage of existing items to be reused or recycled.

### 1.2 PREINSTALLATION MEETINGS

- A. Predemolition Conference: Conduct conference at Project site.
1. Inspect and discuss condition of construction to be selectively demolished.
  2. Review structural load limitations of existing structure.
  3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
  4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
  5. Review areas where existing construction is to remain and requires protection.

### 1.3 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For refrigerant recovery technician.
- B. Engineering Survey: Submit engineering survey of condition of building.
- C. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property, and for environmental protection. Indicate proposed locations and construction of barriers.
- D. Schedule of Selective Demolition Activities: Indicate the following:
1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
  2. Interruption of utility services. Indicate how long utility services will be interrupted.
  3. Coordination for shutoff, capping, and continuation of utility services.
  4. Use of elevator and stairs.
  5. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.
- E. Predemolition Photographs or Video: Show existing conditions of adjoining construction, including finish surfaces, that might be misconstrued as damage caused by salvage and

demolition operations. Comply with Section 013233 "Photographic Documentation." Submit before Work begins.

- F. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.
- G. Warranties: Documentation indicating that existing warranties are still in effect after completion of selective demolition.

#### 1.4 CLOSEOUT SUBMITTALS

- A. Inventory: Submit a list of items that have been removed and salvaged.

#### 1.5 QUALITY ASSURANCE

- A. Refrigerant Recovery Technician Qualifications: Certified by an EPA-approved certification program.

#### 1.6 FIELD CONDITIONS

- A. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- B. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
  - 1. Hazardous materials will be removed by Owner before start of the Work.
  - 2. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.
- C. Hazardous Materials: Present in buildings and structures to be selectively demolished. A report on the presence of hazardous materials is on file for review and use. Examine report to become aware of locations where hazardous materials are present.
  - 1. Hazardous material remediation is specified elsewhere in the Contract Documents.
  - 2. Do not disturb hazardous materials or items suspected of containing hazardous materials except under procedures specified elsewhere in the Contract Documents.
  - 3. Owner will provide material safety data sheets for suspected hazardous materials that are known to be present in buildings and structures to be selectively demolished because of building operations or processes performed there.
- D. Storage or sale of removed items or materials on-site is not permitted.

## 1.7 PERFORMANCE 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/ASSP A10.6 and NFPA 241.

## 1.8 EXAMINATION

- A. Verify that utilities have been disconnected and capped before starting selective demolition operations.
  - 1. For capped or abandoned waste piping, verify there are no fixtures or other piping connected upstream from the point of termination.
- B. Review Project Record Documents of existing construction or other existing condition and hazardous material information provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in Project Record Documents.
- C. Engage a professional engineer to perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective building demolition operations.
  - 1. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.
- D. Steel Tendons: Locate tensioned steel tendons and include recommendations for de-tensioning.
- E. Verify that hazardous materials have been remediated before proceeding with building demolition operations.
- F. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs or video.
  - 1. Comply with Section 013233 "Photographic Documentation."

## 1.9 PREPARATION

- A. Refrigerant: Before starting demolition, remove refrigerant from mechanical equipment according to 40 CFR 82 and regulations of authorities having jurisdiction.

#### 1.10 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

- A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.
- B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off utility services and mechanical/electrical systems serving areas to be selectively demolished.
  - 1. Owner will arrange to shut off indicated services/systems when requested by Contractor.
  - 2. Arrange to shut off utilities with utility companies.
  - 3. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
  - 4. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated on Drawings to be removed.
    - a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
    - b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material and leave in place.
    - c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
    - d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
    - e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
    - f. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
    - g. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material and leave in place.

#### 1.11 PROTECTION

- A. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
  - 1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
  - 2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
  - 3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
  - 4. Cover and protect furniture, furnishings, and equipment that have not been removed.
  - 5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Section 015000 "Temporary Facilities and Controls."

- B. Temporary Shoring: Design, provide, and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
  - 1. Strengthen or add new supports when required during progress of selective demolition.
- C. Remove temporary barricades and protections where hazards no longer exist.

#### 1.12 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. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
  - 2. 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. Temporarily cover openings to remain.
  - 3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
  - 4. 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 portable fire-suppression devices during flame-cutting operations.
  - 5. Maintain adequate ventilation when using cutting torches.
  - 6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
  - 7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
  - 8. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
  - 9. Dispose of demolished items and materials promptly. Comply with requirements in Section 017419 "Construction Waste Management and Disposal."
- B. 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.
- C. 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 reinstalled in their original locations after selective demolition operations are complete.

1.13 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

- A. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals using power-driven saw, and then remove concrete between saw cuts.
- B. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, and then remove masonry between saw cuts.
- C. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, and then break up and remove.
- D. Roofing: Remove no more existing roofing than what can be covered in one day by new roofing and so that building interior remains watertight and weathertight.
- E. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI's "Recommended Work Practices for the Removal of Resilient Floor Coverings."
- F. Exterior Plaster: Completely remove plaster materials, including metal lath and gypsum sheathing where it occurs, to existing substrate.

1.14 DISPOSAL OF DEMOLISHED MATERIALS

- A. Remove demolition waste materials from Project site and recycle or dispose of them according to Section 017419 "Construction Waste Management and Disposal."

1.15 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 031000 - CONCRETE FORMING AND ACCESSORIES

### 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. Form-facing material for cast-in-place concrete.
  - 2. Form liners.
  - 3. Insulating concrete forms.
  - 4. Shoring, bracing, and anchoring.

#### 1.3 DEFINITIONS

- A. Form-Facing Material: Temporary structure or mold for the support of concrete while the concrete is setting and gaining sufficient strength to be self-supporting.
- B. Formwork: The total system of support of freshly placed concrete, including the mold or sheathing that contacts the concrete, as well as supporting members, hardware, and necessary bracing.

#### 1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
  - 1. Review the following:
    - a. Special inspection and testing and inspecting agency procedures for field quality control.
    - b. Construction, movement, contraction, and isolation joints
    - c. Forms and form-removal limitations.
    - d. Shoring and reshoring procedures.
    - e. Anchor rod and anchorage device installation tolerances.

#### 1.5 ACTION SUBMITTALS

- A. Product Data: For each of the following:

1. Exposed surface form-facing material.
2. Concealed surface form-facing material.
3. Forms for cylindrical columns.
4. Pan-type forms.
5. Void forms.
6. Form liners.
7. Insulating concrete forms.
8. Form ties.
9. Waterstops.
10. Form-release agent.

B. Shop Drawings: Prepared by, and signed and sealed by, a qualified professional engineer responsible for their preparation, detailing fabrication, assembly, and support of forms.

1. For exposed vertical concrete walls, indicate dimensions and form tie locations.
2. Indicate dimension and locations of construction and movement joints required to construct the structure in accordance with ACI 301.
  - a. Location of construction joints is subject to approval of the Architect and Engineer of Record.
3. Indicate location of waterstops.
4. Indicate form liner layout and form line termination details.
5. Indicate proposed schedule and sequence of stripping of forms, shoring removal, and reshoring installation and removal.
6. Indicate layout of insulating concrete forms, dimensions, course heights, form types, and details.

C. Samples:

1. For waterstops.
2. For Form Liners: 12-inch by 12-inch sample, indicating texture.

## 1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing and inspection agency.
- B. Research Reports: For insulating concrete forms indicating compliance with International Code Council Acceptance Criteria AC308.
- C. Field quality-control reports.
- D. Minutes of preinstallation conference.

## 1.7 QUALITY ASSURANCE

- A. Testing and Inspection Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified in accordance with ASTM C1077 and ASTM E329 for testing indicated.
- B. Mockups: Formed surfaces to demonstrate typical joints, surface finish, texture, tolerances, and standard of workmanship.
  - 1. Build panel approximately 100 sq. ft. in the location as directed by Architect.
  - 2. Subject to compliance with requirements, approved mockups may become part of the completed Work.

## 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Form Liners: Store form liners under cover to protect from sunlight.
- B. Insulating Concrete Forms: Store forms off ground and under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.
- C. Waterstops: Store waterstops under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Concrete Formwork: Design, engineer, erect, shore, brace, and maintain formwork, shores, and reshores in accordance with ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads, so that resulting concrete conforms to the required shapes, lines, and dimensions.
  - 1. Design wood panel forms in accordance with APA's "Concrete Forming Design/Construction Guide."
  - 2. Design formwork to limit deflection of form-facing material to 1/240 of center-to-center spacing of supports.
    - a. For architectural concrete specified in Section 033300 "Architectural Concrete," limit deflection of form-facing material, studs, and walers to 0.0025 times their respective clear spans (L/400).
- B. Design, engineer, erect, shore, brace, and maintain insulating concrete forms in accordance with ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads, so that resulting concrete conforms to the required shapes, lines, and dimensions.

1. Design cross ties to transfer the effects of the following loads to the cast-in-place concrete core:
  - a. Wind Loads: As indicated on Structural Drawings.
    - 1) Horizontal Deflection Limit: Not more than  $1/720$  of the wall height.

## 2.2 FORM-FACING MATERIALS

### A. As-Cast Surface Form-Facing Material:

1. Provide continuous, true, and smooth concrete surfaces.
2. Furnish in largest practicable sizes to minimize number of joints.
3. Acceptable Materials: As required to comply with Surface Finish designations specified in Section 033000 "Cast-In-Place Concrete, and as follows:
  - a. Plywood, metal, or other approved panel materials.

### B. Concealed Surface Form-Facing Material: Lumber, plywood, metal, plastic, or another approved material.

1. Provide lumber dressed on at least two edges and one side for tight fit.

### C. Forms for Cylindrical Columns, Pedestals, and Supports: Metal, glass-fiber-reinforced plastic, paper, or fiber tubes that produce surfaces with gradual or abrupt irregularities not exceeding specified formwork surface class.

1. Provide forms with sufficient wall thickness to resist plastic concrete loads without detrimental deformation.

### D. Pan-Type Forms: Glass-fiber-reinforced plastic or formed steel, stiffened to resist plastic concrete loads without detrimental deformation, with tapered end forms.

### E. Void Forms: Biodegradable paper surface, treated for moisture resistance, structurally sufficient to support weight of plastic concrete and other superimposed loads.

### F. Form Liners:

1. Size: As directed by Architect.
2. Face Pattern: As directed by Architect.

## 2.3 INSULATING CONCRETE FORMS

### A. Insulating Concrete Forms: Concrete-forming system complying with ASTM E2634, consisting of two panels of insulation connected with cross ties.

1. Insulation: ASTM C578, Type II, expanded polystyrene.
  - a. Thickness: Not less than 2-1/2 inches each face.

2. 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: 25 or less.
  - 2) Smoke Developed Index: 450 or less.

## 2.4 WATERSTOPS

- A. Flexible Rubber Waterstops: U.S. Army Corps of Engineers CRD-C 513, with factory-installed metal eyelets, for embedding in concrete to prevent passage of fluids through joints, with factory fabricated corners, intersections, and directional changes.
  1. Profile: Ribbed with center bulb.
  2. Dimensions: 6 inches by 3/8 inch thick minimum; nontapered.
- B. Chemically Resistant Flexible Waterstops: Thermoplastic elastomer rubber waterstops with factory-installed metal eyelets, for embedding in concrete to prevent passage of fluids through joints; resistant to oils, solvents, and chemicals, with factory fabricate corners, intersections, and directional changes.
  1. Profile: Ribbed with center bulb.
  2. Dimensions: 6 inches by 3/8 inch thick minimum; nontapered.
- C. Flexible PVC Waterstops: U.S. Army Corps of Engineers CRD-C 572, with factory-installed metal eyelets, for embedding in concrete to prevent passage of fluids through joints, with factory fabricate corners, intersections, and directional changes.
  1. Profile: Ribbed with center bulb.
  2. Dimensions: 6 inches by 3/8 inch thick minimum; nontapered.

## 2.5 RELATED MATERIALS

- A. Reglets: Fabricate reglets of not less than 0.022 inch thick, galvanized-steel sheet. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.
- B. Dovetail Anchor Slots: Hot-dip galvanized-steel sheet, not less than 0.034 inch thick, with bent tab anchors. Temporarily fill or cover face opening of slots to prevent intrusion of concrete or debris.
- C. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, minimum.
- D. Rustication Strips: Wood, metal, PVC, or rubber strips, kerfed for ease of form removal.
- E. Form-Release Agent: Commercially formulated form-release agent that does not bond with, stain, or adversely affect concrete surfaces and does not impair subsequent treatments of concrete surfaces.
  1. Formulate form-release agent with rust inhibitor for steel form-facing materials.

2. Form release agent for form liners shall be acceptable to form liner manufacturer.
  3. Use of Petroleum based oils (Motor Oil) is not allowed.
- F. Form Ties: Factory-fabricated, removable or snap-off, glass-fiber-reinforced plastic or metal form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
1. Furnish units that leave no corrodible metal closer than 1 inch to the plane of exposed concrete surface.
  2. Furnish ties that, when removed, leave holes no larger than 1 inch in diameter in concrete surface.
  3. Furnish ties with integral water-barrier plates to walls indicated to receive damp proofing or waterproofing.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION OF FORMWORK

- A. Comply with ACI 301.
- B. Construct formwork, so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117 and to comply with the Surface Finish designations specified in Section 033000 "Cast-In-Place Concrete" for as-cast finishes Section 033300 "Architectural Concrete".
- C. Limit concrete surface irregularities as follows:
1. Surface Finish-1.0: ACI 117 Class D, 1 inch.
  2. Surface Finish-2.0: ACI 117 Class B, 1/4 inch.
  3. Surface Finish-3.0: ACI 117 Class A, 1/8 inch.
- D. Construct forms tight enough to prevent loss of concrete mortar.
1. Minimize joints.
  2. Exposed Concrete: Symmetrically align joints in forms.
- E. Construct removable forms for easy removal without hammering or prying against concrete surfaces.
1. Provide crush or wrecking plates where stripping may damage cast-concrete surfaces.
  2. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
  3. Install keyways, reglets, recesses, and other accessories, for easy removal.
- F. Do not use rust-stained, steel, form-facing material.
- G. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces.

1. Provide and secure units to support screed strips
  2. Use strike-off templates or compacting-type screeds.
- H. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible.
1. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar.
  2. Locate temporary openings in forms at inconspicuous locations.
- I. Chamfer exterior corners and edges of permanently exposed concrete.
- J. At construction joints, overlap forms onto previously placed concrete not less than 12 inches.
- K. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work.
1. Determine sizes and locations from trades providing such items.
  2. Obtain written approval of Architect prior to forming openings not indicated on Drawings.
- L. Construction and Movement Joints:
1. Construct joints true to line with faces perpendicular to surface plane of concrete.
  2. Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
  3. Place joints perpendicular to main reinforcement.
  4. Locate joints for beams, slabs, joists, and girders in the middle third of spans.
    - a. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
  5. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
  6. Space vertical joints in walls as indicated on Drawings.
    - a. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
- M. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection.
1. Locate ports and openings in bottom of vertical forms, in inconspicuous location, to allow flushing water to drain.
  2. Close temporary ports and openings with tight-fitting panels, flush with inside face of form, and neatly fitted, so joints will not be apparent in exposed concrete surfaces.
- N. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

- O. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- P. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

### 3.2 INSTALLATION OF EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete.
  - 1. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
  - 2. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC 303.
  - 3. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.
  - 4. Install dovetail anchor slots in concrete structures, as indicated on Drawings.
  - 5. Clean embedded items immediately prior to concrete placement.

### 3.3 INSTALLATION OF WATERSTOPS

- A. Flexible Waterstops: Install in construction joints and at other joints indicated to form a continuous diaphragm.
  - 1. Install in longest lengths practicable.
  - 2. Locate waterstops in center of joint unless otherwise indicated on Drawings.
  - 3. Allow clearance between waterstop and reinforcing steel of not less than 2 times the largest concrete aggregate size specified in Section 033000 "Cast-In-Place Concrete."
  - 4. Secure waterstops in correct position at 12 inches on center.
  - 5. Field fabricate joints in accordance with manufacturer's instructions using heat welding.
    - a. Miter corners, intersections, and directional changes in waterstops.
    - b. Align center bulbs.
  - 6. Clean waterstops immediately prior to placement of concrete.
  - 7. Support and protect exposed waterstops during progress of the Work.

### 3.4 INSTALLATION OF INSULATING CONCRETE FORMS

- A. Comply with ACI 301 and manufacturer's instructions.
- B. Construct formwork, so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- C. Install forms in running bond pattern.

1. Align joints.
  2. Align furring strips.
- D. Construct forms tight to prevent loss of concrete mortar.
- E. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work.
1. Determine sizes and locations from trades providing such items.
  2. Obtain written approval of Architect prior to forming openings not indicated on Drawings.
- F. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection.
1. Locate ports and openings in bottom of vertical forms, in inconspicuous location, to allow flushing water to drain.
  2. Close temporary ports and openings with tight fitting panels, flush with inside face of form, and neatly fitted, so joints will not be apparent in exposed concrete surfaces.
- G. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- H. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- I. Shore insulating concrete forms to ensure stability and to resist stressing imposed by construction loads.

### 3.5 REMOVING AND REUSING FORMS

- A. Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations, and curing and protection operations need to be maintained.
1. Leave formwork for beam soffits, joists, slabs, and other structural elements that support weight of concrete in place until concrete has achieved at least 70 percent of its 28-day design compressive strength.
  2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.
- B. Clean and repair surfaces of forms to be reused in the Work.
1. Split, frayed, delaminated, or otherwise damaged form-facing material are unacceptable for exposed surfaces.
  2. Apply new form-release agent.
- C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints.

1. Align and secure joints to avoid offsets.
2. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

### 3.6 SHORING AND RESHORING INSTALLATION

- A. Comply with ACI 318 and ACI 301 for design, installation, and removal of shoring and reshoring.
  1. Do not remove shoring or reshoring until measurement of slab tolerances is complete.
- B. In multistory construction, extend shoring or reshoring over a sufficient number of stories to distribute loads in such a manner that no floor or member will be excessively loaded or will induce tensile stress in concrete members without sufficient steel reinforcement.
- C. Plan sequence of removal of shores and reshore to avoid damage to concrete. Locate and provide adequate reshoring to support construction without excessive stress or deflection.

### 3.7 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a special inspector and qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Testing Agency: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.
- C. Inspections:
  1. Inspect formwork for shape, location, and dimensions of the concrete member being formed.
  2. Inspect insulating concrete forms for shape, location, and dimensions of the concrete member being formed.

END OF SECTION 031000

## SECTION 032000 - CONCRETE REINFORCING

### 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. Steel reinforcement bars.
  - 2. Welded-wire reinforcement.

#### 1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
  - 1. Review the following:
    - a. Special inspection and testing and inspecting agency procedures for field quality control.
    - b. Construction contraction and isolation joints.
    - c. Steel-reinforcement installation.

#### 1.4 ACTION SUBMITTALS

- A. Product Data: For the following:
  - 1. Each type of steel reinforcement.
  - 2. Epoxy repair coating.
  - 3. Zinc repair material.
  - 4. Bar supports.
  - 5. Mechanical splice couplers.
  - 6. Structural thermal break insulated connection system.
- B. Shop Drawings: Comply with ACI SP-066:
  - 1. Include placing drawings that detail fabrication, bending, and placement.
  - 2. Include bar sizes, lengths, materials, grades, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, location of splices, lengths of lap splices, details of mechanical splice couplers, details of welding splices, tie spacing, hoop spacing, and supports for concrete reinforcement.

3. For structural thermal break insulated connection system, indicate general configuration, insulation dimensions, tension bars, compression pads, shear bars, and dimensions.

C. Construction Joint Layout: Indicate proposed construction joints required to build the structure.

1. Location of construction joints is subject to approval of the Architect.

D. Delegated-Design Submittal: For structural thermal break insulated connection system, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

#### 1.5 INFORMATIONAL SUBMITTALS

A. Qualification Statements: For delegated-design engineer and testing and inspection agency.

B. Delegated-Design Engineer Qualifications: Include the following:

1. Experience providing delegated-design engineering services of the type indicated.
2. Documentation that delegated-design engineer is licensed in the jurisdiction in which Project is located.

C. Welding certificates.

1. Reinforcement To Be Welded: Welding procedure specification in accordance with AWS D1.4.

D. Material Certificates: For each of the following, signed by manufacturers:

1. Epoxy-Coated Reinforcement: CRSI's "Epoxy Coating Plant Certification."
2. Dual-Coated Reinforcement: CRSI's "Epoxy Coating Plant Certification."

E. Material Test Reports: For the following, from a qualified testing agency:

1. Steel Reinforcement:
  - a. For reinforcement to be welded, mill test analysis for chemical composition and carbon equivalent of the steel in accordance with ASTM A706.
2. Mechanical splice couplers.

F. Field quality-control reports.

G. Minutes of preinstallation conference.

#### 1.6 QUALITY ASSURANCE

A. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified in accordance with ASTM C1077 and ASTM E329 for testing indicated.

- B. Welding Qualifications: Qualify procedures and personnel in accordance with AWS D1.4/D 1.4M.
- C. Mockups: Reinforcing for cast-concrete formed surfaces, to demonstrate tolerances and standard of workmanship.
  - 1. Build panel approximately 100 sq. ft. in the location indicated on Drawings or, if not indicated, as directed by Architect.
  - 2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

## 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage and to avoid damaging coatings on steel reinforcement.
  - 1. Store reinforcement to avoid contact with earth.
  - 2. Do not allow epoxy-coated reinforcement to be stored outdoors for more than 60 days without being stored under an opaque covering.
  - 3. Do not allow dual-coated reinforcement to be stored outdoors for more than 60 days without being stored under an opaque covering.
  - 4. Do not allow stainless steel reinforcement to come into contact with uncoated reinforcement.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design structural thermal break insulated connection system, including attachment to building construction.
- B. Structural Performance of Structural Thermal Break Insulating Connection System: Structural thermal break insulated connection system shall withstand the following loads and stresses:
  - 1. Dead Loads: As indicated on Structural Drawings.
    - a. Shear Load: As indicated on Structural Drawings.
    - b. Bending Moment: As indicated on Structural Drawings.
  - 2. Live Loads: As indicated on Structural Drawings.
    - a. Shear Load: As indicated on Structural Drawings.
    - b. Bending Moment: As indicated on Structural Drawings.

- C. Seismic Performance of Structural Thermal Break Insulated Connection System: Structural thermal break Insulated connection system shall withstand the effects of earthquake motions determined according to ASCE/SEI 7

1. Component Importance Factor: <Insert requirement>.

## 2.2 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A615, Grade 60, deformed.
- B. Low-Alloy Steel Reinforcing Bars: ASTM A706, deformed.
- C. Headed-Steel Reinforcing Bars: ASTM A970.
- D. Galvanized Reinforcing Bars:
1. Steel Bars: ASTM A615, Grade 60, deformed bars.
  2. Zinc Coating: ASTM A767, Class I or Class II zinc coated after fabrication and bending, as directed by architect.
- E. Epoxy-Coated Reinforcing Bars:
1. Steel Bars: ASTM A615, Grade 60, deformed bars.
  2. Epoxy Coating: ASTM A775 or ASTM A934 with less than 2 percent damaged coating in each 12-inch bar length.
- F. Dual-Coated Reinforcing Bars: ASTM A1055.
1. Steel Bars: ASTM A615, Grade 60, deformed bars.
  2. Zinc Coating: ASTM A1055 Type I or Type II as directed by architect.
  3. Epoxy Coating: ASTM A775 or ASTM A934 with less than 2 percent damaged coating in each 12-inch bar length.
- G. Stainless Steel Reinforcing Bars: ASTM A955, Grade 60, deformed.
- H. Steel Bar Mats: ASTM A184, fabricated from ASTM A615, Grade 60, deformed bars, assembled with clips.
- I. Plain-Steel Welded-Wire Reinforcement: ASTM A1064, plain, fabricated from as-drawn steel wire into flat sheets.
- J. Deformed-Steel Welded-Wire Reinforcement: ASTM A1064, flat sheet.
- K. Galvanized-Steel Welded-Wire Reinforcement: ASTM A1064, plain, fabricated from galvanized-steel wire into flat sheets.
- L. Epoxy-Coated Welded-Wire Reinforcement: ASTM A884, Class A coated, Type 1, plain steel.

## 2.3 REINFORCEMENT ACCESSORIES

- A. Joint Dowel Bars: ASTM A615, Grade 60, plain-steel bars, cut true to length with ends square and free of burrs.
- B. Epoxy-Coated Joint Dowel Bars: ASTM A615, Grade 60, plain-steel bars, ASTM A775 epoxy coated.
- C. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire reinforcement in place.
  - 1. Manufacture bar supports from steel wire, plastic, or precast concrete in accordance with CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:
    - a. For concrete surfaces exposed to view, where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire, all-plastic bar supports, or CRSI Class 2 stainless steel bar supports.
    - b. For epoxy-coated reinforcement, use CRSI Class 1A epoxy-coated or other dielectric-polymer-coated wire bar supports.
    - c. For dual-coated reinforcement, use CRSI Class 1A epoxy-coated or other dielectric-polymer-coated wire bar supports.
    - d. For zinc-coated reinforcement, use galvanized wire or dielectric-polymer-coated wire bar supports.
    - e. For stainless steel reinforcement, use CRSI Class 1 plastic-protected steel wire, all-plastic bar supports, or CRSI Class 2 stainless steel bar supports.
- D. Mechanical Splice Couplers: ACI 318 Type 1 or Type 2, same material of reinforcing bar being spliced; mechanical-lap type.
- E. Structural Thermal Break Insulated Connection System:
  - 1. Tension Rods: Carbon steel with crimped Type 316 stainless steel rods or Carbon steel, welded with ASTM A276, Type 316 stainless steel as directed by architect.
  - 2. Shear Reinforcement Rods: ASTM A276, Type 316 stainless steel tube or Carbon steel, welded with ASTM A276, Type 316 stainless steel bar as directed by architect.
  - 3. Pressure pads: ASTM A276, Type 316 stainless steel.
  - 4. Insulation body: Polystyrene.
- F. Steel Tie Wire: ASTM A1064, annealed steel, not less than 0.0508 inch in diameter.
  - 1. Finish: Plain ASTM A884, Class A, Type 1, epoxy coated, with less than 2 percent damaged coating in each 12-inch wire length.
- G. Stainless Steel Tie Wire: ASTM A1022, not less than 0.0508 inch in diameter.
- H. Epoxy Repair Coating: Liquid, two-part, epoxy repair coating; compatible with epoxy coating on reinforcement and complying with ASTM A775.
- I. Zinc Repair Material: ASTM A780.

## 2.4 FABRICATING REINFORCEMENT

- A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Protection of In-Place Conditions:
  - 1. Do not cut or puncture vapor retarder.
  - 2. Repair damage and reseal vapor retarder before placing concrete.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that reduce bond to concrete.

### 3.2 INSTALLATION OF STEEL REINFORCEMENT

- A. Comply with CRSI's "Manual of Standard Practice" for placing and supporting reinforcement.
- B. Accurately position, support, and secure reinforcement against displacement.
  - 1. Locate and support reinforcement with bar supports to maintain minimum concrete cover.
  - 2. Do not tack weld crossing reinforcing bars.
- C. Preserve clearance between bars of not less than 1 inch, not less than one bar diameter, or not less than 1-1/3 times size of large aggregate, whichever is greater.
- D. Provide concrete coverage in accordance with ACI 318.
- E. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- F. Splices: Lap splices as indicated on Drawings.
  - 1. Bars indicated to be continuous, and all vertical bars shall be lapped not less than 36 bar diameters at splices, or 24 inches, whichever is greater.
  - 2. Stagger splices in accordance with ACI 318.
  - 3. Mechanical Splice Couplers: Install in accordance with manufacturer's instructions.
  - 4. Weld reinforcing bars in accordance with AWS D1.4, where indicated on Drawings.
- G. Install structural thermal break insulated connection system in accordance with manufacturer's instructions.
- H. Install welded-wire reinforcement in longest practicable lengths.
  - 1. Support welded-wire reinforcement in accordance with CRSI "Manual of Standard Practice."

- a. For reinforcement less than W4.0 or D4.0, continuous support spacing shall not exceed 12 inches.
2. Lap edges and ends of adjoining sheets at least one wire spacing plus 2 inches for plain wire and 8 inches for deformed wire.
3. Offset laps of adjoining sheet widths to prevent continuous laps in either direction.
4. Lace overlaps with wire.
- I. Epoxy-Coated Reinforcement: Repair cut and damaged epoxy coatings with epoxy repair coating in accordance with ASTM D3963.
- J. Dual-Coated Reinforcement: Repair cut and damaged epoxy coatings with epoxy repair coating in accordance with ASTM D3963.
- K. Zinc-Coated Reinforcement: Repair cut and damaged zinc coatings with zinc repair material in accordance with ASTM A780.

### 3.3 JOINTS

- A. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
  1. Place joints perpendicular to main reinforcement.
  2. Continue reinforcement across construction joints unless otherwise indicated.
  3. Do not continue reinforcement through sides of strip placements of floors and slabs.
- B. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length, to prevent concrete bonding to one side of joint.

### 3.4 INSTALLATION TOLERANCES

- A. Comply with ACI 117.

### 3.5 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a special inspector and qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Testing Agency: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.
- C. Inspections:
  1. Steel-reinforcement placement.
  2. Steel-reinforcement mechanical splice couplers.
  3. Steel-reinforcement welding.

- D. Manufacturer's Inspections: Engage manufacturer of structural thermal break insulated connection system to inspect completed installations prior to placement of concrete, and to provide written report that installation complies with manufacturer's written instructions.

END OF SECTION 032000

## SECTION 033000 - CAST-IN-PLACE CONCRETE

### 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. Cast-in-place concrete, including concrete materials, mixture design, placement procedures, and finishes.

#### 1.3 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash, slag cement, other pozzolans, and silica fume; materials subject to compliance with requirements.
- B. Water/Cement Ratio (w/cm): The ratio by weight of water to cementitious materials.

#### 1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
  - 1. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:
    - a. Contractor's superintendent.
    - b. Independent testing agency responsible for concrete design mixtures.
    - c. Ready-mix concrete manufacturer.
    - d. Concrete Subcontractor.
    - e. Special concrete finish Subcontractor.
  - 2. Review the following:
    - a. Special inspection and testing and inspecting agency procedures for field quality control.
    - b. Construction joints, control joints, isolation joints, and joint-filler strips.
    - c. Semirigid joint fillers.
    - d. Vapor-retarder installation.
    - e. Anchor rod and anchorage device installation tolerances.

- f. Cold and hot weather concreting procedures.
- g. Concrete finishes and finishing.
- h. Curing procedures.
- i. Forms and form-removal limitations.
- j. Shoring and reshoring procedures.
- k. Methods for achieving specified floor and slab flatness and levelness.
- l. Floor and slab flatness and levelness measurements.
- m. Concrete repair procedures.
- n. Concrete protection.
- o. Initial curing and field curing of field test cylinders ASTM C31.
- p. Protection of field cured field test cylinders.

## 1.5 ACTION SUBMITTALS

### A. Product Data: For each of the following.

- 1. Portland cement.
- 2. Fly ash.
- 3. Slag cement.
- 4. Blended hydraulic cement.
- 5. Silica fume.
- 6. Performance-based hydraulic cement
- 7. Aggregates.
- 8. Admixtures:
  - a. Include limitations of use, including restrictions on cementitious materials, supplementary cementitious materials, air entrainment, aggregates, temperature at time of concrete placement, relative humidity at time of concrete placement, curing conditions, and use of other admixtures.
- 9. Color pigments.
- 10. Fiber reinforcement.
- 11. Vapor retarders.
- 12. Floor and slab treatments.
- 13. Liquid floor treatments.
- 14. Curing materials.
  - a. Include documentation from color pigment manufacturer, indicating that proposed methods of curing are recommended by color pigment manufacturer.
- 15. Joint fillers.
- 16. Repair materials.

### B. Design Mixtures: For each concrete mixture, include the following:

- 1. Mixture identification.
- 2. Minimum 28-day compressive strength.
- 3. Durability exposure class.
- 4. Maximum w/cm.

5. Calculated equilibrium unit weight, for lightweight concrete.
6. Slump limit.
7. Air content.
8. Nominal maximum aggregate size.
9. Steel-fiber reinforcement content.
10. Synthetic micro-fiber content.
11. Indicate amounts of mixing water to be withheld for later addition at Project site if permitted.
12. Include manufacturer's certification that permeability-reducing admixture is compatible with mix design.
13. Include certification that dosage rate for permeability-reducing admixture matches dosage rate used in performance compliance test.
14. Intended placement method.
15. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

C. Shop Drawings:

1. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.
  - a. Location of construction joints is subject to approval of the Architect.

D. Samples: For manufacturer's standard colors for color pigment and vapor retarder.

E. Concrete Schedule: For each location of each Class of concrete indicated in "Concrete Mixtures" Article, including the following:

1. Concrete Class designation.
2. Location within Project.
3. Exposure Class designation.
4. Formed Surface Finish designation and final finish.
5. Final finish for floors.
6. Curing process.
7. Floor treatment if any.

## 1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For the following:

1. Installer: Include copies of applicable ACI certificates.
2. Ready-mixed concrete manufacturer.
3. Testing agency: Include copies of applicable ACI certificates.

B. Material Certificates: For each of the following, signed by manufacturers:

1. Cementitious materials.
2. Admixtures.
3. Fiber reinforcement.

4. Curing compounds.
5. Floor and slab treatments.
6. Bonding agents.
7. Adhesives.
8. Vapor retarders.
9. Semirigid joint filler.
10. Joint-filler strips.
11. Repair materials.

C. Material Test Reports: For the following, from a qualified testing agency:

1. Portland cement.
2. Fly ash.
3. Slag cement.
4. Blended hydraulic cement.
5. Silica fume.
6. Performance-based hydraulic cement.
7. Aggregates.
8. Admixtures:

- a. Permeability-Reducing Admixture: Include independent test reports, indicating compliance with specified requirements, including dosage rate used in test.

D. Floor surface flatness and levelness measurements report, indicating compliance with specified tolerances.

E. Research Reports:

1. For concrete admixtures in accordance with ICC's Acceptance Criteria AC198.
2. For sheet vapor retarder/termite barrier, showing compliance with ICC AC380.

F. Preconstruction Test Reports: For each mix design.

G. Field quality-control reports.

H. Minutes of preinstallation conference.

## 1.7 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs Project personnel qualified as an ACI-certified Flatwork Technician and Finisher and a supervisor who is a certified ACI Flatwork Concrete Finisher/Technician or an ACI Concrete Flatwork Technician with experience installing and finishing concrete.

1. Post-Installed Concrete Anchors Installers: ACI-certified Adhesive Anchor Installer.

B. Ready-Mixed Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C94 requirements for production facilities and equipment.

1. Manufacturer certified in accordance with NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- C. Laboratory Testing Agency Qualifications: A testing agency qualified in accordance with ASTM C1077 and ASTM E329 for testing indicated and employing an ACI-certified Concrete Quality Control Technical Manager.
1. Personnel performing laboratory tests shall be an ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician, Grade I. Testing agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician, Grade II.
- D. Field Quality Control Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified in accordance with ASTM C1077 and ASTM E329 for testing indicated.
1. Personnel conducting field tests shall be qualified as an ACI Concrete Field Testing Technician, Grade 1, in accordance with ACI CPP 610.1 or an equivalent certification program.
- E. Mockups: Cast concrete slab-on-ground and formed-surface panels to demonstrate typical joints, surface finish, texture, tolerances, floor treatments, and standard of workmanship.
1. Slab-On-Ground: Build panel approximately 15 feet by 15 feet in the location indicated or, if not indicated, as directed by Architect.
    - a. Divide panel into four equal panels to demonstrate saw joint cutting.
  2. Formed Surfaces: Build panel approximately 100 sq. ft. in the location indicated or, if not indicated, as directed by Architect.
  3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

## 1.8 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing on each concrete mixture.
1. Include the following information in each test report:
    - a. Admixture dosage rates.
    - b. Slump.
    - c. Air content.
    - d. Seven-day compressive strength.
    - e. 28-day compressive strength.
    - f. Permeability.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Comply with ASTM C94 and ACI 301.

1.10 FIELD CONDITIONS

- A. Cold-Weather Placement: Comply with ACI 301 and ACI 306.1 and as follows.

1. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
2. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
3. Do not use frozen materials or materials containing ice or snow.
4. Do not place concrete in contact with surfaces less than 35 deg F, other than reinforcing steel.
5. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

- B. Hot-Weather Placement: Comply with ACI 301 and ACI 305.1, and as follows:

1. Maintain concrete temperature at time of discharge to not exceed 95 deg F.
2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

1.11 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to furnish replacement sheet vapor retarder/termite barrier material and accessories for sheet vapor retarder/ termite barrier and accessories that do not comply with requirements or that fail to resist penetration by termites within specified warranty period.

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

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

- A. ACI Publications: Comply with ACI 301 unless modified by requirements in the Contract Documents.

2.2 CONCRETE MATERIALS

- A. Source Limitations:

1. Obtain all concrete mixtures from a single ready-mixed concrete manufacturer for entire Project.
  2. Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant.
  3. Obtain aggregate from single source.
  4. Obtain each type of admixture from single source from single manufacturer.
- B. Cementitious Materials:
1. Portland Cement: ASTM C150, Type II or Type III.
  2. Fly Ash: ASTM C618, Class C or F.
  3. Slag Cement: ASTM C989, Grade 100 or 120.
  4. Blended Hydraulic Cement: ASTM C595, Type IS, portland blast-furnace slag cement.
  5. Silica Fume: ASTM C1240 amorphous silica.
  6. Performance-Based Hydraulic Cement: ASTM C1157: Type GU, general use.
- C. Normal-Weight Aggregates: ASTM C33, coarse aggregate or better, graded. Provide aggregates from a single source.
1. Alkali-Silica Reaction: Comply with one of the following:
    - a. Expansion Result of Aggregate: Not more than 0.04 percent at one-year when tested in accordance with ASTM C1293.
    - b. Expansion Results of Aggregate and Cementitious Materials in Combination: Not more than 0.10 percent at an age of 16 days when tested in accordance with ASTM C1567.
    - c. Alkali Content in Concrete: Not more than 4 lb./cu. yd. for moderately reactive aggregate or 3 lb./cu. yd. for highly reactive aggregate, when tested in accordance with ASTM C1293 and categorized in accordance with ASTM C1778, based on alkali content being calculated in accordance with ACI 301.
  2. Maximum Coarse-Aggregate Size: 1-inch nominal.
  3. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- D. Lightweight Aggregate: ASTM C330, 3/4-inch nominal maximum aggregate size.
- E. Air-Entraining Admixture: ASTM C260.
- F. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride in steel-reinforced concrete.
1. Water-Reducing Admixture: ASTM C494, Type A.
  2. Retarding Admixture: ASTM C494, Type B.
  3. Water-Reducing and -Retarding Admixture: ASTM C494, Type D.
  4. High-Range, Water-Reducing Admixture: ASTM C494, Type F.
  5. High-Range, Water-Reducing and -Retarding Admixture: ASTM C494, Type G.
  6. Plasticizing and Retarding Admixture: ASTM C1017, Type II.

7. Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete and complying with ASTM C494, Type C.
  8. Non-Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, non-set-accelerating, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete.
  9. Permeability-Reducing Admixture: ASTM C494, Type S, hydrophilic, permeability-reducing crystalline admixture, capable of reducing water absorption of concrete exposed to hydrostatic pressure (PRAH).
    - a. Permeability: No leakage when tested in accordance with U.S. Army Corps of Engineers CRD C48 at a hydraulic pressure of 200 psi for 14 days.
- G. Color Pigment: ASTM C979, synthetic mineral-oxide pigments, color stable, nonfading, and resistant to lime and other alkalis.
1. Color: As selected by Architect from manufacturer's full range.
- H. Water and Water Used to Make Ice: ASTM C94, potable or complying with ASTM C1602, including all limits listed in Table 2 and the requirements of paragraph 5.4.

## 2.3 FIBER REINFORCEMENT

- A. Synthetic Monofilament Micro-Fiber: Monofilament polypropylene micro-fibers engineered and designed for use in concrete, complying with ASTM C1116, Type III, 1 to 2-1/4 inches long.
- B. Synthetic Fibrillated Micro-Fiber: Fibrillated polypropylene micro-fibers engineered and designed for use in concrete, complying with ASTM C1116, Type III, 1 to 2-1/4 inches long.
- C. Synthetic Macro-Fiber: Synthetic macro-fibers engineered and designed for use in concrete, complying with ASTM C1116, Type III, 1 to 2-1/4 inches long.

## 2.4 VAPOR RETARDERS

- A. Sheet Vapor Retarder, Class A: ASTM E1745, Class A, not less than 10 mils thick. Include manufacturer's recommended adhesive or pressure-sensitive tape.
- B. Sheet Vapor Retarder, Class C: ASTM E1745, Class C, not less than 10 mils thick. Include manufacturer's recommended adhesive or pressure-sensitive joint tape.
- C. Sheet Vapor Retarder/Termite Barrier: ASTM E1745, Class A, except with maximum water-vapor permeance of 0.03 perms; complying with ICC AC308. Include manufacturer's recommended adhesive or pressure-sensitive tape.
  1. Low-Temperature Flexibility: Pass at minus 15 deg F; ASTM D146.

2. Puncture Resistance: 224 lbf minimum; ASTM E154.
  3. Water Absorption: 0.1 percent weight-gain maximum after 48-hour immersion at 70 deg F; ASTM D570.
  4. Hydrostatic-Head Resistance: 231 feet minimum; ASTM D5385.
- D. Bituminous Vapor Retarder: ASTM E1993, 110 mil thick, semiflexible, seven-ply sheet membrane, consisting of reinforced core and carrier sheet with fortified asphalt layers, protective weather coating, and removable plastic release liner. Furnish manufacturer's accessories, including bonding asphalt, pointing mastics, and self-adhering joint tape.
1. Water-Vapor Permeance: 0.0011 grains/h x sq. ft. x inches Hg when tested in accordance with ASTM E154.
  2. Tensile Strength: 156 lbf/inch when tested in accordance with ASTM E154.
  3. Puncture Resistance: 140 lbf when tested in accordance with ASTM E154.

## 2.5 FLOOR AND SLAB TREATMENTS

- A. Slip-Resistive Emery Aggregate Finish: Factory-graded, packaged, rustproof, nonglazing, abrasive, crushed emery aggregate containing not less than 50 percent aluminum oxide and not less than 20 percent ferric oxide; unaffected by freezing, moisture, and cleaning materials with 100 percent passing 3/8-inch sieve.
- B. Slip-Resistive Aluminum Granule Finish: Factory-graded, packaged, rustproof, nonglazing, abrasive aggregate of not less than 95 percent fused aluminum-oxide granules.
- C. Emery Dry-Shake Floor Hardener: Pigmented or Unpigmented, factory-packaged, dry combination of portland cement, graded emery aggregate, and plasticizing admixture; with emery aggregate consisting of no less than 60 percent of total aggregate content.
1. Color: As selected by Architect from manufacturer's full range.
- D. Metallic Dry-Shake Floor Hardener: Pigmented Unpigmented, factory-packaged, dry combination of portland cement, graded metallic aggregate, rust inhibitors, and plasticizing admixture; with metallic aggregate consisting of no less than 65 percent of total aggregate content.
1. Color: As selected by Architect from manufacturer's full range, Unpigmented Mineral Dry-Shake Floor Hardener: Factory-packaged dry combination of portland cement, graded quartz aggregate, and plasticizing admixture.
- E. Pigmented Mineral Dry-Shake Floor Hardener: Factory-packaged, dry combination of portland cement, graded quartz aggregate, color pigments, and plasticizing admixture. Use color pigments that are finely ground, nonfading mineral oxides interground with cement.
1. Color: As selected by Architect from manufacturer's full range.

## 2.6 LIQUID FLOOR TREATMENTS

- A. Penetrating Liquid Floor Treatment: Clear, chemically reactive, waterborne solution of inorganic silicate or silicate materials and proprietary components; odorless; that penetrates, hardens, and densifies concrete surfaces.

## 2.7 CURING MATERIALS

- A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
- B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.
- C. Moisture-Retaining Cover: ASTM C171, polyethylene film burlap-polyethylene sheet.
  - 1. Color:
    - a. Ambient Temperature Below 50 deg F: Black.
    - b. Ambient Temperature between 50 deg F and 85 deg F: Any color.
    - c. Ambient Temperature Above 85 deg F: White.
- D. Curing Paper: Eight feet wide paper, consisting of two layers of fibered kraft paper laminated with double coating of asphalt.
- E. Water: Potable or complying with ASTM C1602.
- F. Clear, Waterborne, Membrane-Forming, Dissipating Curing Compound: ASTM C309, Type 1, Class B.
- G. Clear, Waterborne, Membrane-Forming, Nondissipating Curing Compound: ASTM C309, Type 1, Class B, certified by curing compound manufacturer to not interfere with bonding of floor covering.
- H. Clear, Waterborne, Membrane-Forming, Curing Compound: ASTM C309, Type 1, Class B, 18 to 25 percent solids, nondissipating, certified by curing compound manufacturer to not interfere with bonding of floor covering.
- I. Clear, Solvent-Borne, Membrane-Forming, Curing and Sealing Compound: ASTM C1315, Type 1, Class A.
- J. Clear, Waterborne, Membrane-Forming, Curing and Sealing Compound: ASTM C1315, Type 1, Class A.

## 2.8 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D1751, asphalt-saturated cellulosic fiber or ASTM D1752, cork or self-expanding cork.

- B. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids, epoxy resin with a Type A shore durometer hardness of 80 or aromatic polyurea with a Type A shore durometer hardness range of 90 to 95 in accordance with ASTM D2240.
- C. Bonding Agent: ASTM C1059, Type II, nonredispersible, acrylic emulsion or styrene butadiene.
- D. Epoxy Bonding Adhesive: ASTM C881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade and class to suit requirements, and as follows:
  - 1. Types I and II, nonload bearing or Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.
- E. Floor Slab Protective Covering: Eight feet wide cellulose fabric.

## 2.9 REPAIR MATERIALS

- A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.
  - 1. Cement Binder: ASTM C150 portland cement or hydraulic or blended hydraulic cement, as defined in ASTM C219.
  - 2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
  - 3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand, as recommended by underlayment manufacturer.
  - 4. Compressive Strength: Not less than 5000 psi at 28 days when tested in accordance with ASTM C109.
- B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch and that can be filled in over a scarified surface to match adjacent floor elevations.
  - 1. Cement Binder: ASTM C150 portland cement or hydraulic or blended hydraulic cement, as defined in ASTM C219.
  - 2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
  - 3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by topping manufacturer.
  - 4. Compressive Strength: Not less than 5000 psi at 28 days when tested in accordance with ASTM C109.

## 2.10 CONCRETE MIXTURES, GENERAL

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, in accordance with ACI 301.

1. Use a qualified testing agency for preparing and reporting proposed mixture designs, based on laboratory trial mixtures.
- B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
  1. Fly Ash or Other Pozzolans: 25 percent by mass.
  2. Slag Cement: 50 percent by mass.
  3. Silica Fume: 10 percent by mass.
  4. Total of Fly Ash or Other Pozzolans, Slag Cement, and Silica Fume: 50 percent by mass, with fly ash or pozzolans not exceeding 25 percent by mass and silica fume not exceeding 10 percent by mass.
  5. Total of Fly Ash or Other Pozzolans and Silica Fume: 35 percent by mass with fly ash or pozzolans not exceeding 25 percent by mass and silica fume not exceeding 10 percent by mass.
- C. Admixtures: Use admixtures in accordance with manufacturer's written instructions.
  1. Use water-reducing, high-range water-reducing or plasticizing admixture in concrete, as required, for placement and workability.
  2. Use water-reducing and -retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
  3. Use water-reducing admixture as required.
  4. Use corrosion-inhibiting admixture in concrete mixtures where indicated.
  5. Use permeability-reducing admixture in concrete mixtures where indicated.
- D. Color Pigment: Add color pigment to concrete mixture in accordance with manufacturer's written instructions and to result in hardened concrete color consistent with approved mockup.

## 2.11 CONCRETE MIXTURES

- A. Normal-weight concrete used for footings, foundations walls, grade beams, and tie beams.
  1. Exposure Class: ACI 318 F0, S0, W1, C1
  2. Minimum Compressive Strength: 4000 psi at 28 days.
  3. Maximum w/cm: 0.45.
  4. Slump Limit: Contractor to select a target slump based on ASTM C143.
  5. Slump Flow Limit: Contractor to select a target slump flow based on ASTM C1611.
  6. Air Content:
    - a. Exposure Classes F2 and F3: 4.5 percent, plus or minus 1.5 percent at point of delivery for concrete containing 1-inch nominal maximum aggregate size.
  7. Limit water-soluble, chloride-ion content in hardened concrete to 0.30 percent by weight of cement.
- B. Normal-weight concrete used for interior slabs-on-ground.
  1. Exposure Class: ACI 318 F0, S0, W1, C1

2. Minimum Compressive Strength: 4000 psi at 28 days.
3. Maximum w/cm: 0.45.
4. Minimum Cementitious Materials Content: Project specific.
5. Slump Limit: Contractor to select a target slump based on ASTM C143.
6. Slump Flow Limit: Contractor to select a target slump flow based on ASTM C1611.
7. Air Content:
  - a. Do not use an air-entraining admixture or allow total air content to exceed 3 percent for concrete used in trowel-finished floors.
8. Limit water-soluble, chloride-ion content in hardened concrete to 0.30 percent by weight of cement.
9. Synthetic Micro-Fiber: Uniformly disperse in concrete mixture at manufacturer's recommended rate, but not less than a rate of 1.0 lb/cu. yd.
10. Synthetic Macro-Fiber: Uniformly disperse in concrete mixture at manufacturer's recommended rate, but not less than a rate of 4.0 lb/cu. yd.

C. Normal-weight concrete used for interior suspended slabs.

1. Exposure Class: ACI 318 F0, S0, W1, C1
2. Minimum Compressive Strength: 4000 psi at 28 days.
3. Maximum w/cm: 0.45.
4. Minimum Cementitious Materials Content: Project specific.
5. Slump Limit: Contractor to select a target slump based on ASTM C143.
6. Slump Flow Limit: Contractor to select a target slump flow based on ASTM C1611.
7. Air Content:
  - a. Do not use an air-entraining admixture or allow total air content to exceed 3 percent for concrete used in trowel-finished floors.
8. Limit water-soluble, chloride-ion content in hardened concrete to 0.30 percent by weight of cement.
9. Synthetic Micro-Fiber: Uniformly disperse in concrete mixture at manufacturer's recommended rate, but not less than a rate of 1.0 lb/cu. yd.
10. Synthetic Macro-Fiber: Uniformly disperse in concrete mixture at manufacturer's recommended rate, but not less than a rate of 4.0 lb/cu. yd.

D. Normal-weight concrete used for building walls.

1. Exposure Class: ACI 318 F0, S0, W1, C1
2. Minimum Compressive Strength: 4000 psi at 28 days.
3. Maximum w/cm: 0.45.
4. Slump Limit: Contractor to select a target slump based on ASTM C143.
5. Slump Flow Limit: Contractor to select a target slump flow based on ASTM C1611.
6. Air Content:
  - a. Exposure Classes F2 and F3: 4.5 percent, plus or minus 1.5 percent at point of delivery for concrete containing 1-inch nominal maximum aggregate size.

7. Limit water-soluble, chloride-ion content in hardened concrete to 0.30 percent by weight of cement.
- E. Normal-weight concrete used for interior metal pan stairs and landings:
1. Exposure Class: ACI 318 F0, S0, W1, C1
  2. Minimum Compressive Strength: 4000 psi at 28 days.
  3. Maximum w/cm: 0.45.
  4. Slump Limit: Contractor to select a target slump based on ASTM C143.
  5. Slump Flow Limit: Contractor to select a target slump flow based on ASTM C1611.
  6. Air Content:
    - a. Exposure Classes F2 and F3: 4.5 percent, plus or minus 1.5 percent at point of delivery for concrete containing 1-inch nominal maximum aggregate size.
  7. Limit water-soluble, chloride-ion content in hardened concrete to 0.30 percent by weight of cement.
  8. Retarding Admixture: Not allowed.
  9. Accelerating Admixture: Not allowed.
- F. Normal-weight concrete used for exterior retaining walls.
1. Exposure Class: ACI 318 F0, S0, W1, C1
  2. Minimum Compressive Strength: 4000 psi at 28 days.
  3. Maximum w/cm: 0.45.
  4. Slump Limit: Contractor to select a target slump based on ASTM C143.
  5. Slump Flow Limit: Contractor to select a target slump flow based on ASTM C1611.
  6. Air Content:
    - a. Exposure Classes F2 and F3: 4.5 percent, plus or minus 1.5 percent at point of delivery for concrete containing 1-inch nominal maximum aggregate size.
  7. Limit water-soluble, chloride-ion content in hardened concrete to 0.30 percent by weight of cement.

## 2.12 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete in accordance with ASTM C94 and ASTM C1116, and furnish batch ticket information.
- B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete in accordance with ASTM C94. Mix concrete materials in appropriate drum-type batch machine mixer.
  1. For mixer capacity of 1 cu. yd. or smaller, continue mixing at least 1-1/2 minutes, but not more than five minutes after ingredients are in mixer, before any part of batch is released.
  2. For mixer capacity larger than 1 cu. yd., increase mixing time by 15 seconds for each additional 1 cu. yd.

3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixture time, quantity, and amount of water added. Record approximate location of final deposit in structure.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

##### A. Verification of Conditions:

1. Before placing concrete, verify that installation of concrete forms, accessories, and reinforcement, and embedded items is complete and that required inspections have been performed.
2. Do not proceed until unsatisfactory conditions have been corrected.

#### 3.2 PREPARATION

##### A. Provide reasonable auxiliary services to accommodate field testing and inspections, acceptable to testing agency, including the following:

1. Daily access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Secure space for storage, initial curing, and field curing of test samples, including source of water and continuous electrical power at Project site during site curing period for test samples.
4. Security and protection for test samples and for testing and inspection equipment at Project site.

#### 3.3 INSTALLATION OF EMBEDDED ITEMS

##### A. Place and secure anchorage devices and other embedded items required for adjoining Work that is attached to or supported by cast-in-place concrete.

1. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
2. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of ANSI.
3. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.

#### 3.4 INSTALLATION OF VAPOR RETARDER

##### A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder in accordance with ASTM E1643 and manufacturer's written instructions.

1. Install vapor retarder with longest dimension parallel with direction of concrete pour.
2. Face laps away from exposed direction of concrete pour.
3. Lap vapor retarder over footings and grade beams not less than 6 inches, sealing vapor retarder to concrete.
4. Lap joints 6 inches and seal with manufacturer's recommended tape.
5. Terminate vapor retarder at the top of floor slabs, grade beams, and pile caps, sealing entire perimeter to floor slabs, grade beams, foundation walls, or pile caps.
6. Seal penetrations in accordance with vapor retarder manufacturer's instructions.
7. Protect vapor retarder during placement of reinforcement and concrete.
  - a. Repair damaged areas by patching with vapor retarder material, overlapping damages area by 6 inches on all sides, and sealing to vapor retarder.

- B. Bituminous Vapor Retarders: Place, protect, and repair bituminous vapor retarder in accordance with manufacturer's written instructions.

### 3.5 JOINTS

- A. Construct joints true to line, with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Coordinate with floor slab pattern and concrete placement sequence.
1. Install so strength and appearance of concrete are not impaired, at locations indicated on Drawings or as approved by Architect.
  2. Place joints perpendicular to main reinforcement.
    - a. Continue reinforcement across construction joints unless otherwise indicated.
    - b. Do not continue reinforcement through sides of strip placements of floors and slabs.
  3. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete.
  4. Locate joints for beams, slabs, joists, and girders at third points of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
  5. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
  6. Space vertical joints in walls as indicated on Drawings. Unless otherwise indicated on Drawings, locate vertical joints beside piers integral with walls, near corners, and in concealed locations where possible.
  7. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
  8. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
- C. Control Joints in Slabs-on-Ground: Form weakened-plane control joints, sectioning concrete into areas as indicated. Construct control joints for a depth equal to at least one-fourth of concrete thickness as follows:

1. Grooved Joints: Form control joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of control joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
  2. Sawed Joints: Form control joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8 inch wide joints into concrete when cutting action does not tear, abrade, or otherwise damage surface and before concrete develops random cracks.
- D. Isolation Joints in Slabs-on-Ground: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated on Drawings.
  2. Terminate full-width joint-filler strips not less than 1/2 inch or more than 1 inch below finished concrete surface, where joint sealants, specified in Section 079200 "Joint Sealants," are indicated.
  3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.
- E. Doweled Joints:
1. Install dowel bars and support assemblies at joints where indicated on Drawings.
  2. Lubricate or asphalt coat one-half of dowel bar length to prevent concrete bonding to one side of joint.
- F. Dowel Plates: Install dowel plates at joints where indicated on Drawings.

### 3.6 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, embedded items, and vapor retarder is complete and that required inspections are completed.
1. Immediately prior to concrete placement, inspect vapor retarder for damage and deficient installation, and repair defective areas.
  2. Provide continuous inspection of vapor retarder during concrete placement and make necessary repairs to damaged areas as Work progresses.
- B. Notify Architect and testing and inspection agencies 24 hours prior to commencement of concrete placement.
- C. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect in writing, but not to exceed the amount indicated on the concrete delivery ticket.
1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

- D. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301, but not to exceed the amount indicated on the concrete delivery ticket.
  - 1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
- E. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness.
  - 1. If a section cannot be placed continuously, provide construction joints as indicated.
  - 2. Deposit concrete to avoid segregation.
  - 3. Deposit concrete in horizontal layers of depth not to exceed formwork design pressures and in a manner to avoid inclined construction joints.
  - 4. Consolidate placed concrete with mechanical vibrating equipment in accordance with ACI 301.
    - a. Do not use vibrators to transport concrete inside forms.
    - b. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer.
    - c. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity.
    - d. At each insertion, limit duration of vibration to time necessary to consolidate concrete, and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.
- F. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
  - 1. Do not place concrete floors and slabs in a checkerboard sequence.
  - 2. Consolidate concrete during placement operations, so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
  - 3. Maintain reinforcement in position on chairs during concrete placement.
  - 4. Screed slab surfaces with a straightedge and strike off to correct elevations.
  - 5. Level concrete, cut high areas, and fill low areas.
  - 6. Slope surfaces uniformly to drains where required.
  - 7. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface.
  - 8. Do not further disturb slab surfaces before starting finishing operations.

### 3.7 FINISHING FORMED SURFACES

#### A. As-Cast Surface Finishes:

- 1. ACI 301 Surface Finish SF-1.0: As-cast concrete texture imparted by form-facing material.
  - a. Patch voids larger than 1-1/2 inches wide or 1/2 inch deep.
  - b. Remove projections larger than 1 inch.
  - c. Tie holes do not require patching.

- d. Surface Tolerance: ACI 117 Class D.
    - e. Apply to concrete surfaces not exposed to public view.
  2. ACI 301 Surface Finish SF-2.0: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams.
    - a. Patch voids larger than 3/4 inch wide or 1/2 inch deep.
    - b. Remove projections larger than 1/4 inch.
    - c. Patch tie holes.
    - d. Surface Tolerance: ACI 117 Class B.
    - e. Locations: Apply to concrete surfaces exposed to public view, or to be covered with a coating or covering material applied directly to concrete.
  3. ACI 301 Surface Finish SF-3.0:
    - a. Patch voids larger than 3/4 inch wide or 1/2 inch deep.
    - b. Remove projections larger than 1/8 inch.
    - c. Patch tie holes.
    - d. Surface Tolerance: ACI 117 Class A.
    - e. Locations: Apply to concrete surfaces exposed to public view or to be covered with a coating or covering material applied directly to concrete.
- B. Rubbed Finish: Apply the following to as cast surface finishes where indicated on Drawings:
  1. Smooth-Rubbed Finish:
    - a. Perform no later than one day after form removal.
    - b. Moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture.
    - c. If sufficient cement paste cannot be drawn from the concrete by the rubbing process, use a grout made from the same cementitious materials used in the in-place concrete.
    - d. Maintain required patterns or variances as shown on Drawings or to match design reference sample or mockups.
  2. Grout-Cleaned Rubbed Finish:
    - a. Clean concrete surfaces after contiguous surfaces are completed and accessible.
    - b. Do not clean concrete surfaces as Work progresses.
    - c. Mix 1 part portland cement to 1-1/2 parts fine sand, complying with ASTM C144 or ASTM C404, by volume, with sufficient water to produce a mixture with the consistency of thick paint. Add white portland cement in amounts determined by trial patches, so color of dry grout matches adjacent surfaces.
    - d. Wet concrete surfaces.
    - e. Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap, and keep surface damp by fog spray for at least 36 hours.
    - f. Maintain required patterns or variances as shown on Drawings or to match design reference sample or mockups.
  3. Cork-Floated Finish:

- a. Mix 1 part portland cement to 1 part fine sand, complying with ASTM C144 or ASTM C404, by volume, with sufficient water to produce a mixture with the consistency of thick paint.
  - b. Mix 1 part portland cement and 1 part fine sand with sufficient water to produce a mixture of stiff grout. Add white portland cement in amounts determined by trial patches, so color of dry grout matches adjacent surfaces.
  - c. Wet concrete surfaces.
  - d. Compress grout into voids by grinding surface.
  - e. In a swirling motion, finish surface with a cork float.
  - f. Maintain required patterns or variances as shown on Drawings or to match design reference sample or mockups.
4. Scrubbed Finish: After concrete has achieved a compressive strength of from 1000 to 1500 psi, apply scrubbed finish.
- a. Wet concrete surfaces thoroughly and scrub with stiff fiber or wire brushes, using water freely, until top mortar surface is removed and aggregate is uniformly exposed.
  - b. Rinse scrubbed surfaces with clean water.
  - c. Maintain continuity of finish on each surface or area of Work.
  - d. Remove only enough concrete mortar from surfaces to match design reference sample or mockups.
- C. Abrasive-Blast Finish: Apply the following to as-cast surface finishes where indicated on Drawings:
1. Perform abrasive blasting after compressive strength of concrete exceeds 2000 psi.
  2. Coordinate with formwork removal to ensure that surfaces to be abrasive blasted are treated at the same age.
  3. Surface Continuity:
    - a. Perform abrasive-blast finishing as continuous operation, maintaining continuity of finish on each surface or area of Work.
    - b. Maintain required patterns or variances in depths of blast to match design reference sample or mockups.
  4. Abrasive Blasting:
    - a. Abrasive-blast corners and edges of patterns carefully, using backup boards to maintain uniform corner and edge lines.
    - b. Determine type of nozzle pressure and blasting techniques required to match field sample.
    - c. Depth of Cut: Use an abrasive grit of proper type and gradation to expose aggregate and surrounding matrix surfaces to match field sample, as follows:
      - 1) Brush Texture: Remove cement matrix to dull surface sheen and expose face of fine aggregate, with no significant reveal.
      - 2) Light Texture: Expose fine aggregate with occasional exposure of coarse aggregate and uniform color, with maximum reveal of 1/16 inch.

- 3) Medium Texture: Generally, expose coarse aggregate with slight reveal and with a maximum reveal of 1/4 inch.
  - 4) Heavy Texture: Expose and reveal coarse aggregate to a maximum projection of one-third its diameter, with reveal range of 1/4 to 1/2 inch.
- d. Maintain required patterns or variances in reveal projection to match design reference sample or mockups.
- D. High-Pressure Water-Jet Finish: Apply the following to as-cast surface finishes where indicated on Drawings:
1. Perform high-pressure water jetting on concrete that has achieved a minimum compressive strength of 4500 psi.
  2. Coordinate with formwork removal to ensure that surfaces to be high-pressure water-jet finished are treated at same age for uniform results.
  3. Surface Continuity: Perform high-pressure water-jet finishing in as continuous an operation as possible, maintaining continuity of finish on each surface or area of Work.
  4. Maintain required patterns or variances in reveal projection to match design reference sample or mockups.
- E. Bushhammer Finish: Apply the following to as-cast surface finishes where indicated on Drawings:
1. Perform bushhammer finish to concrete that has achieved a minimum compressive strength of 4500 psi.
  2. Surface Continuity:
    - a. Perform bushhammer finishing in as continuous an operation as possible, maintaining continuity of finish on each surface or area of Work.
  3. Surface Cut:
    - a. Maintain required depth of cut and general aggregate exposure.
    - b. Use power tool with hammer attachments for large, flat surfaces, and use hand hammers for small areas, at corners and edges, and for restricted locations where power tools cannot reach.
  4. Remove impressions of formwork and form facings with exception of tie holes.
  5. Maintain required patterns or variances of cut as shown on Drawings or to match design reference sample or mockups.
  6. Maintain control of concrete chips, dust, and debris in each Work area, limiting migration of airborne materials and dust by use of tarpaulins, wind-breaks, or similar devices.
- F. Related Unformed Surfaces:
1. At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a color and texture matching adjacent formed surfaces.
  2. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

## SECTION 033300 - ARCHITECTURAL CONCRETE

### 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. Cast-in-place architectural concrete, including form facings, reinforcement accessories, concrete materials, concrete mixtures, concrete placement, and concrete finishes.
  - 2. Requirements in Section 033000 "Cast-in-Place Concrete" apply to this Section.

#### 1.3 DEFINITIONS

- A. Aggregate Exposure: Projection of coarse aggregate from matrix or mortar after completion of exposure operations.
- B. Cast-in-Place Architectural Concrete: Concrete that is exposed to view, is designated as architectural concrete, and that requires special concrete materials, formwork, placement, or finishes to obtain specified architectural appearance.
- C. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash, slag cement, other pozzolans, and silica fume; materials subject to compliance with requirements.
- D. Design Reference Sample: Sample designated by Architect in the Contract Documents that reflects acceptable surface quality and appearance of cast-in-place architectural concrete.
- E. Water/Cement Ratio (w/cm): The ratio by weight of water to cementitious materials.

#### 1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
  - 1. Require representatives of each entity directly concerned with cast-in-place architectural concrete to attend, including the following:
    - a. Contractor's superintendent.
    - b. Independent testing agency responsible for concrete design mixtures.
    - c. Ready-mix concrete manufacturer.

- d. Cast-in-place architectural concrete Subcontractor.
2. Review the following:
    - a. Special inspection and testing and inspecting agency procedures for field quality control.
    - b. Construction joints, control joints, isolation joints, and joint-filler strips.
    - c. Reinforcement accessory installation.
    - d. Cold- and hot-weather concreting procedures.
    - e. Concrete finishes and finishing.
    - f. Curing procedures.
    - g. Forms and form-removal limitations.
    - h. Shoring and reshoring procedures.
    - i. Concrete repair procedures.
    - j. Protection of cast-in-place architectural concrete.
    - k. Initial curing and field curing of field test cylinders ASTM C31.
    - l. Protection of field-cured field test cylinders.

#### 1.5 ACTION SUBMITTALS

##### A. Product Data: For each of the following:

1. Form-facing panels.
2. Form liners.
3. Form joint tape.
4. Form joint sealant.
5. Wood sealer.
6. Form-release agent.
7. Surface retarder.
8. Form ties.
9. Bar supports.
10. Portland cement.
11. Fly ash.
12. Slag cement.
13. Blended hydraulic cement.
14. Silica fume.
15. Performance-based hydraulic cement.
16. Aggregates.
17. Admixtures:
  - a. Include limitations of use, including restrictions on cementitious materials, supplementary cementitious materials, air entrainment, aggregates, temperature at time of concrete placement, relative humidity at time of concrete placement, curing conditions, and use of other admixtures.
18. Color pigments.
19. Repair materials.

##### B. Design Mixtures: For each concrete mixture, include the following:

1. Mixture identification.
2. Minimum 28-day compressive strength.
3. Durability exposure class.
4. Maximum w/cm.
5. Calculated equilibrium unit weight, for lightweight concrete.
6. Slump limit.
7. Air content.
8. Nominal maximum aggregate size.
9. Steel-fiber reinforcement content.
10. Synthetic microfiber content.
11. Amounts of mixing water to be withheld for later addition at Project site if permitted.
12. Intended placement method.
13. Alternative design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

C. Shop Drawings:

1. Formwork: Prepared by, and signed and sealed by, a qualified professional engineer responsible for their preparation, detailing fabrication, assembly, and support of forms.
  - a. Show formwork construction, including form-liner layout, form-liner termination details, dimensioned locations of form-facing material joints, rustications, construction and contraction joints, form joint-sealant details, form-tie locations and patterns, inserts and embedments, cutouts, cleanout panels, and other items that visually affect cast-in-place architectural concrete.
    - 1) Included separate layout for formwork used in mockups.
    - 2) Indicate proposed schedule and sequence of stripping of forms, shoring removal, and reshoring installation and removal.
    - 3) Location of construction joints is subject to approval of Architect.

D. Samples: For each of the following materials:

1. Form-facing panels.
2. Form ties.
3. Form liners, 12-by-12-inch Sample, indicating texture.
4. Manufacturer's standard colors for color pigment.
5. Exposed aggregates.
6. Chamfers and rustications.

E. Samples for Verification: Architectural concrete Samples, cast vertically, approximately 18 by 18 by 2 inches, of finishes, colors, and textures to match design reference sample. Include Sample sets showing the full range of variations expected in these characteristics.

F. Concrete Schedule: For each location of each Class of concrete indicated in "Concrete Mixtures" Article, including the following:

1. Concrete Class designation.
2. Location within Project.
3. Exposure Class designation.

4. Formed Surface Finish designation and final finish.
5. Curing process.

G. Placement Schedule: Submit before start of placement operations.

## 1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For the following:

1. Installer: Include copies of applicable ACI certificates.
2. Ready-mixed concrete manufacturer.

B. Material Certificates: For each of the following:

1. Cementitious materials.
2. Admixtures.
3. Form materials and form-release agents.
4. Repair materials.

C. Material Test Reports: For the following, by a qualified testing agency:

1. Portland cement.
2. Fly ash.
3. Slag cement.
4. Blended hydraulic cement.
5. Silica fume.
6. Performance-based hydraulic cement.
7. Aggregates: Include service-record data indicating absence of deleterious expansion of concrete due to alkali-aggregate reactivity.

D. Research Reports: For concrete admixtures in accordance with ICC AC198.

E. Preconstruction Test Reports: For each mix design.

F. Concrete Repair: Submit a written, detailed description of materials, methods, equipment, and sequence of operations to be used for repairing architectural concrete, including protection of surrounding materials and Project site.

1. If materials and methods other than those indicated are proposed for any repairs to architectural concrete, add a written description of such materials and methods, including evidence of successful use on comparable projects, and demonstrations to show their effectiveness for this Project and Installer's ability to use such materials and methods properly.

G. Minutes of preinstallation conference.

## 1.7 QUALITY ASSURANCE

- A. Ready-Mixed Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C94 requirements for production facilities and equipment.
1. Manufacturer certified in accordance with NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- B. Installer Qualifications: An experienced cast-in-place architectural concrete installer, as evidenced by not less than five consecutive years' experience, specializing in installing cast-in-place architectural concrete similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
1. Provide written evidence of qualifications and experience.
  2. Include locations, descriptions, and photographs of completed projects, including name of architect, substantiating the quality of the installer's experience.
- C. Laboratory Testing Agency Qualifications: A testing agency qualified in accordance with ASTM C1077 and ASTM E329 for testing indicated and employing an ACI-certified Concrete Quality Technical Manager.
1. Personnel performing laboratory tests shall be an ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician, Level I.
  2. Testing agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician, Level II.
- D. Field Sample Panels: After approval of verification sample and before casting architectural concrete, produce field sample panels to demonstrate the approved range of selections made under Sample submittals. Produce a minimum of three sets of full-scale panels, cast vertically, approximately 48 by 48 by 6 inches minimum, to demonstrate the expected range of finish, color, and texture variations.
1. Locate panels as indicated or, if not indicated, as directed by Architect.
  2. Demonstrate methods of curing, aggregate exposure, wood sealers, and coatings, as applicable.
  3. In presence of Architect, damage part of an exposed-face surface for each finish, color, and texture, and demonstrate materials and techniques proposed for repair of tie holes and surface blemishes to match adjacent undamaged surfaces.
  4. Maintain field sample panels during construction in an undisturbed condition as a standard for judging the completed Work.
  5. Demolish and remove field sample panels when directed.
- E. Mockups: Before casting architectural concrete, build mockups, using the same procedures, equipment, materials, finishing procedures, and curing procedures that will be used for producing architectural concrete, to verify selections made under Sample submittals and to demonstrate typical joints, surface finish, color, texture, tolerances, and standard of workmanship. Build mockups to comply with the following requirements, using materials indicated for the completed Work:

1. Build mockups in the location and of the size indicated or, if not indicated, as directed by Architect.
2. Build mockups of typical wall of cast-in-place architectural concrete as shown on Drawings, including vertical and horizontal rustication joints, and any sculptured features.
3. Construct mockups to include at least two lifts having heights equal to those anticipated for construction.
4. Demonstrate curing, cleaning, and protecting of cast-in-place architectural concrete, finishes, and contraction joints, as applicable.
5. In presence of Architect, damage part of the exposed-face surface for each finish, color, and texture, and demonstrate materials and techniques proposed for repair to match adjacent undamaged surfaces.
6. In presence of Architect, demonstrate materials and techniques proposed for repair of tie holes and surface blemishes to match adjacent undamaged surfaces.
7. Obtain Architect's approval of mockups before casting architectural concrete.
8. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

#### 1.8 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing on concrete mixtures.
  1. Include the following information in each test report:
    - a. Admixture dosage rates.
    - b. Slump.
    - c. Air content.
    - d. Seven-day compressive strength.
    - e. 28-day compressive strength.
    - f. Permeability.

#### 1.9 DELIVERY, STORAGE, AND HANDLING

- A. Comply with ASTM C94 and ACI 301.

#### 1.10 FIELD CONDITIONS

- A. Cold-Weather Placement: Comply with Section 033000 "Cast-in-Place Concrete."
- B. Hot-Weather Placement: Comply with Section 033000 "Cast-in-Place Concrete."

## PART 2 - PRODUCTS

### 2.1 CONCRETE, GENERAL

- A. ACI Publications: Comply with ACI 301 unless modified by requirements in the Contract Documents.

### 2.2 FORM-FACING MATERIALS

- A. Comply with Section 031000 "Concrete Forming and Accessories" for formwork and other form-facing material requirements, and as specified in this Section.
- B. Source Limitations: Obtain each type of form-facing material from single source from single manufacturer.
- C. Form-Facing Panels for As-Cast or Exposed-Aggregate Finishes:
  - 1. Steel- and glass-fiber-reinforced plastic, or other approved nonabsorptive panel materials that provide continuous, true, and smooth architectural concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
  - 2. Exterior-grade plywood panels, nonabsorptive, that will provide continuous, true, and smooth architectural concrete surfaces.
- D. Form Liners: Units of face design, texture, arrangement, and configuration to match design reference sample. Furnish with manufacturer's recommended liquid-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent surface treatments and finishes of concrete.
- E. Rustication Strips: Metal, dressed wood, or rigid plastic, with sides beveled and back kerfed; nonstaining; in longest practicable lengths.
- F. Chamfer Strips: Metal, rigid plastic, elastomeric rubber, or dressed wood, 3/4 by 3/4 inch, minimum; nonstaining; in longest practicable lengths.
- G. Form Joint Tape: Compressible foam tape; pressure sensitive; AAMA 800; minimum 1/4 inch thick.
- H. Form Joint Sealant: Elastomeric sealant complying with ASTM C920, Type M or Type S, Grade NS, that adheres to form joint substrates, does not stain, does not adversely affect concrete surfaces, and does not impair subsequent treatments and finishes of concrete surfaces.
- I. Wood Sealer: Penetrating, clear, polyurethane wood sealer formulated to reduce absorption of bleed water and prevent migration of set-retarding chemicals from wood and does not stain, does not adversely affect concrete surfaces, and does not impair subsequent treatments and finishes of concrete surfaces.

- J. Form-Release Agent: Commercially formulated, colorless form-release agent that does not bond with, stain, or adversely affect architectural concrete surfaces and will not impair subsequent treatments and finishes of architectural concrete surfaces.
  - 1. Formulate form-release agent with rust inhibitor for steel form-facing materials.
  - 2. Form-release agent for form liners shall be acceptable to form-liner manufacturer.
- K. Surface Retarder: Water-soluble chemical liquid set retarder, for application on form-facing materials, capable of temporarily delaying final hardening of newly placed architectural concrete surface to depth of aggregate exposure specified.
  - 1. Source Limitations: Obtain surface retarder from single source from single manufacturer.
- L. Form Ties: Factory-fabricated, internally disconnecting or removable ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
  - 1. Furnish ties with tapered tie cone spreaders that, when removed, will leave holes no larger than 3/4 inch in diameter on architectural concrete surface.
  - 2. Furnish internally disconnecting ties that will leave no metal closer than 1-1/2 inches, after exposing aggregate, from architectural concrete surface.
  - 3. Furnish glass-fiber-reinforced plastic ties, not less than 1/2 inch and not more than 1 inch in diameter, of color selected by Architect from manufacturer's full range.
  - 4. Furnish ties with integral water-barrier plates to walls indicated to receive damp proofing or waterproofing.

## 2.3 REINFORCEMENT ACCESSORIES

- A. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire fabric in place.
  - 1. Manufacture bar supports in accordance with CRSI's "Manual of Standard Practice."
  - 2. Where legs of wire bar supports contact forms, use CRSI Class 1, gray, plastic-protected or CRSI Class 2, stainless steel bar supports.

## 2.4 CONCRETE MATERIALS

- A. Cementitious Materials:
  - 1. Portland Cement: ASTM C150, Type II or Type III.
  - 2. Fly Ash: ASTM C618, Class C or ASTM C618, Class F.
  - 3. Slag Cement: ASTM C989, Grade 100 or Grade 120.
  - 4. Blended Hydraulic Cement: ASTM C595, Type IS, portland blast-furnace slag cement.
  - 5. Silica Fume: ASTM C1240 amorphous silica.
  - 6. Performance-Based Hydraulic Cement: ASTM C1157: Type GU, general use.
- B. Normal-Weight Aggregates: ASTM C33, coarse aggregate or better, graded. Provide aggregates from single source from single manufacturer.

1. Alkali-Silica Reaction: Comply with one of the following:
  - a. Expansion Result of Aggregate: Not more than 0.04 percent at one year when tested in accordance with ASTM C1293.
  - b. Expansion Results of Aggregate and Cementitious Materials in Combination: Not more than 0.10 percent at 16 days when tested in accordance with ASTM C1567.
  - c. Alkali Content in Concrete: Not more than 4 lb./cu. yd. for moderately reactive aggregate or 3 lb./cu. yd. for highly reactive aggregate, when tested in accordance with ASTM C1293 and categorized in accordance with ASTM C1778, based on alkali content being calculated in accordance with ACI 301.
2. Maximum Coarse-Aggregate Size: 1 inch.
3. Gradation: Uniformly or Gap graded.
- C. Normal-Weight Fine Aggregate: ASTM C33 or ASTM C144, manufactured or natural sand, free of materials with deleterious reactivity to alkali in cement, from same source for entire Project.
- D. Air-Entraining Admixture: As specified in Section 033000 "Cast-in-Place Concrete."
- E. Chemical Admixtures: As specified in Section 033000 "Cast-in-Place Concrete," and certified by manufacturer to be compatible with other admixtures and that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
- F. Color Pigment: ASTM C979, synthetic mineral-oxide pigments or colored water-reducing admixtures; color stable, nonfading, and resistant to lime and other alkalis.
  1. Source Limitations: Obtain color pigment from single source from single manufacturer.
  2. Color: As selected by Architect from manufacturer's full range.
- G. Water and Water Used to Make Ice: ASTM C94, potable or complying with ASTM C1602, including all limits listed in Table 2 and requirements of paragraph 5.4.

## 2.5 CURING MATERIALS

- A. Comply with Section 0330000 "Cast-in-Place Concrete."
  1. For integrally colored concrete, curing materials shall be approved by color pigment manufacturer.
  2. For concrete indicated to be sealed, curing materials shall be compatible with sealer.

## 2.6 REPAIR MATERIALS

- A. Bonding Agent: ASTM C1059, Type II, nonredispersible, acrylic emulsion or styrene butadiene.

- B. Epoxy Bonding Adhesive: ASTM C881 two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade and class to suit requirements.
  - 1. Types I and II, non-load bearing or Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

## 2.7 CONCRETE MIXTURES, GENERAL

- A. Obtain each color, size, type, and variety of concrete mixture from single manufacturer with resources to provide cast-in-place architectural concrete of consistent quality in appearance and physical properties.
- B. Prepare design mixtures for each type and strength of cast-in-place architectural concrete proportioned on basis of laboratory trial mixture or field test data, or both, in accordance with ACI 301.
  - 1. Use a qualified independent testing agency for preparing and reporting proposed concrete mixture designs, based on laboratory trial mixtures.
- C. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
  - 1. Fly Ash or Other Pozzolans: 25 percent by mass.
  - 2. Slag Cement: 50 percent by mass.
  - 3. Silica Fume: 10 percent by mass.
  - 4. Total of Fly Ash or Other Pozzolans, Slag Cement, and Silica Fume: 50 percent by mass, with fly ash or pozzolans not exceeding 25 percent by mass and silica fume not exceeding 10 percent by mass.
  - 5. Total of Fly Ash or Other Pozzolans and Silica Fume: 35 percent by mass with fly ash or pozzolans not exceeding 25 percent by mass and silica fume not exceeding 10 percent by mass.
- D. Admixtures: Use admixtures in accordance with manufacturer's written instructions.
- E. Color Pigment: Add color pigment to concrete mixture in accordance with manufacturer's written instructions and to result in hardened concrete color consistent with approved design reference sample or mockups.

## 2.8 CONCRETE MIXTURES

- A. Normal-weight concrete.
  - 1. Exposure Class: ACI 318 F0, S0, W1, C1
  - 2. Minimum Compressive Strength: 4000 psi at 28 days.
  - 3. Maximum w/cm: 0.45.
  - 4. Slump Limit: Contractor to select a target slump based on ASTM C143.
  - 5. Slump Flow Limit: Contractor to select a target slump flow based on ASTM C1611.

6. Air Content:
  - a. Exposure Classes F2 and F3: 4.5 percent, plus or minus 1.5 percent at point of delivery for concrete containing 1-inch nominal maximum aggregate size.
7. Limit water-soluble, chloride-ion content in hardened concrete to 0.30 percent by weight of cement.

## 2.9 CONCRETE MIXING

- A. Ready-Mixed or Project-Site-Mixed Architectural Concrete: Measure, batch, mix, and deliver concrete in accordance with ASTM C94 and ASTM C1116, and furnish batch ticket information.
  1. Clean equipment used to mix and deliver cast-in-place architectural concrete to prevent contamination from other concrete.
  2. For mixer capacity of 1 cu. yd. or smaller, continue mixing at least 1-1/2 minutes, but not more than five minutes after ingredients are in mixer, before any part of batch is released.
  3. For mixer capacity larger than 1 cu. yd., increase mixing time by 15 seconds for each additional 1 cu. yd..
  4. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixture time, quantity, and amount of water added. Record approximate location of final deposit in structure.

## PART 3 - EXECUTION

### 3.1 INSTALLATION OF FORMWORK

- A. Comply with Section 031000 "Concrete Forming and Accessories" for formwork, embedded items, and shoring and reshoring, and as specified in this Section.
- B. Limit deflection of form-facing panels to not exceed ACI 301 requirements.
- C. Limit cast-in-place architectural concrete surface irregularities, as follows:
  1. Surface Finish-1.0: ACI 117 Class D, 1 inch.
  2. Surface Finish-2.0: ACI 117 Class B, 1/4 inch.
  3. Surface Finish-3.0: ACI 117 Class A, 1/8 inch.
- D. Construct forms to result in cast-in-place architectural concrete that complies with ACI 117.
- E. Seal form joints, chamfers, rustication joints, and penetrations at form ties with form joint tape or form joint sealant to prevent cement paste leakage.
  1. Provide closure backing materials if indented rustication is used over a ribbed form line, and seal joint between rustication strip and form with joint sealant.

- F. Chamfer exterior corners and edges of cast-in-place architectural concrete.
- G. Coat contact surfaces of wood rustications and chamfer strips with wood sealer before placing reinforcement, anchoring devices, and embedded items.
- H. Coat contact surfaces of forms with form-release agent, in accordance with manufacturer's written instructions, before placing reinforcement, anchoring devices, and embedded items.
- I. Coat contact surfaces of forms with surface retarder, in accordance with manufacturer's written instructions, before placing reinforcement, anchoring devices, and embedded items.
- J. Place form liners accurately to provide finished surface texture indicated.
  - 1. Provide solid backing and attach securely to prevent deflection and maintain stability of liners during concreting.
  - 2. Secure form liners in place using fasteners that will not transfer impressions onto surface of concrete.
  - 3. Prevent form liners from sagging and stretching in hot weather.
  - 4. Seal joints of form liners and form-liner accessories to prevent mortar leaks.
  - 5. Coat form liner with form-release agent.

### 3.2 INSTALLATION OF REINFORCEMENT AND ACCESSORIES

- A. Comply with Section 032000 "Concrete Reinforcing" for fabricating and installing steel reinforcement and accessories.

### 3.3 REMOVING AND REUSING FORMS

- A. Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations, and curing and protection operations need to be maintained.
  - 1. Schedule form removal to maintain surface appearance that matches approved mockups.
  - 2. Leave formwork for beam soffits, joists, slabs, and other structural elements that support weight of concrete in place until concrete has achieved at least 70 percent of its 28-day design compressive strength.
  - 3. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.
  - 4. Cut off and grind glass-fiber-reinforced plastic form ties flush with surface of concrete.
- B. Clean and repair surfaces of forms to be reused in the Work.
  - 1. Split, frayed, delaminated, or otherwise damaged form-facing material are unacceptable for exposed surfaces.
  - 2. Apply new form-release agent.
- C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints.

1. Align and secure joints to avoid offsets.
2. Do not use patched forms for cast-in-place architectural concrete surfaces.

### 3.4 JOINTS

- A. Construction Joints: Install construction joints true to line, with faces perpendicular to surface plane of cast-in-place architectural concrete, so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated.
  2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete. Align construction joint within rustications attached to form-facing material.
  3. Locate joints for beams, slabs, joists, and girders at third points of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
  4. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at top of footings or floor slabs.
  5. Space vertical joints in walls as indicated on Drawings. Unless otherwise indicated on Drawings, locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
  6. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
- B. Contraction Joints: Form weakened-plane contraction joints true to line, with faces perpendicular to surface plane of cast-in-place architectural concrete, so strength and appearance of concrete are not impaired, at locations indicated on Drawings or as approved by Architect.

### 3.5 CONCRETE PLACEMENT

- A. Comply with Section 033000 "Cast-in-Place Concrete."

### 3.6 FINISHING FORMED SURFACES

- A. Comply with Section 033000 "Cast-in-Place Concrete."
- B. Architectural Concrete Finish: Match Architect's design reference sample, identified and described as indicated, to satisfaction of Architect.
- C. As-Cast Surface Finishes: Comply with Section 033000 "Cast-in-Place Concrete" for the following:
1. ACI 301 Surface Finish-1.0 (SF-1.0).
  2. ACI 301 Surface Finish-2.0 (SF-2.0).
  3. ACI 301 Surface Finish-3.0 (SF-3.0).
- D. Final Concrete Finish: Comply with Section 033000 "Cast-in-Place Concrete" for the following:

1. Smooth-rubbed finish.
2. Grout-cleaned rubbed finish.
3. Cork-floated finish.
4. Abrasive-blast finish.
5. Scrubbed finish.
6. High-pressure water-jet finish.
7. Bushhammer finish.

- E. Form-Liner Finish: Produce a textured surface free of pockets, streaks, and honeycombs, and of uniform appearance, color, and texture.
- F. Maintain uniformity of architectural concrete finishes over construction joints unless otherwise indicated.

### 3.7 CONCRETE CURING

- A. Comply with Section 033000 "Cast-in-Place Concrete" using identical curing procedures to that used for mockups.

### 3.8 REPAIR

- A. Comply with ACI 301.
- B. Repair damaged finished surfaces of cast-in-place architectural concrete when repairing is approved by Architect.
- C. Match repairs to color, texture, and uniformity of surrounding surfaces and to repairs on approved mockups.
- D. Remove and replace cast-in-place architectural concrete that cannot be repaired to Architect's approval.

### 3.9 FIELD QUALITY CONTROL

- A. Comply with Section 033000 "Cast-in-Place Concrete."

### 3.10 CLEANING

- A. Clean cast-in-place architectural concrete surfaces after finish treatment to remove stains, markings, dust, and debris.
- B. Wash and rinse surfaces in accordance with concrete finish applicator's written instructions.
1. Protect other Work from staining or damage due to cleaning operations.
  2. Do not use cleaning materials or processes that could change the appearance of cast-in-place architectural concrete finishes.

3.11 PROTECTION

- A. Protect corners, edges, and surfaces of cast-in-place architectural concrete from damage; use guards and barricades.
- B. Protect cast-in-place architectural concrete from staining, laitance, and contamination during remainder of construction period.

3.12 FINAL ACCEPTANCE

- A. Final acceptance of completed architectural concrete Work will be determined by Architect by comparing approved mockups with installed Work, when viewed at a distance of 20 feet.

END OF SECTION 033300

## SECTION 033543 - POLISHED CONCRETE FINISHING

### 1.1 SUMMARY

- A. Section Includes:
  - 1. Polished concrete finishing, including staining.

### 1.2 SUBMITTALS

- A. Product Data: For each type of product.
- B. Polishing Schedule: Submit plan showing polished concrete surfaces and schedule of polishing operations for each area of polished concrete before start of polishing operations. Include locations of all joints, including construction joints.
- C. Samples for Verification: For each type of exposed color.

### 1.3 QUALITY ASSURANCE

- A. Field Sample Panels: Produce field sample panel to demonstrate the approved range of selections made under Sample submittals. Produce a minimum of three sets of full-scale panels, approximately 48 by 48 by 6 inches (1200 by 1200 by 150 mm) minimum, to demonstrate the expected range of integral color, grind depth, and polished finish.
  - 1. Locate panels as indicated or, if not indicated, as directed by Architect.
  - 2. Maintain field sample panels during construction in an undisturbed condition as a standard for judging the completed Work.
  - 3. Demolish and remove field sample panels when directed.

### 1.4 PRODUCTS

- A. Penetrating Stain: Water-based, acrylic latex, penetrating stain with colorfast pigments.
- B. Penetrating Liquid Floor Treatments for Polished Concrete Finish: Clear, waterborne solution of inorganic silicate or silicate materials and proprietary components; odorless; that penetrates, hardens, and is suitable for polished concrete surfaces.

### 1.5 POLISHING AND GRINDING

- A. Polish: Where indicated, provide as follows:
  - 1. Level 1: Matte finish, 100 grit
  - 2. Level 2: Low sheen, 400 grit
  - 3. Level 3: High sheen, 800 grit.
- B. Aggregate Exposure: Where indicated, provide as follows:

1. Aggregate Exposure Class A – Cream Finish: Grind surface resulting in little or no aggregate exposure.
2. Aggregate Exposure Class B – Fine Aggregate: Grind surface resulting in fine aggregate exposure.
3. Aggregate Exposure Class C – Coarse Aggregate: Grind surface resulting in coarse aggregate exposure.

#### 1.6 EXAMINATION AND PREPARATION

- A. Acceptance of Substrate and Conditions: Examine substrates to be polished for compliance with requirements and other conditions affecting performance.
- B. Proceed with work only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents.
- C. Starting work within a particular area will be construed as acceptance of surface conditions.
- D. Prepare and clean concrete surfaces. Provide sound concrete surfaces free of laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, paint splatter, and other contaminants incompatible with liquid applied products and polishing.
- E. Vapor Testing Concrete Floors:
  1. Alkalinity Test: Measure pH according to ASTM F 710.
    - a. Acceptable results: pH between 8 and 10.
  2. Moisture Vapor Transmission Rate: Measure moisture transmission rate per ASTM F 1869.
    - a. Acceptable results: Not more than 5 pounds per 1,000 square feet in 24-hours.
  3. Relative Humidity: Perform relative humidity test using in situ probes according to ASTM F 2170.
    - a. Acceptable results: Not more than 75 percent.

END OF SECTION 033543

## SECTION 034100 - PRECAST STRUCTURAL CONCRETE

### 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. Precast structural concrete.
  - 2. Precast structural concrete with commercial architectural finish.

#### 1.3 DEFINITIONS

- A. Design Reference Sample: Sample of approved precast structural concrete color, finish, and texture, preapproved by Architect.

#### 1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

#### 1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Design Mixtures: For each precast concrete mixture. Include compressive strength and, if required, water-absorption tests.
- C. Shop Drawings:
  - 1. Include member locations, plans, elevations, dimensions, shapes and sections, openings, support conditions, and types of reinforcement, including special reinforcement.
  - 2. Detail fabrication and installation of precast structural concrete units, including connections at member ends and to adjoining construction.
  - 3. Indicate joints, reveals, drips, chamfers, and extent and location of each surface finish.
  - 4. Indicate separate face and backup mixture locations and thicknesses.
  - 5. Indicate type, size, and length of welded connections by AWS standard symbols.
  - 6. Detail loose and cast-in hardware, lifting and erection inserts, connections, and joints.
  - 7. Indicate locations, tolerances, and details of anchorage devices to be embedded in or attached to structure or other construction.

8. Include and locate openings larger than 10 inches. Where additional structural support is required, include header design.
9. Indicate location of each precast structural concrete unit by same identification mark placed on panel.
10. Indicate relationship of precast structural concrete units to adjacent materials.
11. Indicate estimated camber for precast floor slabs with concrete toppings.
12. Indicate shim sizes and grouting sequence.
13. If design modifications are proposed to meet performance requirements and field conditions, submit design calculations and Shop Drawings. Do not adversely affect the appearance, durability, or strength of units when modifying details or materials and maintain the general design concept.

D. Samples:

1. For each type of finish indicated on exposed surfaces of precast structural concrete units with architectural finish, in sets of three, representative of finish, color, and texture variations expected; approximately 12 by 12 by 2 inches.
  - a. Where other faces of precast concrete unit are exposed, include Samples illustrating workmanship, color, and texture of backup concrete as well as facing concrete.

E. Delegated-Design Submittal: For precast structural concrete indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1. Show precast structural concrete unit types, connections, types of reinforcement, including special reinforcement, and concrete cover on reinforcement. Indicate location, type, magnitude, and direction of loads imposed on the building structural frame from precast structural concrete.

## 1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer, fabricator and testing agency.
- B. Welding certificates.
- C. Material Certificates: For the following:
  1. Cementitious materials.
  2. Reinforcing materials and prestressing tendons.
  3. Admixtures.
  4. Bearing pads.
  5. Insulation.
  6. Structural-steel shapes and hollow structural sections.
- D. Material Test Reports: For aggregates, by a qualified testing agency.
- E. Preconstruction test reports.

- F. Source quality-control reports.
- G. Field quality-control and special inspection reports.

## 1.7 QUALITY ASSURANCE

- A. Fabricator Qualifications: A firm that assumes responsibility for engineering precast structural concrete units to comply with performance requirements. Responsibility includes preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer.
  - 1. Designated as a PCI-certified plant as follows:
    - a. Group C, Category C1 - Precast Concrete Products (no prestressed reinforcement).
    - b. Group CA, Category C1A - Precast Concrete Products (no prestressed reinforcement).
- B. Installer Qualifications: A precast concrete erector qualified and designated by PCI's Certificate of Compliance, to erect Category S1 – Simple Structural Systems.
- C. Installer Qualifications: An experienced precast concrete erector who has retained a "PCI-Certified Field Auditor" to conduct a field audit of a project installed by erector in Category S1 – Simple Structural Systems and who can produce an Erectors' Post Audit Declaration, according to PCI MNL 127, "PCI Erector's Manual - Standards and Guidelines for the Erection of Precast Concrete Products."
- D. Testing Agency Qualifications: Qualified according to ASTM C1077 and ASTM E329 for testing indicated.
- E. Quality-Control Standard: For manufacturing procedures, testing requirements, and quality-control recommendations for types of units required, comply with PCI MNL 116, "Manual for Quality Control for Plants and Production of Structural Precast Concrete Products."
- F. Welding Qualifications: Qualify procedures and personnel according to the following:
  - 1. AWS D1.1, "Structural Welding Code - Steel."
  - 2. AWS D1.4, "Structural Welding Code - Reinforcing Steel."
- G. Sample Panels: After sample approval and before fabricating precast structural concrete units with architectural finish, produce a minimum of two sample panels approximately 16 sq. ft. in area for review by Architect. Incorporate full-scale details of architectural features, finishes, textures, and transitions in sample panels.
  - 1. Locate panels where indicated or, if not indicated, as directed by Architect.
  - 2. Damage part of an exposed-face surface for each finish, color, and texture, and demonstrate adequacy of repair techniques proposed for repair of surface blemishes.
  - 3. After approval of repair technique, maintain one sample panel at fabricator's plant and one at Project site in an undisturbed condition as a standard for judging the completed Work.
  - 4. Demolish and remove sample panels when directed.

- H. Mockups: After sample panel approval but before production of precast structural concrete units with architectural finish, construct full-sized mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and to set quality standards for materials and execution.
1. Build mockup as indicated on Drawings including sealants and precast structural concrete units with an architectural finish complete with anchors, connections, flashings, and joint fillers.
  2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
  3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

## 1.8 COORDINATION

- A. Furnish loose connection hardware and anchorage items to be embedded in or attached to other construction before starting that Work. Provide locations, setting diagrams, templates, instructions, and directions, as required, for installation.

## 1.9 DELIVERY, STORAGE, AND HANDLING

- A. Support units during shipment on nonstaining shock-absorbing material in same position as during storage.
- B. Store units with adequate bracing and protect units to prevent contact with soil, to prevent staining, and to prevent cracking, distortion, warping or other physical damage.
1. Store units with dunnage across full width of each bearing point unless otherwise indicated.
  2. Place adequate dunnage of even thickness between each unit.
  3. Place stored units so identification marks are clearly visible, and units can be inspected.
- C. Handle and transport units in a manner that avoids excessive stresses that cause cracking or damage.
- D. Lift and support units only at designated points indicated on Shop Drawings.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements.

## 2.2 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design precast structural concrete units.
- B. Design Standards: Comply with ACI 318 and with design recommendations in PCI MNL 120, "PCI Design Handbook - Precast and Prestressed Concrete," applicable to types of precast structural concrete units indicated.
- C. Fire-Resistance Calculations: Where indicated, provide precast structural concrete units whose fire resistance meets prescriptive requirements of authorities having jurisdiction or has been calculated according to ACI 216.1 PCI MNL 124, "Design for Fire Resistance of Precast Prestressed Concrete," and is acceptable to authorities having jurisdiction.
- D. Structural Performance: Precast structural concrete units and connections shall withstand design loads indicated within limits and under conditions indicated.
- E. Structural Performance: Provide precast structural concrete units and connections capable of withstanding the design loads of the current edition of the building code specified by the Authority Having Jurisdiction.

## 2.3 MOLD MATERIALS

- A. Molds: Rigid, dimensionally stable, non-absorptive material, warp and buckle free, that provides continuous precast concrete surfaces within fabrication tolerances indicated; nonreactive with concrete and suitable for producing required finishes.
  - 1. Mold-Release Agent: Commercially produced form-release agent that does not bond with, stain, or adversely affect precast concrete surfaces and does not impair subsequent surface or joint treatments of precast concrete.
- B. Form Liners: Units of face design, texture, arrangement, and configuration to match those used for precast concrete design reference sample. Furnish with manufacturer's recommended form-release agent that does not bond with, stain, or adversely affect precast concrete surfaces and does not impair subsequent surface or joint treatments of precast concrete.
- C. Surface Retarder: Chemical set retarder, capable of temporarily delaying setting of newly placed concrete mixture to depth of reveal specified.

## 2.4 REINFORCING MATERIALS

- A. Reinforcing Bars: ASTM A615, Grade 60, deformed.
- B. Low-Alloy-Steel Reinforcing Bars: ASTM A706, deformed.
- C. Galvanized Reinforcing Bars: ASTM A615, Grade 60, ASTM A706, deformed bars, with ASTM A767, Class II zinc coating and chromate treatment. Galvanize after fabrication and bending.

- D. Epoxy-Coated Reinforcing Bars: ASTM A615, Grade 60, ASTM A706, deformed bars, ASTM A775, or ASTM A934 epoxy coated, with less than 2 percent damaged coating in each 12-inch bar length.
- E. Steel Bar Mats: ASTM A184, fabricated from ASTM A615, Grade 60, ASTM A706, deformed bars, assembled with clips.
- F. Plain-Steel Welded Wire Reinforcement: ASTM A185, fabricated from as-drawn steel, wire into flat sheets.
- G. Deformed-Steel Welded Wire Reinforcement: ASTM A497 or ASTM A1064, flat sheet.
- H. Epoxy-Coated-Steel Wire: ASTM A884, Class A coated, plain or deformed, flat sheet, Type 1 bendable coating.
- I. Supports: Suspend reinforcement from back of mold or use bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place according to PCI MNL 116.

## 2.5 PRESTRESSING TENDONS

- A. Pretensioning Strand: ASTM A416, Grade 270, uncoated, seven-wire or ASTM A886, Grade 270, indented, seven-wire, low-relaxation strand.
- B. Unbonded Post-Tensioning Strand: ASTM A416, Grade 270, uncoated, seven-wire, low-relaxation strand.
  - 1. Coat unbonded post-tensioning strand with post-tensioning coating complying with ACI 423.7 and sheath with polypropylene tendon sheathing complying with ACI 423.7. Include anchorage devices and coupler assemblies.
- C. Post-Tensioning Bars: ASTM A722, uncoated high-strength steel bar.

## 2.6 CONCRETE MATERIALS

- A. Portland Cement: ASTM C150, Type I or Type III, gray, unless otherwise indicated.
  - 1. For surfaces exposed to view in finished structure, use gray or white cement, of same type, brand, and mill source.
- B. Supplementary Cementitious Materials:
  - 1. Fly Ash: ASTM C618, Class C or F, with maximum loss on ignition of 3 percent.
  - 2. Metakaolin: ASTM C618, Class N.
  - 3. Silica Fume: ASTM C1240, with optional chemical and physical requirement.
  - 4. Ground Granulated Blast-Furnace Slag: ASTM C989, Grade 100 or 120.
  - 5. Blended Hydraulic Cement: ASTM C595, Type IS, portland blast-furnace slag cement.

- C. Normal-Weight Aggregates: Except as modified by PCI MNL 116, ASTM C33, with coarse aggregates complying with Class 5S. Stockpile fine and coarse aggregates for each type of exposed finish from a single source (pit or quarry) for Project.
  - 1. Face-Mixture-Coarse Aggregates: Selected, hard, and durable; free of material that reacts with cement or causes staining; to match selected finish sample.
    - a. Gradation: To match design reference sample.
  - 2. Face-Mixture-Fine Aggregates: Selected, natural or manufactured sand compatible with coarse aggregate to match approved finish sample.
- D. Lightweight Aggregates: Except as modified by PCI MNL 116, ASTM C330, with absorption less than 11 percent.
- E. Coloring Admixture: ASTM C979, synthetic or natural mineral-oxide pigments or colored water-reducing admixtures, temperature stable, and nonfading.
- F. Water: Potable; free from deleterious material that may affect color stability, setting, or strength of concrete and complying with chemical limits of PCI MNL 116.
- G. Air-Entraining Admixture: ASTM C260, certified by manufacturer to be compatible with other required admixtures.
- H. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and to not contain calcium chloride, or more than 0.15 percent chloride ions or other salts by weight of admixture.
  - 1. Water-Reducing Admixtures: ASTM C494, Type A.
  - 2. Retarding Admixture: ASTM C494, Type B.
  - 3. Water-Reducing and Retarding Admixture: ASTM C494, Type D.
  - 4. Water-Reducing and Accelerating Admixture: ASTM C494, Type E.
  - 5. High-Range, Water-Reducing Admixture: ASTM C494, Type F.
  - 6. High-Range, Water-Reducing and Retarding Admixture: ASTM C494, Type G.
  - 7. Plasticizing Admixture: ASTM C1017, Type I.
  - 8. Plasticizing and Retarding Admixture: ASTM C1017, Type II.
  - 9. Corrosion-Inhibiting Admixture: ASTM C1582.

## 2.7 STEEL CONNECTION MATERIALS

- A. Carbon-Steel Shapes and Plates: ASTM A36.
- B. Carbon-Steel-Headed Studs: ASTM A108, Grade 1010 through 1020, cold finished, AWS D1.1, Type A or B, with arc shields and with minimum mechanical properties of PCI MNL 116.
- C. Carbon-Steel Plate: ASTM A283, Grade C.
- D. Malleable-Iron Castings: ASTM A47, Grade 32510 or Grade 35028.

- E. Carbon-Steel Castings: ASTM A27, Grade 60-30.
  - F. High-Strength, Low-Alloy Structural Steel: ASTM A572.
  - G. Carbon-Steel Structural Tubing: ASTM A500, Grade B or Grade C.
  - H. Wrought Carbon-Steel Bars: ASTM A675, Grade 65.
  - I. Deformed-Steel Wire or Bar Anchors: ASTM A496 or ASTM A706.
  - J. Carbon-Steel Bolts and Studs: ASTM A307, Grade A; carbon-steel, hex-head bolts and studs; carbon-steel nuts, ASTM A563; and flat, unhardened steel washers, ASTM F844.
  - K. High-Strength Bolts, Nuts, and Washers: ASTM F3125, Grade A325, Type 1, heavy-hex steel structural bolts; ASTM A563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F436, Type 1, hardened carbon-steel washers.
    - 1. Finish: Plain, Hot-dip zinc coating or Mechanically deposited zinc coating.
  - L. High-Strength Bolts, Nuts, and Washers: ASTM F3125, Grade A490, Type 1, heavy-hex steel structural bolts; ASTM A563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F436, Type 1, hardened carbon-steel washers; all with plain finish.
  - M. Zinc-Coated Finish: For exterior steel items, steel in exterior walls, and items indicated for galvanizing, apply zinc coating by hot-dip process according to ASTM A123 or ASTM A153.
    - 1. For steel shapes, plates, and tubing to be galvanized, limit silicon content of steel to less than 0.03 percent or to between 0.15 and 0.25 percent or limit sum of silicon and 2.5 times phosphorous content to 0.09 percent.
    - 2. Galvanizing Repair Paint: High-zinc-dust-content paint with dry film containing not less than 94 percent zinc dust by weight, and complying with DOD-P-21035B or SSPC-Paint 20.
  - N. Shop-Primed Finish: Prepare surfaces of nongalvanized-steel items, except those surfaces to be embedded in concrete, according to requirements in SSPC-SP 3, and shop apply lead- and chromate-free, rust-inhibitive primer, complying with performance requirements in MPI 79 according to SSPC-PA 1.
  - O. Welding Electrodes: Comply with AWS standards.
  - P. Precast Accessories: Provide clips, hangers, plastic or steel shims, and other accessories required to install precast structural concrete units.
- 2.8 STAINLESS STEEL CONNECTION MATERIALS
- A. Stainless Steel Plate: ASTM A240 or ASTM A666, Type 304, Type 316, or Type 201.
  - B. Stainless Steel Bolts and Studs: ASTM F593, Alloy Group 1 or 2, hex-head bolts and studs; ASTM F594, Alloy Group 1 or 2 stainless steel nuts; and flat, stainless steel washers.

1. Lubricate threaded parts of stainless steel bolts with an antiseize thread lubricant during assembly.
- C. Stainless Steel-Headed Studs: ASTM A276, Alloy 304 or 316, with minimum mechanical properties of PCI MNL 116.

## 2.9 BEARING PADS

- A. Provide one of the following bearing pads for precast structural concrete units as recommended by precast fabricator for application:
  1. Elastomeric Pads: AASHTO M 251, plain, vulcanized, 100 percent polychloroprene (neoprene) elastomer, molded to size or cut from a molded sheet, 50 to 70 Shore, Type A durometer hardness, ASTM D2240; minimum tensile strength 2250 psi, ASTM D412.
  2. Random-Oriented-Fiber-Reinforced Elastomeric Pads: Preformed, randomly oriented synthetic fibers set in elastomer. 70 to 90 Shore, Type A durometer hardness, ASTM D2240; capable of supporting a compressive stress of 3000 psi with no cracking, splitting, or delaminating in the internal portions of pad. Test one specimen for every 200 pads used in Project.
  3. Cotton-Duck-Fabric-Reinforced Elastomeric Pads: Preformed, horizontally layered cotton-duck fabric bonded to an elastomer; 80 to 100 Shore, Type A durometer hardness, ASTM D2240; complying with AASHTO's "AASHTO LRFD Bridge Design Specifications," Division II, Section 18.10.2; or with MIL-C-882E.
  4. Frictionless Pads: PTFE, glass-fiber reinforced, bonded to stainless or mild-steel plate, or random-oriented-fiber-reinforced elastomeric pads; of type required for in-service stress.
  5. High-Density Plastic: Multimonomer, nonleaching, plastic strip.

## 2.10 ACCESSORIES

- A. Reglets: Specified in Section 076200 "Sheet Metal Flashing and Trim."
- B. Reglets: PVC extrusions, or Stainless steel, Type 302 or Type 304, felt or fiber filled, or with face opening of slots covered.
- C. Precast Accessories: Provide clips, hangers, high-density plastic or steel shims, and other accessories required to install structural precast concrete units.

## 2.11 GROUT MATERIALS

- A. Sand-Cement Grout: Portland cement, ASTM C150, Type I, and clean, natural sand, ASTM C144 or ASTM C404. Mix at ratio of 1 part cement to 2-1/2 to 3 parts sand, by volume, with minimum water required for placement and hydration. Water-soluble chloride ion content less than 0.06 percent by weight of cement when tested according to ASTM C1218.
- B. Nonmetallic, Nonshrink Grout: Packaged, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage-compensating agents, plasticizing and water-reducing agents, complying with ASTM C1107, Grade A for drypack and Grades B

and C for flowable grout and of consistency suitable for application within a 30-minute working time. Water-soluble chloride ion content less than 0.06 percent by weight of cement when tested according to ASTM C1218.

- C. Epoxy-Resin Grout: Two-component, mineral-filled epoxy resin; ASTM C881, of type, grade, and class to suit requirements.

## 2.12 CONCRETE MIXTURES

- A. Prepare design mixtures for each type of precast concrete required.
  - 1. Use fly ash, pozzolan, ground granulated blast-furnace slag, and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 40 percent.
  - 2. Limit use of fly ash to 20 percent replacement of portland cement by weight and ground granulated blast-furnace slag to 50 percent of portland cement by weight; metakaolin and silica fume to 10 percent of portland cement by weight.
- B. Design mixtures may be prepared by a qualified independent testing agency or by qualified precast plant personnel at precast structural concrete fabricator's option.
- C. Limit water-soluble chloride ions to maximum percentage by weight of cement permitted by ACI 318 or PCI MNL 116 when tested according to ASTM C1218.
- D. Normal-Weight Concrete Mixtures: Proportion and backup mixtures or full-depth mixtures, at fabricator's option by either laboratory trial batch or field test data methods according to ACI 211.1, with materials to be used on Project, to provide normal-weight concrete with the following properties:
  - 1. Compressive Strength (28 Days): 5000 psi.
  - 2. Maximum Water-Cementitious Materials Ratio: 0.45.
- E. Water Absorption: For structural precast concrete with an architectural finish, limit water absorption to 6 percent by weight or 14 percent by volume, tested according to ASTM C642, except for boiling requirement.
- F. Lightweight Concrete Backup Mixtures: Proportion mixtures by either laboratory trial batch or field test data methods according to ACI 211.2, with materials to be used on Project, to provide lightweight concrete with the following properties:
  - 1. Compressive Strength (28 Days): 5000 psi.
  - 2. Unit Weight: Calculated equilibrium unit weight of 115 lb/cu. ft., plus or minus 3 lb/cu. ft., according to ASTM C567.
- G. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content complying with PCI MNL 116.
- H. When included in design mixtures, add other admixtures to concrete mixtures according to manufacturer's written instructions.

- I. Concrete Mix Adjustments: Concrete mix design adjustments may be proposed if characteristics of materials, Project conditions, weather, test results, or other circumstances warrant.

## 2.13 MOLD FABRICATION

- A. Molds: Accurately construct molds, mortar tight, of sufficient strength to withstand pressures due to concrete-placement operations and temperature changes and for prestressing and detensioning operations. Coat contact surfaces of molds with release agent before reinforcement is placed. Avoid contamination of reinforcement and prestressing tendons by release agent.
  1. Place form liners accurately to provide finished surface texture indicated. Provide solid backing and supports to maintain stability of liners during concrete placement. Coat form liner with form-release agent.
- B. Maintain molds to provide completed precast structural concrete units of shapes, lines, and dimensions indicated, within fabrication tolerances specified.
  1. Form joints are not permitted on faces of structural precast concrete with an architectural finish that is exposed to view in the finished work.
  2. Edge and Corner Treatment: Uniformly chamfered.

## 2.14 FABRICATION

- A. Cast-in Anchors, Inserts, Plates, Angles, and Other Anchorage Hardware: Fabricate anchorage hardware with sufficient anchorage and embedment to comply with design requirements. Accurately position for attachment of loose hardware, and secure in place during precasting operations. Locate anchorage hardware where it does not affect position of main reinforcement or concrete placement.
  1. Weld-headed studs and deformed bar anchors used for anchorage according to AWS D1.1 and AWS C5.4, "Recommended Practices for Stud Welding."
- B. Furnish loose hardware items including steel plates, clip angles, seat angles, anchors, dowels, cramps, hangers, and other hardware shapes for securing precast structural concrete units to supporting and adjacent construction.
- C. Cast-in reglets, slots, holes, and other accessories in precast structural concrete units as indicated on the Contract Drawings.
- D. Cast-in openings larger than 10 inches in any dimension. Do not drill or cut openings or prestressing strand without Architect's approval.
- E. Reinforcement: Comply with recommendations in PCI MNL 116 for fabricating, placing, and supporting reinforcement.
  1. Clean reinforcement of loose rust and mill scale, earth, and other materials that reduce or destroy the bond with concrete. When damage to epoxy-coated reinforcement exceeds

- limits specified in ASTM A775, repair with patching material compatible with coating material and epoxy coat bar ends after cutting.
2. Accurately position, support, and secure reinforcement against displacement during concrete-placement and consolidation operations. Completely conceal support devices to prevent exposure on finished surfaces.
  3. Place reinforcing steel and prestressing strand to maintain at least 3/4-inch minimum concrete cover. Increase cover requirements for reinforcing steel to 1-1/2 inches when units are exposed to corrosive environment or severe exposure conditions. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position while placing concrete. Direct wire tie ends away from finished, exposed concrete surfaces.
  4. Install welded wire fabric in lengths as long as practicable. Lap adjoining pieces at least one full mesh spacing and wire tie laps, where required by design. Offset laps of adjoining widths to prevent continuous laps in either direction.
- F. Reinforce precast structural concrete units to resist handling, transportation, and erection stresses and specified in-place loads.
- G. Prestress tendons for precast structural concrete units by either pretensioning or post-tensioning methods. Comply with PCI MNL 116.
1. Delay detensioning or post-tensioning of precast, prestressed structural concrete units until concrete has reached its indicated minimum design release compressive strength as established by test cylinders cured under same conditions as concrete unit.
  2. Detension pretensioned tendons either by gradually releasing tensioning jacks or by heat cutting tendons, using a sequence and pattern to prevent shock or unbalanced loading.
  3. If concrete has been heat cured, detension while concrete is still warm and moist to avoid dimensional changes that may cause cracking or undesirable stresses.
  4. Protect strand ends and anchorages with bituminous, zinc-rich, or epoxy paint to avoid corrosion and possible rust spots.
  5. Protect strand ends and anchorages with a minimum of 1-inch- thick, nonmetallic, nonshrink, grout mortar and sack rub surface. Coat or spray the inside surfaces of pocket with bonding agent before installing grout.
- H. Comply with requirements in PCI MNL 116 and in this Section for measuring, mixing, transporting, and placing concrete. After concrete batching, no additional water may be added.
- I. Place face mixture to a minimum thickness after consolidation of the greater of 1 inch or 1.5 times the maximum aggregate size, but not less than the minimum reinforcing cover specified.
- J. Place concrete in a continuous operation to prevent cold joints or planes of weakness from forming in precast concrete units.
1. Place backup concrete mixture to ensure bond with face-mixture concrete.
- K. Thoroughly consolidate placed concrete by vibration without dislocating or damaging reinforcement and built-in items, and minimize pour lines, honeycombing, or entrapped air voids on surfaces. Use equipment and procedures complying with PCI MNL 116.
1. Place self-consolidating concrete without vibration according to PCI TR-6, "Interim Guidelines for the Use of Self-Consolidating Concrete in Precast/Prestressed Concrete

Institute Member Plants." Ensure adequate bond between face and backup concrete, if used.

- L. Comply with PCI MNL 116 procedures for hot- and cold-weather concrete placement.
- M. Identify pickup points of precast structural concrete units and orientation in structure with permanent markings, complying with markings indicated on Shop Drawings. Imprint or permanently mark casting date on each precast structural concrete unit on a surface that does not show in finished structure.
- N. Cure concrete, according to requirements in PCI MNL 116, by moisture retention without heat or by accelerated heat curing using live steam or radiant heat and moisture. Cure units until compressive strength is high enough to ensure that stripping does not have an effect on performance or appearance of final product.
- O. Discard and replace precast structural concrete units that do not comply with requirements, including structural, manufacturing tolerance, and appearance, unless repairs meet requirements in PCI MNL 116 and meet Architect's approval.

#### 2.15 CASTING INSULATED WALL PANELS

- A. Cast, screed, and consolidate wythe supported by mold.
- B. Place insulation boards abutting edges and ends of adjacent boards. Insert wythe connectors through insulation, and consolidate concrete around connectors according to connector manufacturer's written instructions.
- C. Ensure bottom wythe and insulation layer are not disturbed after bottom wythe reaches initial set.
- D. Cast, screed, and consolidate top wythe to meet required finish.
- E. Maintain temperature below 150 deg F in bottom concrete wythe.

#### 2.16 FABRICATION TOLERANCES

- A. Fabricate precast structural concrete units to shapes, lines, and dimensions indicated so each finished unit complies with PCI MNL 116 product dimension tolerances as well as position tolerances for cast-in items.
  - 1. Alignment of Mortar Joints:
    - a. Jog in Alignment: 1/8 inch.
    - b. Alignment with Panel Centerline: Plus or minus 1/8 inch.
  - 2. Variation in Width of Exposed Mortar Joints: Plus or minus 1/8 inch.

## 2.17 COMMERCIAL FINISHES

- A. Commercial Grade: Remove fins and protrusions larger than 1/8 inch (3 mm) and fill holes larger than 1/2 inch (13 mm). Rub or grind ragged edges. Faces must have true, well-defined surfaces. Air holes, water marks, and color variations are permitted. Limit form joint offsets to 3/16 inch.
- B. Standard Grade: Normal plant-run finish produced in molds that impart a smooth finish to concrete. Surface holes smaller than 1/2 inch caused by air bubbles, normal color variations, form joint marks, and minor chips and spalls are permitted. Fill air holes greater than 1/4 inch in width that occur more than once per 2 sq. in. Major or unsightly imperfections, honeycombs, or structural defects are not permitted. Limit joint offsets to 1/8 inch.
- C. Grade B Finish: Fill air pockets and holes larger than 1/4 inch in diameter with sand-cement paste matching color of adjacent surfaces. Fill air holes greater than 1/8 inch in width that occur more than once per 2 sq. in. Grind smooth form offsets or fins larger than 1/8 inch. Repair surface blemishes due to holes or dents in molds. Discoloration at form joints is permitted.
- D. Grade A Finish: Repair surface blemishes and fill air holes with the exception of air holes 1/16 inch in width or smaller, and form marks where the surface deviation is less than 1/16 inch. Float apply a neat cement-paste coating to exposed surfaces. Rub dried paste coat with burlap to remove loose particles. Discoloration at form joints is permitted. Grind smooth all form joints.
- E. Screed or float finish unformed surfaces. Strike off and consolidate concrete with vibrating screeds to a uniform finish. Hand screed at projections. Normal color variations, minor indentations, minor chips, and spalls are permitted. Major imperfections, honeycombing, or defects are not permitted.
- F. Smooth, steel trowel finish unformed surfaces. Consolidate concrete, bring to proper level with straightedge, float, and trowel to a smooth, uniform finish.
- G. Apply roughened surface finish according to ACI 318 to precast concrete units that receive concrete topping after installation.

## 2.18 COMMERCIAL ARCHITECTURAL FINISHES

- A. Manufacture member faces free of joint marks, grain, and other obvious defects with corners, including false joints, uniform and straight. Finish exposed-face surfaces of precast concrete units to match approved mockups and as follows:
  - 1. PCI's "Architectural Precast Concrete - Color and Texture Selection Guide," of plate numbers indicated.
  - 2. As-Cast-Surface Finish: Provide surfaces to match approved sample or mockup for acceptable surface, air voids, sand streaks, and honeycomb.
  - 3. Textured-Surface Finish: Impart by form liners or inserts.
  - 4. Bushhammer Finish: Use power or hand tools to remove matrix and fracture coarse aggregates.

5. Exposed-Aggregate Finish: Use chemical-retarding agents applied to concrete molds and washing and brushing procedures to expose aggregate and surrounding matrix surfaces after form removal.
6. Abrasive-Blast Finish: Use abrasive grit, equipment, application techniques, and cleaning procedures to expose aggregate and surrounding matrix surfaces.
7. Acid-Etched Finish: Use acid and hot-water solution, equipment, application techniques, and cleaning procedures to expose aggregate and surrounding matrix surfaces. Protect hardware, connections, and insulation from acid attack.
8. Honed Finish: Use continuous mechanical abrasion with fine grit, followed by filling and rubbing procedures.
9. Polished Finish: Use continuous mechanical abrasion with fine grit, followed by filling and rubbing procedures.

## 2.19 SOURCE QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to evaluate precast structural concrete fabricator's quality-control and testing methods.
  1. Allow testing agency access to material storage areas, concrete production equipment, concrete placement, and curing facilities. Cooperate with testing agency and provide samples of materials and concrete mixtures as may be requested for additional testing and evaluation.
- B. Testing: Test and inspect precast structural concrete according to PCI MNL 116 requirements and ASTM C1610, ASTM C1611, ASTM C1621, and ASTM C1712.
  1. Test and inspect self-consolidating concrete according to PCI TR-6.
- C. Strength of precast structural concrete units is considered deficient if units fail to comply with ACI 318 requirements for concrete strength.
- D. If there is evidence that strength of precast concrete units may be deficient or may not comply with ACI 318 requirements, employ a qualified testing agency to obtain, prepare, and test cores drilled from hardened concrete to determine compressive strength according to ASTM C42.
  1. A minimum of three representative cores shall be taken from units of suspect strength, from locations directed by Architect.
  2. Test cores in an air-dry condition or, if units are wet under service conditions, test cores after immersion in water in a wet condition.
  3. Strength of concrete for each series of three cores is considered satisfactory if average compressive strength is equal to at least 85 percent of 28-day design compressive strength and no single core is less than 75 percent of 28-day design compressive strength.
  4. Report test results in writing on same day that tests are performed, with copies to Architect, Contractor, and precast concrete fabricator. Test reports include the following:
    - a. Project identification name and number.
    - b. Date when tests were performed.
    - c. Name of precast concrete fabricator.
    - d. Name of concrete testing agency.

- e. Identification letter, name, and type of precast concrete unit(s) represented by core tests; design compressive strength; type of break; compressive strength at breaks, corrected for length-diameter ratio; and direction of applied load to core in relation to horizontal plane of concrete as placed.
- E. Patching: If core test results are satisfactory and precast structural concrete units comply with requirements, clean and dampen core holes and solidly fill with same precast concrete mixture that has no coarse aggregate, and finish to match adjacent precast concrete surfaces.
- F. Defective Units: Discard and replace precast structural concrete units that do not comply with requirements, including strength, manufacturing tolerances, and color and texture range. Chipped, spalled, or cracked units may be repaired, subject to Architect's approval. Architect reserves the right to reject precast units that do not match approved samples, sample panels, and mockups. Replace unacceptable units with precast concrete units that comply with requirements.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine supporting structural frame or foundation and conditions for compliance with requirements for installation tolerances, bearing surface tolerances, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
- C. Do not install precast concrete units until supporting, cast-in-place concrete has attained minimum allowable design compressive strength and until supporting steel or other structure is structurally ready to receive loads from precast concrete units.

#### 3.2 INSTALLATION

- A. Install clips, hangers, bearing pads, and other accessories required for connecting precast structural concrete units to supporting members and backup materials.
- B. Erect precast structural concrete level, plumb, and square within specified allowable tolerances. Provide temporary structural framing, shoring, and bracing as required to maintain position, stability, and alignment of units until permanent connections are complete.
  - 1. Install temporary steel or plastic spacing shims or bearing pads as precast structural concrete units are being erected. Tack weld steel shims to each other to prevent shims from separating.
  - 2. Maintain horizontal and vertical joint alignment and uniform joint width as erection progresses.
  - 3. Remove projecting lifting devices and use plastic patch caps or sand-cement grout to fill voids within recessed lifting devices flush with surface of adjacent precast surfaces when recess is exposed.

4. For hollow-core slab voids used as electrical raceways or mechanical ducts, align voids between units and tape butt joint at end of slabs.
- C. Connect precast structural concrete units in position by bolting, welding, grouting, or as otherwise indicated on Shop Drawings. Remove temporary shims, wedges, and spacers as soon as practical after connecting and grouting are completed.
1. Do not permit connections to disrupt continuity of roof flashing.
- D. Field cutting of precast units is not permitted without approval of Architect.
- E. Fasteners: Do not use drilled or powder-actuated fasteners for attaching accessory items to precast, prestressed concrete units.
- F. Welding: Comply with applicable requirements in AWS D1.1 and AWS D1.4 for welding, welding electrodes, appearance, quality of welds, and methods used in correcting welding work.
1. Protect precast structural concrete units and bearing pads from damage by field welding or cutting operations, and provide noncombustible shields as required.
  2. Clean weld-affected steel surfaces with chipping hammer followed by brushing, and apply a minimum 4.0-miln thick coat of galvanized repair paint to galvanized surfaces according to ASTM A780.
  3. Clean weld-affected steel surfaces with chipping hammer followed by brushing, and reprime damaged painted surfaces.
  4. Visually inspect welds and remove, reweld, or repair incomplete and defective welds.
- G. At bolted connections, use lock washers, tack welding, or other approved means to prevent loosening of nuts after final adjustment.
1. Where slotted connections are used, verify bolt position and tightness. For sliding connections, properly secure bolt but allow bolt to move within connection slot.
  2. For slip-critical connections, use one of the following methods to assure proper bolt pretension:
    - a. Turn-of-Nut: According to RCSC's "Specification for Structural Joints Using ASTM A325 or A 490 Bolts."
    - b. Calibrated Wrench: According to RCSC's "Specification for Structural Joints Using ASTM A325 or A 490 Bolts."
    - c. Twist-off Tension Control Bolt: ASTM F3125, Grade 1852.
    - d. Direct-Tension Control Bolt: ASTM F3125, Grade 1852.
  3. For slip-critical connections, use method and inspection procedure approved by Architect and coordinated with inspection agency.
- H. Grouting or Dry-Packing Connections and Joints: Grout connections and joints and open spaces at keyways, connections, and joints where required or indicated on Shop Drawings. Retain flowable grout in place until hard enough to support itself. Alternatively, pack spaces with stiff dry-pack grout material, tamping until voids are completely filled.
1. Place grout and finish smooth, level, and plumb with adjacent concrete surfaces.

2. Fill joints completely without seepage to other surfaces.
3. Trowel top of grout joints on roofs smooth and uniform. Finish transitions between different surface levels not steeper than 1 to 12.
4. Place grout end cap or dam in voids at ends of hollow-core slabs.
5. Promptly remove grout material from exposed surfaces before it affects finishes or hardens.
6. Keep grouted joints damp for not less than 24 hours after initial set.

### 3.3 ERECTION TOLERANCES

- A. Erect precast structural concrete units level, plumb, square, and in alignment without exceeding the noncumulative erection tolerances of PCI MNL 135.
- B. Minimize variations between adjacent slab members by jacking, loading, or other method recommended by fabricator and approved by Architect.

### 3.4 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:
  1. Erection of precast structural concrete members.
- B. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- C. Visually inspect field welds and test according to ASTM E165 or to ASTM E709 and ASTM E1444. High-strength bolted connections are subject to inspections.
- D. Testing agency will report test results promptly and in writing to Contractor and Architect.
- E. Repair or remove and replace work where tests and inspections indicate that it does not comply with specified requirements.
- F. Additional testing and inspecting, at Contractor's expense, shall be performed to determine compliance of replaced or additional work with specified requirements.
- G. Prepare test and inspection reports.

### 3.5 REPAIRS

- A. Repair precast structural concrete units if permitted by Architect.
  1. Repairs may be permitted if structural adequacy, serviceability, durability, and appearance of units have not been impaired.
- B. Mix patching materials and repair units so cured patches blend with color, texture, and uniformity of adjacent exposed surfaces and show no apparent line of demarcation between

original and repaired work, when viewed in typical daylight illumination from a distance of 20 feet.

- C. Prepare and repair damaged galvanized coatings with galvanizing repair paint according to ASTM A780.
- D. Wire brush, clean, and paint damaged prime-painted components with same type of shop primer.
- E. Remove and replace damaged precast structural concrete units that cannot be repaired or when repairs do not comply with requirements as determined by Architect.

### 3.6 CLEANING

- A. Clean mortar, plaster, fireproofing, weld slag, and other deleterious material from concrete surfaces and adjacent materials immediately.
- B. Clean exposed surfaces of precast concrete units after erection and completion of joint treatment to remove weld marks, other markings, dirt, and stains.
  - 1. Perform cleaning procedures, if necessary, according to precast concrete fabricator's written recommendations. Protect other work from staining or damage due to cleaning operations.
  - 2. Do not use cleaning materials or processes that could change the appearance of exposed concrete finishes or damage adjacent materials.

END OF SECTION 034100

## SECTION 042200 - CONCRETE UNIT MASONRY

### 1.1 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For the following:
  - 1. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.
  - 2. Reinforcing Steel: Detail bending, lap lengths, and placement of unit masonry reinforcing bars. Comply with ACI 315.
  - 3. Fabricated Flashing: Detail corner units, end-dam units, and other special applications.
- C. Samples:
  - 1. Decorative CMUs, in the form of small-scale units.
  - 2. Breeze Blocks.

### 1.2 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing agency.
- B. Material Certificates: For each type and size of the following:
  - 1. Masonry units.
    - a. Include material test reports substantiating compliance with requirements.
    - b. For masonry units used in structural masonry, include data and calculations establishing average net-area compressive strength of units.
  - 2. Cementitious materials. Include name of manufacturer, brand name, and type.
  - 3. Mortar admixtures.
  - 4. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.
  - 5. Grout mixes. Include description of type and proportions of ingredients.
  - 6. Reinforcing bars.
  - 7. Joint reinforcement.
  - 8. Anchors, ties, and metal accessories.
- C. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.
  - 1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C109/C109M for compressive strength, ASTM C1506 for water retention, and ASTM C91/C91M for air content.
  - 2. Include test reports, according to ASTM C1019, for grout mixes required to comply with compressive strength requirement.
- D. Statement of Compressive Strength of Masonry: For each combination of masonry unit type and mortar type, provide statement of average net-area compressive strength of masonry units,

mortar type, and resulting net-area compressive strength of masonry determined according to TMS 602/ACI 530.1/ASCE 6.

### 1.3 DELIVERY, STORAGE, AND HANDLING

- A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.
- B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
- D. Deliver preblended, dry mortar mix in moisture-resistant containers. Store preblended, dry mortar mix in delivery containers on elevated platforms in a dry location or in covered weatherproof dispensing silos.
- E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

### 1.4 FIELD CONDITIONS

- A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
  - 1. Extend cover a minimum of 24 inches (600 mm) down both sides of walls, and hold cover securely in place.
- B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least three days after building masonry walls or columns.
- C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.
  - 1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
  - 2. Protect sills, ledges, and projections from mortar droppings.
  - 3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
  - 4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.

- D. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

## 1.5 MATERIALS

- A. Concrete Masonry Units (CMUs): ASTM C90
  - 1. Units made with integral water repellent for exposed units.
  - 2. CMUs: Normal weight.
  - 3. Size (Width): Nominal 12-inch x 8-inch x 16-inch; Manufactured to dimensions 3/8 inch (10 mm) less-than-nominal dimensions.
  - 4. Provide bullnose units for outside corners where exposed, unless otherwise indicated
- B. Decorative CMUs: ASTM C90
  - 1. Normal-weight units with ground-face or split-face finish where indicated.
  - 2. 4x8x16 integrally colored veneer where indicated.
- C. Pre-faced (Polished) CMUs: Normal weight concrete units complying with ASTM C90, with manufacturer's standard smooth resinous facing complying with ASTM C744.
- D. Breeze (Screen) Blocks: ASTM C90; Lightweight concrete; lightly honed finish.
  - 1. Basis-of-Design: Columbia Machine, Inc.; Screen Wall No. 377
  - 2. Design breeze block reinforcement in accordance with TEK 12.
- E. Colors: Provide integral color where indicated in Exterior Finish Schedules on Drawings.
- F. Concrete and Masonry Lintels: Precast units matching CMUs, precast or formed-in-place concrete, or prefabricated or built-in-place CMU lintels.
- G. Reinforcing Steel: Uncoated-steel reinforcing bars. ASTM A615/A615M, Grade 60.
- H. Masonry-Joint Reinforcement:
  - 1. Interior Walls: Hot-dip galvanized, carbon steel.
  - 2. Exterior Walls: Stainless steel.
- I. Ties and Anchors: Stainless steel.
  - 1. Adjustable anchors for connecting to structural steel framing.
  - 2. Adjustable anchors for connecting to concrete.
  - 3. Partition top anchors.
  - 4. Rigid anchors.
- J. Embedded Flashing:
  - 1. All Flashing: Stainless steel, unless noted otherwise.
  - 2. Partially Exposed Flashing: Stainless steel.
  - 3. Concealed (Flexible) Flashing: Rubberized asphalt, elastomeric thermoplastic, or EPDM.
    - a. Used with stainless steel drip edge.

4. Single-Wythe CMU Flashing System: Polyethylene flashing pans and interlocking web covers.
- K. Reinforcing bar positioners: Units are formed from 0.148-inch (3.77-mm) steel wire, hot-dip galvanized after fabrication. Provide units designed for number of bars indicated.
- L. Mortar:
  1. Portland cement-lime mortar unless otherwise indicated.

## 1.6 TOLERANCES

- A. Dimensions and Locations of Elements:
  1. For dimensions in cross section or elevation, do not vary by more than plus 1/2 inch (13 mm) or minus 1/4 inch (6.4 mm).
  2. For location of elements in plan, do not vary from that indicated by more than plus or minus 1/2 inch (13 mm).
  3. For location of elements in elevation, do not vary from that indicated by more than plus or minus 1/4 inch (6.4 mm) in a story height or 1/2 inch (13 mm) total.
- B. Lines and Levels:
  1. For bed joints and top surfaces of bearing walls, do not vary from level by more than 1/4 inch in 10 ft. (6.4 mm in 3 m), or 1/2-inch (13-mm) maximum.
  2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 ft. (3.2 mm in 3 m), 1/4 inch in 20 ft. (6.4 mm in 6 m), or 1/2-inch (13-mm) maximum.
  3. For vertical lines and surfaces, do not vary from plumb by more than 1/4 inch in 10 ft. (6.4 mm in 3 m), 3/8 inch in 20 ft. (10 mm in 6 m), or 1/2-inch (13-mm) maximum.
  4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 ft. (3.2 mm in 3 m), 1/4 inch in 20 ft. (6.4 mm in 6 m), or 1/2-inch (13-mm) maximum.
  5. For lines and surfaces, do not vary from straight by more than 1/4 inch in 10 ft. (6.4 mm in 3 m), 3/8 inch in 20 ft. (10 mm in 6 m), or 1/2-inch (13-mm) maximum.
  6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 ft. (6.4 mm in 3 m), or 1/2-inch (13-mm) maximum.
  7. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch (1.6 mm) except due to warpage of masonry units within tolerances specified for warpage of units.
- C. Joints:
  1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3.2 mm), with a maximum thickness limited to 1/2 inch (13 mm).
  2. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch (3.2 mm).
  3. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch (10 mm) or minus 1/4 inch (6.4 mm).

4. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3.2 mm).
5. For exposed bed joints and head joints of stacked bond, do not vary from a straight line by more than 1/16 inch (1.6 mm) from one masonry unit to the next.

#### 1.7 FIELD QUALITY CONTROL

- A. Testing Agency: A qualified testing agency to perform tests and inspections. Allow inspectors access to scaffolding and work areas as needed to perform tests and inspections.
- B. Veneer Inspections: Special inspections in accordance with Level 2 in TMS 402.
  1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.
- C. Structural Masonry Inspections: Special inspections according to Level B in TMS 402/ACI 530/ASCE 5.
- D. Testing Prior to Construction: One set of tests.
- E. Clay Masonry Unit Test: For each type of unit provided, in accordance with ASTM C67/C67M for compressive strength.
- F. Concrete Masonry Unit Test: For each type of unit provided, in accordance with ASTM C140/C140M for compressive strength.
- G. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, in accordance with ASTM C780.
- H. Mortar Test (Property Specification): For each mix provided, in accordance with ASTM C780. Test mortar for mortar air content and compressive strength.
- I. Testing: One set of tests for each 5000 sq. ft. (464 sq. m) of wall area.

END OF SECTION 042200

## SECTION 051213 - ARCHITECTURALLY EXPOSED STRUCTURAL STEEL FRAMING

### 1.1 SUMMARY

- A. Architecturally exposed structural-steel (AESS) framing.
  - 1. Requirements in Section 051200 "Structural Steel Framing" also apply to AESS.

### 1.2 DEFINITIONS

- A. AESS: ANSI/AISC 303, Section 10, Category AESS 3.

### 1.3 ACTION SUBMITTALS

- A. Product Data:
  - 1. Tension-control, high-strength, bolt-nut-washer assemblies.
  - 2. Corrosion-resisting (weathering steel), tension-control, high-strength, bolt-nut-washer assemblies.
  - 3. Filler.
  - 4. Primer.
- B. Shop Drawings: Show fabrication of AESS components.
  - 1. Identify AESS category for each steel member and connection, including transitions between AESS categories and between AESS and non-AESS.
  - 2. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
  - 3. Include embedment Drawings.
  - 4. Indicate orientation of mill marks and HSS seams.
  - 5. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain. Indicate grinding, finish, and profile of welds.
  - 6. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical, high-strength bolted connections. Indicate orientation and location of bolt heads.
  - 7. Indicate exposed surfaces and edges and surface preparation being used.
  - 8. Indicate special tolerances and erection requirements.
  - 9. Indicate weep holes for HSS and vent holes for galvanized HSS.
  - 10. Indicate surface preparation, primer, and coating requirements, including systems specified in other Sections.
- C. Samples: Submit Samples to set quality standards for AESS.
  - 1. Two steel plates, 3/8 by 8 by 4 inches (9.5 by 200 by 100 mm), with long edges joined by a groove weld and with weld ground smooth.
  - 2. Steel plate, 3/8 by 8 by 8 inches (9.5 by 200 by 200 mm), with one end of a short length of rectangular steel tube, 4 by 6 by 3/8 inches (100 by 150 by 9.5 mm), welded to plate with a continuous fillet weld and with weld ground smooth and blended.

#### 1.4 QUALITY ASSURANCE

- A. Fabricator Qualifications: AISC-Certified Plant, Category STD or IAS accredited, AC 172.
- B. Installer Qualifications: AISC-Certified Erector, Category CSE.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Use special care in handling AESS to prevent twisting, warping, nicking, and other damage during fabrication, delivery, and erection. Store materials to permit easy access for inspection and identification. Keep AESS members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect AESS members and packaged materials from corrosion and deterioration.
  - 1. Do not store AESS materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

#### 1.6 FIELD CONDITIONS

- A. Field Measurements: Where AESS is indicated to fit against other construction, verify actual dimensions by field measurements before fabrication.

#### 1.7 COORDINATION

- A. Coordinate surface preparation requirements for shop-primed items.
- B. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

#### 1.8 MATERIALS

- A. Steel Primer: Zinc-rich primer equal to Tnemec 94-H20 Hydro-Zinc @ 2.5 to 3.5 mils DFT or Sherwin Williams Zinc Clad 4100 @ 3.0-5.0 mils DFT.
  - 1. Refer to Section 099100 "Painting" for topcoats.

#### 1.9 FABRICATION

- A. Special care used in handling and fabricating AESS according to ANSI/AISC 303.
  - 1. Category AESS 3:
    - a. Comply with overall profile dimensions of AWS D1.1/D1.1M for welded built-up members. Keep appearance and quality of welds consistent. Maintain true alignment of members without warp exceeding specified tolerances.

- b. Clean nongalvanized surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to SSPC-SP 6 (WAB)/NACE WAB-3.
- c. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils (0.038 mm). Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.
  - 1) Stripe paint corners, crevices, bolts, welds, and eased edges.
  - 2) Apply two coats of shop paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.
- d. Grind sheared, punched, and flame-cut edges to remove burrs and provide smooth surfaces and eased edges.
- e. Make intermittent welds appear continuous, using filler or additional welding.
- f. Seal weld open ends of hollow structural sections with 3/8-inch (9.5-mm) closure plates.
- g. Limit butt and plug weld projections to 1/16 inch (1.6 mm).
- h. Install bolt heads on the same side of each connection and maintain orientation consistently from one connection to another.
- i. Remove weld spatter, slivers, and similar surface discontinuities.
- j. Remove blemishes and surface irregularities resulting from temporary braces or fixtures by filling or grinding, before cleaning, treating, and shop priming.
- k. Grind tack welds smooth unless incorporated into final welds.
- l. Remove backing and runoff tabs, and grind welds smooth.
- m. Limit as-fabricated straightness tolerance to one-half that permitted for structural-steel materials in ANSI/AISC 303.
- n. Limit as-fabricated curved structural steel tolerance to that permitted for structural-steel materials in ANSI/AISC 303.
- o. Limit as-fabricated straightness tolerance of welded built-up members to one-half that permitted by AWS D1.1/D1.1M.
- p. Conceal fabrication and erection markings from view in the completed structure.
- q. Make welds uniform and smooth.
- r. Cut out mill marks from mill material or hide these markings from view in the completed structure. Where neither method is possible, remove mill marks by grinding and filling surfaces as approved by Architect.
- s. Grind butt and plug welds smooth or fill, removing weld splatter exposed to view.
- t. Orient HSS seams as indicated or away from view.
- u. Align and match abutting member cross sections.
- v. At visible open joints of copes, miters, and cuts, maintain uniform clear gaps of 1/8 inch (3.2 mm). At closed joints, maintain uniform contact within 1/16 inch (1.6 mm).
- w. Fabricate with exposed surfaces smooth, square, and of surface quality approved by Architect.

#### 1.10 ERECTION

- A. AESS erected according to AISC 303 and AISC 360.
  - 1. Erection of Category AESS 3:

- a. Erect AESS to the standard frame tolerances specified in ANSI/AISC 303 for non-AESS.
- b. Comply with AWS D1.1/D1.1M. Keep appearance and quality of welds consistent. Maintain true alignment of members without warp exceeding specified tolerances.
- c. Remove weld spatter, slivers, and similar surface discontinuities.
- d. Grind off butt and plug weld projections larger than 1/16 inch (1.6 mm).
- e. Continuous welds shall be of uniform size and profile.
- f. Ream holes that must be enlarged. Use of drift pins or burning is not permitted. Replace misaligned connection plates where holes cannot be aligned with acceptable appearance.
- g. Splice members only where indicated on Drawings.
- h. No torch cutting or field fabrication is permitted.
- i. Weld profiles, quality, and finish shall be as approved by Architect.
- j. Make joint welds, including tack welds, appear continuous by filling intermittent welds.

END OF SECTION 051213

SECTION 053100 - STEEL DECKING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Roof deck.
2. Acoustical roof deck.
3. Composite floor deck.

1.2 ACTION SUBMITTALS

A. Product Data:

1. Roof deck.
2. Acoustical roof deck.
3. Composite floor deck.
4. .

B. Shop Drawings:

1. Include layout and types of deck panels, anchorage details, reinforcing channels, pans, cut deck openings, special jointing, accessories, and attachments to other construction.

1.3 INFORMATIONAL SUBMITTALS

A. Certificates:

1. Welding certificates.
2. Product Certificates: For each type of steel deck.

B. Test and Evaluation Reports:

1. Product Test Reports: For tests performed by a qualified testing agency, indicating that each of the following complies with requirements:
  - a. Power-actuated mechanical fasteners.
  - b. Acoustical roof deck.
2. Research Reports: For steel deck, from ICC-ES showing compliance with the building code.

C. Field Quality-Control Submittals:

1. Field quality-control reports.

- D. Qualification Statements: For welding personnel and testing agency.

#### 1.4 QUALITY ASSURANCE

##### A. Qualifications:

- 1. Welding Qualifications: Qualify procedures and personnel in accordance with SDI QA/QC and the following welding codes:
  - a. AWS D1.1.
  - b. AWS D1.3.

- B. FM Approvals' RoofNav Listing: Provide steel roof deck evaluated by FM Approvals and listed in its "RoofNav" for Class 1 fire rating and Class 1-60, Class 1-75 or Class 1-90 windstorm ratings. Identify materials with FM Approvals Certification markings.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.
- B. Store products in accordance with SDI MOC3. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.
  - 1. Protect and ventilate acoustical cellular roof deck with factory-installed insulation to maintain insulation free of moisture.

### PART 2 - PRODUCTS

#### 2.1 PERFORMANCE REQUIREMENTS

- A. AISI Specifications: Comply with calculated structural characteristics of steel deck in accordance with AISI S100.
- B. Fire-Resistance Ratings: Comply with ASTM E119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
  - 1. Indicate design designations from UL's "Fire Resistance Directory" or from listings of another qualified testing agency.

#### 2.2 ROOF DECK

- A. Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with SDI RD and with the following:

1. Prime-Painted Steel Sheet: ASTM A1008, Structural Steel (SS), Grade 40 minimum, shop primed with manufacturer's standard baked-on, rust-inhibitive primer.
  - a. Color: Manufacturer's standard.
2. Galvanized-Steel Sheet: ASTM A653, Structural Steel (SS), Grade 40 zinc coating.
3. Galvanized- and Shop-Primed Steel Sheet: ASTM A653, Structural Steel (SS), Grade 40 zinc coating; cleaned, pretreated, and primed with manufacturer's standard baked-on, rust-inhibitive primer.
  - a. Color: Manufacturer's standard.
4. Aluminum-Zinc-Alloy-Coated Steel Sheet: ASTM A792, Structural Steel (SS), Grade 33 minimum, AZ50 aluminum-zinc-alloy coating.
5. Deck Profile: As indicated.
6. Cellular Deck Profile: As indicated.
7. Profile Depth: As indicated.
8. Design Uncoated-Steel Thickness: As indicated.
9. Design Uncoated-Steel Thicknesses; Deck Unit/Bottom Plate: As indicated.
10. Span Condition: As indicated.
11. Side Laps: Overlapped or interlocking seam at Contractor's option.

## 2.3 ACOUSTICAL ROOF DECK

- A. Acoustical Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with SDI RD and with the following:
1. Prime-Painted Steel Sheet: ASTM A1008, Structural Steel (SS), Grade 40 minimum, shop primed with manufacturer's standard baked-on, rust-inhibitive primer.
    - a. Color: Manufacturer's standard.
  2. Galvanized-Steel Sheet: ASTM A653, Structural Steel (SS), Grade 40 zinc coating.
  3. Galvanized- and Shop-Primed Steel Sheet: ASTM A653, Structural Steel (SS), Grade 40 zinc coating; cleaned, pretreated, and primed with manufacturer's standard baked-on, rust-inhibitive primer.
    - a. Color: Manufacturer's standard.
  4. Aluminum-Zinc-Alloy-Coated Steel Sheet: ASTM A792, Structural Steel (SS), Grade 33 minimum, AZ50 aluminum-zinc-alloy coating.
  5. Deck Profile: As indicated.
  6. Cellular Deck Profile: As indicated.
  7. Profile Depth: As indicated.
  8. Design Uncoated-Steel Thickness: As indicated.
  9. Design Uncoated-Steel Thicknesses; Deck Unit/Bottom Plate: As indicated.
  10. Span Condition: As indicated.
  11. Side Laps: Overlapped or interlocking seam at Contractor's option.
  12. Acoustical Perforations: Deck units with manufacturer's standard perforated vertical webs.

13. Sound-Absorbing Insulation: Manufacturer's standard premolded roll or strip of glass or mineral fiber.
  - a. Factory install sound-absorbing insulation into cells of cellular deck.
14. Acoustical Performance: tested in accordance with ASTM C423.

## 2.4 COMPOSITE FLOOR DECK

- A. Composite Floor Deck: Fabricate panels, with integrally embossed or raised pattern ribs and interlocking side laps, to comply with SDI C, with the minimum section properties indicated, and with the following:
  1. Prime-Painted Steel Sheet: ASTM A1008, Structural Steel (SS), Grade 40 minimum, shop primed with manufacturer's standard baked-on, rust-inhibitive primer.
    - a. Color: Manufacturer's standard.
  2. Galvanized-Steel Sheet: ASTM A653, Structural Steel (SS), Grade 40 zinc coating.
  3. Galvanized- and Shop-Primed Steel Sheet: ASTM A653, Structural Steel (SS), Grade 40 zinc coating; cleaned, pretreated, and primed with manufacturer's standard baked-on, rust-inhibitive primer.
    - a. Color: Manufacturer's standard.
  4. Deck Profile: As indicated.
  5. Design Uncoated-Steel Thickness: As indicated.
  6. Design Uncoated-Steel Thicknesses; Deck Unit/Bottom Plate: As indicated.

## 2.5 ACCESSORIES

- A. Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.
- B. Mechanical Fasteners: Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws.
- C. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 10 minimum diameter.
- D. Flexible Closure Strips: Vulcanized, closed-cell, synthetic rubber.
- E. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 40,000 psi, not less than 0.0359-inch design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.
- F. Pour Stops and Girder Fillers: Steel sheet, minimum yield strength of 40,000 psi, of same material and finish as deck, and of thickness and profile indicated.

- G. Column Closures, End Closures, Z-Closures, and Cover Plates: Steel sheet, of same material, finish, and thickness as deck unless otherwise indicated.
- H. Piercing Hanger Tabs: Piercing steel sheet hanger attachment devices for use with floor deck.
- I. Weld Washers: Uncoated steel sheet, shaped to fit deck rib, 0.0747 inch thick, with factory-punched hole of 3/8-inch minimum diameter.
- J. Shear Stud Connectors: ASTM A108, AISI C-1015 through C-1020, headed-stud type, cold-finished carbon steel; AWS D1.1, Type B.
- K. Flat Sump Plates: Single-piece steel sheet, 0.0747 inch thick, of same material and finish as deck. For drains, cut holes in the field.
- L. Recessed Sump Pans: Single-piece steel sheet, 0.0747 inch thick, of same material and finish as deck, with 3-inch wide flanges and level or sloped recessed pans of 1-1/2-inch minimum depth. For drains, cut holes in the field.
- M. Galvanizing Repair Paint: ASTM A780, SSPC-Paint 20 or MIL-P-21035B, with dry film containing a minimum of 94 percent zinc dust by weight.
- N. Repair Paint: Manufacturer's standard rust-inhibitive primer of same color as primer.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine supporting frame and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 INSTALLATION, GENERAL

- A. Install deck panels and accessories in accordance with SDI C, SDI NC, and SDI RD, as applicable; manufacturer's written instructions; and requirements in this Section.
- B. Install temporary shoring before placing deck panels if required to meet deflection limitations.
- C. Locate deck bundles to prevent overloading of supporting members.
- D. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.
  - 1. Align cellular deck panels over full length of cell runs and align cells at ends of abutting panels.
- E. Place deck panels flat and square and fasten to supporting frame without warp or deflection.

- F. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.
- G. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.
- H. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.
- I. Mechanical fasteners may be used in lieu of welding to fasten deck. Locate mechanical fasteners and install in accordance with deck manufacturer's written instructions.
- J. Shear Stud Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Weld using end welding of headed-stud shear connectors in accordance with AWS D1.1 and manufacturer's written instructions.

### 3.3 INSTALLATION OF ROOF DECK

- A. Fasten roof-deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated or arc seam welds with an equal perimeter that is not less than 1-1/2 inches (38 mm) long, and as follows:
  - 1. Weld Diameter: 3/4 inch, nominal.
  - 2. Weld Spacing: Weld edge and interior ribs of deck units with a minimum of two welds per deck unit at each support. Space welds as indicated.
  - 3. Weld Washers: Install weld washers at each weld location.
- B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals not exceeding the lesser of one-half of the span or 18 inches as follows:
  - 1. Mechanically fasten with self-drilling, No. 10 diameter or larger, carbon-steel screws.
  - 2. Mechanically clinch or button punch.
  - 3. Fasten with a minimum of 1-1/2-inch long welds.
- C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches, with end joints as follows:
  - 1. End Joints: Lapped 2 inches minimum.
- D. Roof Sump Pans and Sump Plates: Install over openings provided in roof deck and weld or mechanically fasten flanges to top of deck. Space welds or mechanical fasteners not more than 12 inches apart with at least one weld or fastener at each corner.
  - 1. Install reinforcing channels or zees in ribs to span between supports and weld or mechanically fasten.
- E. Miscellaneous Roof-Deck Accessories: Install ridge and valley plates, finish strips, end closures, and reinforcing channels in accordance with deck manufacturer's written instructions. Weld or mechanically fasten to substrate to provide a complete deck installation.

1. Weld cover plates at changes in direction of roof-deck panels unless otherwise indicated.
- F. Flexible Closure Strips: Install flexible closure strips over partitions, walls, and where indicated. Install with adhesive in accordance with manufacturer's written instructions to ensure complete closure.
- G. Sound-Absorbing Insulation: Installation into topside ribs of deck as specified

### 3.4 INSTALLATION OF FLOOR DECK

- A. Fasten floor-deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated and as follows:
1. Weld Diameter: 5/8 inch nominal.
  2. Weld Spacing:
    - a. Weld edge ribs of panels at each support. Space additional welds an average of 16 inches apart, but not more than 18 inches apart.
    - b. Space and locate welds as indicated.
  3. Weld Washers: Install weld washers at each weld location.
- B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals not exceeding the lesser of one-half of the span or 36 inches, and as follows:
1. Mechanically fasten with self-drilling, No. 10 diameter or larger, carbon-steel screws.
  2. Mechanically clinch or button punch.
  3. Fasten with a minimum of 1-1/2-inch long welds.
- C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches, with end joints as follows:
1. End Joints: Lapped.
- D. Pour Stops and Girder Fillers: Weld steel sheet pour stops and girder fillers to supporting structure in accordance with SDI recommendations unless otherwise indicated.
- E. Floor-Deck Closures: Weld steel sheet column closures, cell closures, and Z-closures to deck, in accordance with SDI recommendations, to provide tight-fitting closures at open ends of ribs and sides of deck.
- F. Electrified Cellular Floor Deck: Install cellular floor system with deck assembled from units indicated.
1. Coordinate layout and installation of trench headers, preset inserts, duct fittings, and other components specified in Section 260539 "Underfloor Raceways for Electrical Systems" with installation of electrified cellular metal floor deck.

- G. Install piercing hanger tabs at 14 inches apart in both directions, within 9 inches of walls at ends, and not more than 12 inches from walls at sides unless otherwise indicated.

### 3.5 REPAIR

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint in accordance with ASTM A780 and manufacturer's written instructions.
- B. Repair Painting:
  - 1. Wire brush and clean rust spots, welds, and abraded areas on both surfaces of prime-painted deck immediately after installation, and apply repair paint.
  - 2. Apply repair paint, of same color as adjacent shop-primed deck, to bottom surfaces of deck exposed to view.
  - 3. Wire brushing, cleaning, and repair painting of bottom deck surfaces are included in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."
  - 4. Wire brushing, cleaning, and repair painting of rust spots, welds, and abraded areas of both deck surfaces are included in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

### 3.6 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Tests and Inspections:
  - 1. Special inspections and qualification of welding special inspectors for cold-formed steel floor and roof deck in accordance with quality-assurance inspection requirements of SDI QA/QC.
    - a. Field welds will be subject to inspection.
  - 2. Steel decking will be considered defective if it does not pass tests and inspections.
  - 3. Shear Stud Connectors: In addition to visual inspection, test and inspect field-welded shear connectors in accordance with requirements in AWS D1.1 for stud welding and as follows:
    - a. Perform bend tests if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
    - b. Conduct tests in accordance with requirements in AWS D1.1 on additional shear connectors if weld fracture occurs on shear connectors that are already tested.
- C. Prepare test and inspection reports.

END OF SECTION 053100

## SECTION 054000 - COLD-FORMED METAL FRAMING

### 1.1 SUMMARY

- A. Section Includes:
  - 1. Exterior non-load-bearing wall framing.
  - 2. Soffit framing.

### 1.2 ACTION SUBMITTALS

- A. Shop Drawings:
  - 1. Include layout, spacings, sizes, thicknesses, and types of cold-formed steel framing; fabrication; and fastening and anchorage details, including mechanical fasteners.
  - 2. Indicate reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.
- B. Delegated-Design Submittal: For cold-formed steel framing.

### 1.3 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing agency.
- B. Welding certificates.
- C. Product Certificates: For each type of code-compliance certification for studs and tracks.
- D. Product Test Reports: For each listed product, for tests performed by a qualified testing agency.
  - 1. Steel sheet.
  - 2. Expansion anchors.
  - 3. Power-actuated anchors.
  - 4. Mechanical fasteners.
  - 5. Vertical deflection clips.
  - 6. Horizontal drift deflection clips
  - 7. Miscellaneous structural clips and accessories.

### 1.4 QUALITY ASSURANCE

- A. Code-compliance certification of studs and tracks by the Certified Steel Stud Association or the Steel Framing Industry Association.
- B. Welding Qualifications: Qualify procedures and personnel according to the following:
  - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
  - 2. AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."

## 1.5 PERFORMANCE REQUIREMENTS

- A. Delegated Design: For cold-formed steel framing.
- B. Structural Performance: Provide cold-formed steel framing capable of withstanding design loads within limits and under conditions indicated.
  - 1. Deflection Limits: Design framing systems to withstand design loads without deflections greater than the following:
    - a. Exterior Load-Bearing and Non-Load-Bearing Framing: Horizontal deflection of  $1/600$  of the wall height.
    - b. Ceiling/Soffit Joist Framing: Vertical deflection of  $1/180$  and  $1/240$  of the span for total load and live load, respectively.
  - 2. Design framing systems to provide for movement of framing members located outside the insulated building envelope without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change of 120 deg F (67 deg C).
  - 3. Design framing system to maintain clearances at openings, to allow for construction tolerances, and to accommodate live load deflection of primary building structure as follows:
    - a. Upward and downward movement of  $L/300$  for floors and  $L/200$  for roofs.
  - 4. Design exterior non-load-bearing wall framing to accommodate horizontal deflection without regard for contribution of sheathing materials.
- C. Cold-Formed Steel Framing Standards: Unless more stringent requirements are indicated, framing shall comply with AISI S100, AISI S200, and the following:
  - 1. Wall Studs: AISI S211.
  - 2. Headers: AISI S212.
  - 3. Lateral Design: AISI S213.

## 1.6 MATERIALS

- A. Steel Sheet: ASTM A1003/A1003M, Structural Grade, with G90 (Z275) or equivalent metallic coating.

## 1.7 NON-LOAD-BEARING WALL FRAMING

- A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:
  - 1. Minimum Base-Metal Thickness: As required by structural performance.
  - 2. Flange Width: 1-3/8 inches (35 mm).
- B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and as follows:
  - 1. Minimum Base-Metal Thickness: Matching steel studs.
  - 2. Flange Width: 1-1/4 inches (32 mm).

- C. Vertical Deflection Clips: Manufacturer's standard clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.
- D. Single Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal and lateral loads and transfer them to the primary structure, and as follows:
  - 1. Minimum Base-Metal Thickness: As required by structural performance.
  - 2. Flange Width: 1 inch (25 mm) plus the design gap for 1-story structures and 1 inch (25 mm) plus twice the design gap for other applications.
- E. Drift Clips: Manufacturer's standard bypass or head clips, capable of isolating wall stud from upward and downward vertical displacement and lateral drift of primary structure.

#### 1.8 CEILING/SOFFIT JOIST FRAMING

- A. Steel Joists: Manufacturer's standard C-shaped steel sections, of web depths indicated, punched with enlarged service holes, with stiffened flanges, and as follows:
  - 1. Minimum Base-Metal Thickness: As required by structural performance.
  - 2. Flange Width: 1-5/8 inches (41 mm).

#### 1.9 FRAMING ACCESSORIES

- A. Fabricate steel-framing accessories from steel sheet, ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of same grade and coating weight used for framing members.
- B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:
  - 1. Supplementary framing.
  - 2. Bracing, bridging, and solid blocking.
  - 3. Web stiffeners.
  - 4. Anchor clips.
  - 5. End clips.
  - 6. Foundation clips.
  - 7. Gusset plates.
  - 8. Stud kickers, knee braces, and girts.
  - 9. Hole reinforcing plates.
  - 10. Backer plates.

#### 1.10 ANCHORS, CLIPS, AND FASTENERS

- A. Steel Shapes and Clips: ASTM A 36/A 36M, zinc coated by hot-dip process according to ASTM A 123/A 123M.

- B. Anchor Bolts: ASTM F 1554, Grade 36, threaded carbon-steel hex-headed bolts, and carbon-steel nuts; and flat, hardened-steel washers; zinc coated by hot-dip process according to ASTM A 153/A 153M, Class C.
- C. Expansion Anchors: Fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 5 times design load, as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.
- D. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 10 times design load, as determined by testing per ASTM E 1190 conducted by a qualified independent testing agency.
- E. Mechanical Fasteners: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping steel drill screws.
  - 1. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.
- F. Welding Electrodes: Comply with AWS standards.

#### 1.11 FABRICATION

- A. Fabricate cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI's specifications and standards, manufacturer's written instructions, and requirements in this Section.
  - 1. Fabricate framing assemblies using jigs or templates.
  - 2. Cut framing members by sawing or shearing; do not torch cut.
  - 3. Fasten cold-formed metal framing members by welding, screw fastening, clinch fastening, or riveting as standard with fabricator. Wire tying of framing members is not permitted.
    - a. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
    - b. Locate mechanical fasteners and install according to Shop Drawings, with screw penetrating joined members by not less than three exposed screw threads.
  - 4. Fasten other materials to cold-formed metal framing by welding, bolting, or screw fastening, according to Shop Drawings.
- B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies to prevent damage or permanent distortion.
- C. Fabrication Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet (1:960) and as follows:
  - 1. Spacing: Space individual framing members no more than plus or minus 1/8 inch (3 mm) from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
  - 2. Squareness: Fabricate each cold-formed metal framing assembly to a maximum out-of-square tolerance of 1/8 inch (3 mm).

#### 1.12 NON-LOAD-BEARING WALL INSTALLATION

- A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure as indicated.
- B. Fasten both flanges of studs to top as required and bottom track, unless otherwise indicated. Space studs as follows:
  - 1. Stud Spacing: As required by structural performance.
- C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.
- D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.
  - 1. Install single-leg deflection tracks and anchor to building structure.
  - 2. Connect drift clips to cold formed metal framing and anchor to building structure.
- E. Install horizontal bridging in wall studs, spaced in rows indicated on Shop Drawings but not more than 48 inches (1220 mm) apart. Fasten at each stud intersection.
  - 1. Top Bridging for Single Deflection Track: Install row of horizontal bridging within 12 inches (305 mm) of single deflection track. Install a combination of flat, taut, steel sheet straps of width and thickness indicated and stud or stud-track solid blocking of width and thickness matching studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
    - a. Install solid blocking at centers indicated on Shop Drawings.
  - 2. Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.
- F. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, fasteners, and stud girts, to provide a complete and stable wall-framing system.

#### 1.13 JOIST INSTALLATION

- A. Install perimeter joist track sized to match joists. Align and securely anchor or fasten track to supporting structure at corners, ends, and spacings indicated on Shop Drawings.
- B. Install joists bearing on supporting frame, level, straight, and plumb; adjust to final position, brace, and reinforce. Fasten joists to both flanges of joist track.
  - 1. Install joists over supporting frame with a minimum end bearing of 1-1/2 inches (38 mm).
  - 2. Reinforce ends and bearing points of joists with web stiffeners, end clips, joist hangers, steel clip angles, or steel-stud sections as indicated on Shop Drawings.
- C. Space joists not more than 2 inches (51 mm) from abutting walls, and as follows:
  - 1. Joist Spacing: As required by structural performance but not to exceed 16 inches.
- D. Frame openings with built-up joist headers consisting of joist and joist track, nesting joists, or another combination of connected joists if indicated.

- E. Install joist reinforcement at interior supports with single, short length of joist section located directly over interior support, with lapped joists of equal length to joist reinforcement, or as indicated on Shop Drawings.
  - 1. Install web stiffeners to transfer axial loads of walls above.
- F. Install bridging at intervals indicated on Shop Drawings. Fasten bridging at each joist intersection as follows:
  - 1. Bridging: Joist-track solid blocking of width and thickness indicated, secured to joist webs.
- G. Secure joists to load-bearing interior walls to prevent lateral movement of bottom flange.
- H. Install miscellaneous joist framing and connections, including web stiffeners, closure pieces, clip angles, continuous angles, hold-down angles, anchors, and fasteners, to provide a complete and stable joist-framing assembly.

END OF SECTION 054000

## SECTION 101100 - VISUAL DISPLAY UNITS

### 1.1 SUMMARY

- A. Section Includes:
  - 1. Visual display board assemblies.
  - 2. Wall-mounted brochure racks.

### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include construction details, material descriptions, dimensions of individual components and profiles, finishes, and accessories for visual display units.
- B. Shop Drawings: For visual display units.
  - 1. Include plans, elevations, sections, details, and attachment to other work.
- C. Product Schedule: For visual display units. Use same designations indicated on Drawings.

### 1.3 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Test Reports: For each visual display unit, for tests performed by a qualified testing agency.
- C. Sample Warranties: For manufacturer's special warranties.

### 1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For visual display units to include in maintenance manuals.

### 1.5 QUALITY ASSURANCE

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

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver factory-fabricated visual display units completely assembled in one piece. If dimensions exceed maximum manufactured unit size, or if unit size is impracticable to ship in one piece, provide two or more pieces with joints in locations indicated on approved Shop Drawings.

1.7 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install visual display units until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, work above ceilings is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

1.8 WARRANTY

- A. Materials and Workmanship for Porcelain-Enamel Face Sheets: Life of building.

1.9 MARKERBOARD (MB-1)

- A. Basis-of-Design Product: Milestone AV Technologies, Interactive Dry Erase Application (IDEA) Screen
- B. Materials for markerboard panels:
  1. Size: As shown on Drawings
  2. Board: Write/erase projection film.
  3. Frame: Aluminum with anodic finish.
  4. Marker Package: One set of markers, one cleaning cloth and spray cleaner for each unit.
  5. Mounting Bracket: Manufacturer's standard wall bracket(s) for each.
  6. Marker Tray: Aluminum with finish to match frame and screws for field attachment. Width: Full Screen Width.
  7. Frame Finish: Silver

1.10 MARKERBOARD (MB-2)

- A. Basis-of-Design Product: Claridge Series 8
- B. Materials for markerboard panels:
  1. Writing Surface Face Sheet – Manufactured in accordance with Porcelain Enamel Institute's specification.
  2. Shall be enameling grade cold rolled steel manufactured from a minimum of 30 percent post-consumer and post-industrial waste.
  3. Enameling grade steel shall be coated with LCS<sup>3</sup> Porcelain Enamel by Claridge Products and Equipment.

4. Writing Surface Core: 7/16-inch Medium Density Fiberboard (MDF) composed of approximately 90% postindustrial waste.
5. Writing Surface Backing: Moisture Barrier Back

C. Factory Framed Markerboards:

1. Corners: Square.
2. Width: As shown on Drawings.
3. Height: As shown on Drawings.
4. Mounting Method: Direct to wall.
5. Aluminum Frames: Fabricated from not less than 0.062-inch- (1.57-mm-) thick, extruded aluminum; standard size and shape.
  - a. Aluminum Finish: Clear anodic finish.
6. Display Rail: Manufacturer's standard, extruded-aluminum display rail with cork insert, end stops, designed to hold accessories.
  - a. Cork insert: Composed of 1/4-inch thick self-healing, burlap backed cork laminated to a 1/4-inch hardboard backing.
  - b. Size: 2 inches (50 mm) high by.
  - c. Flag Holder: One for each room.

D. Accessories:

1. Marker Tray: Standard continuous, solid, blade-type aluminum tray with ribbed section and injection molded end closures at bottom of each markerboard or chalkboard

1.11 BROCHURE RACK (BR-01)

A. Basis-of-Design Product: Scandinavian Spaces, ARC Magazine Rack

1. Constructed with a frame of solid wood and front/back panels in veneered MDF.
2. Wall-mounted on a metal suspension rail
3. Three panel horizontal configuration: 31.8 inches by 13.5 inches by 3 inches.
4. Finish: Refer to Drawings.

1.12 INSTALLATION

- A. General: Install visual display surfaces in locations and at mounting heights indicated on Drawings, or if not indicated, at heights indicated below. Keep perimeter lines straight, level, and plumb. Provide grounds, clips, backing materials, adhesives, brackets, anchors, trim, and accessories necessary for complete installation.
- B. Visual Display Board Assembly Mounting Heights: Install visual display units at mounting heights indicated on Drawings.

END OF SECTION 101100

## SECTION 101200 - DISPLAY CASES

### 1.1 SUMMARY

- A. Section Includes:
  - 1. Bulletin boards.
  - 2. Display cases.

### 1.2 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 display cases and bulletin boards. Include furnished specialties and accessories.
  - 2. Include electrical characteristics for illuminated display cases.
- B. Shop Drawings: For display cases and bulletin boards.
  - 1. Include plans, elevations, sections, and attachment details.
  - 2. Show location of seams and joints in tackboard panels.
  - 3. Include sections of typical trim members.
  - 4. Include diagrams for wiring of illuminated display cases.
- C. Samples: For each exposed product and for each color and texture specified; not less than 8-1/2 by 11 inches (215 by 280 mm) for tackboard panels and 6 inches (150 mm) long for trim with factory finish.

### 1.3 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: For tackboard panels, for tests performed by a qualified testing agency.

### 1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For display cases and bulletin boards to include in maintenance manuals.

### 1.5 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install display cases and bulletin boards for indoor installations until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, work above ceilings is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

## 1.6 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: 25 or less.
  - 2. Smoke-Developed Index: 450 or less.
- B. Electrical Components: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

## 1.7 PRODUCTS

- A. Bulletin Boards:
  - 1. Factory-fabricated unit consisting of manufacturer's standard wall-mounted cabinet with tackboard panel on back inside surface and operable glazed doors at front.
  - 2. Cabinet: Aluminum framed.
    - a. Aluminum Finish: Clear anodic.
  - 3. Glazed Doors: Sliding.
    - a. Tempered glass; unframed; with extruded-aluminum top and bottom track; supported on nylon or ball-bearing rollers; with plastic top guide and rubber bumpers. Equip each door with ground finger pull and adjustable cylinder lock with two keys.
  - 4. Header Panel: Nonilluminated.
  - 5. Mounting: Recessed.
  - 6. Size: 48 inches (1200 mm) wide by 36 inches (910 mm) high by 4 inches (100 mm) deep.
- B. Display Cases:
  - 1. Factory-fabricated display case; with finished interior, operable glazed doors at front, and trim on face to cover edge of recessed opening.
  - 2. Cabinets: Extruded-aluminum box.
    - a. Cabinet Frame and Trim: Aluminum.
  - 3. Mounting: Recessed.
  - 4. Aluminum Finish: Clear anodic.
  - 5. Glazed Doors: Sliding.
    - a. Tempered glass; unframed; with extruded-aluminum top and bottom track; supported on nylon or ball-bearing rollers; with plastic top guide and rubber bumpers. Equip each door with ground finger pull and adjustable cylinder lock with two keys.
  - 6. Adjustable tempered-glass shelves.
    - a. 6-mm-thick tempered glass; supported on adjustable shelf standards and supports.
  - 7. Illumination system.

#### 1.8 FABRICATION

- A. Fabricate bulletin boards and display cases to requirements indicated for dimensions, design, and thickness and finish of materials.
- B. Use metals and shapes of thickness and reinforcing required to produce flat surfaces, and to impart strength for size, design, and application indicated.
- C. Fabricate cabinets and door frames with reinforced corners, mitered to a hairline fit, with no exposed fasteners.
- D. Fabricate shelf standards plumb and at heights to align shelf brackets for level shelves.

#### 1.9 INSTALLATION

- A. General: Install units in locations and at mounting heights indicated on Drawings. Keep perimeter lines straight, level, and plumb. Provide grounds, clips, backing materials, adhesives, brackets, anchors, trim, and accessories necessary for complete installation.
- B. Bulletin Boards: Attach units to wall surfaces with concealed clips, hangers, or grounds.
- C. Recessed Display Cases: Attach units to wall framing with fasteners at not more than 16 inches (400 mm) o.c. Attach aluminum trim over edges of recessed display cases and conceal grounds and clips. Attach trim with fasteners at not more than 24 inches (600 mm) o.c.
- D. Comply with requirements specified elsewhere for connecting illuminated display cases.
- E. Install display case shelving level and straight.

#### 1.10 ADJUSTING AND CLEANING

- A. Adjust doors to operate smoothly without warp or bind and so contact points meet accurately. Lubricate operating hardware as recommended in writing by manufacturer.
- B. Touch up factory-applied finishes to restore damaged areas.

END OF SECTION 101200

## SECTION 101414 - REGULATORY SIGNAGE

### 1.1 SUMMARY

- A. Section Includes:
1. Regulatory signage posted at the following permanent locations.
    - a. Restroom doors.
    - b. Egress Stairway Doors.
    - c. Exit Passageway Doors.
    - d. Exit Discharge Doors.
    - e. Exit doors.
  2. Supplementary components and accessories necessary for a complete installation.

### 1.2 ADMINISTRATIVE REQUIREMENTS:

- A. Sequencing: Complete all finishing operations, including painting, before beginning installation of signage systems.

### 1.3 SUBMITTALS

- A. Action Submittals:
1. Product Data.
  2. Shop Drawings: For panel signs.
    - a. Include fabrication and installation details and attachments to other work.
    - b. Show sign mounting heights, locations of supplementary supports to be provided by others, and accessories.
    - c. Show message list, type styles, graphic elements, including raised characters and Braille, and layout for each sign at least half size.
    - d. Show locations of electrical service connections.
    - e. Include diagrams for power, signal, and control wiring.
  3. Samples for Verification: For each type of sign assembly showing all components and with the required finishes, in manufacturer's standard size unless otherwise indicated and as follows:
    - a. Room-Identification Signs: Full-size Sample.
    - b. Field-Applied, Vinyl-Character Signs: Full-size Sample of characters on glass.
    - c. Variable Component Materials: Full-size Sample of each base material, character (letter, number, and graphic element) in each exposed color and finish not included in Samples above.
    - d. Exposed Accessories: Full-size Sample of each accessory type.
  4. Template: Submit full-size template drawing for approval of letter size, stock, spacing, setting screws.
  5. Sign Schedule: Use same designations specified or indicated on Drawings or in a sign schedule.

- B. Informational Submittals:
  - 1. Delegated-Design Submittal: For signs indicated in "Performance Requirements" Article.
    - a. Include structural analysis calculations for signs indicated to comply with design loads; signed and sealed by the qualified professional engineer responsible for their preparation.
  - 2. Sample Warranty: For special warranty.
  - 3. Maintenance Data: For signs to include in maintenance manuals.

#### 1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this Section with minimum three years of documented experience.
- B. Quality Standard Requirements: Comply with applicable provisions in ADA-ABA Accessibility Guidelines, CBC Chapter IIB, Section 216.

#### 1.5 PERFORMANCE REQUIREMENTS

- A. Accessibility Standard: Comply with applicable provisions in the USDOJ's "2010 ADA Standards for Accessible Design", the ABA standards of the Federal agency having jurisdiction and ICC A117.1.
- B. Source Limitations: Obtain each size type color pattern and variety of regulatory sign used for the Project through one source from the same manufacturer.

#### 1.6 DOOR SIGNS

- A. Toilet Room Doors:
  - 1. Conform to Title 24 with sign at center of toilet room door at 60 inches (1524 mm) above the finished floor. Do not use raised pictograms and text on door signs.
    - a. Sign Panels: Sign panel material shall be solid acrylic at interior and 1/4 inch (6.35 mm) aluminum or zine at exterior with eased square edges of 1/4 inch (6.35 mm) thickness.
    - b. Graphics: Graphics shall be first surface screen printed, utilizing screens that have been photographically reproduced from Owner-approved electronic files and shall follow dimensions and spacing qualities verbatim.
    - c. Edge finish: All visible edges shall be painted with polyurethane paint. Saw marks, kerfs, rough or uneven edges shall be unacceptable. Edges shall be precision machined and visually smooth.
    - d. Mounting: 3M #4432 black foam tape, 1/2 inch (12.70 mm) wide, at all perimeter sign edges.
    - e. Color:
      - 1) Paint color to match Campus Standard Colors
      - 2) Screen print color to match Campus Standard Colors.

- 3) Sign color shall contrast with door color.
2. Women: 12 inch (305 mm) diameter circle by 1/4 inch (6.35 mm) thick with gender pictogram.
3. Men: 12 inch (305 mm) by 12 inch (305 mm) by 1/4 inch (6.35 mm) triangle with gender pictogram.
4. Single Accommodation: Overlay 12 inch (305 mm) by 1/4 inch (6.35 mm) triangle to contrasting 12 inch (305 mm) diameter circle 1/4 inch (6.35 mm) thick with unisex gender pictogram.

1.7 ROOM IDENTIFICATION SIGNS, TOILET ROOM IDENTIFICATION SIGNS (WALL), AND INTERIOR DIRECTIONAL SIGNS

- A. Painted acrylic sign backer with eased edges and multipolymer acrylic sign face with eased edges, photopolymer process to produce raised letter and Braille at interior. Painted Aluminum or zinc plaque with eased edges, surface etched to produce raised numbers and Braille at exterior.
1. Mounting: 3M #4432 black foam tape (1/2 inch (12.70 mm) wide) at all perimeter edges, or appropriate silicone adhesive as needed.
  2. Colors: Match Campus Standard Colors.
  3. Size and Design: Match Campus Standard Colors.
  4. Interior Directional Signs: Provide a base bid allowance of five interior directional signs.
    - a. Two layers of 1/8 inch (3.17 mm) acrylic, exposed edges eased, painted.
    - b. Changeable message strips with screen-printed messages secured with roll adhesive, removable.
    - c. Mounting: 3M #4432 black foam tape (1/2 inch (12.70 mm) wide) at all perimeter edges, or appropriate silicone adhesive as needed.
    - d. Colors: to match Campus Standard Colors.
    - e. Size and Design to match Campus Signage Standard.

1.8 EXIT

- A. Exits, which are required to be identified as such by the Fire Marshal shall also be identified by sign with raised characters and Braille which conforms to ANSI 117.1 (703.2 or 703.3). The following designations shall be provided:
1. EXIT (For an unlocked exit door without an alarm, leading to the exterior of the building.)
  2. TO EXIT (for an unlocked exit door without an alarm leading to a corridor, hallway, exit enclosure, or exit passageway).
  3. Painted acrylic sign backer with eased edges and multipolymer acrylic sign face with eased edges, photopolymer process to produce raised letters and Braille at interior.
  4. Painted aluminum or zinc plaque with eased edges, surface etched to produce raised numbers and Braille at exterior.
  5. Mounting: 3M #4432 black foam tape (1/2 inch (12.70 mm) wide) at all perimeter edges, or appropriate silicone adhesive as needed.
  6. Colors: to match Campus Standard Colors

## 1.9 ENTRY SIGNS

- A. ISA (International Symbol of Accessibility) sign:
1. Screen printed or cut vinyl graphics reverse-reading on inside face of glass doors and front reading on exterior face of door.
  2. Mounting: Self-adhesive.
  3. Colors: Design to match Campus Standards.
  4. Signs shall be installed or mounted with bottom edge of sign 18 inches from finish floor or ground surface. Sign may be mounted on window or on door itself.

## 1.10 WALL-MOUNTED PHOTOPOLYMER (ONE-PIECE) PANEL SIGNS

- A. Description: Single-piece construction, permanent identification signs consisting of moisture resistant, non-glare photopolymer bonded to sign base material.
- B. Products: Design is based on interior grade photopolymer panels by Jet USA.
- C. Comply with the Following:
1. Sizes:
    - a. Restroom Signs:
      - 1) Women's Room: 12 inch (305 mm) diameter circle.
      - 2) Men's Room: Equilateral triangle with 12 inch (305 mm) long edges and vertex pointing upward.
    - b. Egress Stairway Doors: 12 inches (305 mm) square.
    - c. Exit Passageway Doors: 12 inches (305 mm) square.
    - d. Exit Discharge Doors: 12 inches (305 mm) square.
  2. Thickness: Between 1/8 inch (3.17 mm) minimum and 1/4 inch (6.35 mm) maximum.
  3. Edge Condition: Square cut.
  4. Corner Condition: Square.
  5. Mounting: Wall mounted with mechanical fasteners or adhesive.
  6. Materials:
    - a. Photopolymer Layer: 0.040-inch acrylic photopolymer.
    - b. Base Material:
      - 1) Interior Locations: "Jet 388" 0.120-inch phenolic base.
      - 2) Interior Locations: "Jet 388 EX" exterior grade photopolymer applied to a 0.120-inch phenolic base.
    - c. Colors: As selected by Architect from Manufacturer's full range.
  7. Sign Text:
    - a. Copy: Copy must follow the dimensions and spacing indicated on the Design Drawings and/or approved copy patterns.
      - 1) Letter spacing must conform to standards shown and kerned optically to the acceptance of the Owner.
      - 2) Lines of copy must be straight and parallel to the sign format, unless otherwise specified.

- 3) Edges of letters, numbers, and symbols must be smooth and continuous, with straight and curved portions reproducing the original forms exactly, with corners sharp and true.
  - 4) All form shall be free of ticks, line waiver, discontinuous curves and other imperfections.
- b. Font: As selected by Architect.

#### 1.11 ACCESSIBLE PARKING SIGNS

- A. Screen printed, 12 gage, 0.105 inch (2.66 mm) bonderized steel with blue baked enamel finish and white e screen printed copy.
- B. Size: 12 by 18 inches (305 by 457 mm) and 12 by 18 inches (305 by 457 mm) .
- C. Copy:
  1. "Accessible Parking Only".
  2. "Van Accessible".
  3. "Maximum Fine \$250"
  4. "Unauthorized vehicles parked in designated accessible spaces not displaying distinguishing placards or special license plates issued for persons with disabilities will be towed away at the owner's expense.
    - a. Towed vehicles may be reclaimed at...
    - b. Or by telephoning..."
  5. See drawings for additional copy
- D. Acceptable Products:
  1. Accessible Parking: Best Traffic Signs No. SS04 with SS52 as required.
- E. Post: Galvanized pipe column minimum 9 feet long.

#### 1.12 ACCESSORIES

- A. Fasteners: Non-removable mechanical fasteners and anchors suitable for secure attachment to substrate and placed through predrilled holes as recommended in writing by the sign manufacturer.
- B. Signs Mounted on Glass: Provide blanks on opposite side of glass, match sign.
- C. Adhesives: As furnished, required, recommended, approved or accepted by the sign manufacturer for a secure and permanent installation.
- D. Other Accessories: Provide other accessories and similar secondary items, including and cleaning agents selected by the Contractor, as furnished, required, recommended, approved or accepted by the sign manufacturer.

### 1.13 FABRICATION

- A. General: Provide manufacturer's standard sign assemblies according to requirements indicated.
  - 1. Preassemble signs and assemblies in shop to greatest extent possible. Disassemble signs and assemblies only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation; apply markings in locations concealed from view after final assembly.
  - 2. Mill joints to a tight, hairline fit. Form assemblies and joints exposed to weather to resist water penetration and retention.
  - 3. Comply with AWS for recommended practices in welding and brazing. Provide welds and brazes behind finished surfaces without distorting or discoloring exposed side. Clean exposed welded and brazed connections of flux, and dress exposed and contact surfaces.
  - 4. Conceal connections if possible; otherwise, locate connections where they are inconspicuous.
  - 5. Internally brace signs for stability and for securing fasteners.
  - 6. Provide rebates, lugs, and brackets necessary to assemble components and to attach to existing work. Drill and tap for required fasteners. Use concealed fasteners where possible; use exposed fasteners that match sign finish.
- B. Shop-Applied Vinyl: Align vinyl film in final position and apply to surface. Firmly press film from the middle outward to obtain good bond without blisters or fishmouths.
- C. Brackets: Fabricate brackets, fittings, and hardware for bracket-mounted signs to suit sign construction and mounting conditions indicated. Modify manufacturer's standard brackets as required.

### 1.14 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
- B. Verify that surfaces to receive signs are clean and free of materials or debris that would impair installation.
- C. Verify that items, including anchor inserts, are sized and located to accommodate signs.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

### 1.15 PREPARATION

- A. Clean substrate prior to the start of installation in order to remove dust, debris and loose particles

#### 1.16 INSTALLATION

##### A. General:

1. Locate signs and accessories where indicated, using mounting methods of types described and complying with manufacturer-prepared instructions.
2. Install signage systems level and plumb at the height indicated on the drawings.
3. Install signs on walls adjacent to latch side of door where applicable.
  - a. Where not indicated or possible, such as double doors, install signs on nearest adjacent walls.
  - b. Locate to allow approach within 3 inches of sign without encountering protruding objects or standing within swing of door.

#### 1.17 INTERIOR INSTALLATION - ROOM SIGNS

- A. Install signs plumb, level and square and in proper planes with other work, at heights as indicated by Architect.
- B. Mount on wall surface, 60 inches maximum above finish floor surface to the base line of the highest line of raised characters, 4 inches from door frame to meet ADA and CBC Accessibility Requirements.
- C. Anchor each plastic sign with sufficient amount adhesive for proper installation as recommended by manufacturer for substrate.
- D. Room-Identification Signs and Other Accessible Signage: Install in locations on walls as indicated and according to accessibility standard.
- E. Mounting Methods:
  1. Two-Face Tape: Clean bond-breaking materials from substrate surface and remove loose debris. Apply tape strips symmetrically to back of sign and of suitable quantity to support weight of sign without slippage. Keep strips away from edges to prevent visibility at sign edges. Place sign in position, and push to engage tape adhesive.

#### 1.18 CLEANING

##### A. Cleaning Installed Work:

1. Clean exposed metal surfaces of substances that might interfere with uniform oxidation and weathering.
2. Leave work areas around Project site free of debris and related items after completion of the Work of this Section.

##### B. PROTECTION

- C. Protect installed signs in place against damage until Substantial Completion.

D. Remove protection when no longer needed and prior to Substantial Completion.

END OF SECTION 101414

## SECTION 101416 - PLAQUES

### 1.1 SUMMARY

- A. Section includes metal plaques.

### 1.2 DEFINITIONS

- A. Accessible: In accordance with the accessibility standard.

### 1.3 SUBMITTALS

#### A. Action Submittals

1. Product Data: For each type of product.
2. Shop Drawings: For plaques.
  - a. Include fabrication and installation details and attachments to other work.
  - b. Show plaque mounting heights, locations of supplementary supports to be provided by other installers, and accessories.
  - c. Show message list, typestyles, graphic elements, and layout for each plaque at least half size.
3. Samples for Initial Selection: For each type of plaque, exposed component, and exposed finish.
  - a. Include representative Samples of available typestyles and graphic symbols.
4. Samples for Verification: For each type of plaque showing all components and with the required finish(es), in manufacturer's standard size unless otherwise indicated and as follows:
  - a. Plaques: Full-size Sample.
  - b. Exposed Accessories: Full-size Sample of each accessory type.
  - c. Full-size Samples, if approved, will be returned to Contractor for use in the Project.
5. Product Schedule: For plaques. Use same designations indicated on Drawings or specified.

#### B. Informational Submittals

1. Qualification Data: For installer and manufacturer.
2. Sample Warranty: For special warranty.

### 1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer of products.

## 1.5 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of plaques that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Deterioration of finishes beyond normal weathering.
    - b. Deterioration of embedded graphic image.
  - 2. Warranty Period: Five years from date of Substantial Completion.

## 1.6 PERFORMANCE REQUIREMENTS

- A. Accessibility Standard: Comply with applicable provisions in the USDOJ's "2010 ADA Standards for Accessible Design".

## 1.7 PLAQUES

- A. Cast Plaque: Cast-metal plaque with background texture, border, and characters having uniform faces, sharp corners, and precisely formed lines and profiles; and as follows:
  - 1. Plaque Material: Cast aluminum.
  - 2. Plaque Thickness: 0.153 inch (3.89 mm).
  - 3. Overall Size: 325 square inches.
  - 4. Finishes:
  - 5. Overcoat: Manufacturer's standard baked-on clear coating.
  - 6. Background Texture: Smooth.
  - 7. Integrally Cast Border Style: As indicated on Drawings.
  - 8. Applied Frame Material, Style, and Finish: As indicated on Drawings.
  - 9. Mounting: As indicated on Drawings.
  - 10. Text and Typeface: Accessible raised characters and Braille.

## 1.8 MATERIALS

- A. Aluminum Castings: ASTM B26/B26M, alloy and temper recommended by plaque manufacturer for casting process used and for type of use and finish indicated.

## 1.9 ACCESSORIES

- A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of plaques, noncorrosive and compatible with each material joined, and complying with the following:
  - 1. Use concealed fasteners and anchors unless indicated to be exposed.
  - 2. For exterior exposure, furnish nonferrous-metal devices unless otherwise indicated.
  - 3. Exposed Metal-Fastener Components, General:
    - a. Fabricated from same basic metal and finish of fastened metal unless otherwise indicated.

- b. Fastener Heads: For nonstructural connections, use flathead screws and bolts with tamper-resistant Allen-head slots unless otherwise indicated.
- 4. Plaque Mounting Fasteners:
  - a. Concealed Studs: Concealed (blind), threaded studs welded or brazed to back of plaque, screwed into back of plaque, or screwed into tapped lugs cast integrally into back of plaque unless otherwise indicated.

#### 1.10 FABRICATION

- A. General: Provide manufacturer's standard plaques according to requirements indicated.
  - 1. Preassemble plaques in the shop to greatest extent possible. Disassemble plaques only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation; apply markings in locations concealed from view after final assembly.
  - 2. Mill joints to a tight, hairline fit. Form assemblies and joints exposed to weather to resist water penetration and retention.
  - 3. Comply with AWS for recommended practices in welding and brazing. Provide welds and brazes behind finished surfaces without distorting or discoloring exposed side. Clean exposed welded and brazed connections of flux, and dress exposed and contact surfaces.
  - 4. Conceal connections if possible; otherwise, locate connections where they are inconspicuous.
  - 5. Provide rabbets, lugs, and tabs necessary to assemble components and to attach to existing work. Drill and tap for required fasteners. Use concealed fasteners where possible; use exposed fasteners that match plaque finish.
  - 6. Castings: Fabricate castings free of warp, cracks, blowholes, pits, scale, sand holes, and other defects that impair appearance or strength. Grind, wire brush, sandblast, and buff castings to remove seams, gate marks, casting flash, and other casting marks before finishing.
- B. Surface-Engraved Graphics: Machine-engrave characters and other graphic devices into indicated plaque surface to produce precisely formed copy, incised to uniform depth.
  - 1. Engraved Metal: Fill engraved graphics with manufacturer's standard baked enamel.
- C. Brackets: Fabricate brackets, fittings, and hardware for bracket-mounted plaques to suit plaque construction and mounting conditions indicated. Modify manufacturer's standard brackets as required.
  - 1. Aluminum Brackets: Factory finish brackets with baked-enamel or powder-coat finish to match plaque-background color unless otherwise indicated.
  - 2. Stainless-Steel Brackets: Factory finish brackets to match plaque background finish unless otherwise indicated.

#### 1.11 GENERAL FINISH REQUIREMENTS

- A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- C. Directional Finishes: Run grain with long dimension of each piece and perpendicular to long dimension of finished trim or border surface unless otherwise indicated.
- D. Organic, Anodic, and Chemically Produced Finishes: Apply to formed metal after fabrication but before applying contrasting polished finishes on raised features unless otherwise indicated.

#### 1.12 ALUMINUM FINISHES

- A. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils (0.04 mm). Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

#### 1.13 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Verify that plaque-support surfaces are within tolerances to accommodate plaques without gaps or irregularities between backs of plaques and support surfaces unless otherwise indicated.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 1.14 INSTALLATION

- A. General: Install plaques using mounting methods indicated and according to manufacturer's written instructions.
  - 1. Install plaques level, plumb, true to line, and at locations and heights indicated, with plaque surfaces free of distortion and other defects in appearance.
  - 2. Install plaques so they do not protrude or obstruct according to the accessibility standard.
  - 3. Before installation, verify that plaque surfaces are clean and free of materials or debris that would impair installation.
  - 4. Corrosion Protection: Coat concealed surfaces of exterior aluminum in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.
- B. Mounting Methods:
  - 1. Concealed Studs: Using a template, drill holes in substrate aligning with studs on back of plaque. Remove loose debris from hole and substrate surface.
    - a. Masonry Substrates: Fill holes with adhesive. Leave recess space in hole for displaced adhesive. Place plaque in position and push until flush to surface,

- embedding studs in holes. Temporarily support plaque in position until adhesive fully sets.
- b. Thin or Hollow Surfaces: Place plaque in position and flush to surface, install washers and nuts on studs projecting through opposite side of surface, and tighten.
  2. Through Fasteners: Drill holes in substrate using predrilled holes in plaque as template. Countersink holes in plaque if required. Place plaque in position and flush to surface. Install through fasteners and tighten.
  3. Brackets: Remove loose debris from substrate surface and install bracket supports in position, so that plaque is correctly located and aligned.

#### 1.15 ADJUSTING AND CLEANING

- A. Remove and replace damaged or deformed plaques and plaques that do not comply with specified requirements. Replace plaques with damaged or deteriorated finishes or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.
- B. Remove temporary protective coverings and strippable films as plaques are installed.
- C. On completion of installation, clean exposed surfaces of plaques according to manufacturer's written instructions, and touch up minor nicks and abrasions in finish. Maintain plaques in a clean condition during construction and protect from damage until acceptance by Owner.

END OF SECTION 101416

## SECTION 101419 - DIMENSIONAL LETTER SIGNAGE

### 1.1 SUMMARY

- A. Section Includes:
  - 1. Cast dimensional characters.
  - 2. Cutout dimensional characters.

### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For signs.
  - 1. Include fabrication and installation details and attachments to other work.
  - 2. Show sign mounting heights, locations of supplementary supports to be provided by other installers, and accessories.
  - 3. Show message list, typestyles, graphic elements, and layout for each sign at least half size.
- C. Samples for Verification: For each type of sign assembly showing all components and with the required finish(es), in manufacturer's standard size unless otherwise indicated and as follows:
  - 1. Dimensional Characters: Full-size Sample of each type of dimensional character.
  - 2. Full-size Samples, if approved, will be returned to Contractor for use in the Project.
- D. Product Schedule: For dimensional letter signs. Use same designations indicated on Drawings or specified.
- E. Delegated-Design Submittal: For signs indicated in "Performance Requirements" Article.
  - 1. Include structural analysis calculations for signs indicated to comply with design loads; signed and sealed by the qualified professional engineer responsible for their preparation.

### 1.3 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and manufacturer.
- B. Sample Warranty: For special warranty.

### 1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For signs to include in maintenance manuals.

## 1.5 QUALITY ASSURANCE

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

## 1.6 FIELD CONDITIONS

- A. Field Measurements: Verify locations of electrical service embedded in permanent construction by other installers by field measurements before fabrication, and indicate measurements on Shop Drawings.

## 1.7 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Deterioration of finishes beyond normal weathering.
    - b. Separation or delamination of sheet materials and components.
  - 2. Warranty Period: Five years from date of Substantial Completion.

## 1.8 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design sign structure and anchorage of dimensional character sign type(s) according to structural performance requirements.
- B. Structural Performance: Signs and supporting elements shall withstand the effects of gravity and other loads within limits and under conditions indicated.
  - 1. Uniform Wind Load: As indicated on Structural Drawings.
  - 2. Uniform and concentrated loads need not be assumed to act concurrently.
- C. Thermal Movements: For exterior fabricated channel dimensional characters, allow for thermal movements from ambient and surface temperature changes.
  - 1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

## 1.9 DIMENSIONAL CHARACTERS

- A. Cast Characters: Aluminum.
  - 1. Character Height: As detailed on Drawings.
  - 2. Finish: Clear anodized aluminum.
  - 3. Mounting: Concealed or projecting studs, as detailed.
  - 4. Typeface: As detailed on Drawings.

- B. Cutout Characters: Stainless steel.
  - 1. Character Height: As detailed on Drawings.
  - 2. Finish: No. 4 stainless steel.
  - 3. Mounting: Concealed or projecting studs, as detailed.
  - 4. Typeface: As detailed on Drawings.

#### 1.10 DIMENSIONAL CHARACTER MATERIALS

- A. Aluminum Castings: ASTM B26/B26M, alloy and temper recommended by sign manufacturer for casting process used and for type of use and finish indicated.
- B. Aluminum Sheet and Plate: ASTM B209 (ASTM B209M), alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.
- C. Aluminum Extrusions: ASTM B221 (ASTM B221M), alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.
- D. Stainless-Steel Sheet: ASTM A240/A240M or ASTM A666, Type 304, stretcher-leveled standard of flatness.

#### 1.11 FABRICATION

- A. General: Provide manufacturer's standard sign assemblies according to requirements indicated.
  - 1. Preassemble signs and assemblies in the shop to greatest extent possible. Disassemble signs and assemblies only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation; apply markings in locations concealed from view after final assembly.
  - 2. Mill joints to a tight, hairline fit. Form assemblies and joints exposed to weather to resist water penetration and retention.
  - 3. Comply with AWS for recommended practices in welding and brazing. Provide welds and brazes behind finished surfaces without distorting or discoloring exposed side. Clean exposed welded and brazed connections of flux, and dress exposed and contact surfaces.
  - 4. Conceal connections if possible; otherwise, locate connections where they are inconspicuous.
  - 5. Internally brace dimensional characters for stability, to meet structural performance loading without oil-canning or other surface deformation, and for securing fasteners.
  - 6. Provide rabbets, lugs, and tabs necessary to assemble components and to attach to existing work. Drill and tap for required fasteners. Use concealed fasteners where possible; use exposed fasteners that match sign finish.
  - 7. Castings: Fabricate castings free of warp, cracks, blowholes, pits, scale, sand holes, and other defects that impair appearance or strength. Grind, wire brush, sandblast, and buff castings to remove seams, gate marks, casting flash, and other casting marks before finishing.

#### 1.12 GENERAL FINISH REQUIREMENTS

- A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- C. Directional Finishes: Run grain with long dimension of each piece and perpendicular to long dimension of finished trim or border surface unless otherwise indicated.
- D. Organic, Anodic, and Chemically Produced Finishes: Apply to formed metal after fabrication but before applying contrasting polished finishes on raised features unless otherwise indicated.

#### 1.13 ALUMINUM FINISHES

- A. Clear Anodic Finish: AAMA 611, Class I, 0.018 mm or thicker.

#### 1.14 STAINLESS-STEEL FINISHES

- A. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
- B. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.
  - 1. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
  - 2. Directional Satin Finish: No. 4.

#### 1.15 INSTALLATION

- A. General: Install signs using mounting methods indicated and according to manufacturer's written instructions.
  - 1. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.
  - 2. Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.
  - 3. Corrosion Protection: Coat concealed surfaces of exterior aluminum in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.
- B. Mounting Methods:
  - 1. Concealed Studs: Using a template, drill holes in substrate aligning with studs on back of sign. Remove loose debris from hole and substrate surface.

- a. Masonry Substrates: Fill holes with adhesive. Leave recess space in hole for displaced adhesive. Place sign in position and push until flush to surface, embedding studs in holes. Temporarily support sign in position until adhesive fully sets.
  - b. Thin or Hollow Surfaces: Place sign in position and flush to surface, install washers and nuts on studs projecting through opposite side of surface, and tighten.
2. Projecting Studs: Using a template, drill holes in substrate aligning with studs on back of sign. Remove loose debris from hole and substrate surface.
- a. Masonry Substrates: Fill holes with adhesive. Leave recess space in hole for displaced adhesive. Place spacers on studs, place sign in position, and push until spacers are pinched between sign and substrate, embedding the stud ends in holes. Temporarily support sign in position until adhesive fully sets.
  - b. Thin or Hollow Surfaces: Place spacers on studs, place sign in position with spacers pinched between sign and substrate, and install washers and nuts on stud ends projecting through opposite side of surface, and tighten.

END OF SECTION 101419

## SECTION 102113.17 - PHENOLIC-CORE TOILET COMPARTMENTS

### 1.1 SUMMARY

- A. Phenolic-core toilet compartments configured as toilet enclosures and urinal screens.
  - 1. Toilet-Enclosure Style: Overhead braced/Floor anchored.
  - 2. Urinal-Screen Style: Wall hung, flat panel.

### 1.2 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 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 6-inch- (152-mm-) square Samples of same thickness and material indicated for Work.
  - 2. Each type of hardware and accessory.
- D. Product Schedule: For toilet compartments, prepared by or under the supervision of supplier, detailing location and selected colors for toilet compartment material.

### 1.3 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of toilet compartment.

### 1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For toilet compartments to include in maintenance manuals.

## 1.5 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.

## 1.6 PERFORMANCE REQUIREMENTS

- A. Surface-Burning Characteristics: ASTM E84.
  - 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.

## 1.7 COMPONENTS

- A. Door, Panel, and Pilaster Construction: Solid phenolic-core panel material with melamine facing on both sides, with no-sightline system.
- B. Brackets (Fittings):
  - 1. Full-Height (Continuous) Type: Manufacturer's standard design; stainless steel.
- C. Phenolic-Panel Finish:
  - 1. Facing Sheet Finish: One color and pattern in each room.
  - 2. Color and Pattern: As selected by Architect from manufacturer's full range, with manufacturer's standard dark color core.
  - 3. Edge Color: Manufacturer's standard.

## 1.8 HARDWARE AND ACCESSORIES

- A. Hardware and Accessories: Manufacturer's heavy-duty stainless steel operating hardware and accessories.

## 1.9 FABRICATION

- A. Fabrication, General: Fabricate toilet compartment components to sizes indicated. Coordinate requirements and provide cutouts for through-partition toilet accessories where required for attachment of toilet accessories.

- B. Overhead-Braced Units: Provide manufacturer's standard corrosion-resistant supports, leveling mechanism, and anchors at pilasters to suit floor conditions. Provide shoes at pilasters to conceal supports and leveling mechanism.

#### 1.10 INSTALLATION

- A. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, level, and plumb. Secure units in position with manufacturer's recommended anchoring devices.
  - 1. Maximum Clearances:
    - a. Pilasters and Panels: 1/2 inch (13 mm).
    - b. Panels and Walls: 1 inch (25 mm).
  - 2. Full-Height (Continuous) Brackets: Secure panels to walls and to pilasters with full-height brackets.
    - a. Locate bracket fasteners so holes for wall anchors occur in masonry or tile joints.
    - b. Align brackets at pilasters with brackets at walls.
- B. Overhead-Braced Units: Secure pilasters to floor and level, plumb, and tighten. Set pilasters with anchors penetrating not less than 1-3/4 inches (44 mm) into structural floor unless otherwise indicated in manufacturer's written instructions. Secure continuous head rail to each pilaster with no fewer than two fasteners. Hang doors to align tops of doors with tops of panels, and adjust so tops of doors are parallel with overhead brace when doors are in closed position.
- C. Urinal Screens: Attach with anchoring devices to suit supporting structure. Set units level and plumb, rigid, and secured to resist lateral impact.

END OF SECTION 102113.17

## SECTION 102123 - CUBICLE CURTAINS AND TRACK

### 1.1 SUMMARY

- A. Section Includes:
1. Cubicle-curtain tracks and carriers.
  2. Cubicle curtains.

### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
1. For each type of curtain fabric indicated, include durability, laundry temperature limits, fade resistance, applied curtain treatments, and fire-test-response characteristics.
- B. Shop Drawings: For curtains and tracks.
1. Show layout and types of cubicles, sizes of curtains, number of carriers, anchorage details, and conditions requiring accessories. Indicate dimensions taken from field measurements.
  2. Include details of blocking for track support.
- C. Samples: For each exposed product and for each color and texture specified, 10 inches (254 mm) in size.
- D. Product Schedule: For curtains and tracks. Use same designations indicated on Drawings.

### 1.3 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For curtains, tracks, and hardware to include in operation and maintenance manuals.

### 1.4 PERFORMANCE REQUIREMENTS

- A. Cubicle Curtains: Provide curtain fabrics with the following characteristics:
1. Laundering: Launderable to a water temperature of not less than 160 deg F (71 deg C).
  2. Flame Resistance: Provide fabrics identical to those that have passed NFPA 701 when tested by a qualified testing agency acceptable to authorities having jurisdiction.
    - a. Identify fabrics with appropriate markings of a qualified testing agency.

### 1.5 MATERIALS

- A. Curtain Tracks:
1. Basis-of-Design Product: Inpro Nanotrac Cubicle Curtain Tracking System

2. Tracks: Extruded aluminum cubicle track with white baked acrylic enamel finish. Aluminum shall be 6063-T5.
3. Dimensions: height 1/2" (13mm), width 5/8" (16mm).
4. Bent sections: Provide factory bent track sections with one-foot radii to mate with straight track sections
5. Curtain Carriers: Nylon rollers with aluminum hook.

B. Curtains:

1. Fabric: Inherently and permanently flame resistant, stain resistant, and antimicrobial.
2. Curtain Grommets: Two-piece, rolled-edge, rustproof, nickel-plated brass; spaced not more than 6 inches (152 mm) o.c.; machined into top hem.
3. Refer to Finish Schedule for product and color.

## 1.6 INSTALLATION

- A. Install tracks level and plumb, according to manufacturer's written instructions.
- B. For tracks of up to 20 feet (6.0 m) in length, provide track fabricated from single, continuous length.
- C. Surface-Track Mounting: Fasten tracks to ceilings at intervals recommended by manufacturer. Fasten tracks to structure at each splice and tangent point of each corner. Center fasteners in track to ensure unencumbered carrier operation. Attach track to ceiling as follows:
- D. Suspended-Track Mounting: Install track with manufacturer's standard tubular aluminum suspended supports at intervals and with fasteners recommended by manufacturer. Fasten supports to structure. Provide supports at each splice and tangent point of each corner. Secure ends of track to wall with flanged fittings or brackets.
- E. Track Accessories: Install splices, end caps, connectors, end stops, coupling and joining sleeves, and other accessories as required for a secure and operational installation.
- F. Curtain Carriers: Provide curtain carriers adequate for 6-inch (152-mm) spacing along full length of curtain plus an additional carrier.
- G. Cubicle Curtains: Hang curtains on each curtain track.

END OF SECTION 102123

## SECTION 102239 - FOLDING PANEL PARTITIONS

### 1.1 SUMMARY

- A. Section Includes:
1. Manually operated, acoustical panel partitions with markerboard facings.

### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For operable panel partitions.
1. Include plans, elevations, sections, attachment details.
  2. Indicate stacking and operating clearances. Indicate location and installation requirements for hardware and track, blocking, and direction of travel.
- C. Samples for Verification: For each type of exposed material, finish, covering, or facing, prepared on Samples of size indicated below:
1. Panel Facing Material: Manufacturer's standard-size unit, not less than 3 inches (75 mm) square.
  2. Panel Edge Material: Not less than 3 inches (75 mm) long.
  3. Hardware: One of each exposed door-operating device.
- D. Delegated-Design Submittal: For operable panel partitions.
1. Include design calculations for seismic restraints that brace tracks to structure above.

### 1.3 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
1. Partition track, track supports and bracing, switches, turning space, and storage layout.
  2. Suspended ceiling components.
  3. Structural members to which suspension systems will be attached.
  4. Size and location of initial access modules for acoustical tile.
  5. Items penetrating finished ceiling including the following:
    - a. Lighting fixtures.
    - b. HVAC ductwork, outlets, and inlets.
    - c. Speakers.
    - d. Sprinklers.
    - e. Smoke detectors.
    - f. Access panels.
- B. Qualification Data: For Installer.

- C. Seismic Qualification Certificates: For operable panel partitions, tracks, accessories, and components, from manufacturer. Include seismic capacity of partition assemblies to remain in vertical position during a seismic event and the following:
  - 1. Basis for Certification: Indicate whether certification is based on analysis, testing, or experience data, according to ASCE/SEI 7.
  - 2. Detailed description of partition anchorage devices on which the certification is based and their installation requirements.
- D. Product Test Reports: For each operable panel partition, for tests performed by a qualified testing agency.
- E. Field quality-control reports.
- F. Sample Warranty: For manufacturer's special warranty.

#### 1.4 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For operable panel partitions to include in maintenance manuals.

#### 1.5 QUALITY ASSURANCE

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

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Protectively package and sequence panels in order for installation. Clearly mark packages and panels with numbering system used on Shop Drawings. Do not use permanent markings on panels.

#### 1.7 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of operable panel partitions that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Faulty operation of operable panel partitions.
    - b. Deterioration of metals, metal finishes, and other materials beyond normal use.
  - 2. Warranty Period: Five years from date of Substantial Completion.

#### 1.8 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Seismic bracing of tracks to structure above.
- B. Seismic Performance: According to ASCE/SEI 7.
- C. Flame-Spread Index: 25 or less.

#### 1.9 OPERABLE ACOUSTICAL PANELS (OAP-1)

- A. Basis-of-Design Product: Modernfold Acousti-Seal 932
- B. Panel Operation: Manually operated, paired panels.
- C. Panel Width: Equal widths.
- D. STC: Not less than 52.
- E. Panel Weight: 11 lb/sq. ft. maximum.
- F. Panel Thickness: Nominal dimension of 4 inches (102 mm).
- G. Panel Materials:
  - 1. Frame: Steel.
  - 2. Face/Liner Sheets: Steel.
  - 3. Panel faces shall be laminated to appropriate substrate to meet the STC requirements.
- H. Finish Facing: Porcelain steel marker/projection surface.

#### 1.10 ACCESSORIES

- A. Pass Doors: Single with exit device and self-illuminated exit sign.
- B. Storage pocket door.
- C. Chalk tray.

#### 1.11 INSTALLATION

- A. Install operable panel partitions and accessories after other finishing operations, including painting, have been completed in area of partition installation.
- B. Install panels in numbered sequence indicated on Shop Drawings.
- C. Broken, cracked, chipped, deformed, or unmatched panels are not acceptable.

- D. Broken, cracked, deformed, or unmatched gasketing or gasketing with gaps at butted ends is not acceptable.
- E. Light-Leakage Test: Illuminate one side of partition installation and observe vertical joints and top and bottom seals for voids. Adjust partitions for alignment and full closure of vertical joints and full closure along top and bottom seals. Perform test and make adjustments before NIC testing.

#### 1.12 FIELD QUALITY CONTROL

- A. NIC Testing: Owner will engage a qualified testing agency to perform tests and inspections.
  - 1. Testing Extent: Testing agency shall randomly select one operable panel partition installation(s) for testing.
  - 2. Testing Methodology: Perform testing of installed operable panel partition for noise isolation according to ASTM E336, determined by ASTM E413, and rated for not less than NIC indicated. Adjust and fit partitions to comply with NIC test method requirements.
- B. An operable panel partition installation will be considered defective if it does not pass tests and inspections.
- C. Prepare test and inspection reports.

END OF SECTION 102239

## SECTION 102600 - WALL AND DOOR PROTECTION

### 1.1 SUMMARY

- A. Section Includes:
  - 1. Wall guards.
  - 2. Corner guards.

### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include construction details, material descriptions, impact strength, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: For each type of wall and door protection showing locations and extent.
  - 1. Include plans, elevations, sections, and attachment details.
- C. Samples for Verification: For each type of exposed finish on the following products, prepared on Samples of size indicated below:
  - 1. Wall Guards: 12 inches (300 mm) long. Include examples of joinery, corners, and field splices.
  - 2. Corner Guards: 12 inches (300 mm) long. Include example top caps.

### 1.3 INFORMATIONAL SUBMITTALS

- A. Sample Warranty: For special warranty.

### 1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of wall and door protection product to include in maintenance manuals.
  - 1. Include recommended methods and frequency of maintenance for maintaining best condition of plastic covers under anticipated traffic and use conditions. Include precautions against using cleaning materials and methods that may be detrimental to finishes and performance.

### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store wall and door protection in original undamaged packages and containers inside well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.

1. Maintain room temperature within storage area at not less than 70 deg F (21 deg C) during the period plastic materials are stored.
2. Keep plastic materials out of direct sunlight.
3. Store plastic wall- and door-protection components for a minimum of 72 hours, or until plastic material attains a minimum room temperature of 70 deg F (21 deg C).
  - a. Store corner-guard covers in a vertical position.
  - b. Store wall-guard covers in a horizontal position.

#### 1.6 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of wall- and door-protection units that fail in materials or workmanship within specified warranty period.
  1. Failures include, but are not limited to, the following:
    - a. Structural failures including detachment of components from each other or from the substrates, delamination, and permanent deformation beyond normal use.
    - b. Deterioration of metals, metal finishes, plastics, and other materials beyond normal use.
  2. Warranty Period: Five years from date of Substantial Completion.

#### 1.7 PERFORMANCE REQUIREMENTS

- A. Surface Burning Characteristics: Class A.
- B. Accessibility requirements of authority having jurisdiction.

#### 1.8 PRODUCTS

- A. Stainless Steel Wall Guards:
  1. Basis-of-Design: InPro (IPC) Door and Wall Protection Systems, Model 31SS
  2. Type 304, 16 gauge Stainless Steel, satin finish.
  3. 5-1/2 inches (140mm) high x 1-1/2 inches (38mm) deep, with flat-front profile
- B. Stainless Steel Corner Guards:
  1. Basis-of-Design: InPro (IPC) Door and Wall Protection Systems, Model SAS-183128H-430,
  2. Dimensions: 3-1/2 inches (89mm) x 3-1/2 inches (89mm) x 96 inches (2.43m)
  3. Corners: 1/8-inch radius
  4. Attachment: Screw-on
  5. Material: 430 Stainless Steel, 16 gauge.

1.9 INSTALLATION

- A. Installation Quality: Install wall and door protection according to manufacturer's written instructions, level, plumb, and true to line without distortions. Do not use materials with chips, cracks, voids, stains, or other defects that might be visible in the finished Work.
- B. Mounting Heights: Install wall and door protection in locations and at mounting heights indicated on Drawings.
- C. Accessories: Provide splices, mounting hardware, anchors, trim, joint moldings, and other accessories required for a complete installation.
  - 1. Provide anchoring devices and suitable locations to withstand imposed loads.
  - 2. Where splices occur in horizontal runs of more than 20 feet (6.1 m), splice aluminum retainers and plastic covers at different locations along the run, but no closer than 12 inches (305 mm) apart.

1.10 CLEANING

- A. Immediately after completion of installation, clean plastic covers and accessories using a standard ammonia-based household cleaning agent.
- B. Remove excess adhesive using methods and materials recommended in writing by manufacturer.

END OF SECTION 102600

## SECTION 102800 - TOILET, BATH, AND LAUNDRY ACCESSORIES

### 1.1 SUMMARY

- A. Section Includes:
  - 1. Public-use washroom accessories.
  - 2. Public-use shower room accessories.
  - 3. Childcare accessories.
  - 4. Custodial accessories.

### 1.2 COORDINATION

- A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.
- B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

### 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.
  - 2. Include anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
- B. Samples: For each exposed product and for each finish specified, full size.
  - 1. Approved full-size Samples will be returned and may be used in the Work.
- C. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.
  - 1. Identify locations using room designations indicated.
  - 2. Identify accessories using designations indicated.

### 1.4 INFORMATIONAL SUBMITTALS

- A. Sample Warranty: For manufacturer's special warranties.

### 1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For accessories to include in maintenance manuals.

## 1.6 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. Failures include, but are not limited to, visible silver spoilage defects.
  2. Warranty Period: 15 years from date of Substantial Completion.

## 1.7 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Design accessories and fasteners to comply with the following requirements:
1. Grab Bars: Installed units are able to resist 250 lbf (1112 N) concentrated load applied in any direction and at any point.
  2. Shower Seats: Installed units are able to resist 360 lbf (1601 N) applied in any direction and at any point.

## 1.8 PUBLIC-USE WASHROOM ACCESSORIES

- A. Toilet Tissue (Roll) Dispenser:
1. Basis-of-Design Product: Bobrick Washroom Equipment, Inc; Model B-4288
  2. Description: Roll-in-reserve dispenser with hinged front secured with tumbler lockset.
  3. Mounting: Surface mounted.
  4. Operation: Noncontrol delivery with theft-resistant spindle.
  5. Capacity: Designed for 4-1/2- or 5-inch- (114- or 127-mm-) diameter tissue rolls.
  6. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).
- B. Paper Towel (Roll) Dispenser:
1. Basis-of-Design Product: Bobrick Washroom Equipment, Inc; Model B-72860
  2. Description: Pull-towel actuated mechanism permitting controlled delivery of paper rolls in preset lengths.
  3. Mounting: Surface mounted.
  4. Minimum Capacity: 8-inch- (203-mm-) wide, 800-foot- (244-m-) long roll.
  5. Material and Finish: ABS plastic, gray, with translucent front cover.
  6. Lockset: Tumbler type.
- C. Soap Dispenser:
1. Basis-of-Design Product: Bobrick Washroom Equipment, Inc; Model 818615
  2. Description: Designed for manual operation and dispensing soap in liquid or lotion form.
  3. Mounting: Horizontally oriented, surface mounted.
  4. Capacity: 40 fl oz.
  5. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).
  6. Lockset: Tumbler type.
  7. Refill Indicator: Window type.
- D. Grab Bar:

1. Basis-of-Design Product: Bobrick Washroom Equipment, Inc; Model 6806
2. Mounting: Flanges with concealed fasteners.
3. Material: Stainless steel, 0.05 inch (1.3 mm) thick.
  - a. Finish: Smooth, ASTM A480/A480M No. 4 finish (satin) on ends and slip-resistant texture in grip area.
4. Outside Diameter: 1-1/2 inches (38 mm).
5. Configuration and Length: As indicated on Drawings.

E. Sanitary-Napkin and Tampon Vendor:

1. Basis-of-Design Product: Bobrick Washroom Equipment, Inc; Model 6806
2. Mounting: Surface mounted.
3. Capacity: 30 tampons, 20 napkins.
4. Operation: No coin (free).
5. Exposed Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).
6. Lockset: Tumbler type with separate lock and key for coin box.

F. Sanitary-Napkin Disposal Unit:

1. Basis-of-Design Product: Bobrick Washroom Equipment, Inc; Model B-270
2. Mounting: Surface mounted.
3. Door or Cover: Self-closing, disposal-opening cover.
4. Receptacle: Removable.
5. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).

G. Mirror Unit:

1. Basis-of-Design Product: Bobrick Washroom Equipment, Inc; Model B-290
2. Frame: Stainless steel angle, 0.05 inch (1.3 mm) thick.
  - a. Corners: Welded and ground smooth.
3. Size: As indicated on Drawings.
4. Hangers: Manufacturer's standard rigid, tamper and theft resistant.

## 1.9 PUBLIC-USE SHOWER ROOM ACCESSORIES

A. Shower Curtain Rod:

1. Basis-of-Design Product: Inpro Architectural Products; Shower Rods
2. Description: 1-inch- (25.4-mm-) outside diameter, straight rod.
3. Configuration: As indicated on Drawings
4. Mounting Flanges: Exposed fasteners; in material and finish matching rod.
5. Rod Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).

B. Shower Curtain:

1. Basis-of-Design Product: Inpro Architectural Products; 24 Hour Shower Curtains
2. Size: Minimum 12 inches (305 mm) wider than opening by 72 inches (1829 mm) high.
3. Material: Nylon-reinforced vinyl, minimum 9 oz. (255 g) or 0.008-inch- (0.2-mm-) thick vinyl, with integral antibacterial and flame-retardant agents.
4. Grommets: Corrosion resistant at minimum 6 inches (152 mm) o.c. through top hem.

5. Shower Curtain Hooks: Chrome-plated or stainless steel, spring wire curtain hooks with snap fasteners, sized to accommodate specified curtain rod. Provide one hook per curtain grommet.

C. Folding Shower Seat:

1. Basis-of-Design Product: Bobrick Washroom Equipment, Inc; Model B-5181
2. Configuration: L-shaped seat, designed for wheelchair access.
3. Seat: Phenolic or polymeric composite of slat-type or one-piece construction in color as selected by Architect.
4. Mounting Mechanism: Stainless steel, ASTM A480/A480M No. 4 finish (satin).

D. Soap Dish:

1. Basis-of-Design Product: Bobrick Washroom Equipment, Inc; Model B-76727
2. Description: Surface mounted, with the following features:
3. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).

E. Robe Hook:

1. Basis-of-Design Product: Bobrick Washroom Equipment, Inc; Model B-76727
2. Description: Double-prong unit.
3. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).

#### 1.10 CHILDCARE ACCESSORIES

A. Diaper-Changing Station:

1. Basis-of-Design Product: Koala Kare; Model KB200
2. Description: Horizontal unit that opens by folding down from stored position and with child-protection strap.
  - a. Engineered to support minimum of 200-lb static load when opened.
3. Mounting: Surface mounted, with unit projecting not more than 4 inches (102 mm) from wall when closed.
4. Operation: By pneumatic shock-absorbing mechanism.
5. Material and Finish: HDPE in manufacturer's standard color.
6. Liner Dispenser: Provide built-in dispenser for disposable sanitary liners.

#### 1.11 CUSTODIAL ACCESSORIES

A. Custodial Mop and Broom Holder:

1. Basis-of-Design Product: Bobrick Washroom Equipment, Inc; Model B-224 x 36
2. Description: Unit with shelf, hooks, holders, and rod suspended beneath shelf.
3. Length: 36 inches (914 mm).
4. Hooks: Three.
5. Mop/Broom Holders: Four, spring-loaded, rubber hat, cam type.
6. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).
  - a. Shelf: Not less than nominal 0.05-inch- (1.3-mm-) thick stainless steel.
  - b. Rod: Approximately 1/4-inch- (6-mm-) diameter stainless steel.

1.12 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.
  - 1. Remove temporary labels and protective coatings.
- B. Grab Bars: Install to comply with specified structural-performance requirements.
- C. Shower Seats: Install to comply with specified structural-performance requirements.

1.13 ADJUSTING AND CLEANING

- A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.
- B. Clean and polish exposed surfaces according to manufacturer's written instructions.

END OF SECTION 102800

## SECTION 104116 – EMERGENCY KEY CABINETS

### 1.1 PRODUCTS

#### A. Exterior Emergency Key Cabinets:

1. Basis-of-Design: Rapid Entry System Hinged Door Series 3200 Knox-Box as manufactured by Knox Co., Phoenix, AZ,
2. Locations: Adjacent to the front entrances as directed by local Fire Department.
3. Exterior emergency key cabinets shall be approximately 4"H x 5" W x 3-3/4" D capable of holding up to 10 keys and access cards in interior compartment, fabricated of heavy duty drill-resistant 1/4" solid steel housing 100% welded construction.
4. High security UL listed double-action rotating tumblers and hardened steel pins accessed by a biased cut key. Lock shall have 1/8" thick stainless steel dust cover with tamper seal mounting capability. Provide 4 keys to each cabinet master-keyed to the local Fire Department keying system.
5. Dead bar protected stainless steel hinge.
6. Door: 1/2-inch thick steel door with three-bolt latch and weather resistant door gasket.
7. Hinged door shall allow single hand operation.

#### B. Installation:

1. Exterior emergency key cabinets mounting locations shall be as directed and approved by the local Fire Department.
2. Mounting substrate must be approved by manufacturer.

END OF SECTION 104116

## SECTION 104313 - DEFIBRILLATOR CABINETS

### 1.1 OWNER-FURNISHED PRODUCTS

- A. Defibrillator equipment.

### 1.2 AED CABINET

- A. Cabinet Type: Suitable for mounting AED with emergency telephone and alarm.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. JL Industries, Inc.; a division of the Activar Construction Products Group.
    - b. Strike First Corporation of America.
    - c. Equal as approved by Architect.
- B. Cabinet Construction: Nonrated.
- C. Cabinet Material: Aluminum.
- D. Recessed Cabinet: Cabinet box fully recessed with flat trim.
- E. Door Style: Fully glazed panel with frame.
- F. Door Glazing: Acrylic sheet.
  - 1. Acrylic Sheet Color: Clear transparent acrylic sheet.
- G. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.
- H. Accessories:
  - 1. Alarms: Standard 85 db Commander cabinet-mounted alarm, battery-operated; Alarm deactivates when door is closed.
  - 2. Alarm door contact device: Manufacturer's standard.
  - 3. Cabinet Lettering: Standard door graphics, applied after field-painting.
  - 4. Wall signer: AED wall signs, coordinate with Architect.
- I. Materials:
  - 1. Aluminum: ASTM B221 (ASTM B221M) for extruded shapes and aluminum sheet, with strength and durability characteristics of not less than Alloy 6063-T5 for aluminum sheet.
    - a. Finish: Clear Anodized.
  - 2. Transparent Acrylic Sheet: ASTM D 4802, Category A-1 (cell-cast sheet), 3 mm thick, with Finish 1 (smooth or polished).

1.3 FABRICATION

- A. AED 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. 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.
  - 1. Fabricate door frames with tubular stiles and rails and hollow-metal design, minimum 1/2 inch (13 mm) thick.
  - 2. Fabricate door frames of one-piece construction with edges flanged.
  - 3. Miter and weld perimeter door frames.

END OF SECTION 104313

## SECTION 104413 - FIRE PROTECTION CABINETS

### 1.1 SUMMARY

- A. Section Includes:
  - 1. Fire-protection cabinets for the following:
    - a. Portable fire extinguisher.

### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Show door hardware, cabinet type, trim style, and panel style. Include roughing-in dimensions and details showing recessed-, semirecessed-, or surface-mounting method and relationships of box and trim to surrounding construction.
  - 2. Show location of knockouts for hose valves.
- B. Shop Drawings: For fire-protection cabinets.
  - 1. Include plans, elevations, sections, details, and attachments to other work.
- C. Samples: For each type of exposed finish required.
- D. Product Schedule: For fire-protection cabinets. Indicate whether recessed, semirecessed, or surface mounted. Coordinate final fire-protection cabinet schedule with fire-extinguisher schedule to ensure proper fit and function. Use same designations indicated on Drawings.

### 1.3 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For fire-protection cabinets to include in maintenance manuals.

### 1.4 COORDINATION

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

### 1.5 PRODUCTS

- A. Fire-Protection Cabinets:
  - 1. Type: Fire extinguisher.
  - 2. Cabinet Construction: Nonrated.
  - 3. Mounting: Semirecessed or Surface mounted.

4. Door Style: Vertical duo panel with frame.
5. Door Glazing: Acrylic sheet.
6. Materials:
  - a. Aluminum: ASTM B221 (ASTM B221M) for extruded shapes and aluminum sheet, with strength and durability characteristics of not less than Alloy 6063-T5 for aluminum sheet.
  - b. Finish: Clear anodic.

## 1.6 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. Miter corners and grind smooth.
  3. 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.
  1. Fabricate door frames with tubular stiles and rails and hollow-metal design, minimum 1/2 inch (13 mm) thick.
  2. Miter and weld perimeter door frames and grind smooth.
- C. Cabinet Trim: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.

## 1.7 INSTALLATION

- A. General: Install fire-protection cabinets in locations and at mounting heights indicated or, if not indicated, at heights acceptable to authorities having jurisdiction.
- B. Fire-Protection Cabinets: Fasten cabinets to structure, square and plumb.
  1. Unless otherwise indicated, provide recessed fire-protection cabinets. If wall thickness is inadequate for recessed cabinets, provide semirecessed fire-protection cabinets.
  2. Provide inside latch and lock for break-glass panels.
  3. Fasten mounting brackets to inside surface of fire-protection cabinets, square and plumb.
- C. Identification:
  1. Apply vinyl lettering on field-painted fire-protection cabinets after painting is complete.

END OF SECTION 104413

## SECTION 104416 - FIRE EXTINGUISHERS

### 1.1 PERFORMANCE REQUIREMENTS

- A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."
- B. 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 FM Global.

### 1.2 PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS

- A. Fire Extinguishers: Type, size, and capacity for each fire-protection cabinet and mounting bracket indicated.
  - 1. Source Limitations: Obtain fire extinguishers, fire-protection cabinets, and accessories, from single source from single manufacturer.
  - 2. Valves: Nickel-plated, polished-brass body.
  - 3. Handles and Levers: Stainless steel.
  - 4. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B.
- B. Multipurpose Dry-Chemical Type in Aluminum Container: UL-rated 3-A:40-B:C, 5-lb (2.3-kg) nominal capacity, with monoammonium phosphate-based dry chemical in enameled-aluminum container.
- C. Mounting Brackets: Manufacturer's standard galvanized steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated or black baked-enamel finish.
  - 1. Source Limitations: Obtain mounting brackets and fire extinguishers from single source from single manufacturer.

### 1.3 INSTALLATION

- A. General: Install fire extinguishers and mounting brackets in locations indicated and in compliance with requirements of authorities having jurisdiction.

END OF SECTION 104416

## SECTION 105129 - PHENOLIC LOCKERS

### 1.1 SUMMARY

- A. Section Includes:
  - 1. Phenolic lockers.

### 1.2 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 each type of locker.
- B. Shop Drawings: For phenolic lockers.
  - 1. Include plans, elevations, sections, and attachment details.
  - 2. Show details full size.
  - 3. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
  - 4. Show locations and sizes of cutouts and holes for items installed in lockers.
  - 5. Show locker fillers, trim, base, sloping tops, and accessories.
  - 6. Show locker identification system and numbering sequence.
- C. Samples for Verification: For the following products:
  - 1. Phenolic panels, not less than 8 by 10 inches (200 by 250 mm), for each type, color, pattern, and surface finish.

### 1.3 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Sample Warranty: For special warranty.

### 1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For adjusting, repairing, and replacing locker doors and latching mechanisms to include in maintenance manuals.

### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver lockers until painting and similar operations that could damage lockers have been completed in installation areas. If lockers must be stored in other-than-installation areas, store only in areas where environmental conditions are the same as those in final installation location, and comply with requirements specified in "Field Conditions" Article.

## 1.6 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install lockers until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature between 60 and 90 deg F (16 and 32 deg C) and relative humidity between 43 and 70 percent during the remainder of the construction period.
- B. Field Measurements: Where lockers are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings.
  - 1. Locate concealed framing, blocking, and reinforcements that support lockers by field measurements before being enclosed, and indicate measurements on Shop Drawings.
- C. Established Dimensions: Where lockers are indicated to fit to other construction, establish dimensions for areas where lockers are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

## 1.7 COORDINATION

- A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of work specified in other Sections to ensure that lockers can be supported and installed as indicated.

## 1.8 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of lockers that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Structural failures.
    - b. Faulty operation of locks or hardware.
    - c. Deterioration of finishes, and other materials beyond normal use.
  - 2. Warranty Period: Three years from date of Substantial Completion.

## 1.9 MANUFACTURERS

- A. Source Limitations: Obtain phenolic lockers from single source from single manufacturer.

## 1.10 PERFORMANCE REQUIREMENTS

- A. Accessibility Standard: For lockers indicated to be accessible, comply with applicable provisions in the ABA standards of the Federal agency having jurisdiction and ICC A117.1
- B. 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.

#### 1.11 PHENOLIC LOCKERS

- A. Construction Style: Manufacturer's standard mortise and tenon. Butt joints are unacceptable.
- B. Athletic Locker Configuration:
  1. Stadium Lockers: 24 inches wide x 24 inches deep x 72 inches high
  2. Two-tier Lockers: 18 inches wide x 18 inches deep x 72 inches high
  3. Five-tier Lockers: 18 inches wide x 18 inches deep x 72 inches high
- C. Locker Body: Fabricated from solid phenolic panels.
  1. Side Panels: 5/16 inch (8 mm) thick.
  2. Back Panel: 5/16 inch (8 mm) thick.
  3. Top Panel: 3/8 inch (10 mm) thick.
  4. Bottom Panel: 3/8 inch (10 mm) thick.
- D. Doors: 1/2 inch (13 mm) thick, solid phenolic panel fabricated to full width of locker; frameless with perimeter ventilation.
- E. End Panels: 1/2 inch (13 mm) thick, solid phenolic matching door style, material, construction, and finish.
- F. Shelves: 3/8 inch (10 mm) thick, solid phenolic.
- G. Slope Tops: 1/2-inch- (13-mm-) thick, solid phenolic panel matching door faces.
- H. Toe-Kick Plates: 1/2-inch- (13-mm-) thick, solid phenolic panel matching door faces.
- I. Phenolic: Solid phenolic with same color throughout material. Laminated surfaces are unacceptable.
- J. Cylinder Lock: Built-in, flush, spring bolt locks with five-pin tumbler keyway, keyed separately and master keyed.

#### 1.12 INSTALLATION

- A. Install lockers level, plumb, and true; use concealed shims.
- B. Connect groups of lockers together with manufacturer's standard fasteners, through predrilled holes, with no exposed fasteners on face frames. Fit lockers accurately together to form flush, tight, hairline joints.
- C. Install lockers without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings, providing unencumbered operation. Complete installation of hardware and accessory items as indicated.

1. Installation Tolerance: No more than 1/8 inch in 96-inch (3 mm in 2400-mm) sag, bow, or other variation from a straight line. Shim as required with concealed shims.
- D. Scribe and cut corner and filler panels to fit adjoining work using fasteners concealed where practical. Repair damaged finish at cuts.

END OF SECTION 105129

## SECTION 107516 - GROUND-SET FLAGPOLES

### 1.1 SUMMARY

- A. Section includes ground-mounted flagpoles made from aluminum.
- B. Owner-Furnished Material: Flags.

### 1.2 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Flagpole assemblies, including anchorages and supports, shall withstand the effects of gravity loads, and the following loads and stresses within limits and under conditions indicated according to the following design criteria:
  - 1. Seismic Loads: According to SEI/ASCE 7.
  - 2. Wind Loads: 90 mph according to NAAMM FP 1001, "Guide Specifications for Design of Metal Flagpoles."
  - 3. Base flagpole design on two (2) polyester flags of maximum standard size (3-feet by 5-feet) suitable for use with each flagpole or flag size indicated, whichever is more stringent.

### 1.3 FLAGPOLES

- A. Flagpole Construction, General: Construct flagpoles in one piece if possible. If more than one piece is necessary, comply with the following:
  - 1. Fabricate shop and field joints without using fasteners, screw collars, or lead caulking.
  - 2. Provide flush hairline joints using self-aligning, snug-fitting, internal sleeves.
  - 3. Provide self-aligning, snug-fitting joints.
- B. Exposed Heights: 30-feet (9 m) and 25-feet (7.5 m).
- C. Aluminum Flagpoles: Provide cone-tapered flagpoles fabricated from seamless extruded tubing complying with ASTM B 241/B 241M, Alloy 6063, with a minimum wall thickness of 3/16 inch (4.8 mm).
- D. Metal Foundation Tube: Manufacturer's standard corrugated-steel foundation tube, not less than 0.064-inch- (1.6-mm-) nominal wall thickness. Provide with 3/16-inch (4.8-mm) steel bottom plate and support plate; 3/4-inch- (19-mm-) diameter, steel ground spike; and steel centering wedges welded together. Galvanize steel after assembly. Provide loose hardwood wedges at top of foundation tube for plumbing pole.
  - 1. Provide flashing collar of same material and finish as flagpole.
  - 2. Provide steel ground protectors extending 12 inches (300 mm) aboveground and 6 inches (150 mm) belowground for steel flagpoles where flashing collars are not provided.

- E. Cast-Metal Shoe Base: For anchor-bolt mounting; provide with anchor bolts.
  - 1. Provide units made from aluminum with same finish and color as flagpoles.
  - 2. Provide ground spike at grade-mounted flagpoles.
  - 3. Provide connector to building's lightning protection system conductor at roof-mounted flagpoles.
  
- F. Finial Ball: Manufacturer's standard flush-seam ball, sized as indicated or, if not indicated, to match flagpole-butt diameter.
  - 1. 0.063-inch (1.6-mm) spun aluminum, finished to match flagpole.
  
- G. Internal Halyard, Winch System: Manually operated winch with control stop device and removable handle, stainless-steel cable halyard, and concealed revolving truck assembly with plastic-coated counterweight and sling. Provide flush access door secured with cylinder lock. Finish truck assembly to match flagpole.
  - 1. Halyard Flag Snaps: Provide two chromium-plated bronze swivel snap hooks per halyard.

END OF SECTION 107516

## SECTION 113013 - RESIDENTIAL APPLIANCES

### 1.1 SUMMARY

- A. Section Includes:
  - 1. Cooking appliances.
  - 2. Kitchen exhaust ventilation.
  - 3. Refrigeration appliances.
  - 4. Cleaning appliances.

### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include installation details, material descriptions, dimensions of individual components, and finishes for each appliance.
  - 2. Include rated capacities, operating characteristics, electrical characteristics, and furnished accessories.
- B. Product Schedule: For appliances. Use same designations indicated on Drawings.

### 1.3 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For manufacturer.
- B. Product Certificates: For each type of appliance.
- C. Field quality-control reports.
- D. Sample Warranties: For manufacturers' special warranties.

### 1.4 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For each residential appliance to include in operation and maintenance manuals.

### 1.5 WARRANTY

- A. Special Warranties: Manufacturer agrees to repair or replace residential appliances or components that fail in materials or workmanship within specified warranty period.
- B. Electric Range: Limited warranty, including parts and labor for first year and parts thereafter, for on-site service on surface-burner elements.

1. Warranty Period: Two years from date of Substantial Completion.
- C. Microwave Oven: Limited warranty, including parts and labor for first year and parts thereafter, for on-site service.
  1. Warranty Period: Two years from date of Substantial Completion.
- D. Refrigerator/Freezer, Sealed System: Limited warranty, including parts and labor for first year and parts thereafter, for on-site service on the product.
  1. Warranty Period for Sealed Refrigeration System: Five years from date of Substantial Completion.
  2. Warranty Period for Other Components: Two years from date of Substantial Completion.
- E. Dishwasher: Limited warranty, including parts and labor for first year and parts thereafter, for on-site service on the product.
  1. Warranty Period: Two years from date of Substantial Completion.
- F. Clothes Washer: Limited warranty, including parts and labor for first year and parts thereafter, for on-site service on the product.
  1. Warranty Period: Two years from date of Substantial Completion.

#### 1.6 APPLIANCES

- A. Electric Range: Freestanding range with one oven(s).
  1. Basis-of-Design: GE Appliances, 30" Drop-in Electric Range, Model JD630DF
  2. Material: Porcelain-enameled steel with manufacturer's standard cooktop.
- B. Microwave Oven: Conventional type, over-range mounted.
  1. Basis-of-Design: Fisher & Paykel 30" Over-the-Range Microwave, Model CMOH-30SS-2Y
  2. Exhaust Fan: Vented to outside.
  3. Material: Stainless steel.
- C. Microwave Oven: Conventional, countertop type.
  1. Basis-of-Design: GE Appliances 1.6 Cu. Ft. Countertop Microwave Oven, Model JE1657SM
  2. Material: Stainless steel.
- D. Overhead Exhaust Hood: Wall-mounted or Suspended-island-canopy system.
  1. Fan: Built into hood and vented to outside or nonvented, recirculating type.
  2. Finish: Stainless steel.
- E. Refrigerator/Freezer: Freestanding, two-door refrigerator/freezer with freezer on top.
  1. Basis-of-Design: GE Appliances 15.5 Cu. Ft. Top-Freezer Refrigerator, Model GTS16GTH
  2. Front Panel(s): Porcelain enamel.

- F. Refrigerator/Freezer: Undercounter, one-door refrigerator with freezer compartment inside.
  - 1. Front Panel(s): Manufacturer's standard.
- G. Dishwasher: Built in.
  - 1. Basis-of-Design: GE Appliances, Stainless Steel Interior Dishwasher with Hidden Controls, Model GDT225SSL
  - 2. Front Panel: Stainless steel.
- H. Clothes Washer: Freestanding/Stackable type, front-loading.
  - 1. Basis-of-Design: Bosch 24" Compact Washer, 500 Series, Model WAT28401UC, ADA compliant.
  - 2. Front Panel: Porcelain enamel.
- I. Clothes Dryer: Freestanding/Stackable type, electric ventless unit.
  - 1. Basis-of-Design: Bosch 24" Compact Condensation Dryer, 300 Series, Model WTG86400UC, ADA compliant
  - 2. Front Panel: Porcelain enamel.

#### 1.7 INSTALLATION

- A. Install appliances according to manufacturer's written instructions.
- B. Built-in Equipment: Securely anchor units to supporting cabinets or countertops with concealed fasteners. Verify that clearances are adequate for proper functioning and that rough openings are completely concealed.
- C. Freestanding Equipment: Place units in final locations after finishes have been completed in each area. Verify that clearances are adequate to properly operate equipment.
- D. Range Anti-Tip Device: Install at each range according to manufacturer's written instructions.

#### 1.8 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections with the assistance of a factory-authorized service representative:
  - 1. Perform visual, mechanical, and electrical inspection and testing for each appliance according to manufacturers' written recommendations. Certify compliance with each manufacturer's appliance-performance parameters.
  - 2. Leak Test: After installation, test for leaks. Repair leaks and retest until no leaks exist.
  - 3. Operational Test: After installation, start units to confirm proper operation.
  - 4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and components.
- B. An appliance will be considered defective if it does not pass tests and inspections.
- C. Prepare test and inspection reports.

1.9 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain residential appliances.

END OF SECTION 113100

## SECTION 114000 - FOOD SERVICE EQUIPMENT

### PART 1 GENERAL

#### 1.1 SUMMARY

- A. Section includes Foodservice Equipment as scheduled on the drawings
- B. Whenever the term "KEC" or "Kitchen Equipment Contractor" is used, it shall be the company that is the successful bidder and is awarded the contract for the erection and completion of the work that is outlined herein to the complete satisfaction of the Owner's Representative.
- C. Whenever the term "FSEC" is used, it shall refer to the Food Service Equipment Consultant.
- D. KEC must perform all work in a timely fashion which is aligned with the overall construction schedule for the project. KEC must communicate any delays or schedule conflicts that they foresee to architect and general contractor in a timely fashion. Failure to communicate delays will not be acceptable.

#### 1.2 RELATED WORK

Division 01 – General Requirements

Division 26 – Mechanical Contractor

Division 23 – Electrical Contractor

#### 1.3 SUBMITTALS

- A. Within five (5) calendar days after award of contract, the KEC must provide an itemized list of equipment included in bid to the Owner, Architect, & FSEC for review to confirm conformity to written specifications. Failure to follow specifications as detailed in this Division 11 4000 may result in disqualification.
- B. Within thirty (30) calendar days after award of contract, the KEC is to supply (1) electronic copy and (4) printed, ¼" equals 1'-0" scale dimensioned plan drawings indicating location of all food service equipment along with its associated mechanical, electrical, plumbing, special conditions requirements and shop drawings for any and all custom fabricated equipment requiring approval prior to production.
- C. Within thirty (30) calendar days after award of contract, the KEC shall submit in quadruplicate, specification sheets with full data on all items of brand name manufacturer, catalog cuts to be organized in a single electronic document and clearly identified with item number to correspond with itemized specifications, hereinafter indicated.

- D. Approval of detailed shop drawings and specification sheets shall not waive obligation of KEC to furnish materials and methods of construction called for in specifications, even though they may be shown incorrectly, or, not at all, in the drawings.
- E. KEC must provide in duplicate paper copy and electronic copy a complete Operation and Maintenance Manual document for the project. KEC is responsible for confirming that these requirements meet needs as called for in General Requirements section of this bid specification.
- F. KEC must furnish all registered warranty information as of date of substantial completion to GC and Owner's Representative as it pertains to the equipment and services called for in this section 11 4000 specification.
- G. All equipment of brand name manufacturer shall be of the latest model or succeeding model at the time of the delivery. Any price adjustment in connection with this shall be requested of the Owner's Representative in writing.

#### 1.4 WARRANTY

- A. Submit KEC's guarantee for all workmanship, material and equipment, for a period of one (1) year from the time the equipment is put into operation and accepted by the Owner's Representative. This warranty period shall not supersede any requirements made in the architectural specifications and it will be the responsibility of the KEC to confirm warranty coverage.
- B. Guarantee and conditions of service on items of brand name manufacturer, as established by the manufacturers, shall apply where extending beyond the guarantee and service set forth in these specifications.
- C. Reach-In Refrigeration Systems: For any reach in refrigeration units there shall be provided a full three year system parts and labor warranty to cover installation and parts associated with the reach-in refrigeration units; five year warranty on compressor/condensing unit and coil to cover parts and materials.
- D. Remote-Refrigeration Systems: For any remote refrigeration systems there shall be provided a full one year parts and labor warranty for any labor performed to install said remote refrigeration system. Additionally, a 5 year parts warranty should be provided on all compressors on remote refrigeration systems.

#### 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced installer to perform work of this Section, who has specialized in installation of Food Service Equipment for a minimum of (5) years. Installer must have a successful performance record.
- B. The following are basic specifications of items of custom fabricated equipment covering the type and quality of materials, the method of fabrication, assembly and design and will be referred to in the itemized specifications by the term "as specified".

- C. All items of custom fabrication shall be the product of the single manufacturer of such equipment so as to insure uniformity throughout.
- D. All metal gauges shall be United States Standard.
- E. All workmanship shall be of the finest and all materials shall be new, of best quality and without flaws.
- F. NSF Standards: Comply with Applicable NSF International standards and criteria. All equipment to have NSF mark on each equipment item, unless otherwise indicated.
- G. All equipment shall comply with National Sanitation Foundation standards and all Federal, State and Local Health Codes.
- H. All gas equipment to be U.L. and AGA approved.
- I. All electrical equipment shall wear Underwriter's seal of approval.
- J. KEC to take part in Pre-Installation Conference and prescribed construction meeting(s). Coordinate with all trades for access, connections, disconnects and code compliance.

#### 1.6 SUBSTITUTIONS

- A. Submit a written request to the FSEC and Architect for approval not less than (10) ten business days prior to bid date. Include description, drawings, and equipment cut sheet, performance test data and any other pertinent information regarding the specified item. Approval is subject to FSEC and Owner review.
- B. Any substitute for materials specified, or changes in methods of construction from the way specified and shown on the approved detail drawings is to be requested, in writing, from the Owner's Representative and FSEC, before any such substitution is applicable.
- C. Should any substituted items necessitate changes in utility connections related to this item, it will be the obligation of the KEC to properly notify the GC, Owner's Representative, and FSEC of such impacts at time of submittal request to ensure complete budget for cost impact of substitution is captured. Failure to notify said parties of any changes to utility requirements which result in additional costs to the project will be covered at the expense of the KEC.

#### 1.7 DELIVERY, STORAGE AND HANDLING

- A. KEC will be responsible for storing equipment in safe and secure location prior to delivery to final project location. All equipment stored by KEC shall be covered by adequate insurance in order to protect from damage and loss.
- B. Deliver food service equipment as complete units with protective covering and in original boxes or crating.
- C. Remove packaging into site construction dumpsters to be provided by others.

- D. KEC supplied equipment shall be uncrated, set in place, sealed to wall (where noted) and sealed with NSF Silver, Clear or White silicone to be reviewed with owner.
- E. KEC is responsible for ensuring equipment is level and made ready for final connections by necessary trades.

## 1.8 SITE CONDITIONS

- A. It is the responsibility of the KEC to verify dimensions of food service equipment installation areas by conducting field measurements before custom fabricated equipment is approved for production.
- B. Establish rough-ins for all electrical, plumbing and mechanical connections and verify placement by conducting field visits to the project site as necessary.
- C. Where field measurements cannot be made without delaying the work, KEC shall establish required dimensions with architect and GC and proceed with fabricating equipment upon written approval of requisite hold-to dimensions.
- D. Coordinate construction dimensions and installation with other work as indicated in section 1.2.
- E. Field verification and coordination with G.C. to ensure that units can be delivered to their final destination through existing building openings. If KEC cannot build and install equipment in a fashion that utilizes existing building openings they must notify the architect and general contractor in writing to coordinate alternative delivery methods prior to bid. Failure to notify design team of delivery issues may result in additional costs that will be the responsibility of the KEC.

## PART 2 – PRODUCTS

### 2.1 QUALIFIED FABRICATORS

- A. **QUALIFICATIONS:** Minimum (5) years experience constructing similar equipment for food service applications.
- B. **Authorized Equipment Fabricators:** The companies which have been listed below are approved for fabrication of stainless steel equipment detailed for this project. Substitutions are permitted per Section 1.6.
  - 1. Eagle Group
  - 2. Advance Tabco
  - 3. John Boos

### 2.2 GENERAL REQUIREMENTS

- A. All items of custom fabrication shall be the product of the single manufacturer of such equipment so as to insure uniformity throughout.
- B. All stainless steel to be fabricated per written specification for each item provided in section 3.5 **PRODUCT SPECIFICATIONS** below.
- C. All piecing of stainless steel, whether on cabinet surfaces or cabinet bases, shall be continuous welded joints. All welded joints shall be smooth and polished to original finish.

- D. Where galvanized iron is specified, it shall be copper bearing sheets, used in largest sizes with as few joints as possible. All welded joints shall be sandblasted and finished with rustproof galvanized zinc compound. All galvanized iron is to be finished with a prime coat and two (2) finish coats of hammerloid enamel.
- E. When plywood is used for backing, supports, construction of casework, it shall be no less than exterior grade plywood, manufactured per U.S. Product Standard PS-1-83, 5 or 7 ply, with waterproof glue.
- F. Where marine grade plywood is specified it will be manufactured per U.S. Product Standard PS-1-83, complete with Douglas Fir 1 and Western Larch. Plywood shall be 5 or 7 ply with waterproof glue.
- G. KEC is responsible for delivery assembly of all equipment in locations as they are reflected in the architectural and food service plans.
- H. KEC is responsible for caulking along seams for all equipment. Silicone shall be gray or silver to match finish of equipment. All sealing of equipment must be done in a neat and workmanlike manner.

## 2.3 FABRICATION REQUIREMENTS

### A. BASE CABINETS

To be constructed per shop drawings included in food service plans for this project. Cabinets must be constructed using methods specified in shop drawings.

### B. PIPE STANDS AND OPEN BASE TABLES

All open base tables shall be constructed per description provided for each item in written specification listed below in section 3.4 PRODUCT SPECIFICATIONS.

### C. FIELD JOINTS

IF NECESSARY, all field joints in both tops and cabinet bases shall be completely welded or seamed on the job and ground smooth and polished to match original finish by KEC. Tack welding or bolting in the field will not be accepted.

### D. DRAIN BOARDS

All drain boards shall be constructed per description provided for each item in written specification listed below in section 3.4 PRODUCT SPECIFICATIONS.

### E. DRAWERS

All drawers shall be constructed per description provided for each item in written specification listed below in section 3.4 PRODUCT SPECIFICATIONS and food service plans.

### F. DOORS

All doors shall be constructed per description provided for each item in written specification listed below in section 3.4 PRODUCT SPECIFICATIONS and food service plans.

#### G. CLOSURE AND TRIM PANELS

Where applicable above exhaust hoods and walk-in refrigeration the KEC will be responsible to provide closure and trim panels that match the finish of the equipment that they are incorporated into.

#### H. ELEVATED SHELVING

Shelving to be mounted at a height of 54" AFF unless specified otherwise in an items particular written specification or food service plans.

#### I. WALL FLASHING

KEC will be responsible for furnishing wall flashing underneath all Type I exhaust hoods. Metal used must be 22 gauge stainless and include trim at all breaks in the flashing panels. Flashing must be provided from top of finished floor to bottom side of hood and run complete length of hood unless local codes mandates to extend flashing 18" beyond exhaust hood. KEC to confirm with local Authority having jurisdiction before installation. It is the responsibility of the KEC to confirm that wall construction behind the hood is non-combustible. Should any materials be deemed to be limited combustible or combustible it will be responsibility of KEC to provide adequate clearance from materials. No Penetrations other than utilities to serve equipment allowed. Construction grade adhesive, or acceptable alternate, to secure flashing to wall; no mechanical fasteners to be used

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. The KEC is to deliver set in place, and make ready for final connections all equipment which they provided per this section at locations where shown on plan. Applicable trades, unless otherwise noted, will be responsible for final utility connections.
- B. Install food service equipment level and plumb, according to manufacturer's written instructions, original design and referenced standards.
- C. Install equipment with access and maintenance clearances according to manufacturer's written instructions and requirements of authorities having jurisdiction.
- D. Provide cutouts in equipment, neatly formed where required in order to run service lines through equipment to make final connections.
- E. Provide final protection and maintain conditions, in a manner acceptable to manufacturers and installer that ensure food service equipment is without damage or deterioration at the time of substantial completion.

- F. KEC responsible for delivery and hanging of exhaust hood and wall flashing. KEC to supply exhaust fan(s), MUA, curbs as noted in product specifications. Mechanical contractor responsible for installation of curbs, fans, MUA, ducting and pulling necessary permits.
- G. KEC will be responsible for delivery of any walk-in refrigeration panels and systems to the project site unless otherwise specified. KEC is responsible for erecting all walk-in panels including necessary caulking as required by manufacturer to allow for proper performance. KEC is responsible for confirming that the pad on which any walk-in box will sit is transit level to ensure proper construction of the box by installer.
- H. KEC will be responsible for hanging evaporator coils per drawings. KEC to coordinate the location of condensing units with GC and MC. The installation of the remote condensing unit is the responsibility of the KEC but the installation of the curb on which the condensing unit should rest as well as any penetrations needed to run refrigeration lines through will performed by the GC.
- I. Walk-in lights to be hung and wired by EC. Exposed conduit inside walk in complex not acceptable to wire components.
- J. Heat tape and NEMA rated outlet to which it connects inside walk-in unit is to be provided and installed by EC. Exposed conduit acceptable; penetrations must be sealed inside and out as to not create transfer of temperatures.
- K. All hand sinks are to be provided by KEC and installed by PC.
- L. Walk-in condensate piping to be provided and installed by PC. PC shall use copper plumbing. PVC will not be permitted. PC shall insulate all condensate drain lines in walk-in freezers and coolers using Armaflex.

### 3.2 CLEANING AND PROTECTION

- A. KEC shall remove all debris accumulated during the delivery and installation of his equipment daily and immediately upon completion of said installation.
- B. KEC will provide a representative, when necessary, to correlate final hook-up by related contractors, so as not to impede job progress.
- C. After final hook-up, they shall lubricate, start up and check out all equipment requiring this service, and shall clean equipment and turn over to the Owner's Representative, for their final acceptance, in first class condition, all items in their contract.
- D. Final cleaning of food service space is to be provided by GC.

### 3.3 COMMISSIONING

- A. The KEC shall provide a capable representative or representatives, to demonstrate the proper use of the equipment, at the time selected by the Owner's Representative.
- B. It will be the responsibility of the KEC to verify with the Owner's Representative a complete list of equipment which the Owner and their staff will need training on. This list shall be compiled and then signed off on by the Owner's Representative and returned to Architect and FSEC.
- C. KEC shall provide a sign in sheet for all training sessions provided and return to Owner's Representative, Architect, and FSEC for records.

- D. The Owner's Representative is to give the KEC a minimum of seven (7) calendar days prior to this demonstration date.

### 3.4 PRODUCT SPECIFICATIONS

#### **ITEM #1 TRACK SHELVING SECTION**

Quantity: One (1)  
Basis of Design: Metro  
Model: LOT

1. One (1) each BTS14NA HD qwikTRAK™ Track Set, 14 ft., includes: necessary sections of track for assembling track runs
2. One (1) each BTEK3 qwikTRAK™ High Density Storage System, stationary end unit kit, Metroseal 3™ epoxy-coated corrosion-resistant finish with Microban® antimicrobial protection, includes: (8) 74"H posts & hardware to connect stationary end units to track & anchor track to floor, NSF
3. Five (5) each BTEC qwikTRAK™ High Density Storage System, stationary end unit kit, chrome-plated finish, includes: (8) 74"H posts & hardware to connect stationary end units to track & anchor track to floor, NSF
4. Twenty-Eight (28) each 2454NK3 Quick Ship - Super Erecta® Shelf, wire, 54"W x 24"D, Metroseal™ Green epoxy-coated corrosion-resistant finish with Microban® antimicrobial protection, plastic split sleeves are included in each carton, NSF

#### **ITEM #2 WIRE SHELVING**

Quantity: LOT  
Basis of Design: Metro  
Model: LOT

1. Four (4) each 2436NK3 Quick Ship - Super Erecta® Shelf, wire, 36"W x 24"D, Metroseal™ Green epoxy-coated corrosion-resistant finish with Microban® antimicrobial protection, plastic split sleeves are included in each carton, NSF
2. Four (4) each 74PK3 Quick Ship - Super Erecta® SiteSelect™ Post, 74-1/2"H, adjustable leveling bolt, posts are grooved at 1" increments & numbered at 2" increments, double grooved every 8", Metroseal 3 Green epoxy coated corrosion-resistant finish with Microban® antimicrobial protection
3. Two (2) each HP2248PD Quick Ship - Metro Bow-Tie™ Dunnage Rack, 22" x 48" x 12"H, slotted, with separate polymer tie for joining racks, corrosion proof polymer construction, NSF

#### **ITEM #3 CAN RACK**

Quantity: One (1)  
Basis of Design: Channel Manufacturing  
Model: CSR-99M

1. Can Rack, Full Size - Mobile, Heavy-Duty Series, 25.5"W x 35"D x 82.25"H, Aluminum Construction, (162) #10 Cans or (216) #5 Cans, 5" x 2" Heavy-Duty Swivel Plate Casters w/ Zerk Grease Fitting model # CPS25U, Made in USA, NSF, 115lbs
2. 5-year warranty on parts and 90 days labor, standard
3. Lifetime warranty against rust and corrosion
4. /5B Accessories, Caster Brakes, Heavy-Duty (Set of 2), 11lbs. (ITEM WEIGHT ONLY)

**ITEM #4 OFFICE FURNITURE**

1. By Others - NIKEC

**ITEM #5 LOCKERS**

1. By Others - NIKEC

**ITEM #6 BREAKROOM COUNTER**

1. By Others - NIKEC

**ITEM #7 REACH-IN REFRIGERATOR**

Quantity: One (1)  
Basis of Design: True Mfg. - General Foodservice  
Model: T-19-HC

1. Refrigerator, reach-in, one-section, (1) solid door, (3) adjustable PVC coated shelves, interior lighting, stainless steel door, stainless steel front, aluminum sides, aluminum interior with stainless steel floor, 2-1/2" castors, R290 Hydrocarbon refrigerant, 1/10 HP, 115v/60/1-ph, 1.5 amps, NEMA 5-15P, cULus, UL EPH Classified, Made in USA
2. Self-contained refrigeration standard
3. 7 year compressor warranty, 6 years parts warranty, 5 year labor warranty standard.
4. Left door hinging
5. 2.5" castor kit (set of 4), standard

**ITEM #8 BREAKROOM FURNITURE**

1. By Others - NIKEC

**ITEM #9 ICE MAKER, CUBE-STYLE**

Quantity: One (1)  
Basis of Design: Manitowoc  
Model: IYT0900A

1. Indigo NXT™ Series Ice Maker, cube-style, air-cooled, self-contained condenser, 30"W x 24-1/2"D x 26-1/2"H, production capacity up to 865 lb/24 hours at 70°/50° (750 lb AHRI certified at 90°/70°), easyTouch display with 13 different language options, date/time stamp display, automatic reminder/alert icon, one touch asset information, automatic detection of accessories, continuous operating status, programmable production options (time, weight, day or night), one touch cleaning with displayed instructions, Alpha-San anti-microbial protection, acoustical ice sensing probe, self-diagnostic technology, DuraTech™ exterior, half-dice size cubes, R410A refrigerant, NSF, cULus, CE, ENERGY STAR®
2. Model WARRANTY-ICE-SC 3 year parts & labor (Machine), 5 year parts & labor (Evaporator), 5 year parts & 3 years labor (Compressor), standard
3. (-261) 208-230v/60/1-ph, 9.5 amps
4. AR-20000-P Arctic Pure® Plus Primary Water Filter Assembly, includes head, shroud, hardware, mounting assembly, & (1) filter cartridge, 20,000 gallon capacity, 601-1,000 lbs./ice per day
5. WARRANTY-ARCPURE 3 year parts & labor warranty on cap, housing, hardware, & mounting assembly (does not refer to filter cartridge), standard
6. D570 Ice Bin, 30"W x 34"D x 50"H, with side-hinged front-opening door, side grips, 532 lbs. application capacity, AHRI certified 17.9 cu. ft., for top-mounted ice maker, Duratech exterior, NSF
7. WARRANTY-BIN/DISP 3 year parts & labor warranty, standard
8. Legs, 6" adjustable stainless steel, standard

**ITEM #10 AIR CURTAIN**

Quantity: One (1)  
Basis of Design: Mars Air Systems  
Model: LPV248-1UA-OB

1. LPV248-1UA-OB LoPro Series 2 air curtain for 48"W door, galvanized steel cabinet with Obsidian Black powder coat finish, (1) 1/6 HP motor, 115v/60/1-ph, cETLus
2. 5 year warranty, standard
3. 1 year warranty for all parts (except filters), standard
4. 99-014 Door limit switch, plunger/roller type for indoor applications, single pole double throw, 1 HP max, 250v, 20.0 amps, NEMA 2 (remote mounted)

**ITEM #11 SPARE NO.**

**ITEM #12 WALK IN COMPLEX**

Quantity: One (1)  
Basis of Design: Kolpak  
Model: CUSTOM WALK IN

1. Walk In Cooler and Freezer complex, sized per plan, 9' 6" overall height (8' 10" interior), in 4" floor rated for cart traffic, embossed white interior finish, stainless steel exterior finish where visible (trim and closure panels to match), view port window in both doors, LED Light at door with nightlight, LED overhead lighting, LED Temperature read out. Vertical Air Shield at Cooler & Freezer Door. Refer to MFG Shop drawings for additional details

**ITEM #13                      REFRIGERATION**

Quantity:                      One (1)  
Basis of Design:              Kolpak  
Model:                              COOLER

1.              Cooler Refrigeration, remote type system, air cooled, air defrost evaporator, scroll compressor. 5 year extended warranty included

**ITEM #14                      REFRIGERATION**

Quantity:                      One (1)  
Basis of Design:              Kolpak  
Model:                              FREEZER

1.              Freezer Refrigeration, remote type system, air cooled, electric defrost evaporator, scroll compressor. 5 year extended warranty included

**ITEM #15                      DUNNAGE RACK**

Quantity:                      LOT  
Basis of Design:              Metro  
Model:                              LOT

1.              One (1) each HP2248PD Quick Ship - Metro Bow-Tie™ Dunnage Rack, 22" x 48" x 12"H, slotted, with separate polymer tie for joining racks, corrosion proof polymer construction, NSF
2.              Four (4) each 2460NK3 Quick Ship - Super Erecta® Shelf, wire, 60"W x 24"D, Metroseal™ Green epoxy-coated corrosion-resistant finish with Microban® antimicrobial protection, plastic split sleeves are included in each carton, NSF
3.              Twenty-Eight (28) each 2442NK3 Quick Ship - Super Erecta® Shelf, wire, 42"W x 24"D, Metroseal™ Green epoxy-coated corrosion-resistant finish with Microban® antimicrobial protection, plastic split sleeves are included in each carton, NSF
4.              Thirty-Two (32) each 74PK3 Quick Ship - Super Erecta® SiteSelect™ Post, 74-1/2"H, adjustable leveling bolt, posts are grooved at 1" increments & numbered at 2" increments, double grooved every 8", Metroseal 3 Green epoxy coated corrosion-resistant finish with Microban® antimicrobial protection

**ITEM #16                      DUNNAGE RACK**

Quantity:                      LOT  
Basis of Design:              Metro  
Model:                              LOT

1. One (1) each HP2248PD Quick Ship - Metro Bow-Tie™ Dunnage Rack, 22" x 48" x 12"H, slotted, with separate polymer tie for joining racks, corrosion proof polymer construction, NSF
2. Four (4) each 2460NK3 Quick Ship - Super Erecta® Shelf, wire, 60"W x 24"D, Metroseal™ Green epoxy-coated corrosion-resistant finish with Microban® antimicrobial protection, plastic split sleeves are included in each carton, NSF
3. Twenty-Eight (28) each 2442NK3 Quick Ship - Super Erecta® Shelf, wire, 42"W x 24"D, Metroseal™ Green epoxy-coated corrosion-resistant finish with Microban® antimicrobial protection, plastic split sleeves are included in each carton, NSF
4. Thirty-Two (32) each 74PK3 Quick Ship - Super Erecta® SiteSelect™ Post, 74-1/2"H, adjustable leveling bolt, posts are grooved at 1" increments & numbered at 2" increments, double grooved every 8", Metroseal 3 Green epoxy coated corrosion-resistant finish with Microban® antimicrobial protection

**ITEM #17 WIRE SHELVING**

Quantity: One (1)  
Basis of Design: Metro  
Model: LOT

1. Four (4) each 2448NK3 Quick Ship - Super Erecta® Shelf, wire, 48"W x 24"D, Metroseal™ Green epoxy-coated corrosion-resistant finish with Microban® antimicrobial protection, plastic split sleeves are included in each carton, NSF
2. Four (4) each 74PK3 Quick Ship - Super Erecta® SiteSelect™ Post, 74-1/2"H, adjustable leveling bolt, posts are grooved at 1" increments & numbered at 2" increments, double grooved every 8", Metroseal 3 Green epoxy coated corrosion-resistant finish with Microban® antimicrobial protection

**ITEM #18 WORK TABLE, STAINLESS STEEL TOP**

Quantity: One (1)  
Basis of Design: Eagle Group  
Model: T3072STE-BS

1. Spec-Master® Series Work Table, 72"W x 30"D, 4-1/2"H backplash, 14/300 series stainless steel top, rolled front edge, Uni-Lok® gusset system, stainless steel crossrails on side & rear, (4) stainless steel legs & adjustable bullet feet, NSF

**ITEM #19 INGREDIENT BIN**

Quantity: Three (3)  
Basis of Design: Cambro  
Model: IBS37148

1. Ingredient Bin, mobile, 37 gallon capacity, 1-pc seamless polyethylene bin, 2-pc sliding polycarbonate lid, scoop holder included (scoop sold separately), (4) 3" heavy duty casters (2 front swivel, 2 fixed), white with clear cover, NSF

**ITEM #20                      MOBILE HEATED CABINET**

Quantity:                      One (1)  
Basis of Design:              Metro  
Model:                              C549-ASFS-U

1. 4 Series with Insulation Armour™ Plus, mobile heated holding cabinet, full height, insulated solid door, top mount controls, thermostat to 200°F, universal wire slides on 3" centers, adjustable on 1-1/2" increments, (17) 18" x 26" or (34) 12" x 20" x 2-1/2" pan capacity, 5" casters, stainless steel, 120v/60/1, 1400 watts, 11.7 amps, NEMA 5-15P, cULus, NSF, ENERGY STAR®
2. 1 year warranty against manufacturing defects

**ITEM #21                      HAND SINK**

Quantity:                      Four (4)  
Basis of Design:              Eagle Group  
Model:                              HSA-10-LRS

1. Hand Sink, wall mount, 13-1/2" wide x 9-3/4" front-to-back x 6-3/4" deep bowl, 304 stainless steel construction, requires splash mounted faucet, deep-drawn seamless design-positive drain, inverted "V" edge, NSF
2. Left & right side splashes
3. T&S Brass EC-3105 ChekPoint™ Electronic Faucet, wall mount, 4" centers, rigid gooseneck spout, 2.2 GPM vandal resistant aerator, AC/DC control module with internal flow control, temperature control mixing valve with integral check valves, chrome-plated brass, flexible stainless steel supply hoses, ADA Compliant

**ITEM #22                      PLANETARY MIXER**

Quantity:                      One (1)  
Basis of Design:              Hobart  
Model:                              HL400-1STD

1. Mixer; with bowl, beater, whip, & spiral dough arm; US/EXP configuration - Legacy Planetary Mixer, 1.5 hp, 40 quart capacity, (3) fixed speeds, gear-driven transmission, 20 minute timer, #12 taper attachment hub, manual bowl lift, bowl guard, stainless steel bowl, "B" beater, "D" whip, "ED" dough hook
2. Standard warranty: 1-Year parts, labor & travel time during normal working hours within the USA
3. K-12 School Nutrition extended warranty extends the warranty for 12 months beyond the 12 month Original Equipment Warranty, not to exceed 24 months from date of installation

**ITEM #23                      WORK COUNTER**

Quantity:                      One (1)  
Basis of Design:            Eagle Group  
Model:                         SPECFAB

1. Custom Work Counter, 132"W x 54"D, 14/3 stainless steel top, 7"H back-to-back splash @ sink bowl locations, (2) 8" o.c. splash mount faucet hole provisions, square turndown edges, (2) 16" x 19-1/2" x 12" deep sink bowls, (2) stainless steel twist brackets, 18/3 stainless steel cabinet body, hinged doors @ sink bowl locations, (2) 3- tier drawer assemblies, open base provisions, partial stainless steel intermediate shelves where applicable, stainless steel removable panels, stainless steel fixed bottom shelf where applicable, integral utility chase, partial stainless steel curb base @ water stub up location, stainless steel legs and adjustable bullet feet. (1) overshelf @ microwave location, (1) double over shelf, 20"D top shelf, 10"D bottom shelf, stainless steel tubular supports and flag brackets, Custom counter includes (2) duplex receptacles prewired to a load center, final connections to be made in the field by Others.
2. Two (2) each T&S Brass B-2342 Faucet, wall mount, 8" centers, 10" swing nozzle, lever handles, quarter-turn Eterna cartridges, low lead, ADA Compliant
3. Two (2) each T&S Brass B-3972-XS Waste Drain Valve, 3-1/2" sink hole, short lever handle, 1-1/2" NPT female outlet, 2" NPT male outlet

**ITEM #24                      MICROWAVE OVEN**

Quantity:                      One (1)  
Basis of Design:            ACP  
Model:                         RCS10TS

1. Amana® Commercial Microwave Oven, 1000 watts, 1.2 cu. ft. capacity, medium volume, 4-stage cooking, (5) power levels, (100) memory settings, braille touch pads, non-removable air filter, side hinged door with tempered glass, accommodates 14" plate, stainless steel interior & exterior, 120v/60/1-ph, 13.0 amps, 15 MCA, 1550 watts (total), NEMA 5-15P, cETLus, ETL-Sanitation
2. 3-year limited warranty (1 year full)

**ITEM #25                      COMMERCIAL WASTE CONTAINER**

Quantity:                      Six (6)  
Basis of Design:            Carlisle  
Model:                         341032INE23

1. Bronco™ Waste Container, 32 gallon, 27-3/4"H x 22-3/8" dia. (25-1/2" dia. with handles), round, double-reinforced stress ribs, ergonomic Comfort Curve™ handles, drag skids, deep hand holds on base, polyethylene, "Inedible" gray, NSF, Made in USA (4 each minimum order)
2. 3691003 Bronco™ Container Dolly, round, 6"H x 17-3/4" dia., twist-to-lock, non-marking 3" swivel threaded replaceable casters, fits 20, 32, 44 & 55 gal containers, polyethylene, black, NSF

**ITEM #26                      RANGE, 48", 8 OPEN BURNERS**

Quantity:                      One (1)  
Basis of Design:              Garland/US Range  
Model:                              G48-8RS

1.        G Starfire Pro Series Restaurant Range, gas, 48", (8) 33,000 BTU open burners, cast iron top & ring grates, (1) standard oven & (1) storage base, 3 position rack guides, (1) rack, stainless steel front, sides, plate rail, 2-piece back guard & shelf, 6" stainless steel legs, adjustable feet, 302,000 BTU, CSA Flame, CSA Star, cCSAus, NSF (Garland)
2.        One year limited parts and labor warranty, covers products purchased and installed in the USA only, standard
3.        LP gas, specify elevation if over 2,000 ft
4.        Stainless steel backguard, with shelf, standard
5.        Adjustable height swivel casters with front brakes (set of 4)
6.        Dormont Manufacturing 16100KIT48 Dormont Blue Hose™ Moveable Gas Connector Kit, 1" inside dia., 48" long, covered with stainless steel braid, coated with blue antimicrobial PVC, (1) SnapFast® QD, (1) full port valve, (2) 90° elbows, coiled restraining cable with hardware, 334,000 BTU/hr minimum flow capacity, limited lifetime warranty

**ITEM #27                      TILTING SKILLET BRAISING PAN, GAS**

Quantity:                      One (1)  
Basis of Design:              Cleveland Range  
Model:                              SGL40TR

1.        DuraPan™ Tilting Skillet, gas, 40-gallon capacity, modular open base, standard with hydraulic hand tilt with quick lowering feature, stainless steel construction, includes spring-assisted cover, gallon markings and electronic spark ignition, stainless steel level adjustable feet, 130,000 BTU, CE, NSF, IPX6
2.        1-year parts & labor warranty, standard
3.        Extended Warranty, not to exceed 36 months from date of installation (K-12 Schools only)
4.        Performance start-up included at customer request after equipment is installed (Free Water Quality Check included)
5.        LP gas
6.        120v/60/1-ph, 1.8 amps NEMA 5-15P, standard
7.        HTS Standard Manual Hand Tilt, with quick lowering feature (hydraulic)
8.        TD2SK 2" tangent draw-off valve, front mounted left side (Note: May require additional lead time, contact factory)
9.        SPK14 Single Pantry Faucet And Bracket
10.      Dormont Manufacturing RG7548 Dormont ReliaGuard® Foodservice Gas Connector Kit, 3/4" inside dia., 48" long, covered with stainless steel braid, coated with gray PVC, (1) quick disconnect, coiled restraining cable with hardware, limited 5 year warranty

**ITEM #28 FLOOR TROUGH**

Quantity: One (1)  
Basis of Design: Eagle Group  
Model: ASFT-3030-SG

1. Anti-Splash Floor Trough, 30"W x 24"D, stainless steel subway-style grating, 6" deep trough pan with built-in pitch toward drain, accommodates up to a 4" diameter drain pipe, stainless steel removable perforated basket, all-welded 14/304 stainless steel construction, NSF

**ITEM #29 KETTLE, GAS, TILTING**

Quantity: One (1)  
Basis of Design: Cleveland Range  
Model: KGL40T

1. Kettle, gas, tilting, 40-gallon capacity, 2/3 steam jacket design, 316 stainless steel interior, floor mounted control console supports, 304 stainless steel construction, flanged feet, 50 psi rating, electronic spark ignition, cover & draw-off optional, 140,000 BTU
2. 1-year parts & labor warranty, standard
3. Extended Warranty, not to exceed 36 months from date of installation (K-12 Schools only)
4. Performance start-up included at customer request after equipment is installed (Free Water Quality Check included)
5. LP gas
6. 120v/60/1-ph, 10.0 amps, electronic spark ignition, cord & plug for controls, standard
7. Standard controls, temperature control dial, LED ON indicator light, main power switch with standard and high power setting, standard
8. TD2 2" tangent draw-off valve with strainer
9. KM2G Kettle Markings, 5 gallon increments
10. CHS40 Spring-assisted cover (40 gallon)
11. SPK25 Single Pantry Faucet And Bracket Kit
12. KAK Kettle Accessory Kit, includes: clean up brush, paddle, stainless steel whip, brush, draw-off brush, ladle
13. Dormont Manufacturing RG7548 Dormont ReliaGuard® Foodservice Gas Connector Kit, 3/4" inside dia., 48" long, covered with stainless steel braid, coated with gray PVC, (1) quick disconnect, coiled restraining cable with hardware, limited 5 year warranty

**ITEM #30 FLOOR TROUGH**

Quantity: One (1)  
Basis of Design: Eagle Group  
Model: ASFT-1824-SG

1. Anti-Splash Floor Trough, 24"W x 18"D, stainless steel subway-style grating, 6" deep trough pan with built-in pitch toward drain, accommodates up to a 4" diameter drain pipe, stainless steel removable perforated basket, all-welded 14/304 stainless steel construction, NSF

**ITEM #31 COMBI OVEN, GAS**

Quantity: One (1)  
Basis of Design: RATIONAL  
Model: ICP 6-FULL ON 6-FULL LP 208/240V 1 PH

1. Two (2) (CC1GRRA.0000239) iCombi Pro® 6-Full Size Combi Ovens, double stack, liquid propane, (12) 18" x 26" sheet pan or (24) 12" x 20" steam pan or (12) 2/1 GN pan capacity, (6) stainless steel grids included, intelligent cooking system with (4) assistants; iDensityControl, iCookingSuite, iProductionManager, & iCareSystem, (6) operating modes, (5) cooking methods, (3) manual operating modes, 85° to 572°F temperature range, quick clean, care control, eco mode, 6-point core temperature probe, retractable hand shower, Ethernet interface, Wi-Fi enabled, 104,000 BTU each, 208/240v/60/1-ph, 6 ft. cord, 0.9 kW each, CE, IPX5, cCSAus, NSF, ENERGY STAR-®
2. 60.75.752 Combi-Duo Universal Stacking Kit, for iCombi 6-half size or 6-full size
3. 60.31.203 Stand I Stationary Oven Stand for Combi-Duo, 7-3/4"H, open sides, for iCombi 6-full size on 6-full size
4. 2 years parts and labor, 5 years steam generator warranty
5. 9999.4104 K-12 Extended Warranty: Extends the warranty for 12 months beyond the Original Equipment Warranty to 3 years parts and labor.
6. CAP Chef Assistance Program, a RATIONAL certified Chef conducts 4 hours/location specialized application training with personnel, no charge
7. 9999.2252 RCI RATIONAL Certified Installation
8. Pre-Installation Site Consultation, provides an installation consultation to ensure the site has proper space and connections for gas, electric, drain & water
9. 9999.2110 Commissioning -one (1) gas iCombi - the operational function test and gas flue analysis when not completed at time of RATIONAL certified installation.
10. 8720.1560US Installation Kit
11. 1900.1150US Water Filtration Double Cartridge System, for full-size Combi-Duos or if used for more than (2) units, includes: (1) double head with pressure gauge, (2) R95-CL filter & (1) filter installation kit (for each additional unit add (1) additional head & additional cartridge. Maximum (4) cartridges)
12. 9999.2271 RCI RATIONAL Certified Installation
13. 56.01.535 Active Green Cleaner Tabs, for all iCombi Pro/Classic, 150 pieces/bucket
14. 56.00.562 Care Tabs, bucket of 150 packets for all iCombi Pro/Classic models and SelfCooking Center® units from 10/2008, with CareControl - Serial SG, SH or SI series

**ITEM #32 EXHAUST HOOD W/ FIRE SUPPRESSION SYSTEM**

Quantity: One (1)  
Basis of Design: Accurex  
Model: CUSTOM

1. Exhaust Hood, Sized per plan, includes Stainless Steel X-Tractor filters, LED Lights, Front Perforated supply plenum, top closure panels, stainless steel back splash, utility & fire cabinet mounted on hood with constant volume controls.

Pre-Piped Fire Suppression only system: Pre-Pipe Only: Includes only the piping connected to the

hood as well as the detection line. Does not include required field-supplied parts including but not limited to links, cartridges, agent, tanks, any parts needed to complete the hook-up of the system outside of what is directly connected to hood. This also does not include labor, testing, or permits.

**ITEM #33 EXHAUST FAN**

Quantity: Two (2)  
Basis of Design: Accurex  
Model: XCUE-140-VG

1. Direct drive 1 HP exhaust fan with brushless high efficiency motor, NEMA-3R switch, junction box mounted and wired, hinged top, grease trap. Includes roof curb

**ITEM #34 TEMPERED SUPPLY FAN**

Quantity: One (1)  
Basis of Design: Accurex  
Model: XMSX-P115-H12-MF-8

1. Dedicated Make Up Air unit with VFD control packaged DX Cooling and roof curb. Refer to MFG drawings for additional details

**ITEM #35 BUSSING UTILITY TRANSPORT CART, METAL**

Quantity: One (1)  
Basis of Design: Eagle Group  
Model: UUC-322

1. Utility Cart, 3-tier, 19"W x 33"D x 32"H, 1" upturn on all sides of all shelves, 12-1/2" shelf clearance, (1) push handle, angle legs include bumpers, 500 lbs. capacity, 430 stainless steel all welded construction, 4" swivel plate casters, NSF

**ITEM #36 SPARE NO.**

**ITEM #37 REEL KLEEN CONTROL CABINET**

Quantity: One (1)  
Basis of Design: T&S Brass  
Model: B-2339-LR

1. Hose Reel Control Cabinet, with control valve & temperature gauge & dual check valves

2. B-7133-06 Hose Reel System, open, 1/2" x 35' hose with stainless steel front trigger spray valve (with a 7/16" orifice), with ratcheting system & adjustable hose bumper, stainless steel
3. 1 year limited warranty for hose, standard
4. 2 year limited warranty for hose reel, standard

**ITEM #38                      DRYING RACK UNITS**

Quantity:                      LOT  
Basis of Design:              Metro  
Model:                              LOT

1. One (1) each MAX4-PR48VX3 MetroMax® 4 Mobile Drying Rack Unit, 48"W x 24"D x 68"H, 4-tier, for bulk drying & trays/cutting boards/sheet pans, includes: (3) open shelf frames, (1) shelf, (4) 63" mobile posts, (2) drop-ins, (1) cutting board/tray drying rack, (4) polymer swivel casters (2 with brakes), built in Microban® antimicrobial product protection, NSF
2. Four (4) each MAX4-2460G Quick Ship - MetroMax® 4 Shelf, 60"W x 24"D, with removable polypropylene open grid mats & (4) wedge connectors, built in Microban® antimicrobial product protection, 600 lb. capacity per shelf, NSF
3. Four (4) each MX74P Quick Ship - Polymer trilobal post (compatible with MetroMax® i, MetroMax® 4, MetroMax® Q), 74-3/16"H, for stationary use or with a dolly, adjustable leveling foot, grooved on 1" increments, corrosion proof all polymer construction with built in Microban® antimicrobial product protection

**ITEM #39                      CLEAN DISHTABLE**

Quantity:                      One (1)  
Basis of Design:              Eagle Group  
Model:                              SPECFAB

1. Spec-Master® Clean Dishtable, straight design, 96"W x 30"D x 43-1/2"H overall, right-to-left operation, 14/304 stainless steel top, 8"H backsplash, raised rolled edges on front & side, stainless steel legs & crossbracing, adjustable metal feet, NSF

**ITEM #40                      DISHTABLE SORTING SHELF**

Quantity:                      One (1)  
Basis of Design:              Eagle Group  
Model:                              606297

1. Rack Shelf, tubular, wall mounted, 42"W x 15.5"D x 12"H, 1.625"dia. tubing 14/304 stainless steel knock-down construction

**ITEM #41                    DISHWASHER, CONVEYOR TYPE**

Quantity:                    One (1)  
Basis of Design:           Hobart  
Model:                        CL44EN-EGR+BUILDUP

1.            Conveyor Dishwasher, energy recovery (DWER), single tank, (202) racks/hour, insulated hinged doors, .62 gallon/rack, stainless steel enclosure panels, microprocessor controls with low temperature & dirty water indicators, NSF Pot & Pan mode, programable de-lime notification, ENERGY STAR®, Free factory startup for installations within a 100 mile radius of a Hobart service office; installation beyond 100 miles will be charged at the quoted rate by the local Hobart service office
2.            Standard warranty - 1-Year parts, labor & travel time during normal working hours within the USA
3.            CL44EN-EGRHTE15K Electric tank heat 15kW
4.            CL44EN-EGRERH30K 30kW electric booster
5.            CL44EN-EGRELE0CD 480v/60/3-ph
6.            Single Point (1) service connection standard (Field convertible options available)
7.            CL44EN-EGRHGTSTD Standard height
8.            CL44EN-EGRDIR0LR Left to right operation
9.            CL44EN-EGRFETSTD Standard feet
10.          NOTE: For water of 3-grains of hardness or more, Hobart suggests adding a water softener.
11.          Two (2) each VNTHD/E-ADJ E-series vent hood domestic (adjustable)
12.          CLE/TBL-SWITCH Table limit switch CLE-Series

**ITEM #42                    PANT LEG DUCTING**

1.            By MC - NIKEC

**ITEM #43                    FLOOR TROUGH**

Quantity:                    One (1)  
Basis of Design:            Eagle Group  
Model:                        FT-1260-SG

1.            Floor Trough, 60"W x 12"D, stainless steel subway-style grating, 4" deep trough pan with built-in pitch toward drain, accommodates up to 4" drain pipe, stainless steel removable perforated basket, 1" outer flange for mounting, all-welded 14/304 stainless steel construction, NSF

**ITEM #44                    SOILED DISHTABLE**

Quantity:                    One (1)  
Basis of Design:            Eagle Group  
Model:                        SPECFAB

1. Soiled Dishtable, corner design, size per plan, right-to-left operation, 14/304 stainless steel top, 10"H backsplash w/ rear turndown and Z-clips, raised rolled edges on front & side, grey water recirculating trough to accept compartment trays, 36" pass-thru ledge w/ provisions for overhead coiling door, three Compartment Sink, (2) 8" o.c. splash mount faucet hole provisions, 24" drainboard on right, rolled edges on front & sides, (3) 24" x 24" x 14" deep compartments, stainless steel crossbracing on all sides, stainless steel legs & adjustable bullet feet, NSF
2. E41B Provision for scrap collector & trough veyor
3. T&S Brass B-0279 Big-Flo Mixing Faucet, Add-On-Faucet, 14" end swing nozzle, 36" stainless steel hose, spray valve, wall bracket, 3/4" inlet elbows
4. T&S Brass B-0290-14 Mixing Faucet, wall mount, 8" adjustable centers, 14" Big-Flo swivel nozzle with plain end outlet, 4-arm handles with color coded indexes, 00LL inlet elbows, 3/4" NPT female inlets, ADA Compliant
5. Three (3) each T&S Brass B-3950-01-SB Waste Valve, twist handle, 3-1/2" sink hole, overflow tube kit, removable strainer basket, 1-1/2" NPT male adapter, 2" NPT male outlet

**ITEM #45                      WASTE COLLECTOR**

Quantity:                      One (1)  
Basis of Design:              Salvajor  
Model:                              S419

1. Trough Collector™, trough conveyor & collecting system (widely accepted in areas where disposers are restricted), HYDROLOGIC® with LCD readout, trough diffuser, salvage basin & silverware trap, scrap basket, 3/4 HP corrosion-resistant pump, pump intake screen ,stainless steel construction, start/stop pushbutton control panel, with safety line disconnect & automatic shut off timer, UL, CSA, CE, NSF
2. 208v/60/1-ph, 5.5 amps
3. 419CISS Trough Collector™ full stainless steel cover
4. 988001 Gusher head assembly for TVL, TVR & S419

**ITEM #46                      DISHTABLE SORTING SHELF**

Quantity:                      One (1)  
Basis of Design:              Eagle Group  
Model:                              606297

1. Rack Shelf, tubular, wall mounted, 42"W x 15.5"D x 12"H, 1.625"dia. tubing 14/304 stainless steel knock-down construction

**ITEM #47                      EXHAUST FAN**

1. By MC - NIKEC

**ITEM #48                      SPARE NO.**

**ITEM #49                      SPARE NO.**

**ITEM #50                      ROLL-THRU REFRIGERATOR**

Quantity:                      One (1)  
Basis of Design:              True Mfg. - General Foodservice  
Model:                              STG1RRT89-1S-1S

1.        SPEC SERIES® Refrigerator, roll-thru, 89"H, one-section, (1) stainless steel door front & rear, locks, cam-lift hinges, digital temperature control, stainless steel front, stainless steel ramps, aluminum sides, aluminum interior, 1/3 HP, 115v/60/1-ph, 8.9 amps, NEMA 5-15P, (accommodates 27"W x 29"D x 72"H cart, NOT included) cULus, UL EPH Classified, Made in USA
2.        Warranty - 3 year parts & labor
3.        Warranty - 5 year compressor (self-contained only)
4.        Thermometer side: Door hinged on right standard
5.        Rear: Left door hinging

**ITEM #51                      ROLL-THRU HEATED CABINET**

Quantity:                      One (1)  
Basis of Design:              True Mfg. - General Foodservice  
Model:                              STA1HRT89-1S-1S

1.        SPEC SERIES® Heated Cabinet, roll-thru, 89"H, one-section, (1) stainless steel door front & rear, locks, cam-lift hinges, color-coded temperature display, interior lighting, stainless steel ramps, stainless steel front & sides, aluminum interior, 2.0kW, 115/208-230v/60/1-ph, NEMA 14-20P (accommodates 27"W x 29"D x 72"H cart, NOT included), cULus, UL EPH Classified, Made in USA
2.        Warranty - 3 year parts & labor
3.        Thermometer side: Door hinged on right standard
4.        Rear: Left door hinging

**ITEM #52                      HOT/COLD COUNTER**

Quantity:                      One (1)  
Basis of Design:              Eagle Group  
Model:                              SPECFAB

1.        Work Table, cabinet base with hinged doors, 154"W x 36"D, 14/304 stainless steel top, square turndown edges, Uni-Lok® gusset system, 154"W x 12"D solid ribbed tray slide w/ drop-down brackets, sneeze guard provisions, top cutouts w/ reinforcement for drop-in equipment, stainless steel apron for mounting hot well controls, stainless steel cabinet body, powder coated panels, stainless steel bottom shelf, stainless steel toe kicks, NSF. (1) GFI Duplex Receptacle for Drop-In Cold Well; (1) J-Box for Drop-In Hot Well. Receptacles and Sneeze Guard Lights Pre-Wired To Junction Box for Final Connections in the Field by Others.

**ITEM #53                      COLD FOOD WELL UNIT, DROP-IN, REFRIGERATED**

Quantity:                      Two (2)  
Basis of Design:              Delfield  
Model:                              N8143BP

1. Drop-In Mechanically Cooled Pan, 43-1/2"W x 26" D, 3-pan size, 1" dia. drain, insulated pan, stainless steel inner liner & top, galvanized steel outer liner, includes adapter bars, self-contained refrigeration, R290 Hydrocarbon refrigerant, 2/7 hp, (42-1/2" x 25" cutout required), cUL, UL, NSF
2. 0460000N 1 year parts & labor warranty, standard
3. W00003A 5 year compressor warranty (NET)
4. 115v/60/1-ph, 3.1 amps, NEMA 5-15P, standard

**ITEM #54                      HOT FOOD WELL UNIT, DROP-IN, ELECTRIC**

Quantity:                      Two (2)  
Basis of Design:              Delfield  
Model:                              N8759-D

1. Drop-In Hot Food Well Unit, Electric, individual pans, wet/dry type with drain & manifold, 4-pan size for 12" x 20" pans, individual infinite temperature controls, stainless steel top & wells, galvanized outer liner, (58-1/2" x 25" cutout required), cUL, UL, NSF
2. NOTE: Freight quotes are only valid from Delfield
3. Model 0460000N 1 year parts & labor warranty, standard
4. 208-230v/60/1-ph, 20.0-22.0 amps, standard
5. 000-504-0031 Autofill assembly kit (shipped loose), for N8700 series

**ITEM #55                      SNEEZE GUARD, STATIONARY**

Quantity:                      One (1)  
Basis of Design:              Premier Metal & Glass  
Model:                              TM2N-A

1. Adjustable Dual-Service Sneeze Guard, single sided guard with top shelf, tempered glass with polished edges, adjustable end panels, table mount, 1" OD round stainless support posts, NSF & cULus Listed
2. Approximately 64" + 51" CL Length
3. Brushed (#4) NSF
4. 3/8" Glass
5. Both end panels, fixed, standard
6. Ultra-Slim LED display light 4000k (Std.)

**ITEM #56                      FLATWARE & TRAY CART**

Quantity:                      Three (3)  
Basis of Design:              Lakeside Manufacturing  
Model:                              403

1.        Tray & Silver Cart, accepts (10) flatware cylinders (not included), for (120) 16" x 22" trays, stainless steel construction, stainless steel angle frame with push handle, 500 lb. load capacity, 5" swivel casters, Made in USA
2.        Casters, 5", cushion tread, all swivel, standard
3.        Wall-Saver strip bumpers

**ITEM #57                      MILK COOLER**

Quantity:                      Two (2)  
Basis of Design:              Beverage Air  
Model:                              SMF49HC-1-W

1.        School Milk Cooler, forced air, 49"W x 33-5/8"D x 47"H, 19.66 cu. ft., single access, exterior digital thermometer, (12) 13" x 13" x 11" or (8) 19" x 13" x 11" case capacity, self-latching doors/lids with safety bumpers, cylinder lock, wire floor racks, floor drain, electronic control, auto defrost, galvanized steel interior with stainless steel floor, white exterior, R290 Hydrocarbon refrigerant, 1/4 HP, cULus, UL EPH Classified, UL-Sanitation, Made in USA
2.        3 years parts & labor warranty (excludes maintenance items)
3.        Self-Contained refrigeration
4.        Additional 4 years compressor warranty (part only), standard
5.        115v/60/1-ph, 3.0 amps, cord with NEMA 5-15P
6.        6" Heavy duty casters, (2) with brakes, standard

**ITEM #58                      GRAB-N-GO COUNTER**

Quantity:                      One (1)  
Basis of Design:              Eagle Group  
Model:                              SPECFAB

1.        Work Table, cabinet base with sliding doors, 108"W x 32"D, 14/304 stainless steel top, square turndown edges, 6"H backsplash, Uni-Lok® gusset system, 108"W x 12"D solid ribbed tray slide w/ drop-down brackets, sneeze guard provisions, top cutout w/ reinforcement for drop-in equipment, stainless steel cabinet body, powder coated panels, stainless steel intermediate shelf where applicable, stainless steel bottom shelf, stainless steel toe kicks, NSF. (1) GFI Duplex Receptacle for Drop-In Cold Well. Receptacle and Sneeze Guard Lights Pre-Wired To Junction Box for Final Connections in the Field by Others.

**ITEM #59 COLD FOOD WELL UNIT, DROP-IN, REFRIGERATED**

Quantity: One (1)  
Basis of Design: Delfield  
Model: N8130BP

1. Drop-In Mechanically Cooled Pan, 30-3/4"W x 26" D, 2-pan size, 1" dia. drain, insulated pan, stainless steel inner liner & top, galvanized steel outer liner, includes adapter bars, self-contained refrigeration, R290 Hydrocarbon refrigerant, 1/6 hp, (29-3/4" x 25" cutout required), cUL, UL, NSF
2. 0460000N 1 year parts & labor warranty, standard
3. W00003A 5 year compressor warranty (NET)
4. 115v/60/1-ph, 2.0 amps, NEMA 5-15P, standard

**ITEM #60 SNEEZE GUARD, STATIONARY**

Quantity: One (1)  
Basis of Design: Premier Metal & Glass  
Model: TM2R-G

1. 1Guard™ Fixed Self-Service Sneeze Guard, single sided guard with top shelf, tempered glass with polished edges, end panels, table mount, 1" OD round stainless support posts, NSF & UL
2. Approximately 38" CL Length
3. Brushed (#4) NSF
4. 3/8" Glass
5. Both end panels, fixed, standard
6. Ultra-Slim LED display light

**ITEM #61 DISPLAY MERCHANDISER, HEATED, FOR MULTI-PRODUCT**

Quantity: One (1)  
Basis of Design: Hatco  
Model: GR2SDS-48D

1. Glo-Ray® Designer Slant Display Warmer, countertop, (2) shelves with (18) rods, adjustable thermostat, pre-focused infrared top heat, incandescent light, hardcoat aluminum base, tempered glass end panels, designer panels & corner caps, 4" legs, 3380 watts, cULus, UL EPH Classified, Made in USA
2. One year on-site parts & labor warranty, plus one additional year parts only warranty on all Glo-Ray metal sheathed elements
3. 120/208v/60/1-ph, 3380 watts, 14.1 amps, NEMA L14-20P (domestic voltage), standard
4. Clear Anodized Aluminum housing, finish, standard
5. Black, designer inset panel color, standard
6. Black, designer corner cap color

**ITEM #62                   HOT/COLD COUNTER**

Quantity:                   One (1)  
Basis of Design:       Eagle Group  
Model:                     SPECFAB

1.       Work Table, cabinet base with hinged doors, 154"W x 36"D, 14/304 stainless steel top, square turndown edges, Uni-Lok® gusset system, 154"W x 12"D solid ribbed tray slide w/ drop-down brackets, sneeze guard provisions, top cutouts w/ reinforcement for drop-in equipment, stainless steel apron for mounting hot well controls, stainless steel cabinet body, powder coated panels, stainless steel bottom shelf, stainless steel toe kicks, NSF. (1) GFI Duplex Receptacle for Drop-In Cold Well; (1) J-Box for Drop-In Hot Well. Receptacles and Sneeze Guard Lights Pre-Wired To Junction Box for Final Connections in the Field by Others.

**ITEM #63                   SNEEZE GUARD, STATIONARY**

Quantity:                   One (1)  
Basis of Design:       Premier Metal & Glass  
Model:                     TM2N-A

1.       CHOICE™ Adjustable Dual-Service Sneeze Guard, single sided guard with top shelf, tempered glass with polished edges, adjustable end panels, table mount, 1" OD round stainless support posts, NSF & cULus Listed
2.       Approximately 64" + 51" CL Length
3.       Brushed (#4) NSF
4.       3/8" Glass
5.       Both end panels, fixed, standard
6.       Ultra-Slim LED display light 4000k (Std.)

**ITEM #64                   NESTING PAN RACK**

Quantity:                   Four (4)  
Basis of Design:       Channel Manufacturing  
Model:                     401AN

1.       Bun Pan Rack, Nesting, Standard Heavy-Duty Series, 20.5"W x 26"D x 70.25"H, Aluminum Construction, End Load, 3" Angle Spacing, (20) 18" x 26" or (40) 13" x 18" pans (2 per shelf), 5" Swivel Stem Casters model # CSS450, Made in USA, NSF, 36lbs.       Lifetime       warranty against rust and corrosion

**ITEM #65                   CASHIER STATION**

Quantity:                   Two (2)  
Basis of Design:       Eagle Group  
Model:                     SPECFAB

1. Cashier Station, open cabinet base, 30"W x 30"D, 14/3 stainless steel top, square turndown edges, (1) top grommets (1) 30"W x 12"D solid ribbed tray slide w/ drop-down brackets, (1) cash drawer w/ lock, stainless steel cabinet body, powder coated panels, stainless steel bottom shelf, stainless steel toe kicks, NSF. (1) GFI Duplex Receptacle for Cash Register. Receptacle Pre-Wired To Junction Box(s) for Final Connections in the Field by Others.

**ITEM #66                      POS SYSTEM**

1. By Others - NIKEC

**ITEM #67                      WIRE SHELVING**

Quantity:                      LOT  
Basis of Design:              Metro  
Model:                              LOT

1. Six (6) each HDM2448QBL qwikSLOT™ Drop Mat Shelf, wire, 48"W x 24"D, black finish, built-in ledge around perimeter, requires the use of a standard Super Erecta® shelf at top & bottom
2. Four (4) each 2448NBL Quick Ship - Super Erecta® Designer Shelf, wire, 48"W x 24"D, black finish, shelving is not cart-washable
3. Eight (8) each 63PQBL qwikSLOT™ Post, 63-9/16"H, with slots at 1" intervals, clip snaps into slot, black epoxy finish

**ITEM #68                      CONDIMENT COUNTER**

Quantity:                      One (1)  
Basis of Design:              Eagle Group  
Model:                              SPECFAB

1. Condiment Counter, cabinet base with hinged doors, 72"W x 30"D, 14/304 stainless steel top, square turndown edges, Uni-Lok® gusset system, stainless steel cabinet body, powder coated panels w/ hinged doors, stainless steel intermediate shelf, stainless steel bottom shelf, stainless steel toe kicks, provision for drop in condiment dispensers, NSF.
2. Two (2) each Server Products 07210 SE-4DI SERVER EXPRESS™, quadruple, drop-in, (4) Express™ pumps dispense ambient condiments & dressings from (4) 1-1/2 gallon pouches with a 16 mm fitment, a full portion yields 1 oz., which can be reduced in 1/4 oz. increments, stainless steel base, ADA Compliant, BPA free, NSF
3. Server Products 2 Year warranty

**ITEM #69                      RECYCLING COUNTER**

Quantity:                      One (1)  
Basis of Design:              Eagle Group

Model: SPECFAB

1. Recycling Counter, cabinet base with hinged doors, 72"W x 30"D, Stainless Steel Top, 6"H backsplash with left & right side splashes, square turndown edges, Uni-Lok® gusset system, (3) top cutouts w/ removable trash chutes, stainless steel cabinet body, powder coated panels w/ hinged doors, open base provisions for U/C trash cans, stainless steel legs, & adjustable bullet feet, NSF

**ITEM #70 SPARE NO.**

**ITEM #71 MOP SINK**

Quantity: One (1)  
Basis of Design: Eagle Group  
Model: F1916

1. Mop Sink, floor mount, 24-5/8"L x 21-1/2" W x 15-1/2"H overall, 20" wide x 16" front-to-back x 8" deep bowl, 16 gauge top with "V" edge, full skirt, 2" NPS drain with stainless steel removable strainer plate, 304 stainless steel construction, NSF
2. 312688 Mop Holder, 18"W, holds (3) mops
3. T&S Brass B-0665-CR-BSTR Service Sink, ceramas cartridges, check valves, lever handles, rough chrome

**ITEM #72 WIRE SHELVING**

Quantity: One (1)  
Basis of Design: Metro  
Model: LOT

1. Four (4) each 2430NC Quick Ship - Super Erecta® Shelf, wire, 30"W x 24"D, chrome plated finish, plastic split sleeves are included in each carton, NSF
2. Four (4) each 74P Quick Ship - Super Erecta® SiteSelect™ Post, 74-1/2"H, adjustable leveling bolt, posts are grooved at 1" increments & numbered at 2" increments, double grooved every 8", chrome finish

**ITEM #73 WASHER**

1. By Others - NIKEC

**ITEM #73A DRYER**

1. By Others - NIKEC

END OF SECTION 114000

## SECTION 116623 - GYMNASIUM EQUIPMENT

### 1.1 SUMMARY

- A. Section Includes:
1. Basketball equipment.
  2. Volleyball equipment.
  3. Safety pads.
  4. Interior Scoreboards

### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
1. Include assembly, disassembly, and storage instructions for removable equipment.
  2. Motors: Show nameplate data, ratings, characteristics, and mounting arrangements.
- B. Shop Drawings: For gymnasium equipment.
1. Include plans, elevations, sections, and attachment details.
  2. Include details of field assembly for removable equipment, connections, installation, mountings, floor inserts, and operational clearances.
  3. Include transport and storage accessories for removable equipment.
  4. Include diagrams for power, signal, and control wiring.
- C. Samples: For each exposed product and for each item and color specified.

### 1.3 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Court layout plans, reflected ceiling plans, and other details, drawn to scale, and coordinated with ceiling-suspended gymnasium equipment, floor inserts, game lines, and markers applied to finished flooring, and coordinated with each other, using input from installers of the items involved:
1. Structural members to which overhead-supported gymnasium equipment will be attached.
  2. Suspended ceiling components, if any.
  3. Items supported from building structure above the courts, including the following:
    - a. Luminaires.
    - b. Air outlets and inlets.
    - c. Speakers.
    - d. Sprinklers.
    - e. Smoke detectors.
    - f. Acoustical treatments or panels.
    - g. Access panels.
- B. Setting Drawings: For embedded items and cutouts required in other work.

- C. Qualification Data: For Installer.
- D. Product Certificates: For each type of gymnasium equipment.
- E. Field quality-control reports.
- F. Sample Warranty: For special warranty.

#### 1.4 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For gymnasium equipment to include in operation and maintenance manuals.

#### 1.5 QUALITY ASSURANCE

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

#### 1.6 FIELD CONDITIONS

- A. Field Measurements: Verify position and elevation of floor inserts and layout for gymnasium equipment.

#### 1.7 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of gymnasium equipment that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Basketball backboard failures, including glass breakage.
    - b. Faulty operation of basketball backstops.
  - 2. Warranty Period: Five years from date of Substantial Completion.

#### 1.8 PERFORMANCE REQUIREMENTS

- A. Seismic Performance for Basketball Backboards: ASCE/SEI 7.

#### 1.9 PRODUCTS

- A. Basketball Equipment: According to requirements of FIBA's "Official Basketball Rules - Basketball Equipment."
  - 1. Overhead-Supported Backstops:

- a. Folding Type: Manufacturer's standard assembly for forward-folding, front-braced backstop, with hardware and fittings to permit folding.
  - b. Framing: Steel pipe, tubing, and shapes designed to minimize vibration during play.
  - c. Finish: Manufacturer's standard polyester powder-coat finish.
  2. Goal Height Adjuster: Adjustable from 8 to 10 feet (2.40 to 3.05 m) to top of ring with gear-drive mechanism, locking in any position within adjustment range, with visible height scale attached to side of framing.
  3. Electric operation with integral gear-drive motor, with limit switches preset to goal heights and key switch control.
  4. Basketball Backboards: Fiberglass.
    - a. Minimum 1-1/2-inch- (38-mm-) thick, composite backboard consisting of minimum two 3/16-inch- (5-mm-) thick, molded-fiberglass panels laminated together over faces and edges encapsulating a 3/4-inch (19-mm) honeycomb core, reinforced at goal and backboard mountings, or a wood panel product core; with threaded inserts or embedded anchors for mounting backboard corners to support framing at standard mounting centers.
  5. Basketball Goals: Single rim; fixed.
  6. Basketball Nets: 12-loop-mesh net, between 15 and 18 inches (380 to 460 mm) long, sized to fit ring diameter.
  7. Safety pads for backboard.
- B. Volleyball Equipment: According to requirements of FIVB's "Official Volleyball Rules."
1. Floor Insert: Solid-brass floor plate and steel pipe sleeve, concealed by floor plate, with capped bottom end, sized with ID to fit post standards, minimum 9 inches (230 mm) long, to securely anchor pipe sleeve in structural floor; with anchors designed for securing floor insert to floor substrate indicated; one per post standard.
  2. Flush Floor Plate: Self-locking, hinged access cover, designed to be flush with adjacent flooring.
  3. Post Standards: Removable, fixed-height paired volleyball post standards, as indicated on Drawings, designed for easy removal from permanently placed floor inserts.
  4. Net: 32 feet (9.75 m) long; one per pair of paired post standards. 36 inches (910 mm) with 4-1/2-inch- (114-mm-) square mesh made of black polyester string.
  5. Net-Tensioning System: Designed to adjust and hold tension of net. Fully enclosed, nonslip, manufacturer's standard-type winch with cable length and fittings for connecting to net lines, positive-release mechanism, and manufacturer's standard handle.
  6. Storage Cart: Manufacturer's standard wheeled unit designed for transporting and storing volleyball equipment and passing through 36-inch- (910-mm-) wide door openings. Fabricate welded-steel tubing units with heavy-duty casters, including no fewer than two swivel casters. Fabricate wheels from materials that do not damage or mark floors; number of units as required to provide transport and storage for specified equipment.
- C. Safety Pads:
1. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
    - a. Flame-Spread Index: 25 or less.
    - b. Smoke-Developed Index: 450 or less.

2. Pad Coverings: Provide safety pad fabric covering that is fabricated from puncture- and tear-resistant, PVC-coated polyester or nylon-reinforced PVC fabric, minimum 14-oz./sq. yd. (475-g/sq. m) and treated with fungicide for mildew resistance; with surface-burning characteristics indicated.
3. Wall Safety Pads: Padded wall wainscot panels designed to be attached in a continuous row; each panel section consisting of fill laminated to backer board, with visible surfaces fully covered by seamless fabric covering, free of sag and wrinkles and firmly attached to back of backer board.

D. Scoreboard:

1. Basis-of-Design: Daktronics Basketball Scoreboard BB-2125
2. Single-sided LED basketball scoreboard displays period time to 99:59, HOME and GUEST scores to 99, PERIOD to nine, PLAYER number to 99, player FOUL to nine, team FOULS to 19, T.O.L. (time outs left) to nine and indicates possession and bonus. Scoreboard can also score volleyball and wrestling.
3. Sports Scored: Basketball, Volleyball, Wrestling
4. Digit Sizes: 10", 7"
5. Dimensions: H = 4' 0" W = 10' 0" D = 0' 6"
6. Control: All Sport 5000
7. Caption Options: Vinyl, Team Name Message Centers
8. Digit Colors: ColorSmart LEDs
9. Digit Technology: ColorSmart
10. Construction: Durable, lightweight aluminum Tuff Sport® cabinet

1.10 INSTALLATION, GENERAL

- A. Comply with manufacturer's written installation instructions and competition rules for each type of gymnasium equipment.
- B. Install gymnasium equipment after other finishing operations, including painting, have been completed unless otherwise indicated.
- C. Permanently Placed Gymnasium Equipment and Components: Install rigid, level, plumb, square, and true; anchored securely to supporting structure; positioned at locations and elevations indicated; in proper relationship to adjacent construction; and aligned with court layout.
  1. Floor-Insert Locations: Coordinate locations with application of game lines and markers.
  2. Floor-Insert Elevation: Coordinate installed heights of floor inserts with installation and field finishing of finish flooring and floor-plate type.
  3. Operating Gymnasium Equipment: Verify clearances for movable components of gymnasium equipment throughout entire range of operation and for access to operating components.
- D. Floor-Insert Setting: Clean oversized, recessed voids in concrete substrate of debris. Position each sleeve, and fill void around sleeve with grout, mixed and placed according to grout manufacturer's written instructions. Protect portion of sleeve above subfloor from splatter.

Verify that sleeves are set plumb, aligned, and at correct height and spacing; hold in position during placement and finishing operations until grout is sufficiently cured. Set insert so top surface of completed unit is flush with finished flooring surface.

- E. Anchoring to In-Place Construction: Use anchors and fasteners where necessary to secure built-in and permanently placed gymnasium equipment to structural support and to properly transfer load to in-place construction.
- F. Connections: Connect electric operators to building electrical system.
- G. Removable Gymnasium-Equipment Components: Assemble in place to verify that equipment and components are complete and in proper working order. Disassemble removable gymnasium equipment after assembled configuration is approved by Owner, and store units in location indicated on Drawings.

#### 1.11 INSTALLATION OF SAFETY PADS

- A. Mount with bottom edge at dimension indicated on Drawings above finished floor.
- B. Cutout Trim: Limit cuts in face of padding so that cuts are securely and fully concealed behind trim-kit flange.

#### 1.12 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Perform the following tests and inspections with the assistance of a factory-authorized service representative:
  - 1. Perform visual inspections and operational tests as recommended by referenced standard rules of each sport and the equipment manufacturer.
  - 2. Test rebound elasticity of basketball goals.
  - 3. Test basketball goal pressure-release characteristics and adjustability.
- C. Gymnasium equipment will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.

#### 1.13 ADJUSTING

- A. Adjust movable components of gymnasium equipment to operate safely, smoothly, easily, and quietly; free from binding, warp, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range; and lubricate as recommended in writing by manufacturer.

END OF SECTION 116623

## SECTION 116653 - GYMNASIUM DIVIDERS

### 1.1 SUMMARY

- A. Section Includes:
1. Walk-draw divider systems.

### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For gymnasium dividers.
1. Include plans showing alignment of curtains in relation to sport-court layout and overhead structural supports.
  2. Include elevations, sections, details, and attachments to other work.
  3. Include system clearances, stacking requirements, and limits for fitting into adjacent construction.
  4. Include point loads and locations for attachment of gymnasium dividers to structure.
- C. Samples: For each exposed product and for each item and color specified.

### 1.3 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Reflected ceiling plans with divider-curtain layouts, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:
1. Structural members to which divider-curtain systems will be attached.
  2. Suspended ceiling components, if any.
  3. Items supported from building structure, including the following:
    - a. Lighting fixtures.
    - b. Air outlets and inlets.
    - c. Speakers.
    - d. Sprinklers.
    - e. Smoke detectors.
    - f. Acoustical treatments or panels.
    - g. Access panels.
- B. Qualification Data: For Installer.
- C. Product Certificates: For each type of gymnasium divider.
- D. Sample Warranty: For special warranty.

#### 1.4 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For gymnasium dividers to include in operation and maintenance manuals.

#### 1.5 QUALITY ASSURANCE

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

#### 1.6 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of gymnasium dividers that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Faulty operation of gymnasium dividers.
    - b. Tearing or deterioration of fabric, seams, or other materials beyond normal use.
  - 2. Warranty Period: Five years from date of Substantial Completion.

#### 1.7 PRODUCTS

- A. Divider-Curtain System: Manually operated, channel track system, and as follows:
  - 1. Basis-of-Design: Porter Athletic, 640 Walk Draw Divider Curtain
  - 2. Stacking: Stacks to one side as indicated on Drawings.
  - 3. Top Hem: Double-thickness mesh or solid vinyl for grommets.
  - 4. Outer Edge Hems: Double turned and welded.
  - 5. Bottom Pocket: Double thickness with proof coil chain in pocket.
  - 6. Channel Track: Galvanized steel or formed aluminum.
  - 7. Grommets: Manufacturer's standard material, size, and spacing; for snaps or S-hooks.
- B. Curtain, Solid: Woven polyester fabric coated with vinyl, 18 oz./sq. yd. (610 g/sq. m), 8-foot (2.4-m) height above floor.
- C. Upper Curtain, Mesh: Woven mesh of polyester yarn coated with vinyl, weighing not less than 9 oz./sq. yd. (305 g/sq. m).

#### 1.8 INSTALLATION, GENERAL

- A. Comply with manufacturer's written installation instructions.
- B. Install gymnasium dividers after other finishing operations, including painting, have been completed unless otherwise indicated.

- C. Install gymnasium dividers level, plumb, square, and true; anchored securely to supporting structure; positioned at locations and elevations indicated; in proper relation to adjacent construction; and aligned with sport-court layout.
  - 1. Verify clearances for movable components of gymnasium dividers throughout entire range of operation and for access to operating components.

#### 1.9 ADJUSTING

- A. Adjust movable components of gymnasium dividers to operate safely, smoothly, easily, and quietly, free from binding, warp, distortion, uneven tension, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range; and lubricate as recommended in writing by manufacturer.

END OF SECTION 116653

## SECTION 116800 - PLAYGROUND EQUIPMENT

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes providing and installing play equipment and coordination for the following:
  - 1. Freestanding playground equipment and structures.
  - 2. Basketball goals
  - 3. Gym/Wellness circuit.
  - 4. Composite playground equipment and structures.
  - 5. Coordination with play equipment safety fall and heavy-use zones.
- B. Refer to Equipment Schedule and links to equipment data at the end of this section.
- C. Related Sections include the following:
  - 1. Section 321313 Concrete Paving for concrete mix and footings.
  - 2. Division 32 Section "Playground Protective Surfacing" for protective surfacing under and around playground equipment.

#### 1.3 DEFINITIONS

- A. Fall Height: According to ASTM F 1487, "the vertical distance between a designated play surface and the protective surfacing beneath it."
- B. HDPE: High-density polyethylene.
- C. IPEMA: International Play Equipment Manufacturers Association.
- D. LLDPE: Linear low-density polyethylene.
- E. MDPE: Medium-density polyethylene.
- F. Use Zone: According to ASTM F 1487, "the area beneath and immediately adjacent to a play structure that is designated for unrestricted circulation around the equipment and on whose surface, it is predicted that a user would land when falling from or exiting the equipment."

#### 1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show fabrication and installation details for playground equipment, play structures, and concrete footings.
  - 1. Delegated Design: Provide delegated design drawings for the equipment posts and footing design, steel members, and structural analysis data design to withstand dead and live loads and extend post and footings prepared by a qualified professional engineer responsible for their preparation.
- C. Coordination Drawings: Plans, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:
  - 1. Extent of surface systems and use zones for equipment.
  - 2. Critical heights for playground surface or fall heights for equipment.
- D. Samples for Initial Selection: For each type of playground equipment and structure indicated.
  - 1. Manufacturer's color charts.
  - 2. Include similar Samples of playground equipment and accessories involving color selection.
- E. Samples for Verification: For each type of exposed finish required, prepared on samples of size indicated below.
  - 1. Posts and Rails: Not less than 6 inches (150 mm) long.
  - 2. Platforms: Not less than 6 inches (150 mm) square.
  - 3. Molded Plastic: Not less than 3 inches (75 mm) square.
- F. Product Certificates: For each type of playground equipment, signed by product manufacturer requirements.
- G. Installer Certificates: Signed by manufacturers certifying that installers comply with requirements.
- H. Qualification Data: For Installer manufacturer.
- I. Material Certificates: For the following items, signed by manufacturers:
  - 1. Shop finishes.
  - 2. Recycled plastic.
- J. Field quality-control test reports.
- K. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for playground equipment.

- L. Maintenance Data: For playground equipment and finishes to include in maintenance manuals.
- M. Warranty: Special warranty specified in this Section.

#### 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An employer of workers trained and approved by manufacturer.
- B. Manufacturer Qualifications: A firm whose playground equipment components have been certified by IPEMA's third-party product certification service.
  - 1. Provide playground equipment and play structure components bearing the IPEMA Certification Seal.
  - 2. Provide the following playground equipment and play structure components bearing the IPEMA Certification Seal:
    - a. Refer to Section 116800-A "Playground Schedule" at the end of this Section.
- C. Testing Agency Qualifications: An independent agency qualified according to ANSI Z34.1 for testing indicated.
- D. Safety Standards: Provide playground equipment complying with or exceeding requirements in the following:
  - 1. ASTM F 1487.
  - 2. CPSC No. 325.
- E. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

#### 1.6 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of playground equipment that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Structural failures including: Deterioration of metals, metal finishes, and other materials beyond normal weathering.
  - 2. Warranty Period: Five years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Basis-of-Design Product: The design for each piece of playground equipment is based on the product named.

### 2.2 MATERIALS

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

1. Extruded Bars, Profiles, and Tubes: ASTM B 221 (ASTM B 221M).
2. Cast Aluminum: ASTM B 179.
3. Flat Sheet: ASTM B 209 (ASTM B 209M).

- B. Steel: Comply with the following:

1. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M, hot-dip galvanized.
2. Steel Pipe: ASTM A 53/A 53M or ASTM A 135, standard-weight, hot-dip galvanized.
3. Steel Tubing: ASTM A 500 or ASTM A 513, cold formed, hot-dip galvanized.
4. Steel Sheet: ASTM A 1011/A 1011M, hot-dip galvanized.
5. Perforated Metal: Steel sheet not less than 0.0747-inch (1.9-mm) uncoated thickness; hot-dip galvanized, manufacturer's standard perforation pattern.
6. Expanded Metal: ASTM F 1267, Type II (expanded and flattened), Class manufacturer's standard carbon-steel sheets, hot-dip galvanized, deburred after expansion.
7. Woven Wire Mesh: Manufacturer's standard, with wire complying with ASTM A 510 (ASTM A 510M).
8. Recycled Content: Provide products with average recycled content of steel products such that postconsumer recycled content plus one-half of pre-consumer recycled content is not less than 25 percent.

- C. Stainless-Steel Sheet: ASTM A 240/A 240M or ASTM A 666; Type 304.

- D. Chain and Fittings: ASTM A 467/A 467M, Class CS, 4/0 or 5/0, welded-straight-link coil chain; zinc plated. With commercial-quality, zinc-plated steel connectors and swing or ring hangars.

- E. Castings and Hangers: Malleable iron, ASTM A 47/A 47M, Grade 32510, hot-dip galvanized.

- F. Post Caps: Cast aluminum; color to match posts.

- G. Platform Clamps and Hangers: zinc-plated steel, not less than 0.105-inch- (2.7-mm-) nominal thickness.

- H. Hardware: Manufacturer's standard; commercial-quality; corrosion-resistant; hot-dip galvanized steel and iron, stainless steel, or aluminum; of a secure and vandal-resistant design.

- I. Fasteners: Manufacturer's standard; corrosion-resistant; hot-dip galvanized or plated steel and iron, or stainless steel; permanently capped, and theft resistant.
- J. Opaque Plastic: Color impregnated, UV stabilized, and mold resistant.
  - 1. Polyethylene: Fabricated from plastic resin; rotationally molded HDPE, LLDPE, or MDPE with not less than 1/4-inch (6-mm) wall thickness.
- K. Transparent Plastic: Abrasion-resistant, UV-stabilized monolithic polycarbonate sheet; clear, colorless; not less than 3/16 inch (5 mm) thick.

### 2.3 PLAYGROUND EQUIPMENT FABRICATION

- A. Assemble items in the shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.
- B. Metal Frame: Fabricate main-frame upright support posts from metal pipe or tubing with cross-section profile and dimensions as indicated. Form metal to required shapes and sizes, true to line and level with true curves and accurate angles and surfaces. Finish exposed surfaces to smooth, sharp, and well-defined lines.
  - 1. Fabricate secondary frame members, bracing, and connections from either steel or aluminum. Unless otherwise indicated, provide each pipe or tubing main-frame member with manufacturer's standard drainable bottom plate or support flange.
  - 2. Form simple and compound curves in bars and extruded shapes by bending members in jigs to produce uniform curvature for each configuration required; maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces.
  - 3. Cut, drill, and punch metals cleanly and accurately. Remove sharp or rough areas on exposed surfaces.
  - 4. Mill joints to a tight, hairline fit. Cope or miter corner joints. Fabricate connections that will be exposed to weather in a manner to exclude water.
  - 5. Comply with AWS recommended practices for shop welding and brazing. Weld and braze behind finished surfaces without distorting or discoloring exposed side. Clean exposed welded and brazed joints of flux, and dress exposed and contact surfaces.
  - 6. Provide weep holes where water may accumulate.
- C. Provide necessary rebates, lugs, and brackets to assemble units and to attach to other work. Cut, reinforce, drill, and tap to receive finish hardware, screws, and similar items, unless otherwise indicated.
- D. Provide castings that are sound and free of warp, cracks, blowholes, or other defects that impair strength or appearance. Grind, wire brush, sandblast, and buff castings to remove seams, gate marks, casting flash, and other casting marks.

- E. Composite Frame: Fabricate main-frame upright support posts from metal and plastic with profile and dimensions as indicated. Fabricate secondary frame members, bracing, and connections from either steel or aluminum.
- F. Play Surfaces: Provide manufacturer's standard elevated drainable decks, platforms, landings, walkways, ramps, and similar transitional play surfaces, designed to withstand loads; fabricated from perforated or expanded metal made into floor units with slip-resistant foot surfaces. Fabricate units in manufacturer's standard modular sizes and shapes to form assembled play surfaces indicated.
- G. Elevated Play Surfaces: Guardrails or protective barriers completely surround elevated play surface except for access openings, if play-surface heights above protective surfacing exceeds the following for use by age group indicated:
  - 1. Elevated surface greater than 20 inches (510 mm) intended for use by children aged 2 through 5.
  - 2. Elevated surface greater than 30 inches (760 mm) intended for use by children aged 5 through 12.
- H. Stepped Play Surfaces: Provide manufacturer's standard infill between stepped platforms according to referenced standards.
- I. Protective Barriers and Guardrails: Fabricate according to ASTM F 1487 and as follows:
  - 1. Welded metal pipe or tubing with vertical bars.
  - 2. Steel sheet with openings for vision and ventilation.
  - 3. Welded metal-pipe or -tubing frame with woven wire mesh infill panels.
  - 4. Solid plastic panels with openings per drawings.
- J. Handrails: Welded metal pipe or tubing, OD between 0.95 and 1.55 inches (24.1 and 39.4 mm). Provide handrails at height for use by age group indicated below:
  - 1. Ages: Between 2 and 5 and 5 and 12 years.
  - 2. Height of Top Surface: 29 inches (737 mm) intended for use by children aged 2 through 5 and 38 inches (965 mm) intended for use by children aged 5 through 12.
  - 3. Close exposed ends of handrails with returns with clearance of 1/4 inch (6 mm) or less.
- K. Roofs and Canopies: Manufacturer's standard plastic.
- L. Signs: Manufacturer's standard sign panels, fabricated from opaque plastic with graphics molded in, attached to upright support posts.
  - 1. Text: Per manufacturer's standard based on equipment theme.
  - 2. Colors: Per manufacturer's standard based on color scheme per Drawings.

## 2.4 FREESTANDING PLAYGROUND EQUIPMENT AND STRUCTURES

- A. Swings, Single Axis:

1. Chain: Short link not permitting finger penetration.
  - a. Color: As selected by Architect from manufacturer's full range.
2. Swing Connector: S-hook and double clevis and bolt link.
3. Swing Hanger: Galvanized manufacturer's standard.
4. Swing Seats: EPDM rubber, and enclosed infant seat.
  - a. Color: As selected by Architect from manufacturer's full range.

## 2.5 COMPOSITE PLAYGROUND EQUIPMENT AND STRUCTURES

- A. Composite Structure: Fabricated from steel and opaque plastic.
1. Frame: Galvanized steel pipe or tubing frame sections connected with bolts.
    - a. Pipe or Tubing: Not less than 4 1/2-inch (102-mm) OD legs.
    - b. Color: As selected by Architect from manufacturer's full range.
  2. Platforms: Perforated metal.
    - a. Color: As selected by Architect from manufacturer's full range.
  3. Roofs: Manufacturer's standard.
    - a. Color: As selected by Architect from manufacturer's full range.

## 2.6 BASKETBALL GOAL

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Patterson-Williams; Model No. 1590 with 6-inch square adjustable height basketball system or comparable product by one of the following:
1. BCI Burke Company, LLC.
  2. GameTime; a PlayCore, Inc. Company.
  3. Henderson Recreation Equipment Ltd.
  4. Kay Park Recreation.
  5. Playworld Systems, Inc.
  6. Recreation Creations, Inc.
- B. Description:
1. Heavy-duty 6-inch square galvanized steel with powder-coated paint system.
  2. Heavy-duty breakaway goal.
  3. Nylon net system.
  4. Backboard.
  5. Post pad system.

- C. Backboard and Goal: Provide heavy-duty 42" x 72" x 3/8" thick clear acrylic backboard welded to steel support system. Double-rimmed goal painted orange, with white shooter's square on backboard.
- D. Install manufacturer's standard "J-bolt" anchoring system in concrete footing designed by manufacturer to accommodate all live and dead loads per local codes.
- E. Adjustable Goal Height: Provide adjustable goal height from 7.5-feet to 10-feet.
- F. Steel Powder Coat Color: "Black" or as approved from manufacturer's full color range.

## 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. 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 ALUMINUM FINISHES

- A. Baked-Enamel Finish: Prepare, treat, and coat metal to comply with paint manufacturer's written instructions and as follows:
  - 1. Thermosetting, modified-acrylic enamel primer/topcoat system complying with AAMA 2603 except with a minimum dry film thickness not less than 3 to 5 mils (0.076 to 0.127 mm), medium gloss.

## 2.9 IRON AND STEEL FINISHES

- A. Galvanizing: Hot-dip galvanize products made from rolled-, pressed-, and forged-steel shapes, castings, plates, bars, and strips indicated to be galvanized to comply with ASTM A 123/A 123M.
  - 1. Hot-dip galvanize steel and iron hardware indicated to be galvanized to comply with ASTM A 153/A 153M.
  - 2. Galvanized Steel Sheet: Commercial steel sheet, hot-dip galvanized, complying with ASTM A 653/A 653M for not less than G60 (Z180) coating designation; mill phosphatized.
- B. Powder-Coat Finish: Prepare, treat, and coat ferrous metal to comply with resin manufacturer's written instructions and as follows:

1. Apply thermosetting polyester or acrylic urethane powder coating with cured-film thickness not less than 1.5 mils (0.04 mm).
  - 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 (0.05 mm).
  - D. PVC Finish: Manufacturer's standard, UV-stabilized, mold-resistant, slip-resistant, matte-textured, dipped or sprayed-on, PVC-plastisol finish, with flame retardant added, complying with coating manufacturer's written instructions for pretreatment, application, and minimum dry film thickness of 100 mils (2.5 mm).
  - E. Colors: As selected by Architect/Owner from manufacturer's full range.
- 2.10 STAINLESS-STEEL FINISHES
- A. Remove tool and die marks and stretch lines or blend into finish.
  - B. Bright, Cold-Rolled, Unpolished Finish: No. 2B finish on exposed faces.
- 2.11 PLAY EQUIPMENT SCHEDULE
- A. Refer to equipment keynotes on Documents.
    1. "Fairy's Burrow" model US-175515 by Lappset:  
[https://www.lappset.com/Products/Product/Fairys-Burrow-\(ASTM\)/US175515](https://www.lappset.com/Products/Product/Fairys-Burrow-(ASTM)/US175515)
    2. "Wobbling Logs" US-175533 by Lappset:  
[https://www.lappset.com/Products/Product/WOBBLING-LOGS-\(ASTM\)/US175533](https://www.lappset.com/Products/Product/WOBBLING-LOGS-(ASTM)/US175533)
    3. "Troll's Balance Beam" 17530 by Lappset:  
<https://www.lappset.com/Products/Product/Trolls-Balance-Beam/175530>
    4. "Clover Stools" US-175560 by Lappset:  
[https://www.lappset.com/Products/Product/Clover-\(ASTM\)/US175560](https://www.lappset.com/Products/Product/Clover-(ASTM)/US175560)
    5. "Magic Mountain" by Lappset: [https://www.lappset.com/Products/Product/MAGIC-MOUNTAIN-\(ASTM\)/US175529](https://www.lappset.com/Products/Product/MAGIC-MOUNTAIN-(ASTM)/US175529)
    6. "Forest Elf's Swing" by Lappset: <https://www.lappset.com/Products/Product/Forest-Elfs-Swing/175575>
    7. "Trolls Climbing Track" by Lappset: <https://www.lappset.com/Products/Product/Trolls-Climbing-Track/175590>
    8. "Fairy Circus" by Lappset: [https://www.lappset.com/Products/Product/FAIRY-CIRCUS-\(ASTM\)/US175599](https://www.lappset.com/Products/Product/FAIRY-CIRCUS-(ASTM)/US175599)
    9. "Bird's Nest Swing" by Lappset: [https://www.lappset.com/Products/Product/Birds-Nest-Swing/137417\\_M](https://www.lappset.com/Products/Product/Birds-Nest-Swing/137417_M)
    10. Gym/Wellness Circuit "Fitness Park M" by Lappset:  
<https://www.lappset.com/Products/Product/FITNESS-PARK-M/081326M>

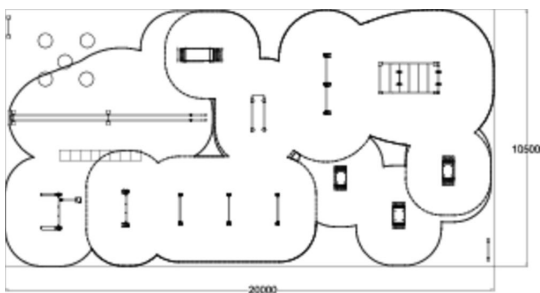
END OF SECTION 116800

DRAFT

# FITNESS PARK M



M-size Fitness Park offers wide-range and challenging functional training movements without free weight products. Park includes: 081290M SIGN x 2, 081200M BOX S, 081201M BOX M, 081202M BOX L, 081255M BATTLING ROPES, 081210M BACK'N ABS, 081220M DIP BAR, 081265M PULL-UP, 081230M MONKEY BARS, 081236M OBSTACLE WALL, 081240M MEDICINE BALL THROW, 081250M JUMPER.

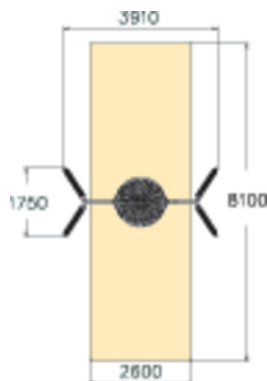


Product length, mm	20000
Product width, mm	10500
Foundation options	deep_mounting surface_mounting

# Bird's Nest Swing



Swing frame for bird's nest swing, matching the Finno family of products. The frame height is 2,70 mm. The bird's nest swing is everybody's favourite! Children, youngsters and adults alike will take pleasure in swinging and lounging in this birds' nest swing with a streamline design. To ensure that people with physical limitations can access the product, please place it so that the surface is hard enough for independent or assisted access.

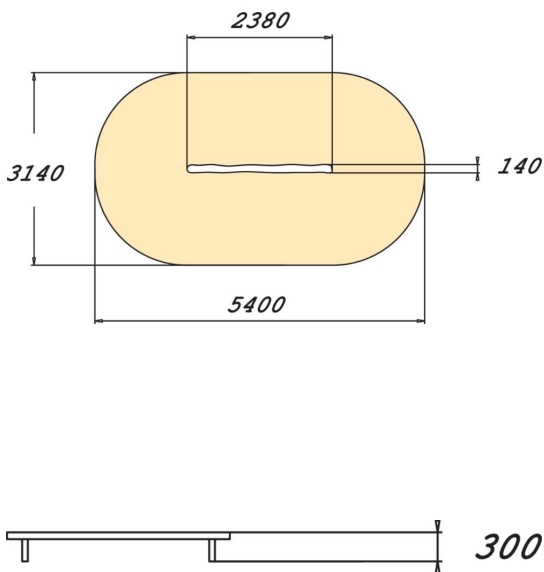


User age	1+
Number of users	4
Product length, mm	3910
Product width, mm	1730
Product height, mm	2700
Impact area, m <sup>2</sup>	21.1
Falling space, m <sup>2</sup>	21.1
Height required, mm	2900
Max. free fall height, mm	1400
Safety info	EN 1176-1, 2:2008
Installation time (for 1), H	6
Foundation options	deep_mounting

# Troll's Balance Beam



Like a sunken log! The Troll's Balance Beam is 370 mm high and 2,380 mm long. In the form of a real log, it is suitable for games that develop balance. A simple balance beam like this can be used in many ways, for example by installing several in a row to create diverse balancing routes, or placing them side by side to form an obstacle course. The beams can also be used to mark out different areas of a playground.

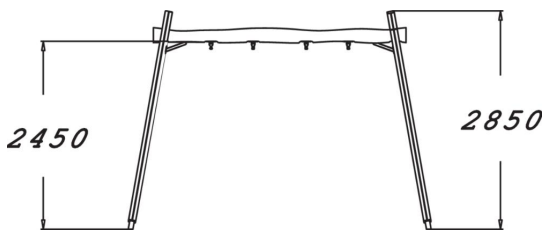
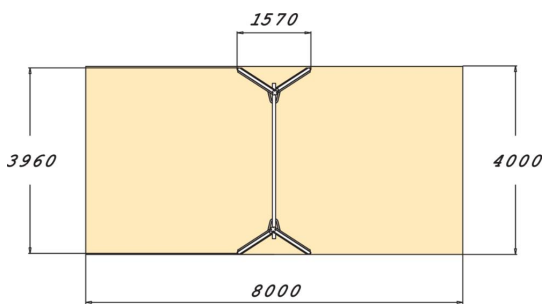


User age	3+
Number of users	4
Product length, mm	2380
Product width, mm	140
Product height, mm	370
Impact area, m <sup>2</sup>	15.1
Falling space, m <sup>2</sup>	15.1
Height required, mm	2170
Max. free fall height, mm	370
Safety info	EN 1176-1 TÜV
Installation time (for 1), H	1
Foundation options	Deep mounting Surface mounting
Wood	
Metal colour	

# Forest Elf's Swing



The Forest Elf's Swing is a perennial favourite among kids, offering thrilling speed! The lovely swing frame fits beautifully into its natural background. The height of the frame is 2850 mm. The frame has bearings for two seats, with 210 cm chains.



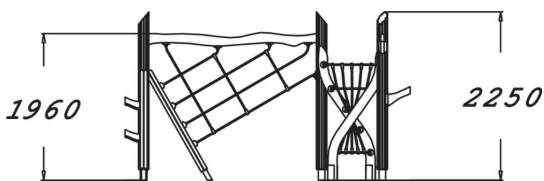
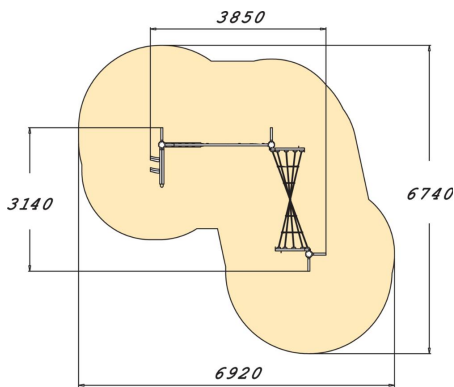
User age	4+
Number of users	2
Product length, mm	3960
Product width, mm	1570
Product height, mm	2850
Impact area, m <sup>2</sup>	25.5
Falling space, m <sup>2</sup>	25.5
Height required, mm	2900
Max. free fall height, mm	1400
Safety info	EN 1176-1, 2 TÜV
Installation time (for 1), H	6
Foundation options	Deep mounting Surface mounting
Wood	
Metal colour	

175590

# Troll's Climbing Track



A 2,250 mm high climbing frame with one triangular climbing net and one leaning climbing net, as well as upright posts with six climbing branches. Children can traverse the set from one end to the other. The pleasant natural rope material and the fun design provide new climbing and hanging challenges. The nets are tilted or twisted in different directions and have holes of different sizes at various heights, just like the nature that surrounds us. The Goblin's Climbing Route varies when approached from different directions, offering countless opportunities for play.



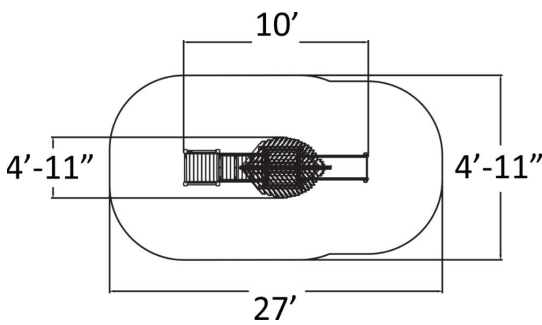
User age	4+
Number of users	5
Product length, mm	3830
Product width, mm	3140
Product height, mm	2250
Impact area, m <sup>2</sup>	30.7
Falling space, m <sup>2</sup>	32.6
Height required, mm	3460
Max. free fall height, mm	1960
Safety info	EN 1176-1 TÜV
Installation time (for 1), H	6
Foundation options	Deep mounting Surface mounting
Wood	
Metal colour	



**US175515**

**Fairy's Burrow (ASTM)**




The US175515 product complies with the ASTM Standard. Fairy's Burrow is a lovely slide, straight from a story-book, that will fit into a small space. The platform's leafy roof and wooden fences give wings to the imagination and lead to all sorts of exciting imaginative games. Structure of the slides is curved laminated wood and the gliding surface is stainless steel. All Flora products are modular, and all parts are factory-made which guarantees an easy access and exchangeability of spare parts.



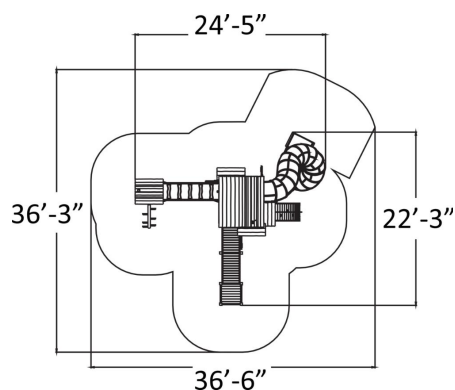
User age	2-5
Number of users	4
Product length, mm	4560
Product width, mm	1500
Product height, mm	3200
Height required, mm	3200
Max. free fall height, mm	870
Safety info	ASTM F1487-17
Installation time (for 1), H	8
Wood	
Metal colour	



# MAGIC MOUNTAIN (ASTM)

-  Bridges  
1
-  Slides  
1
-  Towers  
2



The US175529 product complies with the ASTM Standard. Magic Mountain is an exciting control centre and a watchtower for the courageous and agile magicians. With the highest point reaching over six metres, it is also a stunning landmark. However, not only magic will take the players up to the top floor. Instead, everyone can practise their climbing skills in many different ways to reach the intriguing "chambers" on multiple levels, and to enjoy the tube slide back down from the top!

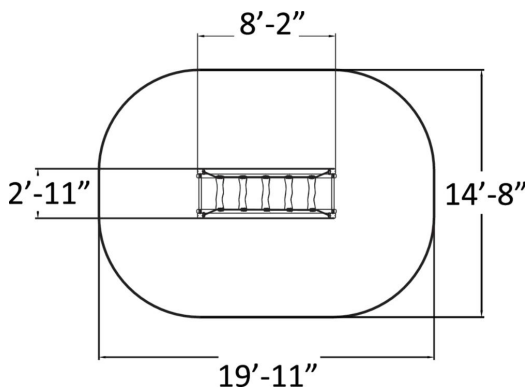


User age	5-12
Number of users	31
Product length, mm	6770
Product width, mm	7450
Product height, mm	6840
Height required, mm	7000
Max. free fall height, mm	1470
Safety info	ASTM F1487-17
Installation time (for 1), H	120
Wood	
Metal colour	

WOBBLING LOGS (ASTM)



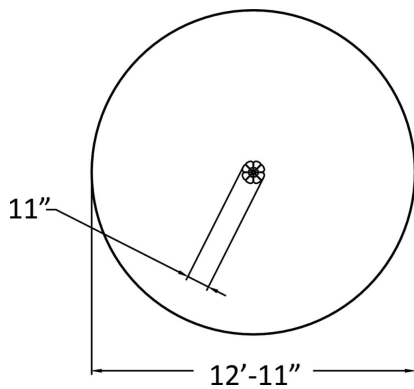
The US175533 product complies with the ASTM Standard. The Wobbling logs improves balance, coordination, core body strength and lower body strength. This equipment is an arched rung bridge with five rungs suspended by ropes from the arched handrails. The unsteady steps rise along the handrail curve and move back and forward, side to side, providing an exciting challenge for wide range of users.



User age	2-12
Number of users	7
Product length, mm	2490
Product width, mm	890
Product height, mm	1100
Height required, mm	2120
Max. free fall height, mm	380
Safety info	ASTM F1487-17
Installation time (for 1), H	2

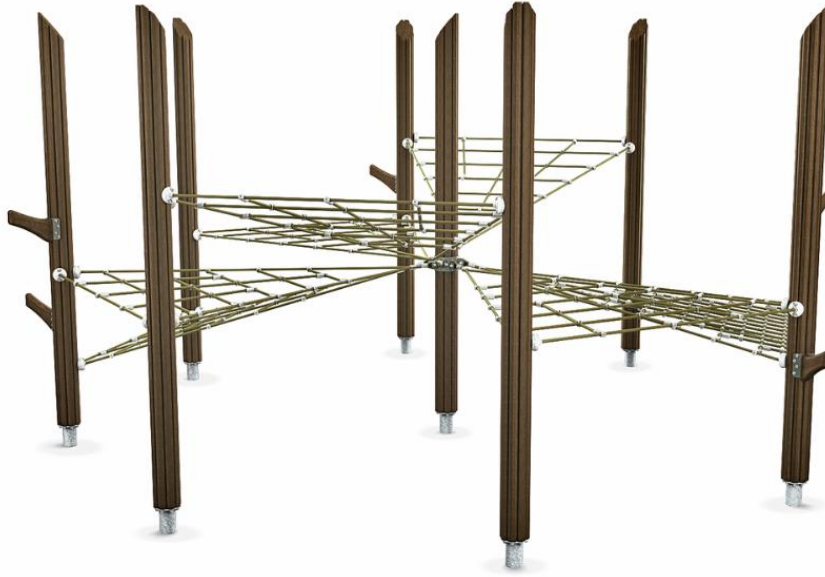


The US175560 product complies with the ASTM Standard. A balancing post with a wooden top on a metal foot. The pretty posts shaped like clover leaves (or pine cones) can be combined, to form balancing routes that are safe even for younger kids thanks to their low height. With practice, the children will become more adept, increasing their speed and the diversity of their movements! The balancing posts can also be used as seats by children or grown-ups, for a little rest.

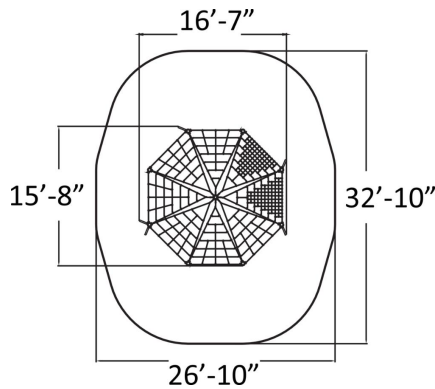


Number of users	1
Product length, mm	280
Product width, mm	280
Product height, mm	470
Height required, mm	2270
Max. free fall height, mm	470
Safety info	ASTM F1487-17
Installation time (for 1), H	1

# FAIRY CIRCUS (ASTM)



The US175599 product complies with the ASTM Standard. The Fairy Circus is a beautiful and inclusive nature play product which offers a nice climbing challenge, as well as a hammock type lounging area on any schoolyard or park! Two of the nets have tighter mesh, which makes the product easier to play and rest also for disabled persons. Some posts have also "grown" branches, which will give even more excitement to climbing.



User age	2-12
Number of users	28
Product length, mm	5050
Product width, mm	4770
Product height, mm	2700
Height required, mm	3700
Max. free fall height, mm	1760
Safety info	ASTM F1487-17
Installation time (for 1), H	8

## SECTION 119513 - KILNS

### 1.1 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include installation details, material descriptions, dimensions of individual components, and finishes for each kiln.
  - 2. Include rated capacities, operating characteristics, electrical characteristics, and furnished accessories.

### 1.2 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: To include in operation and maintenance manuals.

### 1.3 PERFORMANCE REQUIREMENTS

- A. Kiln shall have a sealed, dust-free lid with a full-floating hinge to allow for expansion and contraction of the kiln chamber during firing.
- B. Kiln shall have a solid bar to secure the lid during loading and unloading.
- C. Kiln shall be equipped with a Limit Timer and a power on light.
- D. Kiln shall provide switches for complete control.
- E. Kiln shall be equipped with reversible top and bottom slabs.
- F. Kiln shall be equipped with peepholes and plugs for a visual checking of firing.

### 1.4 MANUFACTURERS

- A. Basis-of-Design: Model No. KMT-1227-3 as manufactured by Scutt Kilns with EnviroVent2 downdraft vent system.
- B. Features:
  - 1. Nominal Interior Size: 23 inches dia. x 27 inches deep, with 7.0 cu ft. interior capacity.
  - 2. Minimum 3-inch brick thickness.
  - 3. Electrical Characteristics:
    - a. 240V, 3-phase, 48-Amps, 11520 Watts.
    - b. Direct wired with #6 copper wiring for 60-Amp breaker
    - c. NEMA receptacle configuration of 6-50.
    - d. Digital controls and shut-off timer.

- C. Accessories:
1. Downdraft Vent System.
  2. Wall-mounted touch-screen digital controller.
  3. Furniture kit consisting of shelves and posts.
  4. Lid lifter with spring assist.

END OF SECTION 119513

## SECTION 122413 - ROLLER WINDOW SHADES

### 1.1 SUMMARY

- A. Section Includes:
  - 1. Manually operated roller shades with single rollers.
  - 2. Motor-operated roller shades with single and double rollers.

### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include construction details, material descriptions, dimensions of individual components and profiles, features, finishes, and operating instructions for roller shades.
- B. Shop Drawings: Show fabrication and installation details for roller shades, including shadeband materials, their orientation to rollers, and their seam and batten locations.
  - 1. Motor-Operated Shades: Include details of installation and diagrams for power, signal, and control wiring.
- C. Samples for Verification: For each type of roller shade.
  - 1. Shadeband Material: Not less than 10 inches (250 mm) square. Mark interior face of material if applicable.
  - 2. Roller Shade: Full-size operating unit, not less than 16 inches (400 mm) wide by 36 inches (900 mm) long for each type of roller shade indicated.
  - 3. Installation Accessories: Full-size unit, not less than 10 inches (250 mm) long.
- D. Product Schedule: For roller shades. Use same designations indicated on Drawings.

### 1.3 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Certificates: For each type of shadeband material.
- C. Product Test Reports: For each type of shadeband material, for tests performed by a qualified testing agency.

### 1.4 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For roller shades to include in maintenance manuals.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Fabricator of products.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver roller shades in factory packages, marked with manufacturer, product name, and location of installation using same designations indicated on Drawings.

1.7 FIELD CONDITIONS

- A. Environmental Limitations: Do not install roller shades until construction and finish work in spaces, including painting, is complete and dry and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
- B. Field Measurements: Where roller shades are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Allow clearances for operating hardware of operable glazed units through entire operating range. Notify Architect of installation conditions that vary from Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1.8 MANUALLY OPERATED SHADES WITH SINGLE ROLLERS

- A. Basis-of-Design Product: MechoShade Mecho/5 for shades below 10 feet.
- B. Chain-and-Clutch Operating Mechanisms: With continuous-loop bead chain and clutch that stops shade movement when bead chain is released; permanently adjusted and lubricated.
- C. Rollers: Corrosion-resistant steel or extruded-aluminum tubes of diameters and wall thicknesses required to accommodate operating mechanisms and weights and widths of shadebands indicated without deflection. Provide with permanently lubricated drive-end assemblies and idle-end assemblies designed to facilitate removal of shadebands for service.
- D. Mounting Hardware: Brackets or endcaps, corrosion resistant and compatible with roller assembly, operating mechanism, installation accessories, and mounting location and conditions indicated.
- E. Shadebands:
  - 1. Shadeband Material: Light-filtering fabric.
  - 2. Shadeband Bottom (Hem) Bar: Steel or extruded aluminum.

#### 1.9 MOTOR-OPERATED, SINGLE-ROLLER SHADES

- A. Basis-of-Design Product: MechoShade ElectroShade with WhisperShade for shades above 10 feet.
- B. Motorized Operating System: Provide factory-assembled, shade-operator system of size and capacity and with features, characteristics, and accessories suitable for conditions indicated, complete with electric motor and factory-prewired motor controls, power disconnect switch, enclosures protecting controls and operating parts, and accessories required for reliable operation without malfunction. Include wiring from motor controls to motors. Coordinate operator wiring requirements and electrical characteristics with building electrical system.
  - 1. Electrical Components: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
  - 2. Remote Control: Electric controls with NEMA ICS 6, Type 1 enclosure for recessed or flush mounting. Provide the following for remote-control activation of shades:
    - a. Individual/Group Control Station: Maintained-contact, three-position, rocker-style, wall-switch-operated control station with open, close, and center off functions for individual and group control.
- C. Rollers: Corrosion-resistant steel or extruded-aluminum tubes of diameters and wall thicknesses required to accommodate operating mechanisms and weights and widths of shadebands indicated without deflection. Provide with permanently lubricated drive-end assemblies and idle-end assemblies designed to facilitate removal of shadebands for service.
- D. Mounting Hardware: Brackets or endcaps, corrosion resistant and compatible with roller assembly, operating mechanism, installation accessories, and mounting location and conditions indicated.
- E. Shadebands:
  - 1. Shadeband Material: Light-filtering fabric.

#### 1.10 MOTOR-OPERATED, DOUBLE-ROLLER SHADES

- A. Basis-of-Design Product: MechoShade ElectroShade with WhisperShade for shades in performance or specialty spaces.
- B. Motorized Operating Systems: Provide factory-assembled, shade-operator systems of size and capacity and with features, characteristics, and accessories suitable for conditions indicated, complete with electric motor and factory-prewired motor controls, power disconnect switch, enclosures protecting controls and operating parts, and accessories required for reliable operation without malfunction. Include wiring from motor controls to motors. Coordinate operator wiring requirements and electrical characteristics with building electrical system.
  - 1. Electrical Components: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
  - 2. Remote Control: Electric controls with NEMA ICS 6, Type 1 enclosure for recessed or flush mounting. Provide the following for remote-control activation of shades:

- a. Individual/Group Control Station: Maintained-contact, three-position, rocker-style, wall-switch-operated control station with open, close, and center off functions for individual and group control.
- C. Rollers: Corrosion-resistant steel or extruded-aluminum tubes of diameters and wall thicknesses required to accommodate operating mechanisms and weights and widths of shadebands indicated without deflection. Provide with permanently lubricated drive-end assemblies and idle-end assemblies designed to facilitate removal of shades for service.
- D. Mounting Hardware: Brackets or endcaps, corrosion resistant and compatible with roller mounting configuration, roller assemblies, operating mechanisms, installation accessories, and installation locations and conditions indicated.
- E. Inside Shadebands:
  - 1. Shadeband Material: Light-filtering fabric.
- F. Outside Shadebands:
  - 1. Shadeband Material: Light-blocking fabric.

#### 1.11 ROLLER SHADE INSTALLATION

- A. Install roller shades level, plumb, and aligned with adjacent units according to manufacturer's written instructions.
  - 1. Opaque Shadebands: Located so shadeband is not closer than 2 inches (51 mm) to interior face of glass. Allow clearances for window operation hardware.
- B. Electrical Connections: Connect motor-operated roller shades to building electrical system.

#### 1.12 ADJUSTING

- A. Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.

#### 1.13 CLEANING AND PROTECTION

- A. Clean roller shade surfaces, after installation, according to manufacturer's written instructions.
- B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that roller shades are without damage or deterioration at time of Substantial Completion.
- C. Replace damaged roller shades that cannot be repaired, in a manner approved by Architect, before time of Substantial Completion.

END OF SECTION 122413

## SECTION 123661 – SIMULATED STONE COUNTERTOPS

### 1.1 SUMMARY

- A. Section Includes:
  - 1. Simulated stone material countertops.

### 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.
  - 1. Show locations and details of joints.
  - 2. Show direction of directional pattern, if any.
- C. Samples for Verification: For the following products:
  - 1. Countertop material, 6 inches (150 mm) square.

### 1.3 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For fabricator.

### 1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For simulated stone material countertops to include in maintenance manuals. Include Product Data for care products used or recommended by Installer and names, addresses, and telephone numbers of local sources for products.

### 1.5 QUALITY ASSURANCE

- A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate countertops similar to that required for this Project, and whose products have a record of successful in-service performance.
- B. Installer Qualifications: Fabricator of countertops.

### 1.6 FIELD CONDITIONS

- A. Field Measurements: Verify dimensions of countertops by field measurements before countertop fabrication is complete.

## 1.7 COORDINATION

- A. Coordinate locations of utilities that will penetrate countertops or backsplashes.

## 1.8 SOLID SURFACE MATERIAL COUNTERTOPS

- A. Solid Surface Material: Homogeneous-filled plastic resin complying with ICPA SS-1.
  - 1. Type: Provide Standard type unless Special Purpose type is indicated.
  - 2. Integral Sink Bowls: Comply with CSA B45.5/IAPMO Z124.
- B. Front: Straight, slightly eased edge.
- C. Backsplash: Eased edge.
- D. Countertops: 1/2-inch- (12.7-mm-) thick, solid surface material.

## 1.9 QUARTZ AGGLOMERATE COUNTERTOP

- 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.
- B. Front: Straight, slightly eased edge.
- C. Backsplash: Eased edge.
- D. Countertops: 1/2-inch- (12.7-mm-) thick, solid surface material.

## 1.10 COUNTERTOP FABRICATION

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

## 1.11 INSTALLATION

- A. Install countertops level to a tolerance of 1/8 inch in 8 feet (3 mm in 2.4 m), 1/4 inch (6 mm) maximum. Do not exceed 1/64-inch (0.4-mm) difference between planes of adjacent units.
- B. Fasten countertops by screwing through corner blocks of base units into underside of countertop. Pre-drill holes for screws as recommended by manufacturer. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.

END OF SECTION 123661

## SECTION 126613 - TELESCOPING STANDS

### 1.1 SUMMARY

- A. Section includes telescoping stands.
  - 1. Operation: Electrically operated, with friction-type, integral power unit.

### 1.2 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 telescoping stands.
  - 2. Include load capacities, assembly characteristics, and furnished accessories.
  - 3. Include electrical characteristics of electrical components, devices, and accessories.
- B. Shop Drawings: For telescoping stands in both stacked and extended positions.
  - 1. Include plans, elevations, sections, and attachment details.
  - 2. Include load capacities.
  - 3. Show seating layout, aisle widths, row-lettering and seat-numbering scheme, and wheelchair accessibility provisions.
  - 4. Show locations and details for installing operator components, switches, and controls. Indicate motor size, electrical characteristics, drive arrangement, mounting, and grounding provisions.
  - 5. Include diagrams for power, signal, and control wiring.

### 1.3 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Welding certificates.
- C. Product Certificates: For each type of telescoping stand assembly.
- D. Material Certificates: For each type of flame-retardant treatment of upholstery fabric.
- E. Field quality-control reports.

### 1.4 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For telescoping stands to include in operation and maintenance manuals.

1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:
  - a. Procedures for conducting periodic inspections.
  - b. Precautions for cleaning materials and methods that could be detrimental to telescoping-stand finishes and performance.
  - c. Methods for maintaining upholstery fabric.

#### 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
- B. Welding Qualifications: Qualify procedures and personnel according to the following:
  1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
  2. AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."

#### 1.6 FIELD CONDITIONS

- A. Finished Spaces: Do not deliver or install telescoping stands until finishes in spaces to receive them are complete, including suspended ceilings, floors, and painting.
- B. Field Measurements: Indicate measurements on Shop Drawings.

#### 1.7 PERFORMANCE REQUIREMENTS

- A. Structural Performance: ICC 300.
- B. Accessibility Standard: ABA Standards of the Federal agency having jurisdiction and ICC A117.1.

#### 1.8 COMPONENTS

- A. Bench Seating:
  1. Basis-of-Design Product: Interkal Contour Seat Modules (CSM) and Telescoping Bleachers.
  2. Deck: Aluminum
  3. Safety Rails:
    - a. Self-Storing mid-aisle handrails.
    - b. Telescoping and self-storing end rails.
    - c. Fixed Front rails.
    - d. Fixed rails around accessible seating cutouts and truncations.
  4. Accessories:
    - a. Intermediate Stairs, heights shown on Drawings.

- b. Vinyl side curtains, where applicable.
- 5. Seat Module: Molded polyethylene plastic with contour surfaces, 10-inches.
  - a. Seat Colors: Multi-color seats, colors as identified on the Drawings.
- 6. Provide electrically operated, with friction-type, integral power unit at CAHS locations as shown on Drawings.

#### 1.9 FABRICATION

- A. Fabricate telescoping stands to operate easily without special tools or separate fasteners unless otherwise indicated.
- B. Round corners and edges of components and exposed fasteners to reduce snagging and pinching hazards.
- C. Form exposed work with flat, flush surfaces, level and true in line.
- D. Supports: Fabricate supports to withstand, without damage to components, the forces imposed by use of stands without failure or other conditions that might impair their usefulness.
  - 1. Cantilever bench seat supports to produce toe space uninterrupted by vertical bracing.

#### 1.10 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 1.11 INSTALLATION

- A. Install telescoping stands according to ICC 300 and manufacturer's written instructions.

#### 1.12 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Perform the following tests and inspections:
  - 1. ICC 300 Inspection: Inspect installed telescoping stands to verify that construction, installation, and operation are according to ICC 300 requirements.
  - 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- C. Telescoping stands will be considered defective if they do not pass tests and inspections.
- D. Prepare test and inspection reports.

1.13 ADJUSTING

- A. Adjust backrests so that they are at proper angles and aligned with each other in uniform rows.
- B. Adjust hardware and moving parts to function smoothly, and lubricate, test, and adjust each telescoping stand unit to operate according to manufacturer's written instructions.
- C. Clean installed telescoping stands on exposed and semiexposed surfaces. Touch up factory-applied finishes or replace components as required to restore damaged or soiled areas.
- D. Replace upholstery fabric damaged during installation or work of other trades.

1.14 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to inspect, adjust, operate, and maintain telescoping stands.

END OF SECTION 126613

## SECTION 142123.16 - MACHINE ROOM-LESS ELECTRIC TRACTION PASSENGER ELEVATORS

### 1.1 SUMMARY

- A. Section Includes:
1. Machine-room-less electric traction passenger elevators.

### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
1. Include capacities, sizes, performances, operations, safety features, finishes, and similar information.
  2. Include Product Data for car enclosures, hoistway entrances, and operation, control, and signal systems.
- B. Shop Drawings:
1. Include plans, elevations, sections, and large-scale details indicating service at each landing, coordination with building structure, relationships with other construction, and locations of equipment.
  2. Include large-scale layout of car-control station and standby power operation control panel.
  3. Indicate maximum dynamic and static loads imposed on building structure at points of support, and maximum and average power demands.
- C. Samples for Verification: For exposed car, hoistway door and frame, and signal equipment finishes; 3-inch- (75-mm-) square Samples of sheet materials; and 4-inch (100-mm) lengths of running trim members.

### 1.3 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Seismic Qualification Certificates: For elevator equipment, accessories, and components, from manufacturer.
1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
  2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
  3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

- C. Manufacturer Certificates: Signed by elevator manufacturer certifying that hoistway and pit layout and dimensions, as indicated on Drawings, and electrical service including standby power generator, as shown and specified, are adequate for elevator system being provided.

#### 1.4 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For elevators to include in emergency, operation, and maintenance manuals.
- B. Inspection and Acceptance Certificates and Operating Permits: As required by authorities having jurisdiction for normal, unrestricted elevator use.

#### 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Elevator manufacturer or an authorized representative who is trained and approved by manufacturer.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle materials, components, and equipment in manufacturer's protective packaging. Store materials, components, and equipment off of ground, under cover, and in a dry location.

#### 1.7 COORDINATION

- A. Coordinate installation of inserts, sleeves, block outs, elevator equipment with integral anchors, and other items that are embedded in concrete or masonry for elevator equipment. Furnish templates, inserts, sleeves, elevator equipment with integral anchors, and installation instructions and deliver to Project site in time for installation.
- B. Coordinate locations and dimensions of work specified in other Sections that relates to electric traction elevators including pit ladders; sumps and floor drains in pits; entrance subsills; electrical service; and electrical outlets, lights, and switches in hoistways and pits.

#### 1.8 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with ASME A17.1/CSA B44.
- B. Accessibility Requirements: Comply with requirements for accessible elevators in the United States Access Board's ADA-ABA Accessibility Guidelines and with ICC A117.1.

- C. Seismic Performance: Elevator system shall withstand the effects of earthquake motions determined according to ASCE/SEI 7 and shall comply with elevator seismic requirements in ASME A17.1/CSA B44.
1. The term "withstand" means "the system will remain in place without separation of any parts when subjected to the seismic forces specified."
  2. Elevator Component Importance Factor: 1.0.
  3. Provide earthquake equipment required by ASME A17.1/CSA B44.
  4. Provide seismic switch required by ASCE/SEI 7.

## 1.9 ELEVATORS

A. Elevator Basis-of-Design: ThyssenKrup Endura MRL Twin Post 3-Stage.

B. Rated Load: 3000 lb (1362 kg).

C. Rated Speed: 100 fpm (0.5 m/s).

D. Operation System: Single elevator.

E. Auxiliary Operations:

1. Battery-powered automatic evacuation.
2. Earthquake Emergency Operation: ASME A17.1/CSA B44.

F. Security Features: Card-reader operation.

G. Car Enclosures:

1. Inside Width: 80 inches (2032 mm).
2. Inside Depth: 56-1/2 inches (1435 mm).
3. Inside Height: 93 inches (2362 mm).
4. Front Walls (Return Panels): Stainless steel.
5. Side and Rear Wall Panels: Stainless steel.
6. Doors: Stainless steel.
7. Door Sills: Aluminum.
8. Ceiling: Stainless steel.
9. Handrails: Stainless steel.
10. Floor: Prepared to receive resilient flooring.

H. Hoistway Entrances:

1. Width: 42 inches (1067 mm).
2. Height: 84 inches (2134 mm).
3. Type: Single-speed side sliding.
4. Frames: Stainless steel.
5. Doors: Stainless steel.
6. Sills: Nickel silver.

I. Hall Fixtures: Stainless steel.

#### 1.10 INSTALLATION

- A. Comply with manufacturer's written instructions.
- B. **Welded Construction:** Provide welded connections for installing elevator work where bolted connections are not required for subsequent removal or for normal operation, adjustment, inspection, maintenance, and replacement of worn parts. Comply with AWS standards for workmanship and for qualifications of welding operators.
- C. **Sound Isolation:** Mount rotating and vibrating equipment on vibration-isolating mounts to minimize vibration transmission to structure and structure-borne noise due to elevator system.
- D. Lubricate operating parts of systems, including ropes, as recommended by manufacturers.
- E. **Alignment:** Coordinate installation of hoistway entrances with installation of elevator guide rails for accurate alignment of entrances with car. Where possible, delay final adjustment of sills and doors until car is operable in shaft. Reduce clearances to minimum, safe, workable dimension at each landing.
- F. **Leveling Tolerance:** 1/8 inch (3 mm), up or down, regardless of load and travel direction.
- G. Set sills flush with finished floor surface at landing. Fill space under sill solidly with nonshrink, nonmetallic grout.
- H. **Locate hall signal equipment for elevators as follows unless otherwise indicated:**
  - 1. For groups of elevators, locate hall push-button stations between two elevators at center of group or at location most convenient for approaching passengers.
  - 2. Place hall lanterns either above or beside each hoistway entrance.
  - 3. Mount hall lanterns at a minimum of 72 inches (1829 mm) above finished floor.

#### 1.11 FIELD QUALITY CONTROL

- A. **Acceptance Testing:** On completion of elevator installation and before permitting elevator use (either temporary or permanent), perform acceptance tests as required and recommended by ASME A17.1/CSA B44 and by governing regulations and agencies.
- B. **Operating Test:** Load elevator to rated capacity and operate continuously for 30 minutes over full travel distance, stopping at each level and proceeding immediately to the next. Record temperature rise of elevator machine during 30-minute test period. Record failure to perform as required.
- C. Advise Owner, Architect, and authorities having jurisdiction in advance of dates and times that tests are to be performed on elevators.

END OF SECTION 142123.16