



UNIVERSITY OF COLORADO ANSCHUTZ MEDICAL CAMPUS

Sheridan Health HRSA Grant Amer Rescue Fund

PN 21-107321

**STATE OF COLORADO
STATE BUILDINGS AND REAL ESTATE PROGRAMS**

100% Design Development Specifications

September 1, 2023

Architect: Architectural Workshop, LLC.
2 Kalamath Street
Denver, CO 80223
Ph: 303.788.1717

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END OF SECTION 00 01 00

SECTION 01 00 00 - GENERAL REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Design Requirements:

1. Designer Responsibility: Based on a series of meetings with the University Project Manager and applicable University staff, draft Division 01 Specification Sections consistent with State of Colorado Construction Contract provisions, General and Supplementary Conditions of the Contract, including requirements for administrative procedures consistent with the size and scope of the project.
2. Content: Include, as applicable, the following Sections:
 - a. SECTION 01 00 00 – SUMMARY.
 - b. SECTION 01 25 00 – SUBSTITUTION PROCEDURES.
 - c. SECTION 01 26 00 – CONTRACT MODIFICATION PROCEDURES.
 - d. SECTION 01 31 00 – PROJECT MANAGERMENTS AND COORDINATION.
 - e. SECTION 01 32 33 – PHOTOGRAPHIC DOCUMENTATION.
 - f. SECTION 01 33 00 – SUBMITTAL PROCEDURES.
 - g. SECTION 01 35 00 – SPECIAL PROCEDURES.
 - 1) This Section includes special environment health and safety procedures unique to work at University projects.
 - h. SECTION 01 35 46 – INDOOR AIR QUALITY PROCEDURES
 - 1) This Section includes special procedures required by the University to maintain a high level of indoor air quality both during construction and subsequent to occupancy.
 - i. SECTION 01 40 00 – QUALITY REQUIREMENTS.
 - j. SECTION 01 41 00 – REGULATORY REQUIREMENTS.
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PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01 00 00

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SECTION 01 10 00

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 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Project information.
2. Work covered by Contract Documents.
3. Work by University.
4. Work under separate contracts.
5. University-furnished and installed products.
6. University-furnished, Contractor-installed products.
7. Access to site.
8. Coordination with occupants.
9. Work restrictions.
10. Specification and drawing conventions.

B. Related Requirements:

1. Section 01 35 46 "Indoor Air Quality Procedures" for requirements and procedures related to maintaining air quality in adjacent occupied spaces and buildings.
2. Section 01 50 00 "Temporary Facilities and Controls" for limitations and procedures governing temporary use of University's facilities and for the provision of temporary construction barriers and dust partitions.

1.3 PROJECT INFORMATION

A. Project Identification: Sheridan Health Services- Suite Remodel

1. Project # 21-107321.
2. Project Location: 3525 West Oxford, Denver, Colorado 80296

B. Principal Representation: University of Colorado Denver.

1. University's Representative: Stephanie Menke, Ph: 303-483-1594

C. Architect/Engineer: Architectural Workshop – Joe Marshall Ph: 303-788-1717.

D. Architect/Engineer's Consultants: The Architect/Engineer has retained the following design professionals who have prepared designated portions of the Contract Documents:

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1. BG Buildingworks – Mike Reed Ph: 303-278-3820.

1.4 WORK COVERED BY CONTRACT DOCUMENTS

- A. The Work of Project is defined by the Contract Documents and, in summary, briefly consists of the following:
 1. Renovation (T.I.) of existing 4 wings (B Occupancy). Attached to existing hospital (I-2 Occupancy). This facility does not provide any ambulatory services.

1.5 WORK BY UNIVERSITY

- A. General: Cooperate fully with University so work may be carried out smoothly, without interfering with or delaying work under this Contract or work by University. Coordinate the Work of this Contract with work performed by University.

1.6 WORK UNDER SEPARATE CONTRACTS

- A. General: Cooperate fully with separate contractors so work on those contracts may be carried out smoothly, without interfering with or delaying work under this Contract or other contracts. Coordinate the Work of this Contract with work performed under separate contracts.

1.7 UNIVERSITY-FURNISHED AND INSTALLED PRODUCTS

- A. University will furnish certain items of equipment/furnishings as shown on the Drawings. Contractor will be responsible for coordinating their work to accommodate these items including, but not limited to, physical space fit, utility connections and rough-in, power wiring and electrical characteristics.
- B. Include in Project scheduling the latest times when information for such items is required and so notify the University in writing.

1.8 UNIVERSITY-FURNISHED, CONTRACTOR-INSTALLED PRODUCTS

- A. The University will furnish certain items delivered to the jobsite as shown on the drawings. Contractor will receive, unload, move, set in position, anchor and connect such items and put them into operating condition.
- B. The Contractor will be responsible for coordinating their work to accommodate these items including, but not limited to, physical space fit, utility connections and rough-in, power wiring and electrical characteristics.
- C. Include in Project scheduling the latest times when information for such items is required and so notify the University in writing.
- D. Cooperate with University in scheduling the delivery of these items and be responsible for accommodating their storage and protection in the building and their replacement or repair due to damage as a result of Contractor's operations.

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1.9 ACCESS TO SITE

- A. General: Contractor shall have limited and restricted use of Project site for construction operations as indicated on Drawings by the Contract limits and as indicated by requirements of this Section.
- B. Use of Site: Limit use of Project site to areas within the Contract limits indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.
 - 1. Adjust means and methods of construction based on site limits and restrictions.
 - 2. Locate staging areas only where permitted by University.
 - 3. As part of this Project, replace damaged lawns, sprinkler systems, sidewalks and any other existing site improvements within staging area and access ways.
- C. Construction Access and Travel:
 - 1. Use only those entrances, exits, and travel ways on campus roads and within the building designated by University. Contractor's personnel are not permitted in non-designated areas of University's existing facilities. Use only designated travel ways for transporting demolition materials, new construction materials, tools and equipment.
 - 2. Use of other than designated travel ways on campus roads and within existing buildings requires a minimum of 20 business days prior approval by University.
 - a. Request variations to traffic flow including temporary fire lane, parking lot, sidewalk and road closures, regulatory signage, and traffic control devices in accordance with University "Procedure for Approval of Regulatory Signage, Traffic Control Devices and for Street Closures at the Anschutz Medical Campus" and "AMC Campus Street and Parking Lot Closure Request" available through University Project Manager.
 - 3. Access to the site will be as permitted by the University. Prearrange delivery and use of cranes, heavy trucks and other heavy equipment at least 72 hours prior to need through the University's Project Manager and University Police.
 - 4. Maintain access to fire lanes and campus operations at all times. Provide flag personnel during the ingress or egress of large equipment.
 - a. When fire lanes and/or access way must be temporarily disrupted notify University Police and University Parking and Transportation at least 20 business days in advance and reconfirm 72 hours in advance through the University's Project Manager.
 - 5. Arrange for and obtain all necessary permits from City of Aurora for any disruption to or temporary closures of public city streets. Coordinate procurement of permits with Anschutz Medical Campus Liaison and University Project Manager.
- D. Construction Parking:
 - 1. General: Contractor must pay for all parking and, if available, may be assigned parking spaces in designated contractor parking lots. Parking in lots designated for visitors and patients is not permitted. Make arrangements for designated spaces and payment for long term parking with University Parking Services through the University Project Manager.
 - 2. Provide temporary parking or use designated areas of University's existing parking areas as applicable to the Project and in accordance with the following:
 - a. All parking on University property, including parking on University owned streets, is under the exclusive control and authority of University Parking and Transportation Services. Direct policy question to the department at (303) 724-2555.

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- b. There is no free parking on campus. Displacement or use of existing parking spaces by Contractor, either for parking or for staging, is a Contractor cost.
 - c. Use of existing parking spaces or other areas outside of Contractor's staging area must be approved in advance by University Parking and Transportation Services.
 - d. University Parking and Transportation Services may require and issue parking permits through the University Project Manager. Permits must be displayed and visible at all times while parked on the campus. Failure to display a permit will result in citations being written and possible removal of the vehicle from University property.
 - e. Keep all designated parking areas clean and free of litter and debris. University reserves the right to direct Contractor to clean areas not kept clean and orderly.
 - f. University Parking and Transportation Services may change parking assignments as deemed necessary, restrict the use of any space(s) or lot(s) at any time, and determine the hours of control and mode of operations for any parking area at any time. University Parking and Transportation Services may deny or revoke parking privileges to any person when deemed necessary and/or considered to be in the best interests of the University.
3. Parking on University property is at the Contractor's own risk. The University and any entity affiliated with it are not responsible for fire, theft, and damage to or loss of contractor's or subcontractor's vehicle or any article left therein. Only a license is granted to the user and no bailment is created.
- E. Condition of Existing Building: Maintain portions of existing building affected by construction operations in a weathertight condition throughout construction period. Repair damage caused by construction operations.

1.10 COORDINATION WITH OCCUPANTS

- A. University may occupy site and both existing and adjacent building(s) during entire construction period. Cooperate with University during construction and sequence operations to minimize conflicts and facilitate University usage. Perform the Work so as not to interfere with University's day-to-day operations.
 1. Maintain existing exits from existing and adjacent building, unless otherwise indicated.
 2. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from University and approval of authorities having jurisdiction.
 3. Limit construction operations to those methods and procedures which will not adversely and unduly affect the working environment of University's occupied spaces, including noise, dust, odors, air pollution, ambient discomfort, poor lighting, hazards and other undesirable effects and conditions.
 4. Coordinate with University Project Manager to schedule jack hammering or activities producing dusty conditions, excessive fumes or odors during off-hours.
 5. When work must be accomplished in areas containing existing furniture, upon a minimum of 3 business days notification of the University Project Manager, University will remove or relocate existing furniture.
 6. Provide not less than 72 hours' notice to University Project Manager of activities that will affect University's operations. University Project Manager will coordinate with campus tenants.
 - a. Refer to "Work Restrictions" Article of this Section for procedures and notification requirements related to utility interruptions.
 7. Provide temporary barriers and partitions, or other means as required to protect occupants of existing building and the general public from injury due to construction activities. Prevent the spread of dust and dirt to adjacent occupied areas and building.

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1.11 WORK RESTRICTIONS

- A. Work Restrictions, General: Comply with restrictions on construction operations.
 - 1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.
 - 2. In planning and executing the Work, take into consideration the special needs of University patient care, teaching and research settings, for example, supply of critical utilities, noise and dust control, access to existing loading docks, occupied buildings, etc.
- B. Normal Working Hours: Limit work to normal working hours of 7:00 a.m. to 6:00 p.m., Monday through Friday.
 - 1. Notify University Project Manager of all proposed work outside of normal working hours. Include dates, times, names and contact information for contractors and subcontractor performing the Work with notification. University Project Manager will notify, as appropriate, other University personnel and departments including, but not limited to, Building Maintenance and Operations (BMO) Directors, BMO assigned representative, Campus Police and Facilities Management.
- C. Noise and Vibration: Coordinate operations that may result in high levels of noise and vibration, or other disruption to University occupancy with University.
 - 1. Noise during Normal Working Hours: Identify potentially disruptive construction activities at weekly Progress Meeting and adjust active time of day to reduce significant impacts on occupants.
 - 2. Noise outside Normal Working Hours: Schedule construction work or demolition work outside of normal working hours with University Project Manager at minimum of 72 hours in advance.
 - a. The maximum permissible noise level is 75 decibels (dBA), measured at the adjacent property line.
- D. Contractor Identification:
 - 1. Supervisory staff for the primary contractor must obtain an identification badge at the University Anschutz Medical Center (AMC) Building 500. Submit the University Access Control Badge Application form through University Project Manager. Submitted forms shall be complete with all required information including a letter on company letterhead confirming employee status with company and stating whether the company completes background testing and/or drug screening. Contractor supervision must display badge on site during construction activities.
 - 2. To the greatest extent possible, Contractor's and subcontractor's employees must wear a recognizable logo shirt or hardhat identifying them as members of the contractor's work force.
- E. Use of Existing Elevators: Use "freight" elevators only and protect finishes during transport. Restrict use exclusively to time required to move construction materials.
 - 1. Do not block corridors, aisles, passageways or doors leading to elevator except as, and only to the extent approved by University Project Manager.
- F. Keys: Submit written request to University Project Manager on University Key Request Form.
 - 1. To the extent the need for keys is demonstrated and required to complete the Work, University Project Manager will issue keys to Contractor.
 - 2. Contractor is responsible for all costs related to lost or non-returned keys.

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3. Electrical, mechanical and sensitive research space may require University escort in lieu of issuing keys.
- G. Dock Deliveries: Restrict use exclusively to time required to unload and move construction materials.
- H. Existing Utility Interruptions: Do not interrupt water, sewer, plumbing, gas, steam, chilled water, oxygen, HVAC, electrical power, lighting, telephone and other related utilities serving facilities occupied by University without prior notice to and approval by the University. Coordinate and schedule interruptions in advance through the University Project Manager in strict conformance with University Utility Interruption/Outage Request Procedure.
 1. Form of Notice: University Utility Interruption and Start-up Request form.
 2. Time of Notice: Notice for major and minor outages as defined by the Utility Interruption/Outage Request Procedure is 8 business days for minor outages and 31 business days for major outages.
- I. Fire Alarm and Fire Sprinkler Interruptions: When construction activities require interruption of fire alarm or fire sprinkler service, or when dust from construction activities is likely to cause accidental alarm, advise University Project Manager who will submit an interruption request.
 1. Form of Notice: University Fire Alarm/Sprinkler Disable Request Form.
 2. Time of Notice: Prior to noon on the day before the anticipated interruption.
- J. Nonsmoking Campus: Smoking, chewing tobacco, and other related tobacco product use is not permitted at any location on campus or on any adjacent property.
- K. University Policies Applying to All Contractors: Comply with University policies applying to contractors including drug policy, sexual harassment policy and tobacco free policy. Obtain copies of University policies from University Project Manager.
 1. Controlled Substances: Use of tobacco products and other controlled substances on Project site and surrounding Campus is not permitted.
- L. Designated Eating Areas: Restrict consumption of food on project site to designated eating areas as approved by University Project Manager.

1.12 SPECIFICATION AND DRAWING CONVENTIONS

- A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
 1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
 2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.
 3. Words in the singular number include the plural and those in the plural include the singular.
 4. Words of any gender include any other gender.
- B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.

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- C. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:
1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
 2. Abbreviations: Materials and products are identified by abbreviations published as part of the U.S. National CAD Standard and scheduled on Drawings.
 3. Keynoting: Materials and products may be identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 10 00

SECTION 01 18 00

PROJECT UTILITY SOURCES

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 matrix of utility sources applicable to Project.

1.3 QUALITY ASSURANCE

- A. Comply with utility company and regulatory agency codes, standards, and guidelines for the provision of new or extension of exiting utilities.

1.4 UTILITY SOURCE MATRIX

- A. The following matrix summarizes utility responsible for provision of utility service:

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	AMC				DC		AMC		DC	
	Trunk		In Tract		Trunk	In Tract	Trunk	In Tract	Trunk	In Tract
Steam	University	Note 1	Developer		Xcel	University	University	University	DW	University
Chilled Water	University	Note 1	Developer		NA	University	University	University	NA	University
Electricity	University	Note 2	Developer		Xcel	University	University	University	DW	University
Storm Drainage	COA		Developer		DW	University	University/ COA Note 5	University	DW	University
Sanitary Sewer	COA		Developer		DW	University	University/ COA Note 5	University	DW	University
Water	COA		Developer		DW	University	University/ COA Note 5	University	DW	University
Telecommunications	University	Note 3	Developer	Note 3	University	University	University	University	DW	University
Natural Gas	Xcel	Note 4	Developer		Xcel	University	University	University	DW	University
University: University of Colorado Denver			Note 1: University owns Trunk steam and chilled water from CUP to vault							
COA: City of Aurora			Note 2: University owns Trunk electrical from switch gear to manhole							
DW: Denver Water			Note 3: University owns Trunk telecom ductbank from main switch to manhole. Developer owns cable from switch to building							
			Note 4: Xcel has license agreement with University							
Developer:			Note 5: University and COA jointly permit							
University, TCH, UCH. In Tract lines are owned by the building they are feeding										

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PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 18 00

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SECTION 01 21 00

ALLOWANCES

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 governing allowances.
 - 1. Certain items are specified in the Contract Documents by allowances. Allowances have been established in lieu of additional requirements and to defer selection of actual materials and equipment to a later date when direction will be provided to Contractor. If necessary, additional requirements will be issued by Change Order.
- B. Types of allowances include the following:
 - 1. Lump-sum allowances.
 - 2. Unit-cost allowances.
 - 3. Quantity allowances.
- C. Related Requirements:
 - 1. Section 01 22 00 "Unit Prices" for procedures for using unit prices.

1.3 SELECTION AND PURCHASE

- A. At the earliest practical date after award of the Contract, advise Architect/Engineer of the date when final selection and purchase of each product or system described by an allowance must be completed to avoid delaying the Work.
- B. At Architect/Engineer's request, obtain proposals for each allowance for use in making final selections. Include recommendations that are relevant to performing the Work.
- C. Purchase products and systems selected by Architect/Engineer from the designated supplier.

1.4 ACTION SUBMITTALS

- A. Submit proposals for purchase of products or systems included in allowances, in the form specified for Change Orders.

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1.5 INFORMATIONAL SUBMITTALS

- A. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.
- B. Submit time sheets and other documentation to show labor time and cost for installation of allowance items that include installation as part of the allowance.
- C. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

1.6 COORDINATION

- A. Coordinate allowance items with other portions of the Work. Furnish templates as required to coordinate installation.

1.7 [LUMP-SUM] [UNIT-COST] [AND] [QUANTITY] ALLOWANCES

- A. Unless otherwise indicated, Contractor's costs for receiving and handling at Project site, labor, installation, overhead and profit, and similar costs related to products and materials ordered by University and/or selected by Architect/Engineer under allowance shall be included as part of the Contract Sum and not part of the allowance.
- B. Unused Materials: Return unused materials purchased under an allowance to manufacturer or supplier for credit to University, after installation has been completed and accepted.
 - 1. If requested by Architect/Engineer, retain and prepare unused material for storage by University. Deliver unused material to University's storage space as directed.

1.8 ADJUSTMENT OF ALLOWANCES

- A. Allowance Adjustment: To adjust allowance amounts, prepare a Change Order proposal based on the difference between purchase amount and the allowance, multiplied by final measurement of work-in-place where applicable. If applicable, include reasonable allowances for cutting losses, tolerances, mixing wastes, normal product imperfections, and similar margins.
 - 1. Include installation costs in purchase amount only where indicated as part of the allowance.

Delete both subparagraphs below if no unit-cost allowances.

- 2. Submit substantiation of a change in scope of work, if any, claimed in Change Orders related to unit-cost allowances.
 - 3. University reserves the right to establish the quantity of work-in-place by independent quantity survey, measure, or count.
- B. Submit claims for increased costs because of a change in scope or nature of the allowance described in the Contract Documents, whether for the purchase order amount or Contractor's handling, labor, installation, overhead, and profit.
 - 1. Do not include Contractor's or subcontractor's indirect expense in the Change Order cost amount unless it is clearly shown that the nature or extent of work has changed from what could have been foreseen from information in the Contract Documents.

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2. No change to Contractor's indirect expense is permitted for selection of higher- or lower-priced materials or systems of the same scope and nature as originally indicated.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine products covered by an allowance promptly on delivery for damage or defects. Return damaged or defective products to manufacturer for replacement.

3.2 PREPARATION

- A. Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.

3.3 SCHEDULE OF ALLOWANCES

The sample schedule of allowances below illustrates several types of common occurrences where allowances enable deferred design or indeterminate scope elements to be bid under lump-sum contracts. Revise to suit Project.

Sample quantity allowances in "Allowance No. 1" paragraph below illustrates one approach to applying allowances to work that cannot be measured prior to bidding, but can be reasonably anticipated.

- A. Allowance No. 1: Quantity Allowance: Include 2000 cu. yd. of unsatisfactory soil excavation and disposal off-site and replacement with satisfactory soil material from off-site, as specified in Section 31 20 00 "Earth Moving."

Subparagraph below addresses relationship to unit prices.

1. Coordinate quantity allowance adjustment with unit-price requirements in Section 01 22 00 "Unit Prices."

Sample lump-sum allowance in "Allowance No. 2" Paragraph below includes a stipulation that cost items ordinarily included in the Contract Sum are to be included in the allowance cost for this item only.

- B. Allowance No. 2: Lump-Sum Allowance: Include the sum of \$30,000 for three chandeliers for the main lobby as specified in Section 26 51 00 "Interior Lighting."

1. This allowance includes material cost, receiving, handling, and installation, and Contractor overhead and profit.

Sample unit-cost allowance in "Allowance No. 3" Paragraph below is a typical industry practice but one which can result in significant variations in bids due to differences in quantity survey calculations.

- C. Allowance No. 3: Unit-Cost Allowance: Include the sum of \$350.00 per thousand for buff-colored face brick as specified in Section 04 20 00 "Unit Masonry" and as shown on Drawings.

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Sample quantity allowance in "Allowance No. 4" Paragraph below illustrates practice for both new construction and tenant allowances. Carpet and cushion type can affect installation labor costs.

- D. Allowance No. 4: Quantity Allowance: Include 5000 sq. yd. of Carpet Type 1 installed, including urethane foam carpet cushion and related amount of tackless strip, as specified in Section 09 68 16 "Sheet Carpeting."

Copy and re-edit "Allowance No. (Insert number)" Paragraph below for each allowance required for Project.

- E. Allowance No. <Insert number>: [Lump-Sum] [Unit-Cost] [Quantity] [Contingency] [Testing and Inspecting] Allowance: Include the sum of <Insert dollar or quantity amount of allowance>: Include <Insert allowance description> as specified in Section <Insert Section number> "<Insert Section title>"[and as shown on Drawings].

Retain first subparagraph below if costs in addition to material costs are covered under this allowance. Revise to suit Project. Delete below if this allowance is for material costs only.

1. This allowance includes [material cost] [receiving, handling, and installation] [and] [Contractor overhead and profit].

Retain subparagraph below if this allowance is a quantity allowance with a corresponding unit price to be used to adjust the Contract Sum once final quantities are established. Revise to suit Project.

2. Coordinate quantity allowance adjustment with corresponding unit-price requirements in Section 01 22 00 "Unit Prices."

END OF SECTION 01 21 00

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SECTION 01 22 00

UNIT PRICES

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 unit prices.
- B. Related Requirements:
 - 1. Section 01 21 00 "Allowances" for lump-sum and unit-cost allowances.
 - 2. Section 01 26 00 "Contract Modification Procedures" for procedures for submitting and handling Change Orders.

1.3 DEFINITIONS

- A. Unit price is an amount incorporated in the Agreement, applicable during the duration of the Work as a price per unit of measurement for materials, equipment, or services, or a portion of the Work, added to or deducted from the Contract Sum by Change Order, if the scope of Work or estimated quantities of Work required by the Contract Documents are increased or decreased.

1.4 PROCEDURES

- A. Unit prices include all necessary material, plus cost for delivery, installation, insurance, applicable taxes, overhead, and profit.
- B. Measurement and Payment: Upon completion of work involving unit prices, submit documentation to establish actual quantity of work provided. A Change Order will be issued in an amount equal to the actual quantity multiplied by the unit price.
- C. University reserves the right to reject Contractor's measurement of work-in-place that involves use of established unit prices and to have this work measured, at University's expense, by an independent surveyor acceptable to Contractor.
- D. List of Unit Prices: A schedule of unit prices is included in Part 3. Specification Sections referenced in the schedule contain requirements for materials described under each unit price.

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PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF UNIT PRICES

The sample schedule of unit prices in this article illustrates several types of common occurrences where unit prices allow indeterminate work elements to be bid under lump-sum contracts. Revise paragraphs below to suit Project.

Sample unit prices in "Unit Price 1" paragraph below illustrates one approach to applying unit prices to work that cannot be measured before bidding, but can be reasonably anticipated.

A. Unit Price 1: Removal of unsatisfactory soil and replacement with satisfactory soil material.

1. Description: Unsatisfactory soil excavation and disposal off site and replacement with satisfactory fill material or engineered fill from off site, as required, according to Section 31 20 00 "Earth Moving."
2. Unit of Measurement: Cubic yard of soil excavated, based on survey of volume removed.

"Quantity Allowance" Subparagraph below addresses relationship to quantity allowance. Retain below if coordination is required with a corresponding quantity allowance. Revise to suit Project.

3. Quantity Allowance: Coordinate unit price with allowance adjustment requirements in Section 01 21 00 "Allowances."

Sample unit price in "Unit Price No. 2" Paragraph below illustrates a typical use of unit price in renovation work where work is being bid before extent of some work (in this case, underslab utilities) can be established in the Bidding Documents.

B. Unit Price No. 2: Cutting and patching of concrete floor slabs.

1. Description: Cutting of new or existing concrete floor slabs up to <Insert dimension> thick, removal and excavation as required, and subsequent backfill, compaction, and patching of concrete according to Section 01 73 00 "Execution." not otherwise indicated in the Contract Documents.
2. Unit of Measurement: Square feet of concrete removed.

Sample unit price in "Unit Price No. 3" Paragraph below illustrates use of unit price to establish pricing for items that may otherwise become contentious when priced as individual change order units.

C. Unit Price No. 3: Miscellaneous and structural steel.

1. Description: Miscellaneous lintels and other supports not otherwise indicated in the Contract Documents, according to Section 05 12 00 "Structural Steel Framing" and Section 05 50 00 "Metal Fabrications."
2. Unit of Measurement: Cost in place of pounds of fabricated steel as indicated on itemized invoice of steel supplier and verified by Architect/Engineer.

Copy and re-edit "Unit Price No. (Insert unit-price number)" Paragraph below for each unit price required for Project. See samples of unit-price descriptions in the Evaluations.

D. Unit Price No. <Insert unit-price number> - <Insert unit-price item>:

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1. Description: <Insert unit-price item description> according to Section <Insert Section number> "<Insert Section title>."
2. Unit of Measurement: <Insert unit of measurement>.

"Quantity Allowance" Subparagraph below addresses relationship to quantity allowance. Retain below if coordination is required with a corresponding quantity allowance. Revise to suit Project.

3. Quantity Allowance: Coordinate unit price with allowance adjustment requirements in Section 01 21 00 "Allowances."

END OF SECTION 01 22 00

SECTION 01 23 00

ALTERNATES

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 alternates.

1.3 DEFINITIONS

- A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the bidding requirements that may be added to or deducted from the base bid amount if University decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.
 - 1. Alternates described in this Section are part of the Work only if enumerated in the Agreement.
 - 2. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternate into the Work. No other adjustments are made to the Contract Sum.
 - 3. Selection of alternates described in this Section may be deferred for possible selection at a subsequent date if so indicated in the Agreement.

1.4 PROCEDURES

- A. Coordination: Revise or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.
 - 1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.
- B. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated revisions to alternates.
- C. Execute accepted alternates under the same conditions as other work of the Contract.
- D. Schedule: A schedule of alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

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1. Alternate descriptions are recognized as abbreviated and incomplete. Correlate the descriptions with applicable Specification Sections and Drawings for the provision of complete and coordinated work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

A. Alternate No. <Insert number>: <Insert title of alternate>.

1. Base Bid: <Insert brief description of base-bid requirement> [as indicated on Sheet <Insert title of sheet>] [and] [as specified in Section <Insert Section number> "<Insert Section title>."]
2. Alternate: <Insert brief description of alternate requirement> [as indicated on Sheet <Insert title of sheet>] [and] [as specified in Section <Insert Section number> "<Insert Section title>."]

END OF SECTION 01 23 00

SECTION 01 25 00

SUBSTITUTION PROCEDURES

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 substitutions.
- B. Related Requirements:
 - 1. Section 01 60 00 "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.

1.3 DEFINITIONS

- A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.
 - 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 College that are not required in order to meet other Project requirements but may offer advantage to Contractor or College.

1.4 ACTION SUBMITTALS

- A. Substitution Requests: Submit each request for consideration in format and quantities specified in Section 01 33 00 "Submittal Procedures". Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
 - 1. Substitution Request Form: Use CSI Form 13.1A or Contractor-generated form with substantially the same information.
 - 2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
 - a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.
 - b. Coordination information, including a list of changes or revisions needed to other parts of the Work and to construction performed by College and separate contractors that will be necessary to accommodate proposed substitution.

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- c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
 - d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
 - e. 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 and 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 substitution 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/Engineer's Action: If necessary, Architect/Engineer in consultation with the College will request additional information or documentation for evaluation within seven calendar days of receipt of a request for substitution. Architect/Engineer in consultation with the College will notify Contractor of acceptance or rejection of proposed substitution within 14 calendar days of receipt of request, or seven calendar days of receipt of additional information or documentation, whichever is later.
- a. Forms of Acceptance: Change Order.
 - b. Use product specified if Architect/Engineer does not issue a decision on use of a proposed substitution within time allocated.

1.5 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.

1.6 PROCEDURES

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

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PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

- A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 14 calendar days prior to time required for preparation and review of related submittals.
 - 1. Conditions: Architect/Engineer in consultation with the College will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect/Engineer 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. Requested substitution provides sustainable design characteristics that specified product provided.
 - c. Substitution request is fully documented and properly submitted.
 - d. Requested substitution will not adversely affect Contractor's construction schedule.
 - e. Requested substitution has received necessary approvals of authorities having jurisdiction.
 - f. Requested substitution is compatible with other portions of the Work.
 - g. Requested substitution has been coordinated with other portions of the Work.
 - h. Requested substitution provides specified warranty.
 - i. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.
- B. Substitutions for Convenience: Not allowed.

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 25 00

SECTION 01 26 00

CONTRACT MODIFICATION PROCEDURES

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 handling and processing Contract modifications.
- B. Related Requirements:
 - 1. Section 01 25 00 "Substitution Procedures" for administrative procedures for handling requests for substitutions made after the Contract award.

Retain one of the three options in the subparagraph below based on project delivery method: Design/Bid/Build, CMGC, or Design/Build.
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- 2. **[Contractor's Agreement Design/Bid/Build, State Form SC-6.21 and The General Conditions of the Construction Contract Design/Bid/Build, State Form SC-6.23]**
[Construction Manager/General Contractor Agreement CMGC, State Form SC-6.4]
[Design/Build Agreement, State Form SC-8.0 and The General Conditions of the Design/Build Agreement, State Form SC-8.1] for definitions and contractual requirements related to contract modification procedures.

1.3 DEFINITIONS

- A. Change Order: A written order in compliance with the requirements of the Contract authorizing changes in the Work. For the purposes of this Section a Change Order and a Contract Amendment shall have the same meaning.

1.4 INFORMATIONAL SUBMITTALS

- A. Contractor's Authorized Signatory: Submit name of individual authorized to accept changes and responsible for informing others employed by Contractor of changes in the Work.

1.5 MINOR CHANGES IN THE WORK

- A. Architect/Engineer will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time.

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1.6 CHANGE ORDER BULLETIN

- A. University-Initiated Change Order Bulletin: Architect/Engineer 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. It will also state the time period for which the request will remain valid.
 - 1. Change Order Bulletin Form: State Form SC-6.311 available on the website of the Office of the State Architect.
 - 2. Work Change Order Bulletins issued by Architect/Engineer are not instructions either to stop work in progress or to execute the proposed change.
- B. Contractor-Initiated Change Order Bulletin: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Architect/Engineer.
 - 1. Change Order Bulletin Form: State Form SC-6.311 available from the website of the Office of the State Architect.
 - 2. 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.

1.7 CHANGE ORDER PROPOSAL

- A. Change Order Proposal: In response to a University-Initiated Change Order Bulletin or accompanying a Contractor-Initiated Change Order Bulletin, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change described.
 - 1. Change Order Proposal Form: State Form SC-6.312 available from the website of the Office of the State Architect.
 - 2. Labor Rates: Prior to submitting first Change Order Proposal, submit bare, unburdened hourly labor rates for all contractor and subcontractor labor categories; submit itemized breakdown of all applicable additional labor benefit costs to be added to the bare labor cost to arrive at the total burdened hourly labor cost.
 - 3. Equipment Costs: Provide cost backup for all equipment clearly indicating equipment billing rates and sufficient to demonstrate, as determined by the University Project Manager, that proposed rates are competitive and reasonable in all cases. Submit completed Change Order Proposal Form within the requested timeframe. Include backup documentation to support calculations consistent with Contract provisions, including but not limited to, the following:
 - a. Contractor and Subcontractor labor, material and equipment costs including:
 - 1) 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.
 - 2) Applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 - 3) Costs of labor and supervision directly attributable to the change and as permitted by the terms and conditions of the General Contract for Construction.
 - b. Contractor and Subcontractor overhead and profit.
 - c. Contractor's bond cost.
 - d. Justification for Change in Contract Time: An updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity

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

4. Maintain detailed records of work completed. Provide complete information for evaluation of proposed changes and to substantiate proposed changes in Contract Sum or Contract Time.

1.8 ADMINISTRATIVE CHANGE ORDERS

- A. Allowance Adjustment: See Section 01 21 00 "Allowances" for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect actual costs of allowances.
- B. Unit-Price Adjustment: See Section 01 22 00 "Unit Prices" for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect measured scope of unit-price work.

1.9 CHANGE ORDER PROCEDURES

- A. Submit three signed copies of Change Order Proposal to Architect/Engineer for review.
 1. University-Initiated Change Order Bulletins: University and Architect/Engineer will evaluate Contractor's Change Order Proposal and either request additional information or suggest modifications. Based on this review and evaluation University will either accept or reject the proposal.
 2. Contractor-Initiated Change Order Bulletins: Architect/Engineer will evaluate Contractor's claim based on the terms and conditions of the Contractor Agreement and General Conditions of the Construction Contract, as applicable.
 3. Architect/Engineer's Action: When satisfied as to the accuracy and completeness of the Change Order Proposal, the Architect/Engineer will sign all three copies and forward to the University for consideration.
- B. On University's approval of a Change Order Proposal, Architect/Engineer will prepare, sign and forward three copies of a Change Order, State Form SC-6.31 available from the website of the Office of the State Architect, for signature by the Contractor. Contractor then forwards all three copies of signed Change Order to the University for signature and distribution of fully executed copies to Architect/Engineer and Contractor for record.
- C. Upon receipt of a fully executed Change Order, promptly perform the following:
 1. Revise Schedule of Values on the Application for Payment Form by indicating each authorized Change Order as a separate line item and adjusting the Contract Sum as shown on the Change Order.
 - a. University will not pay for changes to the Work until authorized by a Change Order signed by all parties.
 2. Revise the Progress Schedule to reflect any change in the Contract Time.
 3. Enter changes in the Project Record Documents.

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PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 26 00

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SECTION 01 29 00

PAYMENT PROCEDURES

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 necessary to prepare and process Applications for Payment.
- B. Related Requirements:
 - 1. Section 01 21 00 "Allowances" for procedural requirements governing the handling and processing of allowances.
 - 2. Section 01 22 00 "Unit Prices" for administrative requirements governing the use of unit prices.
 - 3. Section 01 26 00 "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
 - 4. Section 01 32 00 "Construction Progress Documentation" for administrative requirements governing the preparation and submittal of the Contractor's construction schedule.
 - 5. For projects required to obtain LEED certification, Division 01 Section "Sustainable Design Requirements" for administrative requirements governing submittal of cost breakdown information required for LEED documentation.

1.3 DEFINITIONS

- A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.4 SCHEDULE OF VALUES

- A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule. Schedule of values report from cost-loaded Critical Path Method Schedule prepared in accordance with Section 01 32 00 "Construction Progress Documentation" may serve to satisfy requirements for the schedule of values.
 - 1. Coordinate line items in the schedule of values with other required administrative forms and schedules, including the following:
 - a. Application for Payment forms with continuation sheets.
 - b. Submittal schedule.
 - c. Items required to be indicated as separate activities in Contractor's construction schedule.

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- 1) Construction Manager's Fee.
 - 2) Estimated Project General Conditions Costs.
 2. Submit schedule of values and hold a conference with the Architect/Engineer and University Project Manager to finalize the schedule of values at earliest possible date, but no later than 10 business days before the date scheduled for submittal of initial Certificates and Applications for Payment.
- B. Format and Content: Use Project Manual table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section.
 1. Identification: Include the following Project identification on the schedule of values:
 - a. Project name and location.
 - b. Name of Architect/Engineer.
 - c. Architect/Engineer's project number.
 - d. Contractor's name and address.
 - e. Date of submittal.
 2. Arrange the schedule of values in tabular form with separate columns to indicate the following for each item listed:
 - a. Related Specification Section or Division.
 - b. Description of the Work.
 - c. Name of subcontractor.
 - d. Name of manufacturer or fabricator.
 - e. Name of supplier.
 - f. Change Orders (numbers) that affect value.
 - g. Dollar value of the following, as a percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.
 - 1) Labor.
 - 2) Materials.
 - 3) Equipment.
 3. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with Project Manual table of contents. Provide multiple line items for principal subcontract amounts in excess of five percent of the Contract Sum.
 - a. Include separate line items under Contractor and principal subcontracts for LEED documentation, where applicable, and other Project closeout requirements in an amount totaling five percent of the Contract Sum and subcontract amount.
 4. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
 5. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
 - a. Differentiate between items stored on-site and items stored off-site. If required, include evidence of insurance.
 6. Each item in the schedule of values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.

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- a. Temporary facilities and other major cost items that are not a direct cost of actual work-in-place shall be shown as separate line items in the schedule of values.
7. Schedule Updating: Update and resubmit the schedule of values before the next Applications for Payment when Change Orders result in a change in the Contract Sum.

1.5 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment following the initial Application for Payment shall be consistent with previous applications and payments as certified by Architect/Engineer and paid for by University.
 1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.
- B. Pay Application and Schedule Review Meetings: Conduct in accordance with Section 01 31 00 "Project Management and Coordination." Provide draft application for payment and draft schedule update reflecting work accomplished during previous pay period. Review progress achieved; discuss and resolve issues affecting the progress; and review critical activities to be accomplished during the following 90 calendar days.
 1. Jobsite Walk: When required, conduct a walk of the jobsite to confirm progress related to any activity in question.
- C. Monthly Schedule Reporting: Upon conclusion of the Pay Application and Schedule Review Meeting, but not later than the 28th of the month, update the Construction Schedule and submit the Pay Application.
- D. Payment Application Times: Submit Application for Payment to Architect/Engineer by the first day of the month and no more than five (5) business days prior thereto. The period covered by each Application for Payment is per the date indicated in the Application.
- E. Payment Application Review: The Architect/Engineer shall, within five (5) business days after the receipt of each Certificate and Application for Payment, review the Project Application for Payment and either execute a Project Certificate for Payment to the University or notify the Contractor in writing of the reasons for withholding a Certificate.
 1. All applications for payment, except the final application, and the payments there under, shall be subject to correction in the next application rendered following the discovery of any error
- F. Application for Payment Forms: Use State Form SBP-7.2 "Certification for Contractor Payment."
- G. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect/Engineer will return incomplete applications without action.
 1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
 2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
 3. Include amounts of Change Orders issued before last day of construction period covered by application.

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4. Indicate separate amounts for work being carried out under University-requested project acceleration.
- H. Stored Materials: Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site as approved in advance by the University Project Manager and items stored at an off-site location previously agreed upon in writing.
1. Provide certificate of insurance, evidence of transfer of title to University, and consent of surety to payment, for stored materials.
 2. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
 3. Provide summary documentation for stored materials indicating the following:
 - a. Value of materials previously stored and remaining stored as of date of previous Applications for Payment.
 - b. Value of previously stored materials put in place after date of previous Application for Payment and on or before date of current Application for Payment.
 - c. Value of materials stored since date of previous Application for Payment and remaining stored as of date of current Application for Payment.
- I. Transmittal: Submit three signed and notarized original copies of each Application for Payment to Architect/Engineer by a method ensuring receipt. One copy shall include waivers of lien and similar attachments if required.
1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.
- J. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
1. List of subcontractors.
 2. Schedule of values.
 3. For projects required to obtain LEED certification, LEED submittal for project materials cost data.
 4. Contractor's construction schedule (preliminary if not final).
 5. Products list (preliminary if not final).
 6. For projects required to obtain LEED certification, LEED action plans.
 7. Schedule of unit prices.
 8. Submittal schedule (preliminary if not final).
 9. List of Contractor's staff assignments.
 10. List of Contractor's principal consultants.
 11. Copies of building permits.
 12. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
 13. Initial progress report.
 14. Report of preconstruction conference.
- K. Application for Payment at Substantial Completion: After Architect/Engineer issues the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.

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2. This application shall reflect Certificate(s) of Substantial Completion issued previously for University occupancy of designated portions of the Work.
- L. Final Payment Application: After completing Project closeout requirements, submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
1. All items on Pre-acceptance Checklist (State Form SBP-05) have been completed.
 2. Notice of Acceptance (State Form SBP-6.27) has been issued.
 3. Statements to support local sales tax refunds, if any submitted.
 4. Notice of Contractor's settlement has been published.
 5. Evidence of completion of Project closeout requirements, including but not limited to:
 - a. Submittal of Record Documents.
 - b. Submittal of all Operation and Maintenance Manuals.
 - c. Completion of all required demonstration and training.
 6. Updated final statement, accounting for final changes to the Contract Sum.
 7. Evidence that claims have been settled.
 8. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when University took possession of and assumed responsibility for corresponding elements of the Work.
 9. Final liquidated damages settlement statement.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 29 00

SECTION 01 31 00

PROJECT MANAGEMENT AND COORDINATION

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 provisions for coordinating construction operations on Project including, but not limited to, the following:
 - 1. General coordination procedures.
 - 2. Coordination drawings.
 - 3. Requests for Information (RFIs).
 - 4. Project Web site.
 - 5. Project meetings.
- B. Related Requirements:
 - 1. Section 01 32 00 "Construction Progress Documentation" for preparing and submitting Contractor's construction schedule.
 - 2. Section 01 73 00 "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
 - 3. Section 01 77 00 "Closeout Procedures" for coordinating closeout of the Contract.

1.3 DEFINITIONS

- A. RFI: Request from Contractor seeking information required by or clarifications of the Contract Documents.

1.4 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. Within 21 calendar days of Notice of Award submit, as complete as possible, a preliminary list to include all major subcontractors. Augment, complete and submit the final subcontractor list within 60 calendar days of Notice of Award, unless a longer duration is approved by the Architect/Engineer. Include the following information in tabular form:
 - 1. Name, address, and telephone number 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.

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- B. Key Personnel Names: Within 14 calendar days after Notice to Proceed, 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 and telephone numbers, including home, office, and 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.

Retain option in subparagraph below for Large Projects administered through a Project Web site specified later in this Section.

1. Post copies of list in project meeting room, in temporary field office, **[on Project Web site,]** and by each temporary telephone. Keep list current at all times.

1.5 GENERAL COORDINATION PROCEDURES

- A. General: Each entity involved in the performance of work for the entire Project shall cooperate in the overall coordination of the Work; promptly, when requested, furnish information concerning its portion of the Work; and respond promptly and reasonably to the decisions and requests of persons designated with coordination, supervision, administrative or similar authority.

1. University Standard Project Management Forms

- a. Where applicable, obtain from the University Project Manager and use the following University Standard Forms:

- 1) Preconstruction Agenda
- 2) Change Order Log with Contingency Codes
- 3) Access Control Badge Application Form
- 4) Utility Interruption Request Form
- 5) Utility Start-Up Request Form
- 6) Fire Alarm/Sprinkler Disable Request Form
- 7) Hot Work Permit Form
- 8) Anschutz Medical Campus (AMC) Street and Parking Lot Closure Form
- 9) Indoor Air Quality (IAQ) Planning Checklist
- 10) Indoor Air Quality (IAQ) Inspection Checklist

2. Site Utilization:

- a. In addition to the site utilization limitations and requirements indicated in Section 01 10 00 "Summary" and indicated by the Contract Documents; administer the allocation of available space equitably among entities needing access and space, so as to produce the best overall efficiency in the performance of the total work of the project. Schedule deliveries so as to minimize the space and time requirements for storage of materials and equipment on the site; but do not unduly risk delays in the work.
- b. Concurrent with work of the Contractor, other contractors, suppliers, and the University personnel may be working in relatively close proximity. The Contractor is solely responsible for coordinating their work with that of other contractors and will make no claims for failure to do so.

3. Layout:

- a. It is recognized that the Contract Documents are diagrammatic in showing certain physical relationships of the various elements and systems and their interfacing with other elements and systems. Establishment and coordination of these relationships is the exclusive responsibility of the Contractor. Do not scale the drawings. Lay out and arrange all

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elements to contribute to safety, efficiency and to carry the harmony of design throughout the Work. In case of conflict or undimensioned locations, verify required positioning with Architect/Engineer.

4. Substrate Examination:
 - a. The Installer of each element of the work must examine the conditions of the substrate to receive the work, dimensions and spaces adjacent, tolerances, interfacing with other elements and services, and the conditions under which the work will be performed, and must notify the Contractor in writing of conditions detrimental to the proper or timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the Installer.
5. Large and Heavy Equipment:
 - a. Contractor to coordinate with University Project Manager requirements to be maintained for the subsequent entry of large equipment units. Coordinate the movement of heavy items with shoring and bracing, so that the building structure will not be overloaded during the movement and installation.
 - b. Where equipment or products to be installed on the roof are too heavy to be hand-carried, do not transport across roof deck; position by crane or other device so as to avoid overloading the roof deck.
- B. 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 of the Specification that depend on each other for proper installation, connection, and operation.
 1. Contractor Communication with the University: Direct all communication with the University through the University Project Manager.
 2. 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.
 3. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
 4. Make adequate provisions to accommodate items scheduled for later installation.
- C. 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.
 1. Prepare similar memoranda for University and separate contractors if coordination of their Work is required.
- D. 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.

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- E. Coordination Of Submittals: Prior to transmittal to the Architect/Engineer, review shop and erection drawings, product data, and samples for compliance with Contract Documents and for coordination among work of all Sections of the Specifications. Coordination of submittals shall include, but not be limited to the following:
1. Verification of field dimensions and clearances and relationship to available space and anchors.
 2. Verification of compatibility with equipment and work of other Sections, electrical characteristics, and operational control requirements.
 3. Verification of motor voltages and control characteristics.
 4. Coordination of controls, interlocks, wiring of pneumatic switches, and relays.
 5. Coordination of wiring and control diagrams.
 6. Review of the effect of any changes on work of other Sections.
 7. For any item to be installed in or on a finished surface, certify that applicable Contract Documents have been checked and that the item submitted is compatible with the surface finish on which it is to be installed.
 8. Equipment and material submittals shall show sufficient data to indicate complete compliance with Contract Documents as follows:
 - a. Proper sizes and capabilities.
 - b. Ability to fit in the available space in a manner that will allow proper service.
 - c. Construction methods, materials, and finishes.
 - d. List of accessories.
- F. Special Coordination Requirements for Mechanical and Electrical Work:
1. General: Provide necessary work and services required to coordinate the complete installation of heating, ventilating, and air conditioning (HVAC) equipment and systems; plumbing systems and fixtures; electrical equipment, fixtures, and systems; and other equipment or systems containing motors and controls or requiring connection to mechanical or electrical systems; all so that the various systems perform as indicated and are in harmony with other project Work.
 2. Contract Drawings:
 - a. Drawings are schematic in nature, and indicate in general how the various components are integrated with other parts of the building. Coordinate exact locations by job measurement, by verifying the requirements of other trades, and by review of Contract Documents.
 3. Mechanical and Electrical Drawings indicate general routing of the various parts of the systems, but do not indicate all sizes, fittings, offsets, and runouts which are required. Coordinate correct sizes, fittings, offsets, and runouts required to fit systems into allocated spaces. Coordinate locations of all light fixtures, vents, and supply grilles to conform to the ceiling grid system or other modular finishes.
 4. Coordinate installation of mechanical and electrical work in compliance with the following requirements:
 - a. Install piping, ductwork and similar services straight and true, aligned with other work, close to walls and overhead structure, allowing for insulation, concealed (except where indicated as exposed) in occupied spaces, and out-of-the-way with maximum passageway and headroom remaining in each space.
 - b. Install electrical work in a neat, organized manner with conduit and similar services in or parallel with building lines, and concealed unless indicated as exposed.
 - c. For all work maintain maximum practical overhead clearance but not less than 6" above ceiling. Where exposed, maintain 7'-0" minimum clearance.
 - d. Arrange all work to facilitate maintenance and repair or replacement of equipment. Locate services requiring maintenance on valves and similar units in front of services requiring

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- less maintenance. Connect equipment for ease of disconnecting, with minimum of interference with other work.
- e. Provide space to permit removal of coils, tubes, fan shafts, filters, other parts which may require replacement.
 - f. Locate operating and control equipment and devices for easy access. Furnish access panels where units are concealed by finishes and similar work.
 - g. Integrate mechanical work in ceiling plenums with suspension system, light fixtures and other work, so that required performances of each will be achieved.
 - h. Give the right-of-way to piping systems required to slope for drainage over other service lines and ductwork.
 - i. Advise other trades of openings required in their work for accommodation of mechanical and electrical elements. Provide and place sleeves and anchors required in other work.
5. Access to Equipment: Except where located above accessible ceilings, provide access panels wherever access is required to concealed valves, controls, dampers, pull boxes and other devices requiring ongoing or periodic access.
- a. Acceptable types of access panels are specified in Division 08.
 - b. Each trade is responsible for providing access panels needed for access to their equipment and coordinating installation with other Division 03, 04, 06 and 09 trades.
 - c. Coordinate requirements and obtain approval of locations from Architect/Engineer.

G. Compatibility of Systems:

1. Provide products and equipment which are compatible with other work requiring mechanical/electrical interface including electrical connections, control devices, water, drain and other piping connections. Verify electrical characteristics, fuel requirements and other interface requirements before ordering equipment and resolve conflicts that may arise.
2. Coordinate equipment, mechanical and electrical work in accordance with the following schedule:

<u>ITEM</u>	<u>FURNISHED BY</u>	<u>MOUNTED BY</u>	<u>LOW VOLTAGE WIRED BY</u>	<u>POWER WIRED & CONNECTED BY</u>	<u>LOW VOLTAGE CONTROL CONNECTED BY</u>
Equipment motors	I	MI	MI	EI	--
Motor starters, contactors and overload heaters	MI	EI	EI	EI	MI
Fused and unfused disconnect switches	EI**	EI**	EI**	EI	--
Manual operating switches, speed switches, push-button stations and pilot lights	MI	EI	EI	EI	EI
Duct detectors	EI	MI	MI	EI	MI
Control relays and transformers	MI	MI	MI	EI	MI
Thermostats, time switches*	MI	MI	MI	EI	MI
Temperature control panels	MI	MI	MI	EI	MI

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Motor and solenoid valves, damper motors, PE and EP switches	MI	MI	MI	--	MI
Refrigeration equipment, cooling tower and controls	MI	MI	MI	EI	MI
Electric meters	EI	EI	EI	EI	MI
Steam meters	MI	MI	MI	MI	MI
Chilled water meters,	MI	MI	MI	MI	MI
Water meters	MI***	MI	MI	MI	MI
Natural Gas	MI	MI	MI	MI	MI
<p>I = Installer of equipment requiring electrical service EI = Electrical Installer MI = Mechanical Installer</p> <p>* Motor driven units which are controlled from line voltage automatic controls such as line voltage thermostats, float switches or time switches which conduct full load current of the motor shall be wired for both power and control circuit under the electrical contract. However, if the control device does not conduct full load current, then the responsibility shall be that set forth in the above schedule. (Example: a 208 volt, 3-phase, 3- wire motor requires 120 volt control. Electrical Installer shall furnish a 120 volt circuit for control and 208 volt circuit for power and wire the power circuit. Mechanical Installer shall wire the control circuit.)</p> <p>** Disconnects for AH units are factory mounted.</p> <p>***Building Service meter provided by Civil. Any sub meter provided by MI. Coordinate meter requirements with utility for remote monitoring by 23 09 00 – Instrumentation and Controls.</p>					

H. Special Coordination Requirements for Exterior Envelope Work:

1. General: Provide necessary work and services required to coordinate the complete and continuous installation of the building's heat, air and moisture barriers. Exterior building envelope construction to be coordinated includes, but is not limited to, below-grade walls, slabs-on-grade, exterior opaque walls, windows, curtain walls, roofs, and skylights.
2. Contract Drawings:
 - a. Drawings indicate general concepts and design intent for continuity of heat, air and moisture barriers at each exterior building envelope component and at transitions between building envelope components. Coordinate details for continuity based on actual product selections and Contractor's proposed sequence of construction.

I. Complete Systems:

1. It is the intent of the Contract Documents that all systems, including mechanical and electrical, be complete and functional to provide the intended or specified performance. Provide all incidental items and parts necessary to achieve this requirement.
2. Provide correctly sized power, utilities, piping, drains, services and their connections to equipment and systems requiring them, whether or not specific items are listed in the schedule under "Compatibility of Systems" paragraph in this Section.

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- J. Conservation: Coordinate construction activities to ensure that operations are carried out 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 University's property.
 - 2. Establish recycling program at job site. Refer to Section 01 74 19 "Construction Waste Management and Disposal" for additional requirements.

1.6 COORDINATION DRAWINGS

- A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely shown 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 the coordination drawings by multiple subcontractors 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 the Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect/Engineer indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.

Retain "Coordination Drawing Organization" Paragraph below and delete subsequent "Coordination Digital Data Files" Paragraph for Small Projects not utilizing a Building Information Model to facilitate coordination of systems.

- 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 ceiling plenum to

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- accommodate layout of light fixtures 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 in diameter and larger.
 - b. Light fixture, exit light, emergency battery pack, smoke detector, and other fire-alarm locations.
 - c. Panel board, switch board, 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. Windows, Curtain Wall, and Exterior Wall Assembly Transition Work: Show all components of each adjacent wall or window system and all required compatible tie-ins between them including transition strips, flashings and sealants. Clearly identify each product, its configuration and its extent. Shop Drawings which only generically indicate adjacent construction and/or indicate "construction by others" will not be acceptable.
 10. Review: Architect/Engineer will review coordination drawings to confirm that the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility. If Architect/Engineer determines that coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, Architect/Engineer will so inform Contractor, who shall make changes as directed and resubmit.
 11. Coordination Drawing Prints: Prepare coordination drawing prints according to requirements in Section 01 33 00 "Submittal Procedures."

Retain "Virtual Design and Construction (VDC), Building Information Model (BIM), and Coordination Digital Data Files" Paragraph below and delete "Coordination Drawing Organization Paragraph above for Large Projects utilizing a Building Information Model to facilitate coordination of systems."

- C. Virtual Design and Construction (VDC), Building Information Model (BIM) and Coordination Digital Data Files:
1. General: It is expected that, to the greatest extent applicable, Contractor will employ VDC and BIM tools to facilitate the construction, coordination, scheduling and phasing of the Work.
 2. Contractor's VDC implementation shall include at a minimum the following activities:

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- a. Development and maintenance of a three-dimensional building information model (BIM) of the Work that includes contractor-developed, shop-drawing level information of the following building components and systems:
 - 1) Building structure, including but not limited to, foundations, columns, beams, joists, purlins, floor and roof decking and fill, bracing, and load-bearing walls.
 - 2) HVAC systems, including but not limited to, HVAC piping and pumps, air distribution ductwork, fans, air terminal units, air outlets and inlets; central cooling equipment compressors, chillers, condensers, and cooling towers; boilers, heat exchangers and packaged and/or custom air-handling units and thermal storage systems.
 - 3) Plumbing systems, including but not limited to, water distribution, storm drainage and sanitary sewerage waste and vent piping, water-heaters and plumbing fixtures.
 - 4) Fire suppression systems, including but not limited to, standpipes, sprinkler systems, fire pumps, and non-water-based fire-extinguishing systems.
 - 5) Electrical systems, including but not limited to, conduit greater than 1-1/2 inches in diameter, or bundled conduits, cable-tray, transformers, switchgear, switchboards, panelboards, generators, lightning protection and lighting.
 - 6) Communication systems, including but not limited to, structured cabling, premise wiring distribution system, equipment room fittings, racks, frames and enclosures, data communications switches, hubs, and routers, common use systems, and paging systems
 - 7) Vertical Transportation systems including.
 - 8) Architectural building systems including interior and exterior walls, windows, curtain walls, ceilings, and roof.
 - b. Collision Detection Reports: Based on information developed and included in the Contractor's three-dimensional BIM, perform collision/interference checking and develop reports for review and resolution by the integrated Contractor team, including subcontractors, manufacturers and suppliers, working with the Design team where needed prior to release of fabrication drawings.
3. Schedule Visualization: Develop and maintain a three-dimension building information model for the expressed purpose of visually demonstrating and communicating proposed project construction schedule and phasing to University, subcontractors and suppliers as applicable. Include all major building systems and construct in such a fashion as to permit animation showing sequential construction of the project based on and driven by the approved Primavera construction schedule.
 4. Prepare coordination digital data files according to the following requirements:
 - a. File Preparation Format: Same digital data software program, version, and operating system as original Drawings.
 - b. File Submittal Format: Submit or post coordination drawing files using format same as file preparation format and Portable Data File (PDF) format.
 - c. BIM File Incorporation: Develop and incorporate coordination drawing files into Building Information Model established for Project.
 - 1) 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/Engineer.

University and A/E to agree on and coordinate acceptable data licensing agreement to enable Contractor's use of A/E's Building Information Design Model.
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- d. Architect/Engineer will furnish Contractor one set of digital data files of Drawings for use in preparing coordination digital data files.
 - 1) Architect/Engineer makes no representations as to the accuracy or completeness of digital data files as they relate to Drawings.
 - 2) Digital Data Software Program: Drawings are available in <Insert name and version of digital data software program and operating system>.
 - 3) Contractor shall execute a data licensing agreement in the form of Agreement form acceptable to University and Architect/Engineer.
5. Review: At request of Contractor and at Architect/Engineer's discretion, Architect/Engineer will participate in BIM coordination and review meetings and will review coordination model and drawings to confirm that the Work is being coordinated, but not for the details of the coordination, which are the Contractor's responsibility. If the Architect/Engineer determines that the coordination model and drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, the Architect/Engineer will inform the Contractor, who shall make changes as directed and resubmit.
- D. Interference Resolution: Whenever job measurements and an analysis of the building coordination model, Drawings and Specifications indicate that the various systems cannot be installed without significant deviation from the intent of the Contract, prepare interference drawings as required to indicate conflict between the various systems and other components of the building such as beams, columns, and walls. Include plans, elevations, sections, and other details drawn to large scale as required to clearly define the interference and to indicate the Contractor's proposed solution. Submit interference drawings for review by the Architect prior to proceeding with work in the general areas of the conflict.

1.7 REQUESTS FOR INFORMATION (RFIs)

- A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.
 1. Architect/Engineer will return RFIs submitted to Architect/Engineer by other entities controlled by Contractor with no response.
 2. Coordinate and submit RFIs in a prompt manner so as 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. Project number.
 3. Date.
 4. Name of Contractor.
 5. Name of Architect/Engineer.
 6. RFI number, numbered sequentially.
 7. RFI subject.
 8. Specification Section number and title and related paragraphs, as appropriate.
 9. Drawing number and detail references, as appropriate.
 10. Field dimensions and conditions, as appropriate.
 11. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
 12. Contractor's signature.

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13. 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.
 14. Space for response and signature by Architect/Engineer.
- C. RFI Forms: Hard copy form or software-generated form with substantially the same content as indicated above, acceptable to Architect/Engineer.
1. Attachments shall be electronic files in Adobe Acrobat PDF format.
- D. Architect/Engineer's Action: Architect/Engineer will review each RFI, determine action required, and respond. Allow seven calendar days for Architect/Engineer's response for each RFI. RFIs received by Architect/Engineer 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/Engineer's actions on submittals.
 - g. Incomplete RFIs or inaccurately prepared RFIs.
 2. Architect/Engineer's action may include a request for additional information, in which case Architect/Engineer's time for response will date from time of receipt of additional information.
 3. Architect/Engineer'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 Contractor-Initiated Change Order Bulletin and Proposal according to Section 01 26 00 "Contract Modification Procedures."
 - a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect/Engineer in writing within seven calendar days of receipt of the RFI response.

Select first option in following Paragraph for Small Projects and second option for Large Projects.

- E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by RFI number. Submit log weekly. **[Use CSI Log Form 13.2B or Contractor-generated form of substantially same content.]** **[Use software log that is part of Project Web site.]** Include the following:
1. Project name.
 2. Name and address of Contractor.
 3. Name and address of Architect/Engineer.
 4. RFI number including RFIs that were returned without action or withdrawn.
 5. RFI description.
 6. Date the RFI was submitted.
 7. Date Architect/Engineer's response was received.

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- F. On receipt of Architect/Engineer's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect/Engineer within seven calendar days if Contractor disagrees with response.

1.8 PROJECT WEB SITE

Retain this article for Large Projects. Note that Construction Manager/General Contractor Agreement CMGC (State Form SC-6.4) requires the CMGC to provide and use Project Management Software for project control, communication and documentation.

- A. Provide, administer, and use Project Web site for purposes of hosting and managing project communication and documentation until Final Completion. Project Web site shall include the following functions:
1. Project directory.
 2. Project correspondence.
 3. Meeting minutes.
 4. Contract modifications forms and logs.
 5. RFI forms and logs.
 6. Submittals forms and logs.
 7. Electronic submittal document hosting, viewing and transmitting.
 8. Drawing and specification document hosting, viewing, and updating.
 9. Pay applications.
 10. Change orders.
 11. Daily reports.
 12. Punchlists.
 13. Archiving functions.
- B. Provide up to twenty-five (25) Project Web site user licenses for use of the University, Architect/Engineer, and Architect/Engineer's consultants. Provide eight hours of software training at Project Site office for Project Web site users.
- C. On completion of Project, provide one each complete archive copy of Project Web site files to University and to Architect/Engineer in a digital storage format acceptable to Architect/Engineer.
- D. Software:
1. Basis-of-Design Product: Subject to compliance with requirements, provide Meridian Systems; Prolog or ProjectTalk under their current published licensing agreements. Comparable software by other software suppliers may be provided if approved in writing at the sole discretion of the Architect/Engineer in consultation with the University Project Manager.
- E. Contractor, subcontractors, and other parties granted access by Contractor to Project Web site shall execute a data licensing agreement in the form of Agreement acceptable to University and Architect/Engineer.

1.9 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 University and Architect/Engineer of scheduled meeting dates and times a minimum of 4 business days prior to meeting.

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- a. Participants, including representatives of subcontractors and suppliers, shall be qualified, familiar with Project and authorized to conclude matters relating to the Work.
 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 University and Architect/Engineer, within three business days of the meeting.
- B. Preconstruction Conference: Schedule and conduct a preconstruction conference before starting construction, at a time and site convenient to all parties, but not later than 14 calendar days after Notice to Proceed.
1. Conduct the conference to review responsibilities and personnel assignments.
 2. Attendees: Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work and include the following:
 - a. Authorized representatives of University:
 - 1) University Project Manager.
 - 2) University Building Maintenance Operations (BMO) Representative.
 - b. Architect/Engineer and their consultants.
 - c. Contractor's project manager and superintendent.
 - d. Major subcontractors and suppliers.
 - e. Other concerned parties shall attend the conference.
 3. Agenda: Discuss items of significance that could affect progress, including the following:
 - a. Designation of key personnel and their duties.
 - b. Lines of communications.
 - c. List of major subcontractors and suppliers.
 - d. Tentative construction schedule.
 - 1) Phasing.
 - 2) Critical work sequencing and long-lead items.
 - 3) Equipment deliveries and priorities.
 - e. Procedures and processing of:
 - 1) Change Order Bulletin, Change Order Proposal and Change Orders.
 - 2) RFI's
 - 3) Testing and inspecting.
 - 4) Applications for Payment.
 - 5) Submittals.
 - 6) Preparation of record documents.
 - f. Use of the premises, existing building and adjacent buildings as applicable.
 - 1) Work restrictions.
 - 2) Working hours.
 - 3) University's occupancy requirements.
 - 4) Procedures for disruptions and shutdowns.
 - 5) Construction parking and staging.
 - 6) Construction route and site access.

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- 7) Office, work, and storage areas.
 - 8) Progress cleaning and housekeeping procedures.
 - g. Project coordination.
 - h. Distribution of the Contract Documents.
 - i. Temporary facilities and controls.
 - j. Indoor Air Quality Plan and Monitoring including procedures for moisture and mold control.
 - k. Construction waste management and recycling.
 - l. Safety.
 - 1) Fire and Life Safety.
 - 2) Health and Safety.
 - m. First aid.
 - n. Security.
 - o. Building Department.
 - p. Telecommunications.
 - q. Building Services.
 - r. Building Operations.
 - s. University Work Related Policies.
 - t. Contractor Contacts.
 - u. University Contacts.
 - v. University Process Forms.
 - 1) Key Request Form.
 - 2) Access Control Badge Application Form.
 - 3) Utility Interruption Request Form.
 - 4) Utility Start-Up Form.
 - 5) Fire Alarm/ Sprinkler Disable Request Form.
 - 6) Hot Work Permit Form.
 - 7) Anschutz Medical Campus (AMC) Street and Parking Lot Closure Form.
 - 8) Indoor Air Quality (IAQ) Plan.
 - 9) IAQ Planning Checklist.
 - 10) IAQ Inspection Checklist.
 - 11) Request for Variance.
 - 4. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.
- C. LEED Coordination Conference: For projects pursuing LEED certification, schedule and conduct a LEED coordination conference before starting construction, at a time convenient to University Architect/Engineer, and Contractor.
- 1. Attendees: Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work and include the following:
 - a. University Project Manager.
 - b. Architect/Engineer and their consultants.
 - c. Contractor's project manager, superintendent and LEED coordinator.
 - d. Major subcontractors and suppliers.
 - e. Other concerned parties.
 - 2. Agenda: Discuss items of significance that could affect meeting requirements for LEED certification, including the following:

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- a. LEED Project Checklist.
 - b. Procedures for selecting and monitoring status for achieving Project goals related to recycled content and regional materials.
 - c. General requirements for LEED-related procurement and documentation.
 - d. Project closeout requirements and LEED certification procedures.
 - e. Role of LEED coordinator.
 - f. Construction waste management.
 - g. Construction operations and LEED requirements and restrictions.
 3. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.
- D. Preinstallation Conferences: Conduct a preinstallation conference at Project site for installations, systems or assemblies where required by individual Specification Sections, or where deemed necessary by Contractor.
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/Engineer 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, as appropriate:
 - a. Contract Documents.
 - b. Options.
 - c. Related RFIs.
 - d. Related Change Orders.
 - e. Purchases.
 - f. Deliveries.
 - g. Submittals.
 - h. LEED requirements, for projects pursuing LEED certification.
 - 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, approved schedules, 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, including University Project Manager and Architect/Engineer.

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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.

First option in Paragraph below is for Large Projects; second option for Small Projects.
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- E. Project Closeout Conference: Schedule and conduct a project closeout conference, at a time convenient to University and Architect/Engineer, but no later than **[90][30]** calendar days prior to the scheduled date of Substantial Completion or Partial Substantial Completion.

1. Conduct the conference to review requirements and responsibilities related to Project closeout.
2. Attendees: Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work and include the following:
 - a. University Project Manager.
 - b. University Building Maintenance Operations (BMO) Representative.
 - c. Architect/Engineer and their consultants.
 - d. Contractor's project manager and superintendent.
 - e. Major subcontractors and suppliers.
 - f. Other concerned parties.
3. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:
 - a. Procedures related to:
 - 1) Notice of Completion, including preparation of Contractor's punch list.
 - 2) Final Inspection.
 - 3) Notice of Substantial Completion.
 - 4) Notice of Approval of Occupancy/Use.
 - 5) Supplemental Occupancy/Use Checklist.
 - 6) Supplemental Acceptance Checklist.
 - 7) Pre-acceptance Checklists.
 - 8) Notice of Acceptance.
 - 9) Settlement and Final Payment.
 - b. Preparation of record documents.
 - c. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
 - d. Submittal of written warranties.
 - e. Requirements for completing LEED documentation, for projects pursuing LEED certification.
 - 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. University's partial occupancy requirements.
 - j. Installation of University's furniture, fixtures, and equipment.
 - k. Responsibility for removing temporary facilities and controls.
4. Minutes: Entity conducting meeting will record and distribute meeting minutes.

- F. Progress Meetings: Conduct progress meetings at weekly intervals.

1. Coordinate dates of meetings with preparation of payment requests.

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2. Attendees: Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work and include the following:
 - a. University Project Manager.
 - b. University Health Safety Department Representative.
 - c. University Building Maintenance Operations Representative.
 - d. University Campus Building Official.
 - e. Architect/Engineer and their consultants.
 - f. Contractor's project manager and superintendent.
 - g. Major subcontractors and suppliers.
 - h. Other entities concerned with current progress or involved in planning, coordination, or performance of future activities.
 - i. As needed, University Building Maintenance Operations (BMO), Subject Matter Experts (SME), and University Facility Support Services (FSS) Representatives.
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:
 - 1) Review progress since the last meeting.
 - 2) Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule.
 - 3) 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.
 - 4) Review schedule for next two week period.
 - 5) Review schedule of deliveries.
 - 6) Review off-site fabrication.
 - b. Site Safety.
 - c. Indoor Air Quality Management monitoring.
 - d. MS4 Storm Water and Water Quality monitoring.
 - e. Quality:
 - 1) Quality and work standards.
 - 2) Status of correction of deficient items.
 - 3) Progress cleaning.
 - 4) Field observations.
 - f. Status of submittals.
 - g. Status of RFIs.
 - h. Status of Changes including:
 - 1) Change Order Bulletins.
 - 2) Change Order Proposals.
 - 3) Change Orders.
 - 4) Pending claims and disputes.
 - i. Status of LEED documentation, for projects pursuing LEED certification.
 - j. Review present and future needs of each entity present including:
 - 1) Access.

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- 2) Site utilization.
 - 3) Temporary facilities and controls.
 - 4) Coordination.
4. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.
- G. Pay Application and Schedule Review Meeting: Conduct review meeting monthly on or about the 25th of each month.
 1. Attendees:
 - a. University Project Manager.
 - b. Architect/Engineer.
 - c. Contractor's Project Manager, Superintendant and Scheduler.
 2. Agenda: Review draft pay application and progress schedule update in accordance with the requirements of Section 01 29 00 "Payment Procedures" and Section 01 32 00 "Construction Progress Documentation."

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 31 00

SECTION 01 33 00

SUBMITTAL PROCEDURES

RETAIN OPTIONS FOR EITHER PAPER OR ELECTRONIC SUBMITTALS WHERE INDICATED BASED ON PROJECT SIZE AND THE ANTICIPATED CAPABILITIES OF QUALIFIED CONTRACTORS. MAKE SELECTION IN CONSULTATION WITH UNIVERSITY PROJECT MANAGER.

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 requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.
- B. Related Requirements:
 - 1. Section 01 29 00 "Payment Procedures" for submitting Applications for Payment and the schedule of values.
 - 2. Section 01 32 00 "Construction Progress Documentation" for submitting schedules and reports, including Contractor's construction schedule.
 - 3. Section 01 78 23 "Operation and Maintenance Data" for submitting operation and maintenance manuals.
 - 4. Section 01 78 39 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
 - 5. Division 02 through 33 for additional submittal requirements specific to indicated Specification Sections.

1.3 DEFINITIONS

- A. Action Submittals: Written and graphic information and physical samples that require Architect/Engineer's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals." Submittals not specifically indicated as informational submittals are considered to be action submittals.
- B. Informational Submittals: Written and graphic information and physical samples that do not require Architect/Engineer'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" and include, but are not limited to:
 - 1. Schedules.
 - 2. Permits.
 - 3. Applications for payment.
 - 4. Performance and payment bonds.

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5. Insurance certificates.
6. List of Subcontractors.
7. Schedule of Values.
8. Inspection and test results.
9. Closeout documents.
10. Coordination drawings.
11. Street and Storm Water Quality Management Plan.
12. Indoor Air Quality Management Plan.
13. Anschutz Medical Campus Street Services Request.

- C. File Transfer Protocol (FTP): Communications protocol that enables transfer of files to and from another computer over a network and that serves as the basis for standard Internet protocols. An FTP site is a portion of a network located outside of network firewalls within which internal and external users are able to access files.
- D. Portable Document Format (PDF): An open standard file format licensed by Adobe Systems used for representing documents in a device-independent and display resolution-independent fixed-layout document format.

1.4 ACTION SUBMITTALS

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

For Small Projects of short duration where a startup construction schedule is not required, delete "Initial Submittal" Subparagraph below.

2. Initial Submittal: Submit concurrently with startup construction schedule and within 30 calendar days of Notice to Proceed or Commencement of Work, but not later than submittal of first application for payment. Include submittals required during the first 90 calendar 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: Submit concurrently with the first complete submittal of Contractor's construction schedule.
 - a. Submit revised submittal schedule 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 resubmittal.
 - g. Scheduled date for Architect/Engineer's final release or approval.

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- h. Scheduled date of fabrication.

For Large Projects and those employing CMGC delivery method, retain three Subparagraphs below where CPM construction schedules are required.

- i. Scheduled dates for purchasing.
- j. Scheduled dates for installation.
- k. Activity or event numbers.

1.5 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

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

- 1. Architect/Engineer will furnish Contractor one set of digital data drawing files of the Contract Drawings for use in preparing Shop Drawings **[and Project record drawings]**.
 - a. Architect/Engineer makes no representations as to the accuracy or completeness of digital data drawing files as they relate to the Contract Drawings.
 - b. Digital Drawing Software Program: The Contract Drawings are available in **<Insert name and version of digital drawing software program and operating system>**.
 - c. Contractor shall execute a data licensing agreement in the form of Agreement form acceptable to University and Architect/Engineer.

- B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities. Transmit for review with sufficient time to avoid construction delays.

- 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 different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a. Architect/Engineer 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/Engineer'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 14 calendar days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect/Engineer 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 14 calendar days for review of each resubmittal.
- 4. Large and/or Complex Submittals: For large and/or complex submittals, as determined by the Architect/Engineer and for submittals that require sequential reviews by Architect/Engineer's consultants, a review period greater than 14 calendar days may be required. Architect/Engineer

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and Contractor shall identify such submittals upon submission of the submittal schedule and determine a mutually agreed upon review period.

For Small Projects retain "Paper Submittals" Paragraph and Subparagraphs below.

- D. Paper Submittals: Place a permanent label or title block on each submittal item for identification.
1. Indicate name of firm or entity that prepared each submittal on label or title block.
 2. Provide a space approximately [**6 by 8 inches**] <Insert dimensions> on label or beside title block to record Contractor's review and approval markings and action taken by Architect/Engineer.
 3. Include the following information for processing and recording action taken:
 - a. Project name.
 - b. Date.
 - c. Name of Architect/Engineer.
 - d. Name and address of Contractor.
 - e. Name and address of subcontractor.
 - f. Name and address of supplier.
 - g. Name of manufacturer.
 - h. Submittal number or other unique identifier, including revision identifier.
 - 1) Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 061000.01.A).
 - i. Number and title of appropriate Specification Section.
 - j. Drawing number and detail references, as appropriate.
 - k. Location(s) where product is to be installed, as appropriate.
 - l. Other necessary identification.
 4. Additional Paper Copies: Unless additional copies are required for final submittal, and unless Architect/Engineer observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.
 - a. Submit one copy of submittal to concurrent reviewer in addition to specified number of copies to Architect/Engineer.
 5. Transmittal for Paper Submittals: Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect/Engineer will return without review submittals received from sources other than Contractor.
 - a. Transmittal Form for Paper Submittals: Provide locations on form for the following information:
 - 1) Project name.
 - 2) Date.
 - 3) Destination (To:).
 - 4) Source (From:).
 - 5) Name and address of Architect/Engineer.
 - 6) Name and address of Contractor.
 - 7) Name of firm or entity that prepared submittal.
 - 8) Names of subcontractor, manufacturer, and supplier.
 - 9) Category and type of submittal.
 - 10) Submittal purpose and description.

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- 11) Specification Section number and title.
- 12) Specification paragraph number or drawing designation and generic name for each of multiple items.
- 13) Drawing number and detail references, as appropriate.
- 14) Indication of full or partial submittal.
- 15) Transmittal number.
- 16) Submittal and transmittal distribution record.
- 17) Remarks.
- 18) Contractor's certification that information complies with Contract Document requirements.
- 19) Signature of transmitter.

For Large Projects retain "Electronic Submittals" Paragraph and Subparagraphs below.

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

1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
2. Name file with submittal number or other unique identifier, including revision identifier.
 - a. File name shall use project identifier and Specification Section number followed by a dash and then a sequential number (e.g., LNHS-061000-01). Resubmittals shall include an alphabetic suffix after another dash (e.g., LNHS-061000-01-A).
3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Architect/Engineer.

Select first option below for CM/GC and other Large Projects which employ project management software. The use of project management software is required in the Construction Manager/General Contractor Agreement CMGC, State Form SC-6.4.

4. Transmittal Form for Electronic Submittals: Use [**software-generated form from electronic project management software**] [**electronic form**] acceptable to University, containing the following information:
 - a. Project name.
 - b. Date.
 - c. Name and address of Architect/Engineer.
 - d. Name and address of Contractor.
 - e. Name of firm or entity that prepared submittal.
 - f. Names of subcontractor, manufacturer, and supplier.
 - g. Category and type of submittal.
 - h. Submittal purpose and description.
 - i. Specification Section number and title.
 - j. Specification paragraph number or drawing designation and generic name for each of multiple items.
 - k. Drawing number and detail references, as appropriate.
 - l. Location(s) where product is to be installed, as appropriate.
 - m. Related physical samples submitted directly.
 - n. Indication of full or partial submittal.
 - o. Transmittal number.
 - p. Submittal and transmittal distribution record.
 - q. Other necessary identification.
 - r. Contractor's certification that information complies with Contract Document requirements.

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s. Remarks.

- F. Options: Identify options requiring selection by Architect/Engineer.
- G. Deviations and Additional Information: On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect/Engineer on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.
- H. Contractor Certification: On transmittal include Contractor's certification that information complies with Contract Document requirements.
- I. 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/Engineer's action stamp.
- J. 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.
- K. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect/Engineer's action stamp.
- L. Record Documents: Retain complete additional copies of submittals on Project site to be submitted as record documents in accordance with requirements of Section 01 78 39 "Project Record Documents."
- M. Legibility: Provide clear and legible submittals. Submittals that are blurry or are for any reason unreadable will be returned without action.

PART 2 - PRODUCTS

2.1 SUBMITTAL PROCEDURES

- A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.

Retain subparagraphs below for electronic submittals

- 1. Post electronic submittals as PDF electronic files directly to [**Project Management Software Web site**] specifically established for Project.
 - a. Architect/Engineer will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.

Retain "Action Submittals" and "Informational Submittals" subparagraphs below as default requirements for paper copies of submittals.

- 2. Action Submittals: Submit three paper copies of each submittal to Architect/Engineer and one to University unless otherwise indicated. Architect/Engineer will return one copy.

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3. Informational Submittals: Submit two paper copies of each submittal to Architect/Engineer and one to University unless otherwise indicated. Architect/Engineer will not return copies.
 4. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
- B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
 2. Mark each copy of each submittal to show which products and options are applicable.
 3. Include the following information, as applicable:
 - a. Manufacturer's catalog cuts.
 - b. Manufacturer's product specifications.
 - c. Manufacturer's installation instructions.
 - d. Manufacturer's printed recommendations.
 - e. Standard color charts.
 - f. Statement of compliance with specified referenced standards.
 - g. Statement of compliance with specified trade association standards.
 - h. Testing by recognized testing agency.
 - i. Application of testing agency labels and seals.
 - j. Notation of coordination requirements.
 - k. Notation of dimensions verified by field measurement.
 4. For equipment, include the following in addition to the above, as applicable:
 - a. Wiring diagrams showing factory-installed wiring.
 - b. Printed performance curves.
 - c. Operational range diagrams.
 - d. Rough-in diagrams and templates indicating clearances required to other construction, if not indicated on accompanying Shop Drawings.
 5. Submit Product Data before or concurrent with Samples.
 6. Confirm compliance of Product Data with requirements of Contract Documents. Submit cover letter indicating Contractor's certification of compliance.
 7. Submit additional copies of Product Data as required complying with requirements of Section 01 78 39 "Project Record Documents."
- C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Highlight, encircle or otherwise indicate deviations from Contract Documents. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data, unless submittal based on Architect/Engineer's digital data drawing files is otherwise permitted. Standard information prepared without specific reference to the Project is not considered a shop drawing.
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.

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- g. Seal and signature of professional engineer if specified.
- 2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches, but no larger than size of Construction Drawings.

Retain first subparagraph below for Large Projects when Project utilizes BIM through the Construction Stage and Contractor is required to prepare Shop Drawings for incorporation into the BIM. Coordinate with requirements for Virtual Design and Construction in Section 01 31 00. Edit as required to reflect Project scope agreements.

- 3. BIM File Incorporation: Develop and incorporate Shop Drawing files into Building Information Model established for Project.
 - a. Prepare Shop Drawings in the following format: Same digital data software program, version, and operating system as the original Drawings.
 - b. Refer to Section 01 31 00 "Project Management and Coordination" for requirements for coordination drawings.
- D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.
 - 1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
 - 2. Mount, display or package Samples in the manner specified to facilitate review of qualities indicated. Prepare Samples to match the Architect/Engineer's Sample.
 - 3. Identification: Attach label on unexposed side of Samples that includes the following:
 - a. Generic description of Sample.
 - b. Product name and name of manufacturer.
 - c. Sample source.
 - d. Number and title of applicable Specification Section.
 - e. Specification paragraph number and generic name of each item.
 - f. Compliance with recognized standards.
 - g. Availability and delivery time.

Retain first subparagraph below for projects using electronic submittals to provide complete electronic submittal record of Sample items.

- 4. For projects where electronic submittals are required, provide corresponding electronic submittal of Sample transmittal, digital image file illustrating Sample characteristics, and identification information for record.
- 5. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
 - a. Number of Samples: Submit one full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect/Engineer will return submittal with options selected.
- 6. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used

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materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.

- a. Number of Samples: Submit three sets of Samples. Architect/Engineer will retain two Sample sets; remainder will be returned. Mark up and retain one returned Sample set as a project record sample.
 - 1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
 - 2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.
7. 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 University's property, are the property of Contractor.
8. Distribution of Samples: Prepare and distribute additional sets to Subcontractors, manufacturers, fabricators, suppliers, Installers, and others as required for performance of the Work. Show distribution on transmittal forms.
9. Field Samples and Mock-Ups: Field Samples and mock-ups specified in individual Sections are full-size examples erected on site to illustrate finishes, coatings, or finish materials and to establish the standard by which the Work will be judged.
- E. Selection of Related Materials: Where selections of colors, patterns, textures are specified to be made by Architect/Engineer, assemble complete samples of all specified or approved products for all Specification Sections and submit to Architect/Engineer. Review specifications and assemble all such samples for a combined single submittal. Indicate on the transmittal the latest date for selections to be made for each item to permit delivery of material in accordance with Progress Schedule. Architect/Engineer's action is limited solely to the specified selections or rejection of submittal items not in accordance with Specifications.
- F. Coordination Drawing Submittals: Comply with requirements specified in Section 01 31 00 "Project Management and Coordination."
- G. Contractor's Construction Schedule: Comply with requirements specified in Section 01 32 00 "Construction Progress Documentation."
- H. Application for Payment and Schedule of Values: Comply with requirements specified in Section 01 29 00 "Payment Procedures."
- I. Test and Inspection Reports and Schedule of Tests and Inspections Submittals: Comply with requirements specified in Section 01 40 00 "Quality Requirements."
- J. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Section 01 77 00 "Closeout Procedures."

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- K. Maintenance Data: Comply with requirements specified in Section 01 78 23 "Operation and Maintenance Data."
- L. LEED Submittals: For project required to obtain LEED certification, comply with requirements specified in Division 01 Section "Sustainable Design Requirements".
- M. 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.
- N. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.
- O. 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.
- P. 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.
- Q. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
- R. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
- S. 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.
- T. 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.
- U. 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:
 - 1. Name of evaluation organization.
 - 2. Date of evaluation.
 - 3. Time period when report is in effect.
 - 4. Product and manufacturers' names.
 - 5. Description of product.
 - 6. Test procedures and results.
 - 7. Limitations of use.
- V. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.

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- W. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
- X. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
- Y. Design Data: Prepare and submit written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

2.2 DELEGATED-DESIGN SERVICES

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
 - 1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect/Engineer.
- B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit three paper copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
 - 1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

Retain first subparagraph below when Project utilizes BIM through the Construction Stage and delegated-design drawings and data will be incorporated into the BIM.

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

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

- A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect/Engineer. Submittals received without Contractor's substantive review and approval stamp will be rejected and returned to the Contractor.
- B. Project Closeout and Maintenance Material Submittals: See requirements in Section 01 77 00 "Closeout Procedures."

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- C. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 ARCHITECT/ENGINEER'S ACTION

- A. Action Submittals: Architect/Engineer will review each submittal, make marks to indicate corrections or revisions required, and return it. Architect/Engineer will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action.
- B. Informational Submittals: Architect/Engineer will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect/Engineer 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/Engineer.
- D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.
- E. Submittals not required by the Contract Documents may be returned by the Architect/Engineer without action.

END OF SECTION 01 33 00

SECTION 01 35 44

SPECIAL PROCEDURES FOR ENVIRONMENTAL HEALTH AND SAFETY AND FIRE AND LIFE SAFETY

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 special administrative and procedural requirements related to environmental health and safety.
- B. University is Authority Having Jurisdiction (AHJ) for Fire and Life Safety. This responsibility is administered by the University's Fire and Life Safety Officer.
- C. Related Requirements:
 - 1. Section 01 35 46 "Indoor Air Quality Procedures" for procedure related to maintaining indoor air quality during construction.
 - 2. Section 02 81 00 "Transportation/Disposal of Hazardous Materials."

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 ENVIRONMENTAL HEALTH AND SAFETY AND FIRE AND LIFE SAFETY PROCEDURES

- A. Physical, Life, and Fire Safety:
 - 1. All contractors are required to conform to the Federal Occupational Safety and Health Administration (OSHA) regulations for construction (29 CFR 1926). Certain General Industry Standards (29 CFR 1910) may also apply, depending on location of work.
 - 2. Provide an effective health and safety program to control hazards, including but not limited to compressed gases, welding, electrical, safety netting, cranes, scaffolding and supplies on the roof.
 - 3. Provide fire protection in all construction areas to the satisfaction of the Authority Having Jurisdiction.
 - 4. During the construction phase, the Authority Having Jurisdiction may conduct oversight inspections to observe and provide recommendations regarding applicable safety standards. The following minimum items are included:
 - a. Do not block exit corridors. Install signage clearly identifying exit routes.

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- b. Provide physical barriers with appropriate warning signage to protect public areas from construction work.
- c. Conduct daily inspections to eliminate fire hazards and any other safety hazards.
- d. Periodic safety inspections will be performed on job sites by the Authority Having Jurisdiction. The Authority Having Jurisdiction for fire safety will present University's Project Manager with a written summary of the findings who will then take these issues to the Contractor's superintendent, foreman or other designated representative and return the summary form with documentation of the resolution of safety items to AHJ. Abate deficient items in a timely manner. Include documentation and resolution of safety items presented in weekly Progress Meeting minutes. Inspections by University AHJ are spot-checks only. They are not all encompassing. These inspections and recommendations do not relieve the Contractor from obligations related to safe work practices, as required under federal law.
- e. AHJ has the right to access the site at all times. Should a potential threat to personnel or property be observed, AHJ may require the hazard related operation immediately altered until adequate safeguards are addressed.
- f. Supply AHJ, through the University Project Manager, with a copy of Contractor's weekly safety meeting minutes and safety inspection reports.
- g. Provide signs used for proper identification of construction areas.
- h. Provide adequate number of appropriately rated fire extinguishers to be available on-site for emergency use in the construction area.
- i. Insure standpipes, pull stations, electrical panels, water control valves and fire hydrants are accessible at all times.
- j. Post emergency notification phone numbers provided by Contractor and University in all construction areas.
- k. Notify University Project Manager of any lost time injuries occurring on University's property within one (1) calendar day and of any fatalities immediately.
- l. Submit copies of all injury reports to AHJ, through University's Project Manager.
- m. Equip construction personnel with personal protective equipment (PPE) where required. Coordinate with University Project Manager to identify where use of PPE will be required.

B. OSHA Hazard Communication Standard:

- 1. Every Contractor and Subcontractor performing work shall to comply with the OSHA Hazard Communication Standard. Compliance includes joint University and Contractor responsibilities for the purpose of providing timely communications and information sharing with regard to hazardous materials, chemicals and chemical sources which may be present on-site or brought in by Contractor.
- 2. University Project Manager will provide Contractor with the following:
 - a. Information regarding known hazardous chemicals and agents or other hazards present at the job site.
 - b. University emergency procedures and contact numbers.
- 3. Provide safety training and environmental surveillance of all workers.
- 4. Inform and provide University's Project Manager the following:
 - a. Material safety data sheets (MSDS) for all chemicals introduced into the workplace.
 - b. Information regarding potential sources of pollutants which may be entrained in University's air intakes, e.g., roofing tar fumes, nuisance dusts, exhaust from internal combustion engines, welding or cutting fumes, and asbestos - if damaged or encountered during the course of the work.

C. Asbestos and Lead Paint:

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1. The presence of asbestos-containing materials and/or paint containing lead on the job site does not mean a problem exists. Areas where asbestos is friable and not contained or lead paint is present or will be caused to be present in airborne or settled dust are of concern.
2. Responsibilities of University and Contractor regarding asbestos and lead paint are as follows:
 - a. University:
 - 1) Notify the Contractor of the condition and location(s) where asbestos is known to be present or may reasonably be encountered, e.g., asbestos insulation, ceiling tiles, floor tiles, fire doors, wall and ceiling plasters, concrete, grouting, etc., and lead paint on metal building materials, walls, windows, etc.
 - 2) Coordinate with Contractor when response action is required by a Subcontractor.
 - 3) Contract with third party contractor to monitor areas where friable asbestos and/or lead-containing particles are present during construction/renovation projects for its own records and purpose. Monitoring results can be shared with Contractors but are in no way to be used for Contractor employee monitoring.
 - 4) Final authority on all asbestos-related concerns and contractual arrangements.
 - b. Contractor:
 - 1) Notify University's Project Manager of any suspected or existing problem involving asbestos or lead and cease work in that area until University has assessed the situation.
 - 2) Ensure that undamaged asbestos-containing material and/or material containing lead, not included in the scope of the project, are not damaged.
 - 3) Train and monitor their own employees, including Asbestos Awareness training and Lead Paint Awareness training, where applicable.
 - 4) Be responsible for all environmental/industrial hygiene surveillance of its work staff and subcontractors and for required area monitoring where potential contamination of adjacent areas exists.
 - 5) Prevent problems which can result in asbestos or lead exposure to building occupants.
 - 6) Coordinate with the University's EHS Department and Building Maintenance and Operations through University's Project Manager and perform all activities that may potentially disturb asbestos containing materials in a manner acceptable to the EHS.
 - 7) Follow State of Colorado regulation, Emission Standards for Asbestos, Part B, Control of Asbestos, "Regulation 8" and OSHA standards regulating exposure to asbestos and lead.
 - 8) Where applicable, comply with Section 02 81 00 "Transportation/Disposal of Hazardous Materials."
 - 9) Comply with current "Asbestos-Contaminated Soil Management Standard Operating Procedure Document, University of Colorado Anschutz Medical Campus" during excavation operations.

D. Carcinogens:

1. Contractor or any Subcontractor shall not knowingly install or cause to be installed any material or product containing carcinogens. Refer to Annual Report on Carcinogens, U.S. Department of Health and Human Services, National toxicology Program.

E. Hazardous Waste:

1. All hazardous wastes are to be handled and disposed of according to current University EHS guidelines which can be obtained through University Project Manager. Only individuals specifically authorized by University may sign hazardous waste manifests for wastes generated on

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University's property. Only University approved transporters and disposal facilities are to be used for transportation and disposal of hazardous wastes.

F. The Control of Hazardous Energy (Lockout/Tagout):

1. Provide and enforce a program and procedures for the control of hazardous energy (lockout/tagout) including, but not limited to, locks, tags and lockout devices. Provide proof that workers have received safety training in the control of hazardous energy through lockout/tagout.

G. Hot Work Operations:

1. Comply with University hot work policy and obtain Hot Work Permit prior to executing any hot work in existing buildings.
2. Notify University Project Manager prior to any hot work on University property.
3. Provide and enforce a program to control fires during hot work operations. Provide appropriately rated fire extinguishers, fire retardant protective covers (when needed), and any other hot work related equipment.

H. Confined Space Entry:

1. Work in compliance with the "Confined Space Entry Procedure for Non-University Personnel" whenever any project requires entry into a confined space. A copy of this procedure can be obtained from University EHS through University's Project Manager.

I. Green Tagging of Work Area:

1. Obtain a Green Tag and Construction Permit from the University Project Manager prior to any work being conducted in a laboratory or on any exhaust ductwork system serving a laboratory. If a Green Tag has been issued, it will be displayed at the entry of the laboratory area. The Green Tag assures that any radioactive, chemical or biological materials have been removed from the laboratory verifying the area is free from hazards to workers. If a Green Tag is not displayed, coordinate tagging with EHS through University's Project Manager.

END OF SECTION 01 35 44

SECTION 01 35 46

INDOOR AIR QUALITY PROCEDURES

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 managing emissions and moisture control during construction.

1.3 DEFINITIONS

- A. Sustainable Design Related Terminology: As defined is ASTM E 2114.
- B. Adequate Ventilation: Ventilation, including air circulation and air changes, required to cure materials, dissipate humidity, and prevent accumulation of particulates, dust, fumes, vapors, or gases.
- C. Hazardous Materials: Any material that is regulated as a hazardous material in accordance with 49 CFR 173, requires a Material Safety Data Sheet (MSDS) in accordance with 29 CFR 1910.1200, or which during end use, treatment, handling, storage, transportation or disposal meets or has components which meet or have the potential to meet the definition of a Hazardous Waste in accordance with 40 CFR 261. Throughout this specification, hazardous material includes hazardous chemicals.
 - 1. Hazardous materials include: pesticides, biocides, and carcinogens as listed by recognized authorities, such as the Environmental Protection Agency (EPA) and the International Agency for Research on Cancer (IARC).
- D. Indoor Air Quality (IAQ): The composition and characteristics of the air in an enclosed space that affect the occupants of that space. The indoor air quality of a space refers to the relative quality of air in a building with respect to contaminants and hazards and is determined by the level of indoor air pollution and other characteristics of the air, including those that impact thermal comfort such as air temperature, relative humidity and air speed.
- E. Interior Final Finishes: Materials and products that will be exposed at interior, occupied spaces including but not limited to flooring, wallcovering, finish carpentry, and ceilings.
- F. Packaged Dry Products: Materials and products that are installed in dry form and are delivered to the site in manufacturer's packaging including but not limited to carpets, resilient flooring, ceiling tiles, and insulation.
- G. Wet Products: Materials and products installed in wet form, including paints, sealants, adhesives, special coatings, and other materials which require curing.

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1.4 QUALITY ASSURANCE

- A. Inspection and Testing Lab Qualifications: Minimum of 5 years experience in performing the types of testing specified herein.

1.5 PRECONSTRUCTION MEETING

- A. After award of Contract and prior to the commencement of the Work, schedule and conduct meeting with University and Architect/Engineer to review and discuss the proposed IAQ Management Plan and develop a mutual understanding of detailed requirements for maintaining indoor air quality and environmental protection.

1.6 SUBMITTALS

- A. Indoor Air Quality (IAQ) Management Plan: Not less than 10 business days before the Pre-construction meeting, prepare and submit an IAQ Management Plan including, but not limited to, the following:
 - 1. Procedures for control of emissions during construction.
 - a. Identify schedule for application of interior finishes.
 - 2. Procedures for moisture control during construction.
 - a. Identify porous materials and absorptive materials.
 - b. Identify schedule for inspection of stored and installed absorptive materials.
 - 3. Revise and resubmit Plan as required by University.
 - a. Approval of Contractor's Plan will not relieve the Contractor of responsibility for compliance with applicable environmental regulations.
- B. Product Data:
 - 1. Submit product data for filtration media used during construction and during operation. Include Minimum Efficiency Reporting Value (MERV).
 - 2. Submit air pressure difference maps for each mode of operation of HVAC.
 - 3. Material Safety Data Sheets: Submit MSDSs for inclusion in Operation and Maintenance Manual for the following products. Coordinate with Section 01 78 23 – Operation and Maintenance Data.
 - a. Adhesives.
 - b. Floor and wall patching/leveling materials.
 - c. Caulking and sealants.
 - d. Insulating materials.
 - e. Fireproofing and firestopping.
 - f. Carpet.
 - g. Paint.
 - h. Clear finish for wood surfaces.
 - i. Lubricants.
 - j. Cleaning products.
- C. Inspection and Test Reports:

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1. Moisture control inspections.
2. Moisture content testing.
3. Moisture penetration testing.
4. Microbial growth testing.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 IAQ MANAGEMENT - EMISSIONS CONTROL

- A. Provide point person responsible for the implementation and assurance that the Indoor Air Quality Plan is being implemented.
- B. University Indoor Air Quality Plan: Comply with the requirements of the University IAQ Plan, latest version, appended to this Specification Section.
- C. Flush-Out: After construction ends, prior to occupancy and with all interior finishes installed, perform a building flush-out by supplying a total air volume of 14,000 cu.ft. of outdoor air per sq.ft. of floor area while maintaining an internal temperature of at least 60 degrees F and relative humidity no higher than 60%.

3.2 IAQ MANAGEMENT - MOISTURE CONTROL

- A. Housekeeping:
 1. Keep materials dry. Protect stored on-site and installed absorptive materials from moisture damage.
 2. Verify that installed materials and products are dry prior to sealing and weatherproofing the building envelope.
 3. Install interior absorptive materials only after building envelope is sealed and weatherproofed.
- B. Inspections: Document and report results of inspections; state whether or not inspections indicate satisfactory conditions.
 1. Examine materials for dampness as they arrive. If acceptable to University, dry damp materials completely prior to installation; otherwise, reject materials that arrive damp.
 2. Examine materials for mold as they arrive and reject materials that arrive contaminated with mold.
 3. Inspect stored and installed absorptive materials regularly for dampness and mold growth. Inspect weekly.
 - a. Where stored on-site or installed absorptive materials become wet, notify Architect/Engineer and University. Inspect for damage. If acceptable to University, dry completely prior to closing in assemblies; otherwise, remove and replace with new materials.
 4. Basement: Monitor basement and crawlspace humidity, and dehumidify when relative humidity is greater than 85 percent for more than 2 weeks or at the first sign of mold growth.
 5. Site drainage: Verify that final grades of site work and landscaping drain surface water and ground water away from the building.

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6. Weather-proofing: Inspect moisture control materials as they are being installed. Include the following:
 - a. Air and weather-resistive barrier: Verify air and weather-resistive barrier is installed without punctures and/or other damage. Verify air barrier and weather-resistive is sealed completely.
 - b. Flashing: Verify correct shingling of the flashing for roof, walls, windows, doors, and other penetrations.
 - c. Insulation layer: Verify insulation is installed without voids.
 - d. Roofing: In accordance with ASTM D7186 Standard Practice for Quality Assurance Observation of Roof Construction and Repair
7. Plumbing: Verify satisfactory pressure test of pipes and drains is performed before closing in and insulating lines.
8. HVAC: Inspect HVAC system as specified in Section 23 08 00 – Commissioning.
 - a. And, inspect HVAC to verify:
 - 1) Condensate pans are sloped and plumbed correctly.
 - 2) Access panels are installed to allow for inspection and cleaning of coils and ductwork downstream of coils.
 - 3) Ductwork and return plenums are air sealed.
 - 4) Duct insulation is installed and sealed.
 - 5) Chilled water line and refrigerant line insulation are installed and sealed.

C. Schedule:

1. Schedule work such that absorptive materials, including but not limited to porous insulations, paper-faced gypsum board, ceiling tile, and finish flooring, are not installed until they can be protected from rain and construction-related water.
2. Weather-proof as quickly as possible. Schedule installation of moisture-control materials, including but not limited to air and weather-resistive barriers, flashing, exterior sealants and roofing, at the earliest possible time.

D. Testing for Moisture Content: Test moisture content of porous materials and absorptive materials to ensure that they are dry before sealing them into an assembly. Document and report results of testing. Where tests are not satisfactory, dry materials and retest. If satisfactory results cannot be obtained with retest, remove and replace with new materials.

1. Concrete: Moisture test prior to finish flooring application as specified in Division 09.
2. Wood: Moisture test as per ASTM D4444 - Standard Test Methods for Use and Calibration of Hand-Held Moisture Meters; unless otherwise indicated acceptable upper limits for wood products are < 20% at center of piece; < 15% at surface.
3. Gypsum Board, Gypsum Plaster, Insulation, and other absorptive materials: Moisture test with a Pinless Moisture Meter to assess patterns of moisture, if any.

E. Testing for Moisture Penetration:

1. Windows: Test as per ASTM E1105 Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform or Cyclic Static Air Pressure Difference at 100 percent static-air-pressure difference specified in applicable

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Division 08 Sections; unless otherwise indicated, acceptable upper limits are no leakage for 15 minutes.

- a. Number of Tests: 1 percent of openings but not less than two.
 2. Horizontal Waterproofing (not roofing): Test as per ASTM D5957 Standard Guide for Flood Testing Horizontal Waterproofing Installations; acceptable upper limits are no leakage for 15 minutes.
 - a. Test frequency: 100 percent of horizontal waterproofed surfaces.
 3. Masonry: Test as per ASTM C1601 Standard Test Method for Field Determination of Water Penetration of Masonry Wall Surfaces; acceptable upper limits are no leakage for 15 minutes.
 4. Exterior Walls:
 - a. Air tightness of the enclosure test: ASTM E779 Standard Test Method for Determining Air Leakage Rate by Fan Pressurization or ASTM E1827
 - 1) Air Leakage: The mean value of the air leakage flow rate calculated from measured data at 0.3 in wg (75 Pa) must not exceed 0.25 cu ft/ minute per square foot of envelope area. Measurements must be referenced at standard conditions of 14.696 psi (101.325 KPa) and 68 deg F.
- F. Testing for Support of Microbial Growth: Test and report in accordance with ASTM D6329 Standard Guide for Developing Methodology for Evaluating the Ability of Indoor Materials to Support Microbial Growth Using Static Environmental Chambers. Indicate susceptibility of product or material to colonization and amplification of microorganisms. Identify microorganisms and conditions of testing.
1. Normal conditions: Perform testing at 35 degrees Centigrade and 50 percent relative humidity.
 2. Extreme conditions: Perform worst case scenarios screening tests by providing an atmosphere where environmental conditions may be favorable for microbial growth.
 3. Perform testing for the following:
 - a. Fireproofing material on appropriate substrate.
 - b. Ceiling tile.
 - c. Wall covering.
 - d. Other appropriate material.

END OF SECTION 01 35 46

Indoor Air Quality Plan

March 1, 2012

Project _____

Completed by: _____
(Name & Company)

Date: _____

This plan describes the measures to be taken to provide good indoor air quality (IAQ) during construction and after construction is complete and the occupants have moved into the building. This plan is based on the SMACNA standard "IAQ Guidelines for Occupied Buildings under Construction" and the requirements of the LEED.

It is not the intent of this document to replace or supersede OSHA regulations as to safe construction workplace practices. It remains the responsibility of the Construction Manager and the individual sub-contractors to maintain safe building and site operations. Addition precautions may be necessary when hazardous materials are present.

The plan will address construction IAQ by recommending procedures in five areas of concern, which in turn will allow the building to achieve two LEED program points:

- HVAC system protection
- Containment source control
- Pathway interruption
- Housekeeping
- Scheduling

The following describes the specific measures to be performed in each area of concern:

1. HVAC Protection

- During construction, provide MERV 13 filters for supply air intake when in use. Provide MERV 8 filters at the return air system openings when in use. Perform frequent maintenance when the HVAC system is being utilized and replace filters as they become loaded, prior to building flushout, and prior to occupancy.
- When performing construction activities that produce dust, such as drywall sanding, concrete cutting, masonry work, wood sawing or adding insulation, seal off the supply diffusers and return air system openings completely for the duration of the task.
- Shut down and seal off the supply diffusers and return air ducts during any demolition operations.
- Whenever the HVAC system is not used during construction, seal off the supply diffusers and return air system openings to prevent the accumulation of dust and debris in the duct system.
- Do not use the mechanical rooms to store construction or waste materials. Keep rooms clean and neat.
- Provide periodic duct inspections during construction; if the ducts become contaminated due to inadequate protection, clean the ducts professionally in accordance with NADCA (National Air Duct Cleaning Association) standards.
- The General Contractor shall take photographs showing measures in place.

2. Source Control

- Use low VOC products as indicated by the specifications to reduce potential problems.
- Restrict traffic volume and prohibit idling of motor vehicles where emissions could be drawn into the building.

- Utilize electric or natural gas alternatives for gasoline and diesel equipment where possible and practical. Use low-sulfur diesel in lieu of regular diesel.
- Cycle equipment off when not being used or needed.
- Exhaust pollution sources to the outside with portable fan systems. Prevent exhaust from recirculating back into the building from construction equipment outside the building.
- Keep containers of wet products closed as much as possible. Cover or seal containers of waste materials that can release odor or dust.
- Protect stored on-site or installed absorptive building materials from weather and moisture; wrap with plastic and seal tight to prevent moisture absorption.
- The General Contractor shall take photographs showing measures in place.

3. Pathway Interruption

- Provide dust curtains or temporary enclosures to prevent dust from migrating to other areas when applicable.
- Locate pollutant sources as far away as possible from supply ducts and areas occupied by workers when feasible. Supply and exhaust systems may have to be shut down or isolated during such activity.
- During construction, isolate areas of work to prevent contamination of clean or occupied areas. Pressure differentials may be utilized to prevent contaminated air from entering clean areas.
- Depending on weather, ventilation using 100% outside air will be used to exhaust contaminated air directly to the outside during installation of VOC emitting materials.

4. Housekeeping

- Provide regular cleaning concentrating on HVAC equipment and building spaces to remove contaminants from the building prior to occupancy.
- All coils, air filters, fans and ductwork shall remain clean during installation and, if required, will be cleaned prior to performing the testing, adjusting and balancing of the systems.
- Suppress and minimize dust with wetting agents or sweeping compounds. Utilize efficient and effective dust collecting methods such as a damp cloth, wet mop, or vacuum with particulate filters, or wet scrubber.
- Remove accumulations of water inside the building. Protect porous materials such as insulation and ceiling tile from exposure to moisture.
- Thoroughly clean all interior surfaces prior to replacing filters and running HVAC system for system balancing, commissioning and building flushout.
- Provide photographs of the above activities during construction to document compliance.

5. Scheduling and Construction Activity Sequence

- Schedule high pollution activities that utilize high VOC level products (including paints, sealers, insulation, adhesives, caulking and cleaners) to take place prior to installing highly absorbent materials (such as ceiling tiles, gypsum wall board, fabric furnishing, carpet and insulation, for example). These materials will act as 'sinks' for VOCs, odors and other contaminants, and release them later after occupancy.

PLANNING AND INSPECTION CHECKLISTS

The planning and inspection checklists included in this document are useful to ensure construction IAQ management is planned and implemented correctly. The planning checklist should be completed by the contractor prior to construction. The inspection checklists should be completed monthly to confirm the IAQ management plan is being followed. At the time of inspection, photographs should be taken to support the checklist and to provide audit documentation for the USGBC.

- ☐ General Contractor to document with photographs

4. Housekeeping

- ☐ Provide regular cleaning, including HVAC equipment
- ☐ If necessary clean HVAC equipment prior to testing, adjusting and balancing the systems
- ☐ Suppress and minimize dust with wetting agents or sweeping compounds
- ☐ Remove accumulations of water inside the building
- ☐ Protect porous materials
- ☐ General Contractor to document with photographs

5. Scheduling and Construction Activity Sequence

- ☐ Schedule high pollution activities prior to installing absorbent materials
- ☐ General Contractor to document with photographs

I confirm the checked activities to be proceeding according to the Construction Indoor Air Quality Plan. Items that are not checked will be addressed, initialed and dated once corrective actions have been taken. Items that are not applicable are labeled as such.

Signed: _____
(Contractor)

Date: _____

- ☐ Provide regular cleaning, including HVAC equipment
- ☐ If necessary clean HVAC equipment prior to testing, adjusting and balancing the systems
- ☐ Suppress and minimize dust with wetting agents or sweeping compounds
- ☐ Remove accumulations of water inside the building
- ☐ Protect porous materials
- ☐ General Contractor to document with photographs

5. Scheduling and Construction Activity Sequence

- ☐ Schedule high pollution activities prior to installing absorbent materials
- ☐ General Contractor to document with photographs

I confirm the checked activities to be proceeding according to the Construction Indoor Air Quality Plan. Items that are not checked will be addressed, initialed and dated once corrective actions have been taken. Items that are not applicable are labeled as such.

Signed: _____
(Contractor)

Date: _____

SECTION 01 35 96

SPECIAL PROCEDURES FOR PROPERTY PROTECTION

Include this Section and select appropriate options for projects where Work has the potential to disturb adjacent existing construction.

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Procedures for establishing existing conditions and monitoring procedures for protection of adjacent or nearby structures and improvements including, but not limited to, sidewalks, landscaping, parking facilities, roadways, or driveways, whether on or off the University's property arising from **[drilled caissons]** **[underpinning existing foundations]** **[new foundations or excavations below adjacent or nearby buildings]** **[sheet piling]** **<Insert other relevant construction operation>**.

1.2 UNIVERSITY'S SURVEY

- A. University has obtained visual inspections of adjacent and nearby buildings together with photographic records showing details and conditions. This survey was made on **<Insert Date>** and the photographs are dated and certified by the photographer as of that date. One set of these data is available for Contractor's use and records.

1.3 SUBMITTALS

- A. Submit photographs and survey data from same points as original, certified and dated by photographer and taken upon completion of **[pile driving]** **[caisson work]** **[underpinning existing foundations]** **[backfilling]** **<Insert relevant construction operation>**.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 MONITORING

- A. Establish accurate levels and positions of all elements relative to other fixed points to permit accurate monitoring of potential changes.
- B. At all times during construction activities which are likely to affect adjacent properties, improvements or building, monitor conditions carefully including horizontal or vertical movements, changes in existing cracks, joints or defects or development of new cracks and other evidence of changing conditions. Report immediately to University's Project Manager and Architect/Engineer any changes to existing conditions and stop work where such appear to be significant or potentially dangerous to persons or property.

3.2 REMEDIES

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- A. Conduct construction operations and specifically [excavation] [caisson drilling] [sheet piling] [underpinning] [shoring] <Insert other relevant construction operation> in a manner that will avoid damage to adjacent buildings, structures, properties or improvements. Promptly remedy any such damage whether to University's or other property and hold the University harmless from such damage.

3.3 POST-CONSTRUCTION SURVEY

- A. Within 30 calendar days of completion of those construction activities that would potentially damage adjacent or nearby properties, re-survey all items of University's original survey and Contractor's supplemental information, including monitoring control points. Perform this work using a licensed surveyor and independent photographer. Identify specifically each changed condition, its magnitude and probable cause.

END OF SECTION 01 35 96

SECTION 01 40 00

QUALITY REQUIREMENTS

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 quality assurance and quality control.
- B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
 - 1. Specific quality-assurance and -control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
 - 2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
 - 3. Requirements for Contractor to provide quality-assurance and -control services required by Architect/Engineer, University, or authorities having jurisdiction are not limited by provisions of this Section.
 - 4. Specific test and inspection requirements are not specified in this Section.
- C. Related Requirements:
 - 1. Section 01 42 00 "Reference" for list of references, standards and definitions.
 - 2. Section 01 91 13 "General Commissioning" for coordination of testing with commissioning activities.
 - 3. Division 23 for testing, adjusting and balancing of mechanical systems.
 - 4. Division 26 for testing of electrical systems.

1.3 DEFINITIONS

- A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect/Engineer.

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- C. Mockups: Full-size physical assemblies that are constructed on-site. Mockups are constructed to verify selections made under Sample submittals; to demonstrate aesthetic effects and, where indicated, qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.
 - 1. As indicated in individual Specifications Sections or on the Drawings, the Work may include the following types of mockups:
 - a. Laboratory Mockups: Full-size physical assemblies constructed at testing facility to verify performance characteristics.
 - b. Integrated Exterior Mockups: Mockups of the exterior envelope erected separately from the building but on Project site, consisting of multiple products, assemblies, and subassemblies.
 - c. Room Mockups: Mockups of typical interior spaces complete with wall, floor, and ceiling finishes, doors, windows, millwork, casework, specialties, furnishings and equipment, and lighting.
- D. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.
- E. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.
- F. Source Quality-Control Testing: Tests and inspections that are performed at the source, e.g., plant, mill, factory, or shop.
- G. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
- I. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
 - 1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).
- J. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.4 CONFLICTING REQUIREMENTS

- A. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most

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stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Architect/Engineer for a decision before proceeding.

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

1.5 ACTION SUBMITTALS

A/E note and coordinate requirement in Paragraph below to show extent of and requirement for integrated exterior mockup on Drawings.

- A. **Shop Drawings:** Where integrated exterior mockups are required and indicated on the Drawings, provide plans, sections, and elevations, indicating materials and size of mockup construction.
1. Indicate manufacturer and model number of individual components.
 2. Provide axonometric drawings for conditions difficult to illustrate in two dimensions.

1.6 INFORMATIONAL SUBMITTALS

- A. **Contractor's Statement of Responsibility:** When required by authorities having jurisdiction, submit copy of written statement of responsibility sent to authorities having jurisdiction before starting work on the following systems:
1. Seismic-force-resisting system, designated seismic system, or component listed in the designated seismic system quality-assurance plan prepared by Architect/Engineer.
 2. Main wind-force-resisting system or a wind-resisting component listed in the wind-force-resisting system quality-assurance plan prepared by Architect/Engineer.
- B. **Testing Agency Qualifications:** For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.
- C. **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.

1.7 REPORTS AND DOCUMENTS

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

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

- B. **Manufacturer's 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, and telephone number 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 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, and telephone number 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 whether conditions, products, and installation will affect warranty.
5. Other required items indicated in individual Specification Sections.

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

1.8 QUALITY ASSURANCE

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

1. Monitor quality control over products, services, site conditions, and workmanship to produce work of specified quality.
2. Comply fully with manufacturers' instructions, including each step in sequence.

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3. If manufacturers' instructions conflict with Contract Document requirements, request clarification from Architect/Engineer before proceeding.
 4. Comply with specified standards as a minimum quality for the work except when more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
 5. Perform work by persons qualified to produce workmanship of specified quality.
- 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.
- 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. **Subcontractor and Installer Qualifications:** A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance. In addition comply with the following:
1. For all trades: Proof of applicable licensing.
 2. Electrical contractors:
 - a. Company: State of Colorado master electrician license.
 - b. On-site electricians: State of Colorado journeyman license.
 3. Plumbing Contractors:
 - a. Company: State of Colorado master plumbers license.
 - b. On-site plumbers: State of Colorado journeyman license.
 - c. Gas piping installations: State of Colorado master plumber with minimum 5 years institutional or heavy commercial gas piping experience. Provide an on-site supervisor with a minimum of 3 years of supervisory experience.
- E. **Professional Engineer Qualifications:** A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar in material, design, and extent to those indicated for this Project.
- F. **Specialists:** Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.
1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.
- G. **Testing Agency Qualifications:** An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329 or ASTM D 3740 as appropriate; and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.
1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
 2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.

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3. Independent Agency: Meeting “Recommended Requirements for Independent Laboratory Qualifications” published by American Council for Independent Laboratories.
 4. Authorized to operate in the State of Colorado.
 5. Calibrate testing equipment at reasonable intervals with devices of accuracy traceable to National Bureau of Standards or of accepted values of natural physical constants.
- 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 installation 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:
1. Contractor responsibilities include the following:
 - a. Provide test specimens representative of proposed products and construction.
 - b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
 - c. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
 - d. When required, build site-assembled test assemblies and mockups using installers who will perform same tasks for Project.
 - e. When required, build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
 - f. When testing is complete, remove test specimens, assemblies, mockups, and laboratory mockups, as applicable; do not reuse products on Project.
 2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect/Engineer, 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 in location and of size indicated or, if not indicated, as directed by Architect/Engineer.
 2. Notify Architect/Engineer seven calendar days in advance of dates and times when mockups will be constructed.
 3. Employ supervisory personnel who will oversee mockup construction. Employ workers that will be employed during the construction at Project.
 4. Demonstrate the proposed range of aesthetic effects and workmanship.
 5. Obtain Architect/Engineer's approval of mockups before starting work, fabrication, or construction.
 - a. Allow seven calendar days for initial review and each re-review of each mockup.
 6. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 7. Demolish and remove mockups when directed unless otherwise indicated.

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- L. Integrated Exterior Mockups: When indicated on Drawings, construct integrated exterior mockup. Coordinate installation of exterior envelope materials and products for which mockups are required in individual Specification Sections, along with supporting materials.
- M. Room Mockups: When indicated on Drawings, construct room mockups incorporating required materials and assemblies, finished according to requirements. Provide required lighting and additional lighting where required to enable Architect/Engineer to evaluate quality of the Work. Provide room mockups of the following rooms:
- N. Laboratory Mockups: When required by individual Specification Sections, comply with requirements of preconstruction testing and those specified in individual Specification Sections.

1.9 QUALITY CONTROL

- A. University Responsibilities: Where quality-control services are indicated as University's responsibility, University will engage a qualified testing agency to perform these services.
 - 1. University will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
 - 2. Payment for these services will be made by the University.
 - 3. 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.
- B. Contractor Responsibilities: Tests and inspections not explicitly assigned to University are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.
 - 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. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
 - a. Contractor shall not employ same entity engaged by University, unless agreed to in writing by University.
 - 3. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting 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 inspecting 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. 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 01 33 00 "Submittal Procedures."
- D. 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,

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observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.

- E. 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.
- F. Testing Agency Responsibilities: Cooperate with Architect/Engineer and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
 - 1. Notify Architect/Engineer and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
 - 2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
 - 3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
 - 4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
 - 5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
 - 6. Do not perform any duties of Contractor.
- G. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
 - 1. Access to the Work.
 - 2. Incidental labor and facilities necessary to facilitate tests and inspections.
 - 3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
 - 4. Facilities for storage and field curing of test samples including, but not limited to, safe storage and proper curing of concrete test cylinders at Project site for first 24 hours after casting as required by ASTM C 31.
 - 5. Delivery of samples to testing agencies.
 - 6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
 - 7. Security and protection for samples and for testing and inspecting equipment at Project site.
- H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
 - 1. Schedule times for tests, inspections, obtaining samples, and similar activities.
- I. Manufactured Items and Equipment: Where manufactured products or equipment are required to have representative samples tested, do not use such materials or equipment until tests have been made and the materials or equipment found to be acceptable. Do not incorporate in the work any product which becomes unfit for use after acceptance.
- J. 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 as the Work progresses.
 - 1. Distribution: Distribute schedule to University, Architect/Engineer, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

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1.10 SPECIAL TESTS AND INSPECTIONS

- A. Special Tests and Inspections: University will engage a qualified testing agency or special inspector to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of University, and as follows:
 - 1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviews the completeness and adequacy of those procedures to perform the Work.
 - 2. Notifying Architect/Engineer 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/Engineer 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 including instructions received from University. 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/Engineer.
 - 4. Identification of testing agency or special inspector conducting test or inspection.
 - 5. Disposition: Pass, fail, nature of defects, if any.
 - 6. Date and descriptions of remedial or correction action taken.
- B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Architect/Engineer's reference during normal working hours.

3.2 REPAIR AND PROTECTION

- A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
 - 1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 01 73 00 "Execution."
- B. Protect construction exposed by or for quality-control service activities.

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

3.3 SCHEDULE OF INSPECTIONS AND TESTS BY UNIVERSITY

- A. University will engage testing agency and pay for testing and inspection associated with the following materials and systems, where included in the Project:
 - 1. Compaction density of fill and backfill.
 - 2. Drilled pier end bearing conditions and depths.
 - 3. Cast-in-place concrete.
 - 4. Precast concrete.
 - 5. Post-tensioned concrete tendons.
 - 6. Masonry.
 - 7. Structural steel field welds and bolted connections.
 - 8. Spray-applied fireproofing.
 - 9. Built-up roof cutouts.
 - 10. Asphaltic concrete paving.
 - 11. Foundation drainage systems.
 - 12. Drainage structures and piping.
 - 13. Waterproofing.
 - 14. Air barriers.
 - 15. Fluid applied membranes.
 - 16. Thermal imaging.
 - 17. Curtain wall, window, and door field testing.
 - 18. Ceiling hanger wire pull-out.
 - 19. Electrical resistance of static-control resilient flooring.
 - 20. Field sound testing of operable partitions.
 - 21. Elevator safety.
 - 22. Fan vibration.

END OF SECTION 01 40 00

SECTION 01 41 00

REGULATORY REQUIREMENTS

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:
 - 1. Building Department Authority.
 - 2. MS 4 Storm Water and Water Quality Permits
 - 3. Applicable Codes and Standards.

1.3 BUILDING DEPARTMENT AUTHORITY

- A. The University of Colorado Denver is charged with the responsibility of ensuring that provision of applicable codes, standards and guidelines are met on its campuses.
- B. The University Denver campus has an established Building Authority responsible to review and examine buildings and plan documents, to permit and inspect construction and/or demolition to ensure conformance to codes adopted by the University and issue certificates of temporary occupancy and occupancy if satisfactory conformance is demonstrated.
- C. The authority is executed by the Campus Building Official (CBO) who has the responsibility to perform all the duties set forth in the Current Approved State Buildings Codes and other applicable codes and standards indicated in the "Applicable Codes and Standards" Article of this Section.
- D. Permits: Obtain a separate permit for each Project from the Office of the CBO prior to erecting, constructing, enlarging, repairing, moving, removing, converting or demolishing any building or portion thereof. Coordinate and obtain all permits through the University Project Manager. The Contractor is not responsible for costs associated with construction permits.
 - 1. Exempt work: A building permit is not required for the following:
 - a. Fences less than or equal to 6 feet tall.
 - b. Movable casework, counters and partitions not over 5 feet 9 inches tall with no electrical or plumbing.
 - c. Platforms, walks, and driveways not more than 30 inches above grade and not over any basement or story below.
 - d. Painting, papering and similar finish work.
 - e. Other work of limited scope at the discretion of the CBO.

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- E. **Permit Issuance:** The CBO, or at the discretion of the CBO a third party code consultant, will review application, Drawings, Specifications, computations and other data filed for permit. Complete the permit application with the University Project Manager. Permits require submittal of two (2) stamped, signed sets of Construction Documents, including Drawings, Specifications and all Addenda, and one (1) set of each engineering discipline's calculations, where such calculations are required. If CBO determines that submittal conforms to the requirements of the Building Code and other applicable codes, standards, laws, regulations and ordinances, an inspection record card will be issued with the building permit. Keep one stamped set of documents on site. The University will keep one stamped set in the Campus Support plan room.
- F. **Suspension or Revocation of Permit:** CBO may, in writing, suspend or revoke a permit issued in error or on the basis of submitted information that is incorrect or that is in violation of the Building Code and other applicable codes and standards.
- G. **Posting of Permit:** Post the Permit in a visible and protected location near the access to the project.
- H. **Inspection Record Card:** Post the Inspection Record Card next to the permit in a visible and protected location near the access to the project. CBO will make required entries based on inspection of the work.
- I. **Inspection Requests:**
 - 1. Notify CBO that work is ready for inspection two business days before such inspection is desired by telephoning the number posted on the permit. The CBO retains the right to require requests in writing.
 - 2. A re-inspection fee may be charged for prior rejected items.
- J. **Construction Inspections:**
 - 1. Contractor is not responsible for costs associated with construction inspections, except re-inspections. The CBO or his/her designee will perform all general building, electrical and plumbing inspections. All construction or work for which a permit is required must remain accessible and exposed for inspection purposes. Provide access to and means for inspection of work.
 - 2. **Site Utilities:** Contact and comply with all requirements of City of Aurora.
 - 3. **Plumbing and Electrical Inspections:** For new buildings and major additions, contact and comply with all requirements of State of Colorado Plumbing and Electrical Boards.
 - 4. Provisions for structural and other special inspections required by Contract Documents, current approved State Building Codes and University Codes will be provided by the University.
- K. **Certification of Occupancy:**
 - 1. When CBO inspects the project and finds no violations of any provision of the Building Code, other applicable codes, standards, laws, regulations and ordinances, CBO will issue a Certification of Occupancy (CO) which will contain the following:
 - a. Building permit number.
 - b. Address of building.
 - c. Name and address of Owner.
 - d. Description of building or portion thereof for which certification is issued.
 - e. Statement that described building or portion thereof has been inspected for compliance with the requirements of the Building Code, other applicable codes, standards, laws,

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regulations and ordinances, as relates to type of occupancy and use for which the building is intended.

2. Temporary Certificate of Occupancy (TCO): If CBO finds no substantial hazard will result from occupancy of any building or portion thereof before the same is completed, CBO may issue a TCO for the use of a portion or portions of a building or structure prior to the completion of the entire building or structure.
3. Posting of CO: Provide a copy to the University Project Manager and post in a conspicuous location on the premises. CO may not be removed except by CBO upon initial occupancy.
4. Revocation of CO:

1.4 MS4 STORM WATER AND WATER QUALITY PERMITS

- A. The University has a non-standard MS4 permit for entire Anschutz Medical Campus (AMC) that requires University over-sight of campus construction and its water quality impact. Contractors are required to prepare Storm Water Quality Plans and obtain State of Colorado CDPHE permits for all projects that impact site. In addition, Contractors shall comply with the University MS4 permit requirements, including keeping written record of weekly inspections of Storm Water Quality measures and attaching record to the weekly Progress Meeting minutes. Submit the plan, permits, and evidence of final closeout to University Project Manager who will copy all such storm water documents to University Engineering Department. Coordinate with University Project Manager who will arrange for University Grounds Manager to attend monthly inspections and closeout walk.

1.5 APPLICABLE CODES AND STANDARDS

- A. The following approved building codes and standards have been adopted by State Buildings Programs (SBP) as the minimum requirements to be applied to all state-owned buildings and physical facilities including capital construction and controlled maintenance construction projects. Current applicable codes can be obtained from The Office of the State Architect's website.
- B. University of Colorado Denver Codes and Standards: The following codes and standards supplement those indicated on the Office of the State Architect website.
 1. The Manual of Guidelines and Standards for Construction Projects
 - a. <http://ucdenver.edu/about/departments/FacilitiesManagement/FacilitiesProjects/Pages/GuidelinesStandards.aspx>
 2. Colorado Rules and Regulations pertaining to Radiation Control, 6 CCR 1007 Part 1-20.
 3. Colorado Rules and Regulations pertaining Air Quality Control Commission Regulations, 5 CCR 1001-10, Part B "Asbestos Control."
 4. Colorado Rules and Regulations pertaining to Solid Waste, 6 CCR 1007-2.
 5. Colorado Rules and Regulations pertaining to Hazardous Waste, 6 CCR 1007-3.
 6. Federal Hazardous Waste Regulations, 40 CFR, Parts 260 through 264.
 7. Federal Clean Water Act (CWA) is 33 U.S.C § 1251 et seq. (1972).
 8. University of Colorado Denver | Anschutz Medical Campus, Asbestos Contaminated Soil Management, Standard Operating Procedure (SOP) Document.
 9. NFPA 30: Flammable and Combustible Liquids Code.
 10. NFPA 45: Standard on Fire Protection for Laboratories Using Chemicals.
 11. NFPA 72: National Fire Alarm and Signaling Code.

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12. Life Safety Code (NFPA 101) – latest edition.
 - a. Use the most restrictive interpretation where NFPA 101 conflicts with the IBC requirements.
13. ANSI/AIHA Z9.5 Laboratory Ventilation – latest edition.
 - a. <http://www.aiha.org/insideaiha/standards/Pages/ANSIZ9.aspx>
14. ANSI/AIHA Z9.6 Exhaust Systems for Grinding, Buffing and Polishing – latest edition.
 - a. <http://www.aiha.org/insideaiha/standards/Pages/ANSIZ9.aspx>
15. ANSI/AIHA Z9.10 Fundamentals Governing the Design and Operation of Dilution Ventilation Systems in Industrial Occupancies – latest edition.
 - a. <http://www.aiha.org/insideaiha/standards/Pages/ANSIZ9.aspx>
16. ANSI/ASHRAE/ASHE Standard 170 – Ventilation of Healthcare Facilities – latest edition.
17. ASHRAE 62.1 – Ventilation for Acceptable Indoor Air Quality.
18. OSHA “Safety and Health Regulation for Construction” (29 CFR 1926).
19. OSHA “Occupational Safety and Health Standards” (29 CFR 1910).
20. American Institute of Architects, Academy of Architecture for Health (AIA AAHA) and Facility Guidelines Institute (FGI), Guidelines for Design and Construction of Hospital and Healthcare Facilities – latest edition (FOR PATIENT CARE AREAS ONLY).
21. CDC-NIH Biosafety in Microbiological and Biomedical Laboratories (BMBL); latest edition.
22. NIH Design Requirements Manual (DRM) – latest edition.
 - a. <http://orf.nih.gov/PoliciesAndGuidelines/BiomedicalandAnimalResearchFacilitiesDesignPoliciesandGuidelines/DesignRequirementsManualPDF.htm>
23. NIH Guidelines for Research Involving Recombinant DNA Molecules – latest edition.
24. ILAR Guide for Care and Use of Laboratory Animals - latest edition.
25. National Research Council of the National Academies, Institute for Laboratory Animal Research, Division on Earth and Life Studies: Guide for the Care and Use of Laboratory Animals - latest edition.
26. Uniform Federal Accessibility Standards (UFAS) – latest edition.
27. Metro Wastewater District’s Rules and Regulations, (Sections 6.17 [6.13, 6.14] and 6.18).
28. City of Aurora Asphalt and Paving Standards - latest edition.

C. Other Standards: As indicated in individual Specification Sections.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 41 00

SECTION 01 42 00

REFERENCES

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:
 - 1. Definitions.
 - 2. Industry Standards.
 - 3. Abbreviations and Acronyms.
- B. Related Requirements:
 - 1. Section 01 10 00 "Summary" for an explanation of specification and drawing conventions.
 - 2. Section 01 41 00 "Regulatory Requirements" for a list of applicable codes.

1.3 DEFINITIONS

- A. General: Basic Contract definitions are included in the Conditions of the Contract.
 - 1. Definitions in this Section are not intended to be complete, exhaustive or exclusive. They are general and apply to the Work to the extent that such definitions are not stated more explicitly in other provisions of the Contract Documents.
- B. "Approved": When used to convey Architect/Engineer's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect/Engineer's duties and responsibilities as stated in the Conditions of the Contract. Except where expressly indicated, such approval does not release the Contractor from responsibility to fulfill requirements of the Contract Documents.
- C. "Backup": N+1 system.
- D. "Directed": A command or instruction by Architect/Engineer. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."
- E. "EHS": Environmental Health and Safety.
- F. "Engineer": Architect/Engineer. Other terms including "Mechanical Engineer", "Electrical Engineer", or "Structural Engineer" have the same meaning as "Engineer."

In Paragraph below select appropriate option based on Project delivery method.

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- G. "General Conditions": Contract terms contained in [**Contractor's Agreement Design/Bid/Build, State Form SC-6.21 and The General Conditions of the Construction Contract Design/Bid/Build, State Form SC-6.23**] [**Construction Manager/General Contractor Agreement CMGC, State Form SC-6.4**] [**Design/Build Agreement, State Form SC-8.0 and The General Conditions of the Design/Build Agreement, State Form SC-8.1**]
- H. "General Requirements": Provisions and requirements of all Division 01 Sections as they apply to all aspects of the Work.
- I. "Guarantee": The narrow definition of the term "warranty" applying to both "warranty" and "guarantee" which terms are used interchangeably.
- J. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."
- K. "Redundant": 2N system. The level of redundancy is determined by design.
- L. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work, whether lawfully imposed by authorities having jurisdiction or not.
- M. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
- N. "Install": Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.
- O. "Owner": Principal Representative and/or University.
- P. "Provide": Furnish and install, complete and ready for the intended use.
- Q. "Project Manual": Bound, printed volume or volumes including Conditions of the Contract and Specifications, which may also include bidding requirements, contract forms, details, schedules, surveys, reports or other relevant items that may or may not be Contract Documents.
- R. "Project Site": Space available for performing construction activities, either exclusively or in conjunction with others performing other work as part of the Project. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.
- S. "Supplementary Conditions": University Special Supplementary General Conditions. Other terms including "Supplementary General Conditions" shall have the same meaning.

1.4 INDUSTRY STANDARDS

- A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.
 - 1. Referenced standards take precedence over standards that are not referenced but generally recognized in the construction industry as applicable.

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- B. Publication Dates: Comply with standards in effect as of date of the Contract Documents.
1. Updated Codes and Standards: Where an applicable code or standard has been revised and reissued after the date of the Contract Documents and before performance of Work affected, submit Contractor-Initiated Change Order Bulletin and Change Order Proposal in accordance with Section 01 26 00 "Contract Modification Procedures" for consideration to modify contract requirements to comply with revised code or standard.
- C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.
1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.
 2. Where required by individual Specification Sections provide and maintain copies of referenced codes and standards at Project Site.
 3. Although copies of standards needed for enforcement of requirements may be part of required submittals, the Architect/Engineer reserves the right to require the Contractor to submit additional copies as necessary for enforcement of requirements.
- D. Unreferenced Standards: Unreferenced standards are not directly applicable to the Work, except as a general requirement of whether the Work complies with recognized construction industry standards.
- E. Conflicting Requirements: Where compliance with two or more standards is specified, and they establish different or conflicting requirements for minimum quantities or quality levels, the most stringent requirement will be enforced, unless the Contract Documents indicate otherwise. Refer requirements that are different, but apparently equal, and uncertainties as to which quality level is more stringent to the Architect/Engineer for a decision before proceeding.

1.5 ABBREVIATIONS AND ACRONYMS

- A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

AABC	Associated Air Balance Council www.aabc.com	(202) 737-0202
AAMA	American Architectural Manufacturers Association www.aamanet.org	(847) 303-5664
AASHTO	American Association of State Highway and Transportation Officials www.transportation.org	(202) 624-5800
AATCC	American Association of Textile Chemists and Colorists www.aatcc.org	(919) 549-8141
ABMA	American Bearing Manufacturers Association www.americanbearings.org	(202) 367-1155
ACI	American Concrete Institute (Formerly: ACI International)	(248) 848-3700

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www.concrete.org

ACPA	American Concrete Pipe Association www.concrete-pipe.org	(972) 506-7216
AEIC	Association of Edison Illuminating Companies, Inc. (The) www.aeic.org	(205) 257-2530
AF&PA	American Forest & Paper Association www.afandpa.org	(800) 878-8878 (202) 463-2700
AGA	American Gas Association www.aga.org	(202) 824-7000
AHAM	Association of Home Appliance Manufacturers www.aham.org	(202) 872-5955
AHRI	Air-Conditioning, Heating, and Refrigeration Institute (The) www.ahrinet.org	(703) 524-8800
AI	Asphalt Institute www.asphaltinstitute.org	(859) 288-4960
AIA	American Institute of Architects (The) www.aia.org	(800) 242-3837 (202) 626-7300
AISC	American Institute of Steel Construction www.aisc.org	(800) 644-2400 (312) 670-2400
AISI	American Iron and Steel Institute www.steel.org	(202) 452-7100
AITC	American Institute of Timber Construction www.aitc-glulam.org	(303) 792-9559
AMCA	Air Movement and Control Association International, Inc. www.amca.org	(847) 394-0150
ANSI	American National Standards Institute www.ansi.org	(202) 293-8020
AOSA	Association of Official Seed Analysts, Inc. www.aosaseed.com	(607) 256-3313
APA	APA - The Engineered Wood Association www.apawood.org	(253) 565-6600
APA	Architectural Precast Association www.archprecast.org	(239) 454-6989
API	American Petroleum Institute www.api.org	(202) 682-8000
ARI	Air-Conditioning & Refrigeration Institute (See AHRI)	

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ARI	American Refrigeration Institute (See AHRI)	
ARMA	Asphalt Roofing Manufacturers Association www.asphaltroofing.org	(202) 207-0917
ASCE	American Society of Civil Engineers www.asce.org	(800) 548-2723 (703) 295-6300
ASCE/SEI	American Society of Civil Engineers/Structural Engineering Institute (See ASCE)	
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers www.ashrae.org	(800) 527-4723 (404) 636-8400
ASME	ASME International (American Society of Mechanical Engineers) www.asme.org	(800) 843-2763 (973) 882-1170
ASSE	American Society of Safety Engineers (The) www.asse.org	(847) 699-2929
ASSE	American Society of Sanitary Engineering www.asse-plumbing.org	(440) 835-3040
ASTM	ASTM International (American Society for Testing and Materials International) www.astm.org	(610) 832-9500
ATIS	Alliance for Telecommunications Industry Solutions www.atis.org	(202) 628-6380
AWEA	American Wind Energy Association www.awea.org	(202) 383-2500
AWI	Architectural Woodwork Institute www.awinet.org	(571) 323-3636
AWMAC	Architectural Woodwork Manufacturers Association of Canada www.awmac.com	(403) 453-7387
AWPA	American Wood Protection Association (Formerly: American Wood-Preservers' Association) www.awpa.com	(205) 733-4077
AWS	American Welding Society www.aws.org	(800) 443-9353 (305) 443-9353
AWWA	American Water Works Association www.awwa.org	(800) 926-7337 (303) 794-7711
BHMA	Builders Hardware Manufacturers Association	(212) 297-2122

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	www.buildershardware.com	
BIA	Brick Industry Association (The) www.gobrick.com	(703) 620-0010
BICSI	BICSI, Inc. www.bicsi.org	(800) 242-7405 (813) 979-1991
BIFMA	BIFMA International (Business and Institutional Furniture Manufacturer's Association) www.bifma.com	(616) 285-3963
BISSC	Baking Industry Sanitation Standards Committee www.bissc.org	(866) 342-4772
BOCA	BOCA (Building Officials and Code Administrators International Inc.) (See ICC)	
BWF	Badminton World Federation (Formerly: International Badminton Federation) www.bwfbadminton.org	60 3 9283 7155
CDA	Copper Development Association www.copper.org	(800) 232-3282 (212) 251-7200
CEA	Canadian Electricity Association www.electricity.ca	(613) 230-9263
CEA	Consumer Electronics Association www.ce.org	(866) 858-1555 (703) 907-7600
CFFA	Chemical Fabrics & Film Association, Inc. www.chemicalfabricsandfilm.com	(216) 241-7333
CFSEI	Cold-Formed Steel Engineers Institute www.cfsei.org	(866) 465-4732 (202) 263-4488
CGA	Compressed Gas Association www.cganet.com	(703) 788-2700
CIMA	Cellulose Insulation Manufacturers Association www.cellulose.org	(888) 881-2462 (937) 222-2462
CISCA	Ceilings & Interior Systems Construction Association www.cisca.org	(630) 584-1919
CISPI	Cast Iron Soil Pipe Institute www.cispi.org	(404) 622-0073
CLFMI	Chain Link Fence Manufacturers Institute www.chainlinkinfo.org	(301) 596-2583
CPA	Composite Panel Association www.pbmdf.com	(703) 724-1128

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CRI	Carpet and Rug Institute (The) www.carpet-rug.org	(706) 278-3176
CRRC	Cool Roof Rating Council www.coolroofs.org	(866) 465-2523 (510) 485-7175
CRSI	Concrete Reinforcing Steel Institute www.crsi.org	(800) 328-6306 (847) 517-1200
CSA	Canadian Standards Association www.csa.ca	(800) 463-6727 (416) 747-4000
CSA	CSA International (Formerly: IAS - International Approval Services) www.csa-international.org	(866) 797-4272 (416) 747-4000
CSI	Construction Specifications Institute (The) www.csinet.org	(800) 689-2900 (703) 684-0300
CSSB	Cedar Shake & Shingle Bureau www.cedarbureau.org	(604) 820-7700
CTI	Cooling Technology Institute (Formerly: Cooling Tower Institute) www.cti.org	(281) 583-4087
CWC	Composite Wood Council (See CPA)	
DASMA	Door and Access Systems Manufacturers Association www.dasma.com	(216) 241-7333
DHI	Door and Hardware Institute www.dhi.org	(703) 222-2010
ECA	Electronic Components Association www.ec-central.org	(703) 907-8024
ECAMA	Electronic Components Assemblies & Materials Association (See ECA)	
EIA	Electronic Industries Alliance (See TIA)	
EIMA	EIFS Industry Members Association www.eima.com	(800) 294-3462 (703) 538-1616
EJMA	Expansion Joint Manufacturers Association, Inc. www.ejma.org	(914) 332-0040
ESD	ESD Association (Electrostatic Discharge Association) www.esda.org	(315) 339-6937

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ESTA	Entertainment Services and Technology Association (See PLASA)	
EVO	Efficiency Valuation Organization www.evo-world.org	(415) 367-3643 44 20 88 167 857
FIBA	Fédération Internationale de Basketball (The International Basketball Federation) www.fiba.com	41 22 545 00 00
FIVB	Fédération Internationale de Volleyball (The International Volleyball Federation) www.fivb.org	41 21 345 35 45
FM Approvals	FM Approvals LLC www.fmglobal.com	(781) 762-4300
FM Global	FM Global (Formerly: FMG - FM Global) www.fmglobal.com	(401) 275-3000
FRSA	Florida Roofing, Sheet Metal & Air Conditioning Contractors Association, Inc. www.floridarooft.com	(407) 671-3772
FSA	Fluid Sealing Association www.fluidsealing.com	(610) 971-4850
FSC	Forest Stewardship Council U.S. www.fscus.org	(612) 353-4511
GA	Gypsum Association www.gypsum.org	(301) 277-8686
GANA	Glass Association of North America www.glasswebsite.com	(785) 271-0208
GS	Green Seal www.greenseal.org	(202) 872-6400
HI	Hydraulic Institute www.pumps.org	(973) 267-9700
HI/GAMA	Hydronics Institute/Gas Appliance Manufacturers Association (See AHRI)	
HMMA	Hollow Metal Manufacturers Association (See NAAMM)	
HPVA	Hardwood Plywood & Veneer Association www.hpva.org	(703) 435-2900
HPW	H. P. White Laboratory, Inc. www.hpwhite.com	(410) 838-6550

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IAPSC	International Association of Professional Security Consultants www.iapsc.org	(415) 536-0288
IAS	International Approval Services (See CSA)	
ICBO	International Conference of Building Officials (See ICC)	
ICC	International Code Council www.iccsafe.org	(888) 422-7233 (202) 370-1800
ICEA	Insulated Cable Engineers Association, Inc. www.icea.net	(770) 830-0369
ICPA	International Cast Polymer Alliance www.icpa-hq.org	(703) 525-0511
ICRI	International Concrete Repair Institute, Inc. www.icri.org	(847) 827-0830
IEC	International Electrotechnical Commission www.iec.ch	41 22 919 02 11
IEEE	Institute of Electrical and Electronics Engineers, Inc. (The) www.ieee.org	(212) 419-7900
IES	Illuminating Engineering Society (Formerly: Illuminating Engineering Society of North America) www.ies.org	(212) 248-5000
IESNA	Illuminating Engineering Society of North America (See IES)	
IEST	Institute of Environmental Sciences and Technology www.iest.org	(847) 981-0100
IGMA	Insulating Glass Manufacturers Alliance www.igmaonline.org	(613) 233-1510
IGSHPA	International Ground Source Heat Pump Association www.igshpa.okstate.edu	(405) 744-5175
ILI	Indiana Limestone Institute of America, Inc. www.iliai.com	(812) 275-4426
Intertek	Intertek Group (Formerly: ETL SEMCO; Intertek Testing Service NA) www.intertek.com	(800) 967-5352
ISA	International Society of Automation (The) (Formerly: Instrumentation, Systems, and Automation Society) www.isa.org	(919) 549-8411
ISAS	Instrumentation, Systems, and Automation Society (The)	

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(See ISA)

ISFA	International Surface Fabricators Association (Formerly: International Solid Surface Fabricators Association) www.isfanow.org	(877) 464-7732 (801) 341-7360
ISO	International Organization for Standardization www.iso.org	41 22 749 01 11
ISSFA	International Solid Surface Fabricators Association (See ISFA)	
ITU	International Telecommunication Union www.itu.int/home	41 22 730 51 11
KCMA	Kitchen Cabinet Manufacturers Association www.kcma.org	(703) 264-1690
LMA	Laminating Materials Association (See CPA)	
LPI	Lightning Protection Institute www.lightning.org	(800) 488-6864
MBMA	Metal Building Manufacturers Association www.mbma.com	(216) 241-7333
MCA	Metal Construction Association www.metalconstruction.org	(847) 375-4718
MFMA	Maple Flooring Manufacturers Association, Inc. www.maplefloor.org	(888) 480-9138
MFMA	Metal Framing Manufacturers Association, Inc. www.metalframingmfg.org	(312) 644-6610
MHIA	Material Handling Industry of America www.mhia.org	(800) 345-1815 (704) 676-1190
MIA	Marble Institute of America www.marble-institute.com	(440) 250-9222
MMPA	Moulding & Millwork Producers Association (Formerly: Wood Moulding & Millwork Producers Association) www.wmmpa.com	(800) 550-7889 (530) 661-9591
MPI	Master Painters Institute www.paintinfo.com	(888) 674-8937 (604) 298-7578
MSS	Manufacturers Standardization Society of The Valve and Fittings Industry Inc. www.mss-hq.org	(703) 281-6613
NAAMM	National Association of Architectural Metal Manufacturers www.naamm.org	(630) 942-6591

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NACE	NACE International (National Association of Corrosion Engineers International) www.nace.org	(800) 797-6223 (281) 228-6200
NADCA	National Air Duct Cleaners Association www.nadca.com	(202) 737-2926
NAIMA	North American Insulation Manufacturers Association www.naima.org	(703) 684-0084
NBGQA	National Building Granite Quarries Association, Inc. www.nbgqa.com	(800) 557-2848
NCAA	National Collegiate Athletic Association (The) www.ncaa.org	(317) 917-6222
NCMA	National Concrete Masonry Association www.ncma.org	(703) 713-1900
NEBB	National Environmental Balancing Bureau www.nebb.org	(301) 977-3698
NECA	National Electrical Contractors Association www.necanet.org	(301) 657-3110
NeLMA	Northeastern Lumber Manufacturers Association www.nelma.org	(207) 829-6901
NEMA	National Electrical Manufacturers Association www.nema.org	(703) 841-3200
NETA	InterNational Electrical Testing Association www.netaworld.org	(888) 300-6382 (269) 488-6382
NFHS	National Federation of State High School Associations www.nfhs.org	(317) 972-6900
NFPA	NFPA (National Fire Protection Association) www.nfpa.org	(800) 344-3555 (617) 770-3000
NFPA	NFPA International (See NFPA)	
NFRC	National Fenestration Rating Council www.nfrc.org	(301) 589-1776
NHLA	National Hardwood Lumber Association www.nhla.com	(800) 933-0318 (901) 377-1818
NLGA	National Lumber Grades Authority www.nlga.org	(604) 524-2393
NOFMA	National Oak Flooring Manufacturers Association	

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(See NWFA)

NOMMA	National Ornamental & Miscellaneous Metals Association www.nomma.org	(888) 516-8585
NRCA	National Roofing Contractors Association www.nrca.net	(800) 323-9545 (847) 299-9070
NRMCA	National Ready Mixed Concrete Association www.nrmca.org	(888) 846-7622 (301) 587-1400
NSF	NSF International (National Sanitation Foundation International) www.nsf.org	(800) 673-6275 (734) 769-8010
NSPE	National Society of Professional Engineers www.nspe.org	(703) 684-2800
NSSGA	National Stone, Sand & Gravel Association www.nssga.org	(800) 342-1415 (703) 525-8788
NTMA	National Terrazzo & Mosaic Association, Inc. (The) www.ntma.com	(800) 323-9736
NWFA	National Wood Flooring Association www.nwfa.org	(800) 422-4556 (636) 519-9663
PCI	Precast/Prestressed Concrete Institute www.pci.org	(312) 786-0300
PDI	Plumbing & Drainage Institute www.pdionline.org	(800) 589-8956 (978) 557-0720
PLASA	PLASA (Formerly: ESTA - Entertainment Services and Technology Association) www.plasa.org	(212) 244-1505
RCSC	Research Council on Structural Connections www.boltcouncil.org	
RFCI	Resilient Floor Covering Institute www.rfci.com	(706) 882-3833
RIS	Redwood Inspection Service www.redwoodinspection.com	(925) 935-1499
SAE	SAE International (Society of Automotive Engineers) www.sae.org	(877) 606-7323 (724) 776-4841
SBCCI	Southern Building Code Congress International, Inc. (See ICC)	
SCTE	Society of Cable Telecommunications Engineers	(800) 542-5040

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	www.scte.org	(610) 363-6888
SDI	Steel Deck Institute www.sdi.org	(847) 458-4647
SDI	Steel Door Institute www.steeldoor.org	(440) 899-0010
SEFA	Scientific Equipment and Furniture Association www.sefalabs.com	(877) 294-5424 (516) 294-5424
SEI/ASCE	Structural Engineering Institute/American Society of Civil Engineers (See ASCE)	
SIA	Security Industry Association www.siaonline.org	(866) 817-8888 (703) 683-2075
SJI	Steel Joist Institute www.steeljoist.org	(843) 293-1995
SMA	Screen Manufacturers Association www.smainfo.org	(773) 636-0672
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association www.smacna.org	(703) 803-2980
SMPTE	Society of Motion Picture and Television Engineers www.smpte.org	(914) 761-1100
SPFA	Spray Polyurethane Foam Alliance www.sprayfoam.org	(800) 523-6154
SPIB	Southern Pine Inspection Bureau www.spib.org	(850) 434-2611
SPRI	Single Ply Roofing Industry www.spri.org	(781) 647-7026
SRCC	Solar Rating and Certification Corporation www.solar-rating.org	(321) 638-1537
SSINA	Specialty Steel Industry of North America www.ssina.com	(800) 982-0355 (202) 342-8630
SSPC	SSPC: The Society for Protective Coatings www.sspc.org	(877) 281-7772 (412) 281-2331
STI	Steel Tank Institute www.steeltank.com	(847) 438-8265
SWI	Steel Window Institute www.steelwindows.com	(216) 241-7333
SWPA	Submersible Wastewater Pump Association	(847) 681-1868

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	www.swpa.org	
TCA	Tilt-Up Concrete Association www.tilt-up.org	(319) 895-6911
TCNA	Tile Council of North America, Inc. (Formerly: Tile Council of America) www.tileusa.com	(864) 646-8453
TEMA	Tubular Exchanger Manufacturers Association, Inc. www.tema.org	(914) 332-0040
TIA	Telecommunications Industry Association (Formerly: TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance) www.tiaonline.org	(703) 907-7700
TIA/EIA	Telecommunications Industry Association/Electronic Industries Alliance (See TIA)	
TMS	The Masonry Society www.masonrysociety.org	(303) 939-9700
TPI	Truss Plate Institute www.tpinst.org	(703) 683-1010
TPI	Turfgrass Producers International www.turfgrassod.org	(800) 405-8873 (847) 649-5555
TRI	Tile Roofing Institute www.tilerroofing.org	(312) 670-4177
UBC	Uniform Building Code (See ICC)	
UL	Underwriters Laboratories Inc. www.ul.com	(877) 854-3577
UNI	Uni-Bell PVC Pipe Association www.uni-bell.org	(972) 243-3902
USAV	USA Volleyball www.usavolleyball.org	(888) 786-5539 (719) 228-6800
USGBC	U.S. Green Building Council www.usgbc.org	(800) 795-1747
USITT	United States Institute for Theatre Technology, Inc. www.usitt.org	(800) 938-7488 (315) 463-6463
WASTEC	Waste Equipment Technology Association www.wastec.org	(800) 424-2869 (202) 244-4700
WCLIB	West Coast Lumber Inspection Bureau	(800) 283-1486

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	www.wclib.org	(503) 639-0651
WCMA	Window Covering Manufacturers Association www.wcmanet.org	(212) 297-2122
WDMA	Window & Door Manufacturers Association www.wdma.com	(800) 223-2301 (312) 321-6802
WI	Woodwork Institute (Formerly: WIC - Woodwork Institute of California) www.wicnet.org	(916) 372-9943
WMMPA	Wood Moulding & Millwork Producers Association (See MMPA)	
WSRCA	Western States Roofing Contractors Association www.wsrca.com	(800) 725-0333 (650) 938-5441
WWPA	Western Wood Products Association www.wwpa.org	(503) 224-3930

- B. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

DIN	Deutsches Institut für Normung e.V. www.din.de	49 30 2601-0
IAPMO	International Association of Plumbing and Mechanical Officials www.iapmo.org	(909) 472-4100
ICC	International Code Council www.iccsafe.org	(888) 422-7233
ICC-ES	ICC Evaluation Service, LLC www.icc-es.org	(800) 423-6587 (562) 699-0543

- C. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

COE	Army Corps of Engineers www.usace.army.mil	(202) 761-0011
CPSC	Consumer Product Safety Commission www.cpsc.gov	(800) 638-2772 (301) 504-7923
DOC	Department of Commerce National Institute of Standards and Technology www.nist.gov	(301) 975-4040
DOD	Department of Defense http://dodssp.daps.dla.mil	(215) 697-2664

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DOE	Department of Energy www.energy.gov	(202) 586-9220
EPA	Environmental Protection Agency www.epa.gov	(202) 272-0167
FAA	Federal Aviation Administration www.faa.gov	(866) 835-5322
FG	Federal Government Publications www.gpo.gov	(202) 512-1800
GSA	General Services Administration www.gsa.gov	(800) 488-3111 (202) 619-8925
HUD	Department of Housing and Urban Development www.hud.gov	(202) 708-1112
LBL	Lawrence Berkeley National Laboratory Environmental Energy Technologies Division http://eetd.lbl.gov	(510) 486-4000
OSHA	Occupational Safety & Health Administration www.osha.gov	(800) 321-6742
SD	Department of State www.state.gov	(202) 647-4000
TRB	Transportation Research Board National Cooperative Highway Research Program www.trb.org	(202) 334-2934
USDA	Department of Agriculture Agriculture Research Service U.S. Salinity Laboratory www.ars.usda.gov	(202) 720-3656
USDA	Department of Agriculture Rural Utilities Service www.usda.gov	(202) 720-2791
USDJ	Department of Justice Office of Justice Programs National Institute of Justice www.ojp.usdoj.gov	(202) 307-0703
USP	U.S. Pharmacopeia www.usp.org	(800) 227-8772 (301) 881-0666
USPS	United States Postal Service www.usps.com	(202) 268-2000

- D. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the

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following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

CFR	Code of Federal Regulations Available from Government Printing Office www.gpo.gov/fdsys	(866) 512-1800 (202) 512-1800
DOD	Department of Defense Military Specifications and Standards Available from Department of Defense Single Stock Point http://dodssp.daps.dla.mil	(215) 697-2664
DSCC	Defense Supply Center Columbus (See FS)	
FED-STD	Federal Standard (See FS)	
FS	Federal Specification Available from Department of Defense Single Stock Point http://dodssp.daps.dla.mil Available from Defense Standardization Program www.dsp.dla.mil Available from General Services Administration www.gsa.gov Available from National Institute of Building Sciences/Whole Building Design Guide www.wbdg.org/ccb	(215) 697-2664 (800) 488-3111 (202) 619-8925 (202) 289-7800
MILSPEC	Military Specification and Standards (See DOD)	
USAB	United States Access Board www.access-board.gov	(800) 872-2253 (202) 272-0080
USATBCB	U.S. Architectural & Transportation Barriers Compliance Board (See USAB)	

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 42 00

SECTION 01 60 00

PRODUCT REQUIREMENTS

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 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 01 21 00 "Allowances" for products selected under an allowance, if applicable.
 - 2. Section 01 23 00 "Alternates" for products selected under an alternate, if applicable.
 - 3. Section 01 25 00 "Substitution Procedures" for requests for substitutions.
 - 4. Section 01 42 00 "References" for applicable industry standards for products specified.
 - 5. Section 01 77 00 "Closeout Procedures" for submittal of project warranties.

1.3 DEFINITIONS

- A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
 - 1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature, that is current as of date of the Contract Documents.
 - 2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
 - 3. Comparable Product: Product that is demonstrated and approved through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.
- B. Basis-of-Design Product Specification: A specification in which a specific manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of additional manufacturers named in the specification.

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1.4 ACTION SUBMITTALS

- A. Comparable Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
 - 1. Requests for consideration of comparable products will only be entertained during bidding.
 - 2. Include data to indicate compliance with the requirements specified in "Comparable Products" Article.
 - 3. Architect/Engineer's Action: If necessary, Architect/Engineer will request additional information or documentation for evaluation of a comparable product request. Architect/Engineer will notify Contractor of approval or rejection of proposed comparable product.
 - a. Form of Approval: Written Addendum.
- B. Basis-of-Design Product Specification Submittal: Comply with requirements in Section 01 33 00 "Submittal Procedures." Show compliance with requirements.

1.5 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. The complete compatibility between the various choices available to the Contractor is not assured by the various requirements of the Contract Documents, but must be provided by the Contractor.
- B. Source Limitations: To the fullest extent possible, provide products of the same kind, from a single source.
- C. Nameplates: Except for required labels and operating data, do not attach or imprint manufacturers or producer's nameplates or trademarks on exposed surfaces of products which will be exposed to view in occupied spaces or on the exterior.
- D. Labels: Locate required product labels and stamps on a concealed surface or, where required for observation after installation, on an accessible surface that is not conspicuous.
- E. Equipment Nameplates: Provide a permanent nameplate on each item of service-connected or power-operated equipment. Locate on an easily accessible surface which is inconspicuous in occupied spaces. The nameplate shall contain the following information and other essential operating data.
 - 1. Name of product and manufacturer.
 - 2. Model and serial number.
 - 3. Capacity.
 - 4. Speed.
 - 5. Ratings.
 - 6. Power characteristics (if applicable).
 - 7. UL label or compliance (if applicable).

1.6 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.

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B. Delivery and Handling:

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

C. Storage:

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

1.7 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. Such disclaimers and limitations do not relieve warranty requirements on Work that incorporates product nor do they relieve suppliers, manufacturers and subcontractors required to countersign special warranties with the Contractor.

1. **Manufacturer's Warranty:** Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to University.
2. **Special Warranty:** Written warranty required by the Contract Documents to provide specific rights for University.

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

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

- C. **Submittal Time and Form:** Comply with requirements in Section 01 77 00 "Closeout Procedures."

- D. **Warranty Requirements:**

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1. **Related Damages and Losses:** When correcting warranted Work that has failed, remove and replace other Work that has been damaged as a result of such failure or that must be removed and replaced to provide access for correction of warranted Work.
2. **Reinstatement of Warranty:** When Work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.
3. **Replacement Cost:** Upon determination that Work covered by a warranty has failed, replace or rebuild the Work to an acceptable condition complying with requirements of Contract Documents. The Contractor is responsible for the cost of replacing or rebuilding defective Work regardless of whether the University has benefited from use of the Work through a portion of its anticipated useful service life.
4. **University's Recourse:**
 - a. Written warranties made to the University are in addition to implied warranties, and shall not limit the duties, obligations, rights and remedies otherwise available under the law, nor shall warranty periods be interpreted as limitations on time in which the University can enforce such other duties, obligations, rights, or remedies.
 - b. **Rejection of Warranties:** The University reserves the right to reject warranties and to limit selections to products with warranties not in conflict with requirements of the Contract Documents.
 - c. The University reserves the right to refuse to accept Work for the Project where a special warranty, certification, or similar commitment is required on such Work or part of the Work, until evidence is presented that entities required to countersign such commitments are willing to do so.

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

- A. **General Product Requirements:** Provide products that comply with the Contract Documents, are undamaged, are asbestos free, 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. University reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
 4. Where products are accompanied by the term "as selected," Architect/Engineer 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 "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product and provide only products previously approved during bid phase by written Addendum. The determination of equivalence is at the sole discretion of the Architect/Engineer who has no obligation to prove non-equivalence.
 7. Mechanical and electrical equipment design and their space requirements are based on the first named item of the Section in which specified or that scheduled on the Drawings. If other than the first named or scheduled item listed for use is selected, modification to other elements of Work may be required. Show all such modification on shop drawings and submittals as appropriate. The cost of such modifications is solely the responsibility of the Contractor.

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8. Where manufacturers are listed as acceptable for specific proprietary products but precise identification by model, series, or trade name is not specified, submit detailed product information for such products for Architect/Engineer's acceptance prior to ordering. Include specific requirements for modifications to other construction, including but not limited to, power and utility requirements, characteristics, capacities, size and locations. The cost of such modifications is solely the responsibility of the Contractor.

B. Product Selection Procedures:

1. **Product:** Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
2. **Manufacturer/Source:** Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
3. **Products:**
 - a. **Restricted List:** 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.
4. **Manufacturers:**
 - a. **Restricted List:** 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.
5. **Basis-of-Design Product:** Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. If proposing a comparable product by another manufacturer, whether named or not, provide a custom product if manufacturer's standard product does not include salient features of the Basis-of-Design product indicated. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.
6. **Contractor's Option:** Where materials, products, systems or methods are specified to be selected from a list of options, subject to compliance with requirements, the choice of which material, method, product or system will be solely at the Contractor's discretions. There will be no change in Contract Sum or Time because of such choice.

C. Visual Matching Specification: Where Specifications require "match Architect/Engineer's sample", provide a product that complies with requirements and matches Architect/Engineer's sample. Architect/Engineer'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 01 25 00 "Substitution Procedures" for proposal of product.

D. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect/Engineer from manufacturer's full range" or similar phrase, select a product that complies with requirements. Architect/Engineer will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

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2.2 COMPARABLE PRODUCTS

- A. Conditions for Consideration: Prior to bid, Architect/Engineer will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect/Engineer will reject request:
1. Evidence that the proposed product does not require revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
 2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
 3. Evidence that proposed product provides specified warranty.
 4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
 5. Samples, if requested.

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 60 00

SECTION 01 77 00

CLOSEOUT PROCEDURES

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 contract closeout, including, but not limited to, the following:
 - 1. Substantial Completion procedures, including Notice of Completion and Final Inspection procedures.
 - 2. Occupancy procedures, including Notice of Approval of Occupancy/Use and University Supplemental Notice of Occupancy and Use List.
 - 3. Final Acceptance procedures, including Pre-Acceptance Checklist and University Supplemental Building/Project Acceptance List.
 - 4. Inspections after completion.
 - 5. Warranties.
 - 6. Final cleaning.
 - 7. Repair of the Work.
- B. Related Requirements:
 - 1. Section 01 32 33 "Photographic Documentation" for submitting final completion construction photographic documentation.
 - 2. Section 01 73 00 "Execution" for progress cleaning of Project site.
 - 3. Section 01 78 23 "Operation and Maintenance Data" for operation and maintenance manual requirements.
 - 4. Section 01 78 39 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
 - 5. Section 01 79 00 "Demonstration and Training" for requirements for instructing University's personnel.

1.3 ACTION SUBMITTALS

- A. Product Data: For cleaning agents.
- B. Contractor's List of Incomplete Items: Initial submittal at Notice of Completion.
- C. Certified List of Incomplete Items: Final submittal at Final Acceptance.

1.4 CLOSEOUT SUBMITTALS

- A. Certificates of Release: From authorities having jurisdiction.

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- 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 specified in other Sections.

1.6 NOTICE OF COMPLETION AND SUBSTANTIAL COMPLETION PROCEDURES

- A. Procedures and Submittals Prior to Notice of Completion: Complete and submit all of the following items prior to submitting Notice of Completion to Architect/Engineer. Include Contractor's comprehensive list of items to be completed, corrected or not in compliance with the Drawings and Specifications.
 - 1. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's preliminary punch list), indicating the value of each item on the list and reasons why the Work is incomplete.
 - 2. Building Inspection Record: Submit completed record with all required corrections noted.
 - 3. Certificate of Occupancy: Submit Certificate of Occupancy (CO) or Temporary Certificate of Occupancy (TCO).
 - 4. Final Completion Schedule: Submit schedule for performing and completing all work indicated on the Contractor' list of incomplete items.
 - 5. Submit sustainable design documentation.
 - 6. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information.
 - 7. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
 - 8. Submit test/adjust/balance records.
- B. Final Inspection: Submit Notice of Completion to Architect/Engineer. Upon receipt, Architect/Engineer and University will review and if all items on the University Supplemental Notice of Completion Checklist are complete will, within the timeframe required by the Contract, schedule and make an inspection of the Project to determine whether the Work is substantially complete.
 - 1. Final Punch List: Based on the inspection, Architect/Engineer will prepare a final punch list of work to be completed, work not in compliance with the Drawings or Specifications, and unsatisfactory work for any reason.
 - 2. Re-inspection: If the cumulative number of items identified on the final punch list prevents a determination that the work is substantially complete, complete those items and when complete resubmit Notice of Completion. Upon receipt of resubmittal, Architect/Engineer and University will then schedule and make a re-inspection of the Project to determine whether the Work is substantially complete.
- C. Notice of Substantial Completion: When inspection of the Work indicates that the Project is substantially complete and all other Contract provisions required for substantial completion have been satisfied, Architect/Engineer will issue a Notice of Substantial Completion (State Form SBP-07).

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1.7 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

- A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.
 - 1. Organize list of spaces in sequential order, starting with exterior areas first and proceeding from lowest floor to highest floor or as approved by Architect/Engineer.
 - 2. Organize items applying to each space by major element, including categories for ceiling, 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/Engineer.
 - d. Name of Contractor.
 - e. Page number.
 - 4. Submit list of incomplete items in the following format:
 - a. MS Excel and PDF electronic file. Architect/Engineer will return annotated file.

1.8 OCCUPANCY PROCEDURES

- A. Procedures and Submittals Prior to Occupancy: Complete and submit all items on both State Form SBP-01 "Notice of Approval of Occupancy/Use" and University Supplemental Notice of Occupancy and Use List.

1.9 FINAL ACCEPTANCE PROCEDURES

- A. Procedures and Submittals Prior to Final Acceptance: Complete and submit all items on both State Form SBP-05 "Pre-Acceptance Checklist" and University Supplemental Building/Project Acceptance List.
- B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 10 business days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect/Engineer will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect/Engineer will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.
 - 1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.10 SETTLEMENT AND FINAL PAYMENT

- A. Submit and complete all of the following as a condition precedent to settlement and final payment:
 - 1. All guarantees and warranties.
 - 2. All statement to support local sales tax refunds, if any.
 - 3. Three (3) sets of operation and maintenance manuals.
 - 4. One (1) set of as-built Contract Documents showing all job changes.

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5. All demonstration and training completed in accordance with Section 01 79 00.
6. All punch list items documented as complete.

- B. Final Certificate of Payment: Submit in accordance with the requirements of Section 01 29 00 "Payment Procedures."

1.11 INSPECTIONS AFTER COMPLETION

- A. Warranty/Guarantee Inspections: During the warranty period, accompany Architect/Engineer and University Representative, and participate in inspection(s) of the Project to identify defective and deficient work at intervals and as required by the Contract.
- B. List of Deficient or Defective Work: Within 10 business days of inspection, Architect/Engineer will provide Contractor with a list of items requiring correction.
- C. Remedial Work: Upon receive of itemized list, immediately correct and remedy deficiencies and defects in a manner satisfactory to the Architect/Engineer and University.

1.12 SUBMITTAL OF PROJECT WARRANTIES

- A. Time of Submittal: Submit written warranties to the Architect/Engineer prior to advertisement of the Notice of Contractor's Settlement. If the Notice of Acceptance designates a commencement date for warranties other than the date of Notice of Acceptance for the Work, or a designated portion of the Work, submit written warranties upon request of the Architect.
- B. Partial Occupancy: When a designated portion of the Work is completed and occupied or used by the University, by separate agreement with the Contractor during the construction period, submit properly executed warranties to the Architect/Engineer within fifteen (15) calendar days of completion of that designated portion of the Work.
- C. Special Warranties: When a special warranty is required to be executed by the Contractor, or the Contractor and a Subcontractor, supplier or manufacturer, prepare a written document that contains appropriate terms and identification, ready for execution by the required parties. Submit a draft to the University through the Architect/Engineer for approval prior to final execution. Refer to individual Specification Sections for specific requirements for special warranties.
- D. Form of Submittal: Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.
 1. Number of Copies: Two.
 2. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
 3. 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.
 4. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
 5. Warranty Electronic File: Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide bookmarked table of contents at beginning of document.
- E. Provide additional copies of each warranty to include in operation and maintenance manuals.

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- F. List of Extended Warranties: Provide a comprehensive list of all manufacturers' standard and special warranties with duration greater than one year after Notice of Acceptance. Organize list into an orderly sequence based on table of contents of the Project Manual.

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.
 - 2. Do not use sweeping compounds on concrete floors that will leave residue affecting finish floor materials.

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 immediately prior to Occupancy for entire Project or for a designated portion of Project:
 - a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
 - b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
 - c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
 - d. Remove tools, construction equipment, machinery, and surplus material from Project site.
 - e. Remove snow and ice to provide safe access to building.
 - f. Clean exposed exterior and interior finishes to a dirt-free condition, free of grease, dust, stains, films, fingerprints, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
 - g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
 - h. Sweep concrete floors broom clean in unoccupied spaces.
 - 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. Power scrub and power buff resilient flooring surfaces, tile and fluid-applied flooring.

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- k. 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.
 - l. Remove labels that are not permanent.
 - m. Wipe surfaces of mechanical and electrical equipment, elevator equipment where applicable, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
 - n. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
 - o. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
 - p. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter on inspection.
 - 1) Clean HVAC system in compliance with NADCA Standard 1992-01. Provide written report on completion of cleaning.
 - q. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.
 - r. Clean food service equipment to sanitary condition acceptable for intended food service use and approved by authority having jurisdiction.
 - s. Leave Project clean and ready for occupancy.
- C. Pest Control: Comply with pest control requirements in Section 01 50 00 "Temporary Facilities and Controls." Prepare written report.

3.2 REPAIR OF THE WORK

- A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.
- B. Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.
 - 1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.
 - 2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that already show evidence of repair or restoration.
 - a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.
 - 3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
 - 4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

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3.3 ATTACHMENTS

- A. Samples of the following forms are appended to this Section for reference following End of Section 01 77 00:
1. University of Colorado Denver | Anschutz Medical Campus Supplemental Notice of Occupancy and Use List.
 2. University of Colorado Denver | Anschutz Medical Campus Supplemental Building / Project Acceptance List.

END OF SECTION 01 77 00

Supplemental Notice of Occupancy and Use List

Project Name & Number: _____

Contractor: _____

In addition to completing Notice of Approval of Occupancy / Use (SBP-01), the following items must be completed before Occupancy is approved.

Activity	Date Completed	Remarks
1. Final and formal address posted on the building entries.		
2. A copy of the Contractor's in-progress red line "as-built" drawings has been given to BMO representative & a 2 nd copy is provided-for Projects plan room. This is to include landscape drawings showing irrigation installation.		
3. Maintenance, operations and spare parts manuals on all installed equipment.		
4. Notice of Partial Substantial Completion concerning roles/ responsibilities of University and Contractor for security, maintenance, heat, utilities reviewed and accepted.		
5. Manufacturer maintenance, operations and spare parts manuals for fixtures, mechanical, electrical and plumbing.		
6. Hardware-maintenance, operations and spare parts manuals for doors & locks, including roll up doors.		
7. Warranty Dates and Contact list for all Contractors and Suppliers given to BMO.		
8. Transfer utility account from Contractor to Facilities Operations.		
9. Site plan to include first floor main isolation locations and plans for each floor to include main utility shutoffs, for utilities to include water, electrical, steam, sewer, fuel supply, telecom, fiber optic and gasses, identified on a set of drawings.		
10. If Commissioning Report is completed, BMO has reviewed/ commented, including electrical, plumbing, mechanical/ HVAC.		
11. All Contractor provided equipment has new filters & construction filters removed.		
12. Not Used		
13. Elevator equipment rooms insulated and space conditioned for control system requirements.		
14. Testing Certifications provided to BMO for Elevators, Fire Systems & Annunciator Systems.		
15. FSS has been provided with copy of Building Department testing and inspection report for window washing equipment.		
16. Roof walking pads to access equipment are installed.		
17. PM to communicate to fire department via Life Safety Officer that building has transitioned to BMO. Alarms at Anschutz Medical Campus report to University Police Dispatch and at Downtown report to designated monitoring company.		

18. BAS System (Siemens), Energy and Lighting, Fuel Systems, and Power Management must report remotely & verify with University - Engineering.		
19. Training for BMO and FSS on installed equipment and systems is completed.		
20. Equipment keys and locks transitioned to Operations, including fire panels, electrical panels, directories and generator panels. Construction cores removed and replaced with permanent cores.		
21. Access control pathways and junction boxes for installed doors, gates, loading docks and roof access complete. <u>*All wiring and hardware completed and electronic security access controls in place and tested by University Electronic Security.</u>		
22. EH&S is provided, as applicable for project, with fume hood certification, water testing certification, hazardous waste compliance certification, radiation compliance certification, BSL3 certification, and all other specialty equipment certification.		
23. PM notifies University Risk Management that project is transferring to University and notifies Contractor that it can eliminate Builders Risk Insurance.		
24. Not Used		
25. Not Used		
26. Elevator tools, including hand tools, computer, proprietary and operational software is received and confirm 1-year service from date of acceptance.		
27. All computers and software required in drawings and specs. are received, including for BAS, Energy and Lighting, Fuel Systems, and Power Management, and any specialty software and alarm codes for operating systems.		
28. For all areas to be transferred to University, all waste and debris removed; floor and wall surfaces clean and in good repair; ceiling surfaces clean, unmarked, in place; site, including sidewalks, cleared of debris and construction equipment; and roof is clear of all materials and debris.		
29. Water chlorination and testing complete and provided by PM to Chief Building Official and BMO via BMO Rep.		
30. Toilet accessories are in place that meet custodial contract.		
31. Trash receptacles outside the building are in place		

University Project Manager
(sign & print name)

Date

University BMO Rep.
(sign & print name)

Date

University FSS Rep
(sign & print name)

Date

University Downtown Rep. (If Necessary)
(sign & print name)

Date

***Highlighted items are not the responsibility of Contractor but PM and BMO Rep must ensure these are completed and operational prior to occupancy and use.**

Mark N/A by item if it is not applicable to project

3.1.12

Supplemental Building / Project Acceptance List

Project Name & Number: _____

Contractor: _____

In addition to completing Pre-Acceptance Checklist (SBP-05), the following items must be completed before Final Acceptance.

Activity	Date Completed	Remarks
1. Review State Buildings Pre-Acceptance check list & Notice of Approval of Occupancy / use form with BMO rep & confirm agreement with status		
*2. Establish list of post construction change orders & track separately from basic project until items are complete – call it Phase 2 to avoid delay on basic project		
3. O & M Manuals given to BMO Representative and BMO Archivist (2 hard copies and 1 electronic total)		
*4. Record Documents – a hard copy of plans and specifications are provided for plan room & given to BMO & electronic auto cad & specs are given to Archive Officer (Art Steinman) this is to include landscape drawings showing irrigation installation.		
*5. Final Site Walk is completed with University Grounds Supervisor. Drain barriers are removed and storm drains cleared. MS4 storm water plan, CDPHE permits, and evidence of final closeout received by Project Manager and all copied to University Engineering Division.		
<u>*/**6. Move-related work items complete including physical move, tours (occupants & police), mail, phone & electrical hook ups for equipment & furniture systems complete & freezers enrolled in University freezer program.</u>		
7. If exterior work is applicable: Landscape – Include a walk through with University Grounds for 1) new & established 1-year service date; 2) existing damaged landscape is repaired; and 3) irrigation – zone control test is complete.		
8. Attic stock, matches spec. requirements, is located in secured location, and is inventoried.		
9. Electrical system one line diagram framed and mounted in electrical room.		
10. Spare fire suppression heads in cabinets and tool: cabinet in main electrical room includes one complete set of spare fuses for major equipment.		
11. Contractor keys issued by University BMO returned to University Key Shop via PM/ BMO Rep.		
12. Interior Finishes Binder given to the University Project Manager: (Two hard copies)		
13. Not Used		
14. Not Used		

15. Safety grating in pipe chases in place.		
16. Signs in place including monument sign, building exterior and site signage and building interior signage.		
17. All applicable reports, including Air Emission reports; Sewer Reports, including for process diverters, traps and collection tanks; Fuel Storage Tank and Detection reports; and Water System tests and reports provided to BMO via PM and BMO Rep.		
18. Not Used		
19. Not Used		
20. Not Used		
21. Not Used		
22. If commissioning is included for project, Commissioning Agent certification is received by BMO via PM and BMO Rep.		

University Project Manager
(sign & print name)

Date

University BMO Rep.
(sign & print name)

Date

University FSS
(sign & print name)

Date

University Downtown Rep (if necessary)
(sign & print name)

Date

*Warranty dates are not subject to completion of these items by contract

**** Highlighted items are not the responsibility of Contractor but PM and BMO Rep must ensure these are completed and operational prior to occupancy and use.**

Mark N/A by item if it is not applicable to project

3.1.12

SECTION 01 78 23

OPERATION AND MAINTENANCE DATA

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 preparing operation and maintenance manuals, including the following:
 - 1. Operation and maintenance documentation directory.
 - 2. Systems, subsystems, and equipment operation and maintenance manuals.
 - 3. Product maintenance manuals.
 - 4. Emergency manuals.
 - 5. Framed operating and maintenance instructions.
- B. Related Requirements:
 - 1. Section 01 33 00 "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.
 - 2. Section 01 91 13 "General Commissioning Requirements" for verification and compilation of data into operation and maintenance manuals.

1.3 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.

1.4 CLOSEOUT SUBMITTALS

- A. Schedule: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 30 calendar days before commencing demonstration and training. Architect/Engineer will return copy with comments.
 - 1. Correct or revise each manual to comply with Architect/Engineer's comments. Submit copies of each corrected manual within 15 calendar days of receipt of Architect/Engineer's comments and prior to commencing demonstration and training.
- B. Format: Submit operations and maintenance manuals in the following format:

For Large Projects retain subparagraph below requiring PDF electronic file. Retain paper copies for all projects.

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1. PDF electronic file. Assemble each manual into a composite electronically indexed file. Submit on digital media acceptable to Architect/Engineer.
 - a. Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically linked operation and maintenance directory.
 - b. Compile entirely from documents with searchable text.
 - c. Enable inserted reviewer comments on draft submittals.
 2. Paper copies. Assemble in accordance with the requirements of this Section.
 - a. Submit three final copies, one to be retained by the Architect/Engineer and two to be retained by the University.
- C. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 30 calendar days before commencing demonstration and training. Architect/Engineer will return copy with comments.
1. Correct or revise each manual to comply with Architect/Engineer's comments. Submit copies of each corrected manual within 15 calendar days of receipt of Architect/Engineer's comments and prior to commencing demonstration and training.

PART 2 - PRODUCTS

[Retain "Operation and Maintenance Documentation Directory" Article below only for Large Projects.](#)

2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

- A. Directory: Prepare a single, comprehensive directory of emergency, operation, and maintenance data and materials, listing items and their location to facilitate ready access to desired information. Include a section in the directory for each of the following:
1. List of documents.
 2. List of systems.
 3. List of equipment.
 4. Table of contents.
- B. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.
- C. 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.
- D. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.
- 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."

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2.2 GENERAL REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

- A. Intent: Prepare data in form of an instructional manual for use by University personnel.
- B. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
 - 1. Title page.
 - 2. Table of contents.
 - 3. Manual contents.
- C. Title Page: Include the following information:
 - 1. Subject matter included in manual.
 - 2. Name and address of Project.
 - 3. Name and address of University.
 - 4. Date of submittal.
 - 5. Name and contact information for Contractor.
 - 6. Name and contact information for Construction Manager.
 - 7. Name and contact information for Architect/Engineer.
 - 8. Name and contact information for Commissioning Authority.
 - 9. Names and contact information for major consultants to the Architect/Engineer that designed the systems contained in the manuals.
 - 10. Cross-reference to related systems in other operation and maintenance manuals.
- D. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.
 - 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.
- E. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.
- F. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
 - 1. 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.
- G. 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.

Retain "Manuals, Electronic Files" Paragraph for Large Projects.
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- H. 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 and enable OCR (optical character recognition) to provide searchable text.
 2. File Names and Bookmarks: Enable bookmarking of individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.

Retain "Manuals, Paper Copy" Paragraph for both Large and Small Projects.

- I. Manuals, Paper Copy: Submit manuals in the form of hard copy, bound and labeled volumes.
1. Binders: Heavy-duty, three-ring, vinyl-covered, loose-leaf binders, in minimum 1 inch and maximum 2 inch thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
 - a. 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, and indicate Specification Section number on bottom of spine. Indicate volume number for multiple-volume sets.
 2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
 3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment.
 4. Supplementary Text: Prepared on 8-1/2-by-11-inch, 20 lb., 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.

2.3 SYSTEMS, SUBSYSTEMS AND EQUIPMENT OPERATION AND MAINTENANCE MANUALS

- A. General: Provide operation and maintenance manuals where indicated in individual Specification Section and the following:
1. Heating, ventilating and air-conditioning equipment and systems.
 2. Plumbing equipment and systems.

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3. Special piping equipment and systems.
4. Electrical distribution systems.
5. Standby generator systems.
6. Communications systems.
7. Fire alarm and detection systems.
8. Underground sprinkler systems.
9. Automatic entrances.
10. Food service equipment.
11. Elevators.
12. Other special construction and conveying systems.

B. Operation Content: In addition to requirements in this Section, include operation data required in individual Specification Sections.

1. Additional Operation Content Required:

- a. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
- b. Performance and design criteria if Contractor has delegated design responsibility.
- c. Operating standards.
- d. Operating procedures.
- e. Operating logs.
- f. Wiring diagrams.
- g. Control diagrams.
- h. Piped system diagrams.
- i. Precautions against improper use.
- j. License requirements including inspection and renewal dates.

2. Descriptions: Include the following:

- a. Product name and model number. Use designations for products indicated on Contract Documents.
- b. Manufacturer's name.
- c. Equipment identification with serial number of each component.
- d. Equipment function.
- e. Operating characteristics.
- f. Limiting conditions.
- g. Performance curves.
- h. Engineering data and tests.
- i. Complete nomenclature and number of replacement parts.

3. Operating Procedures: 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. Instructions on stopping.
- f. Normal shutdown instructions.
- g. Seasonal and weekend operating instructions.
- h. Required sequences for electric or electronic systems.
- i. Special operating instructions and procedures.

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

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5. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.
- C. Maintenance 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 warranty and bond information, as described below.
1. Source Information: Provide the following information in a list for each product included in manual:
 - a. Name, address, and telephone number of Installer or supplier and maintenance service agent.
 - b. Name, address, and telephone number of local source for supply of replacement parts.
 - c. Name, address, and telephone number of maintenance contractor, where appropriate.
 - d. Cross-reference Specification Section number and title.
 - e. Drawing or schedule designation or identifier where applicable.
 2. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:
 - a. Standard maintenance instructions and bulletins.
 - b. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
 - c. Identification and nomenclature of parts and components.
 - d. List of items recommended to be stocked as spare parts.
 3. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:
 - a. Test and inspection instructions.
 - b. Troubleshooting guide.
 - c. Precautions against improper maintenance.
 - d. Disassembly; component removal, repair, and replacement; and reassembly instructions.
 - e. Aligning, adjusting, and checking instructions.
 - f. Demonstration and training video recording, if available.
 4. 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.
 - a. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
 - b. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.
 5. 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.
 6. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.
 7. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
 - a. Include procedures to follow and required notifications for warranty claims.

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- b. Include information sheet covering proper procedures in event of failure and instances which might affect validity of warranties and bonds.

2.4 PRODUCT MAINTENANCE MANUALS

- A. Content: Organize manual into a separate section for each product, material, and finish. Separate into two manuals: one for exterior moisture protection products and those exposed to weather and one for interior products. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.
- B. Source Information: Provide the following information for each product included in manual:
 1. Name, address, and telephone number of Installer or supplier and maintenance service agent.
 2. Cross-reference Specification Section number and title.
 3. Drawing or schedule designation or identifier where applicable.
- C. Product Information: Include the following, as applicable:
 1. Product name and model number.
 2. Manufacturer's name.
 3. Color, pattern, and texture.
 4. Material and chemical composition.
 5. Reordering information for specially manufactured products.
- D. Maintenance Procedures: Include manufacturer's written recommendations and the following:
 1. Inspection procedures.
 2. Types of cleaning agents to be used and methods of cleaning.
 3. List of cleaning agents and methods of cleaning detrimental to product.
 4. Schedule for routine cleaning and maintenance.
 5. Repair instructions.
- E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.
- F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
 1. Include procedures to follow and required notifications for warranty claims.

2.5 EMERGENCY MANUALS

- A. Content: Organize manual into a separate section for each of the following:
 1. Type of emergency.
 2. Emergency instructions.
 3. Emergency procedures.
- B. 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.

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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.
- C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of University's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.
- D. 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.

2.6 FRAMED OPERATING AND MAINTENANCE INSTRUCTIONS

- A. All mechanically and electrically operated equipment and controls shall be provided with legible and complete wiring diagrams, schematics, operating instructions, and pertinent preventative maintenance instructions in a sturdy frame with clear glass or plastic cover. Use non-fading, permanent media.
- B. Locate frames in the same room or service enclosure as equipment, or in the nearest mechanical or electrical room.

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 78 23

SECTION 01 78 39

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.
 - 4. Record Samples.
 - 5. Miscellaneous record submittals.
- B. Related Requirements:
 - 1. Section 01 73 00 "Execution" for final property survey.
 - 2. Section 01 77 00 "Closeout Procedures" for general closeout procedures.
 - 3. Section 01 78 23 "Operation and Maintenance Data" for operation and maintenance manual requirements.

1.3 CLOSEOUT SUBMITTALS

- A. General: Submit record drawings with duplicate original transmittal letters containing:
 - 1. Date.
 - 2. Project title and number.
 - 3. Contractor's name and address.
 - 4. Certification that each document as submitted is complete and accurate.
 - 5. Signature of authorized representative of the Contractor.
- B. Record Drawings: Submit copies of record Drawings as follows:
 - 1. Submit three paper-copy sets of marked-up record prints, two copies will be retained by the University and one copy retained by the Architect/Engineer.
 - 2. Submit three paper-copy sets and three digital copies on CD of electronic files for all delegated-design submittals. Two copies will be retained by the University and one copy retained by the Architect/Engineer.

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- C. Record Specifications: Submit three paper copies of Project's Specifications, including addenda and contract modifications. Two copies will be retained by the University and one copy retained by the Architect/Engineer.
- D. Record Product Data: Submit three paper copies of each submittal. Two copies will be retained by the University and one copy retained by the Architect/Engineer.
 - 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.
- E. Miscellaneous Record Submittals: See other Specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Submit three paper copies of each submittal. Two copies will be retained by the University and one copy retained by the Architect/Engineer.
- F. Interior Finishes Binder: Three copies. Two copies will be retained by the University and one copy retained by the Architect/Engineer.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

- A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.
 - 1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.
 - a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
 - b. 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 archive photographic documentation.
 - f. Mark using line types and symbols conforming to Contract Documents.
 - 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 below first floor.
 - d. Locations and depths of underground utilities referenced to permanent surface improvements.
 - 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 referenced to visible and accessible features of structure.

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- j. Locations of concealed valves, dampers, controls, balancing devices, junction boxes, cleanouts, and other items requiring access or maintenance.
 - k. Changes made by Change Order.
 - l. Changes made following Architect/Engineer's written orders.
 - m. Details not on the original Contract Drawings.
 - n. Field records for variable and concealed conditions.
 - o. 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 sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
 5. Mark additional information important to University that was either shown schematically or omitted from original Drawings.
 6. Note Change Order numbers, and similar identification, where applicable.
- B. Record Delegated Design Electronic Files: For all delegated design submittals, including but not limited to landscape irrigation, fire alarm and fire sprinkler plans, prepare electronic files in full compliance with University of Colorado Denver | Anschutz Medical Campus Guidelines and Design Standards, Part 1.0, Paragraph "Drawing Production Standards."
- C. Identification: 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. Identification: As follows:
 - a. Project name.
 - b. Date.
 - c. Designation "PROJECT RECORD DRAWINGS."
 - d. Name of Architect/Engineer.
 - e. Name of Contractor.

2.2 RECORD SPECIFICATIONS

- A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.
1. Give particular attention to substitutions, selection of options, and similar 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. Note related Change Orders where applicable.
 4. Maintain one complete copy of all Addenda, Change Orders and other written change documents in printed form during construction.

2.3 RECORD PRODUCT DATA

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

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

B. Directory: Include record Product Data directory organized by Specification Section number and title.

C. Product List: Update and record any changes to Product List submitted in accordance with Section 01 60 00 "Product Requirements", including any changes to brand, model, subcontractor, or Installer so that final list reflects materials, equipment and systems incorporated into the Work.

2.4 RECORD SAMPLES

A. Prior to Final Acceptance, meet with University Project Manager and Architect/Engineer at site to review and identify which submitted samples maintained during the progress of the Work are to be transmitted to the University.

B. Deliver selected samples to storage area identified by University.

C. Finishes Binder: Three-ring notebook or notebooks, organized by Specification Section number, providing a listing and description of all material finishes on the Project and including a minimum 6 inch by 6 inch sample thereof to accompany the description. Accompany each material selection indicated with the following:

1. Manufacturer and product name.
2. Pattern name and number, as applicable.
3. Color name, as applicable.
4. Any additional information required to order replacement product.

2.5 MISCELLANEOUS RECORD SUBMITTALS

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

1. Include manufacturer's certifications, field test record, copies of permits, licenses, certifications, inspection reports, releases, notices, receipts for fee payments and similar documents.

B. Directory: Include miscellaneous record submittals directory organized by Specification Section number and title.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

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

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

END OF SECTION 01 78 39

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SECTION 01 78 46

EXTRA STOCK MATERIALS

Revise this Section by deleting and inserting text to meet Project-specific requirements. Coordinate with the University Project Manager.

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 descriptions and quantities of required extra stock materials.

1.3 INFORMATIONAL SUBMITTALS

- A. Schedule of Maintenance Materials: Prepare a schedule in tabular form of all extra stock materials required in individual Specification Sections including:
1. Specification Section number and title.
 2. Description of required material
 3. Quantity of required material.

1.4 MAINTENANCE MATERIALS

- A. Furnish extra materials that match and are from the same production runs as the product installed.
- B. Provide in the quantities indicated.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 MAINTENANCE MATERIAL SCHEDULE

SECTION	TITLE	DESCRIPTION	QUANTITY
04 42 00	EXTERIOR STONE CLADDING	Dimension Stone Units	Furnish 100 sq. ft. finished stone panels for each finish and variety of stone specified.

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09 30 00	TILING	Tile and Trim Units	Furnish 100 sq. ft. of full-size units for each type, composition, color, pattern, and size indicated.
09 30 33	STONE TILING	Dimension Stone Tile	Furnish 100 sq. ft. of full-size units for each type, composition, color, pattern, and size indicated.
09 51 13	ACOUSTICAL PANEL CEILINGS	Acoustical Ceiling Panels	100 sq. ft. of full-size panels.
09 51 23	ACOUSTICAL TILE CEILINGS	Acoustical Ceiling Units	100 sq. ft. of full-size tiles.
09 54 36	SUSPENDED DECORATIVE GRIDS	Suspended Decorative Grids	100 sq. ft. of each suspended decorative grid component, exposed molding, and trim.
09 62 29	CORK FLOORING	Cork Flooring	Furnish 1 box of each type, shade, pattern, and finish of cork flooring installed.
09 65 13	RESILIENT BASE AND ACCESSORIES		Furnish 50 linear feet of each type, color, pattern, and size of wall base installed. Furnish 2% of each type, color, pattern, and size of all other resilient accessories installed.
09 68 13	TILE CARPETING	Carpet Tile	100 sq. ft. of full-size units for each type indicated.
10 13 00	DIRECTORIES	Message Strips	Full-size, blank strips equal to 10 percent of amount installed for each size indicated, but no fewer than 20 strips.
11 12 00	PARKING CONTROL EQUIPMENT	Gate Arms	1 breakaway gate arms for each gate installed, complete with accessory components.
12 21 13	HORIZONTAL LOUVER BLINDS	Horizontal Louver Blinds	Full-size units equal to 1 percent of quantity installed for each size, color, texture, pattern, and gloss indicated, but no fewer than two units and no more than five units.
14 20 00	ELEVATORS		2 sets of complete parts catalogs including manufacturer's recommended spare parts list with clear identification and illustration of each functional part, exploded parts views, identification of part numbers and assembly numbers including replaceable electrical and electronic parts and circuit boards.
21 05 00	FIRE SUPPRESSION	Sprinkler heads and Special Sprinkler Wrenches.	2 heads minimum of each type and temperature rating installed and special sprinkler wrenches enclosed in a steel cabinet in accordance with NFPA 13.
22 30 00	PLUMBING EQUIPMENT	Valve Key	1 valve key for each key operated wall hydrant, post hydrant, hose bib, or faucet installed.
23 05 13	MOTORS	Variable Frequency Drives	1 complete set of spare fuses for each VFD supplied.
23 30 00	HVAC AIR DISTRIBUTION	Fire Dampers	3 fusible links per type installed.

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23 57 00	HEAT EXCHANGERS FOR HVAC	Heat Exchanger	1 gasket for each flanged connection for each heat exchanger installed.
23 65 00	COOLING TOWERS		3 spray nozzles for each tower cell provided.
			1 gasket for each gasketed access and inspection opening provided.
			1 set of matched fan belts for each belt driven fan provided.
23 70 00	CENTRAL HVAC EQUIPMENT	Air Handling Units	1 complete set of filters for each air-handling unit installed.
			1 set of belts for each unit installed with label clearly identifying to which fan the belt belongs.
26 09 43	NETWORK LIGHTING CONTROLS	Control Devices	3 devices for each device used.
26 20 00	LOW VOLTAGE ELECTRICAL DISTRIBUTION	Fuses	1 set of 3 of each type and size used on the project and fuse cabinet in main electrical room to hold them.
26 51 00	INTERIOR LIGHTING	Lamps	Provide 5% or a maximum of 25 spares of each lamp type used on the project.
28 31 00	FIRE DETECTION AND ALARM	Initiating and Control Devices	Provide 5 spare devices for each device type used.
		Notification Devices	Provide 5 spare devices for each device type used.

END OF SECTION 01 78 46

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SECTION 01 79 00

DEMONSTRATION AND TRAINING

Revise this Section by deleting and inserting text to meet Project-specific requirements. Coordinate with the University Project Manager.

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 instructing University's personnel, including the following:
 - 1. Demonstration of operation of systems, subsystems, and equipment.
 - 2. Training in operation and maintenance of systems, subsystems, and equipment.

1.3 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 outline for each training module.
- B. Qualification Data: For instructor, demonstrating qualifications and ability to instruct on maintenance and care of system, equipment and products.
- C. Schedule of Demonstration and Training: Prepare a schedule in tabular form of all demonstration and training required in individual Specification Sections including:
 - 1. Specification Section number and title.
 - 2. Description of required demonstration and training.
- D. Attendance Record: For each training module, submit list of participants and length of instruction time.

1.4 QUALITY ASSURANCE

- A. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Section 01 40 00 "Quality Requirements," experienced in operation and maintenance procedures and training. Manufacturer's sales staff is not acceptable.
- B. Pre-instruction Conference: Conduct conference at Project site to comply with requirements in Section 01 31 00 "Project Management and Coordination." Review methods and procedures related to demonstration and training.

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PART 2 - PRODUCTS

2.1 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: 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. Operations manuals.
 - c. Maintenance manuals.
 - d. Project record documents.
 - e. Identification systems.
 - f. Warranties and bonds.
 - g. 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.
 - g. A tour of the installation identifying the location of all system components.
 - 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.

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- k. Seasonal and weekend operating instructions.
 - l. Required sequences for electric or electronic systems.
 - m. Special operating instructions and procedures.
 - n. Sequence of operation.
- 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.
 - f. Product support/service model.
 - g. Purchasing of replacement parts.
- 9. Instruction specific to Instrumentation and Controls, Electrical Gateway, Network Lighting Controls, or any other new technology that is integrated with another system: Include the following:
 - a. Overview and theory.
 - b. Wiring diagrams, including the one line diagram.
 - c. Creation, editing, and programming of the point database.
 - d. Integration topology and platform for communication.
 - e. Graphics packages and touch screens for the system.
 - f. Alarms and diagnostics.
 - g. Reporting functions dynamically and historically.
 - h. Remote access to the system.
 - i. Database back-up and maintenance.
 - j. Replacement and re-programming of replacement parts.
 - k. Point type and functionality for each type of point.
 - l. Programming.
 - m. Point/object editing.
 - n. Loop tuning.

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- o. Help files and other troubleshooting documentation.
 - p. Instruction is given by the staff that setup the integration.
 - C. Operation and Maintenance Manuals: Provide appropriate Operation and Maintenance manuals in each training session so that the detail drawings and maintenance activities are outlined and discussed for each application.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Assemble educational materials necessary for instruction, including documentation and training module.
- B. Set up instructional equipment at instruction location.

3.2 INSTRUCTION

- A. Engage qualified instructors to instruct University's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
 - 1. University will furnish Contractor with names and positions of participants.
- B. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.
 - 1. Coordinate schedule for all training with University Project Manager and provide the following:
 - a. Minimum 3 weeks notification.
 - b. Training matrix in calendar format.
 - c. Training outline for each session.
 - 2. Do not schedule training until equipment has been started up, commissioned, and is currently operating in its normal condition.
 - 3. Do not schedule overlapping training sessions.
 - 4. Schedule training sessions for a maximum of 4 hours per day; afternoons preferred.
 - 5. Provide separate training session on each system for operational/maintenance groups and user groups.
 - 6. Training sessions will be cancelled and rescheduled unless the following documentation is received:
 - a. Instruction qualifications.
 - b. Evidence that equipment has been started up, commissioned, and is currently operating in its normal condition.
 - c. Operation and Maintenance manuals.
- C. 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.
- D. Travel, Room and Board: Coordinate any out-of-state training with the University Project Manager.

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- E. 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.

3.3 DEMONSTRATION SCHEDULE

SECTION	TITLE	DESCRIPTION
08 42 29.33	SWINGING AUTOMATIC ENTRANCES	Engage a factory-authorized service representative to train University's maintenance personnel to adjust, operate, and maintain automatic entrances.
10 11 00	VISUAL DISPLAY SURFACES	Engage a factory-authorized service representative to train University's maintenance personnel to adjust, operate, and maintain motor-operated, sliding visual display units.
10 22 38	OPERABLE PANEL PARTITIONS	Engage a factory-authorized service representative to train University's maintenance personnel to adjust, operate, and maintain operable panel partitions.
10 55 00	POSTAL SPECIALTIES	Engage a factory-authorized service representative to train University's maintenance personnel to adjust, operate, and maintain postal specialties.
11 12 00	PARKING CONTROL EQUIPMENT	Engage a factory-authorized service representative to train University's maintenance personnel to adjust, operate, and maintain parking control equipment.
11 13 00	LOADING DOCK EQUIPMENT	Engage a factory-authorized service representative to train University's maintenance personnel to adjust, operate, and maintain loading dock equipment.
11 14 00	FOOD SERVICE EQUIPMENT	Engage a factory-authorized service representative to train University's maintenance personnel to adjust, operate, and maintain foodservice equipment.
11 82 26	FACILITY WASTE COMPACTORS	Engage a factory-authorized service representative to train University's maintenance personnel to adjust, operate, and maintain waste compactors according to manufacturer's requirements and ANSI Z245.2.
12 21 13	HORIZONTAL LOUVER BLINDS	Engage a factory-authorized service representative to train University's maintenance personnel to adjust, operate, and maintain systems.
12 24 13	ROLLER WINDOW SHADES	Engage a factory-authorized service representative to train University's maintenance personnel to adjust, operate, and maintain motor-operated roller shades.
13 20 00	SPECIAL PURPOSE ROOMS	Engage a factory-authorized service representative to train and provide training video to University's maintenance personnel to operate, adjust, maintain, and repair controlled environmental rooms and cold rooms.

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14 21 00	ELECTRIC TRACTION ELEVATORS	Engage a factory-authorized service representative to train University's maintenance personnel to operate, adjust, and maintain elevator(s).
14 21 13	ELECTRIC TRACTION FREIGHT ELEVATORS	Engage a factory-authorized service representative to train University's maintenance personnel to operate, adjust, and maintain elevator(s).
14 24 00	HYDRAULIC ELEVATORS	Engage a factory-authorized service representative to train University's maintenance personnel to operate, adjust, and maintain elevator(s).
14 24 13	HYDRAULIC FREIGHT ELEVATORS	Engage a factory-authorized service representative to train University's maintenance personnel to operate, adjust, and maintain elevator(s).
23 00 00	HEATING, VENTILATING, AND AIR CONDITIONING (HVAC)	Schedule instructional meetings for The University of Colorado Anschutz Medical Campus Facilities Operations maintenance personnel on the proper operation and maintenance of mechanical systems. Provide the project manager a minimum of 5 days notice prior to any testing.
23 05 13	MOTORS	Engage a factory-authorized representative to train the University's representative for 2 hours for each variable frequency drive installed. Training includes startup, shutdown, emergency operation, maintenance and servicing.
23 08 00	COMMISSIONING OF HVAC	Engage the commissioning authority to provide a customized one to two day training class for the university's engineering personnel in problem solving techniques including the review of mechanical system design as a whole, integrated unit, unique qualities of the installed mechanical system, insights into how to solve system-wide, multi-faceted problems, and identify a variety of resources to assist with problem solving.
23 09 00	INSTRUMENTATION AND CONTROLS	Engage a factory-authorized trained representative to conduct a minimum of 1-four hour on-site training course and an additional 1-four hour on-site training course per 25,000 sq. ft. for designated University personnel.
		Engage a factory-authorized trained representative to conduct an 8-hour seasonal loop training.
		Provide 40 hours of certified training in Instrument and Controls for every 100,000 sq. ft. of a lab/research building.
23 11 13	FACILITY FUEL-OIL PIPING	Engage a factory-authorized service representative to train University's maintenance personnel to adjust, operate, and maintain liquid-level gage systems, leak-detection and monitoring systems, and fuel-oil pumps.

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23 21 23	PUMPS	Engage a factory-authorized service representative to train a University Representative for 2 hours of instruction for each pumping system provided.
23 25 13	CHEMICAL WATER TREATMENT	Engage a factory-authorized service representative to train operating personnel for 8 hours to familiarize them with all treatment equipment and procedures. Include procedure for taking weekly water test on open-loop systems and the application and safe handling of supplied chemicals.
23 64 16	CENTRIFUGAL WATER CHILLERS	Engage a factory-authorized service representative to train the University's representative for 4 hours including the operation of chillers, accessories and controls, procedures for startup and shutdown, troubleshooting, servicing, preventative maintenance, and review of the maintenance manuals.
23 65 00	COOLING TOWERS	Engage a factory-authorized service representative to train the University's personnel for one, 8-hour day, for operation and maintenance of the cooling towers.
23 76 00	EVAPORATIVE COOLING EQUIPMENT	Engage the manufacturer's representative to train the University's personnel for four (4) hours. Include start-up and shutdown procedures, troubleshooting procedures, and servicing and preventative maintenance schedules and procedures, and the contents of the Operating and Maintenance Data.
26 00 00	ELECTRICAL	Engage a factory-authorized service representative to train the University's Operations personnel a minimum of 8 hours for each system. Provide an additional minimum of 4 hours for any electrical gateway or networked lighting controls.
26 56 00	EXTERIOR LIGHTING	Engage a factory-authorized service representative to train University's maintenance personnel to adjust, operate, and maintain luminaire lowering devices.
28 31 00	FIRE DETECTION AND ALARM	Engage a factory-authorized service representative to train the University's Operations personnel a minimum of 8 hours for each system.
32 84 00	PLANTING IRRIGATION	Engage a factory-authorized service representative to train University's maintenance personnel to adjust, operate, and maintain automatic control valves and controllers.

END OF SECTION 01 79 00

SECTION 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS

PART 1 - GENERAL

1.1 SYSTEM REQUIREMENTS

- A. Design Requirements:
 - 1. Comply with State of Colorado High Performance Certification Program (HPCP).
 - a. LEED Certification Level: At a minimum, achieve the level required by the HPCP at the commencement of the project.
 - b. Design building enclosure, building interiors and building systems, and select materials consistent with and as required for achievement of the project LEED certification goal, including both prerequisites and credits.
 - 2. LEED Checklist: Prepare a checklist identifying credits to be achieved and demonstrating that the design, when complete, will obtain the required LEED certification level.
 - 3. Pursue Measurement + Verification credit for all buildings.
- B. Performance Requirements:
 - 1. Energy Reduction: Design building to achieve the reduction of energy by cost method based on ASHRAE 90.1 required by the HPCP.

1.2 QUALITY ASSURANCE

- A. LEED Coordinator: Require Contractor to engage an experienced LEED-Accredited Professional to manage the LEED compliance program during construction.
- B. LEED Action Plan: Require Contractor to prepare and submit plan identifying strategies for obtaining the following credits, as applicable:
 - 1. Credit MR 2: Waste management plan.
 - 2. Credit MR 3: Salvaged and refurbished materials.
 - 3. Credit MR 4: Materials with recycled content.
 - 4. Credit MR 5: Regional materials.
 - 5. Credit MR 7: Certified wood products.
 - 6. Credit IEQ 3.1: Construction indoor-air-quality management plan.
- C. LEED Progress Reports: Require Contractor to provide, with each Application for Payment, a progress report comparing construction and purchasing with LEED action plans.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Specify products and procedures necessary to obtain the LEED credits identified in the project LEED checklist, considering the following:
 - 1. Credit MR 3: Salvaged, refurbished or reused materials.
 - 2. Credit MR 4: Recycled content of material.
 - 3. Credit MR 5: Regional materials.
 - 4. Credit MR 7: Certified Wood.
 - 5. Credit IEQ 4: Low-Emitting Materials

PART 3 - EXECUTION

3.1 CONSTRUCTION WASTE MANAGEMENT

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- A. Credit MR 2: Develop a construction waste management program sufficient to achieve the level indicated in LEED checklist.

3.2 CONSTRUCTION INDOOR-AIR-QUALITY MANAGEMENT

- A. Credit IEQ 3: Require Contractor to comply with requirements during construction and before occupancy to achieve these credits. Additional construction indoor-air-quality procedures are specified in Section 01 35 46 – Indoor Air Quality Procedures.

END OF SECTION 01 81 13

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SECTION 08 00 00 - OPENINGS

PART 1 - GENERAL

1.1 SYSTEM REQUIREMENTS

A. Design Requirements:

1. Design doors to be larger than the width of the largest piece of equipment to be installed in the space.
2. Provide either hollow metal or glazed aluminum storefront for all exterior doors; wood doors not permitted.
3. Provide either hollow metal or solid-core wood for interior doors.
4. Provide 3'-0" by 7'-0" doors typical; wider doors are permitted if required by function and approved by the University Project Manager.
5. Prepare doors and frames to receive security hardware including door switch monitoring devices. Refer to 28 13 00 – Access Control.
6. All replacement windows must be approved by the University Campus Architect and the University Project Manager.
7. Provide solid doors for vermin control at all OLAR doors.
8. All-glass doors are prohibited for interior use. Provide wood stile and rail doors with glass.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Doors:

1. Provide all fire-rated doors and frames with an approved UL label.

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 08 00 00

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SECTION 08 11 13 - HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL (Not Applicable)

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products from one of the following:
 - 1. Ceco Door Products; an Assa Abloy Group company.
 - 2. Curries Company; an Assa Abloy Group company.
 - 3. Republic Doors and Frames.
 - 4. Steelcraft; an Ingersoll-Rand company.
 - 5. Any current member in good standing of the Steel Door Institute (SDI).

2.2 INTERIOR DOORS AND FRAMES

- A. SDI Extra Heavy Duty: ANSI/SDI A250.8, Level 3. Uncoated, cold-rolled steel sheet.
 - 1. Edge Construction: Model 2, Seamless.
 - 2. Core: Manufacturer's standard.
 - 3. Frames: Face welded.
 - 4. Exposed Finish: Prime for field painting.

2.3 EXTERIOR DOORS AND FRAMES

- A. SDI Maximum Duty: ANSI/SDI A250.8, Level 4. Metallic-coated, cold-rolled steel sheet.
 - 1. Edge Construction: Model 2, Seamless.
 - 2. Core: Manufacturer's standard, insulated.
 - 3. Frames: Face welded.
 - 4. Exposed Finish: Prime for field painting.

2.4 FABRICATION

- A. Preparation for Finish Hardware:
 - 1. Doors and Frames: Spot weld all reinforcement at the factory. Drill and tap for mortise template hardware.
 - 2. Frame Reinforcement: Comply with ANSI/SDI A250.6 and the following:
 - a. Hinges: 7 gage plate, 12 inches long by full width of jamb at each hinge.
 - b. Lock: 12 gage.
 - c. Strikes, Flush Bolts, and all other Surface Mounted Hardware: 12 gage.
 - d. Closer: 10 gage channel section, 12 inches long and full width of frame trim.
 - 3. Door Reinforcement: Comply with ANSI/SDI A250.6 and the following:
 - a. Hinges: 7 gage, 9 inch long, welded to 16 gage interior edge channels at each hinge.
 - b. Closers: 12 gage box section minimum 4 inch deep and 12 inch long.
 - c. Locksets, Deadbolts, Panic Devices: 12 gage.
 - d. Pull Plates, Flush Bolts, and Surface Mounted Hardware: 12 gage.
- B. Frame Anchors:
 - 1. Frames up to 7 feet tall: 3 anchors per jamb.
 - 2. Frames greater than 7 feet and less than 8 feet tall: 4 anchors per jamb.
 - 3. Frames greater than 8 feet tall: 1 additional anchor for each 2 feet or fraction thereof in height per jamb.

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PART 3 - EXECUTION (Not Applicable)

END OF SECTION 08 11 13

SECTION 08 14 16 - FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 SYSTEM REQUIREMENTS

- A. Design Requirements:
 - 1. Provide solid-core doors only; hollow-core not permitted.
 - 2. Flush wood doors permitted for interior use only; exterior wood doors are not permitted.
 - 3. In new construction use close-grained wood veneer; in existing buildings match existing doors.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products from one of the following:
 - 1. Algoma Hardwoods, Inc.
 - 2. Eggers Industries.
 - 3. Marshfield Door Systems, Inc.
 - 4. Oshkosh Architectural Door Company.

2.2 MATERIALS, GENERAL

2.3 DOOR CONSTRUCTION, GENERAL

- A. Quality Standard: WDMA I.S.1-A.
- B. WDMA I.S.1-A Performance Grade:
 - 1. Heavy Duty unless otherwise indicated.
 - 2. Extra Heavy Duty: Classrooms, public toilets, janitor's closets, assembly spaces, and exits.

2.4 VENEER-FACED DOORS FOR TRANSPARENT FINISH

- A. Interior Solid-Core Doors:
 - 1. Grade: Premium, with Grade A faces.
 - 2. Species: Close-grained.
 - 3. Cut: Plain sliced (flat sliced) or quarter sliced.
 - 4. Assembly of Veneer Leaves on Door Faces: Center-balance match.
 - 5. Core: Particleboard.
 - 6. Rails and Stiles: LSL, adhered to core.
 - 7. Construction: Five or seven plies, bonded.
 - 8. Edge Band: With matching veneers.

2.5 DOORS FOR OPAQUE FINISH

- A. Interior Solid-Core Doors:
 - 1. Grade: Premium.
 - 2. Faces: Medium-density overlay.
 - 3. Core: Particleboard.
 - 4. Construction: Five or seven plies, bonded.

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2.6 PRIMING/FINISHING

- A. Shop Priming:
 - 1. Doors for Opaque Finish: One coat of wood primer.
- B. Factory Finishing: Doors indicated to receive transparent finish.
- C. Transparent Factory Finishes:
 - 1. Grade: Premium.
 - 2. Finish: Catalyzed polyurethane.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Seal top, bottom, and edges of doors immediately after fitting.
- B. Through-bolt (barrel bolts) door closers and exit devices.

END OF SECTION 08 14 16

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SECTION 08 71 00 - DOOR HARDWARE

PART 1 - GENERAL

1.1 SYSTEM PERFORMANCE REQUIREMENTS

A. Design Requirements

1. Provide Mortise and Rim Cylinders capable of accepting small format (7 pin) interchangeable cores.
 - a. Dull chromium (626) finish, unless otherwise specified and approved by the University Locksmith through the University Project Manager.
2. Consult with the University Locksmith, through the University Project Manager, regarding the various lock functions and keyway for each building.
3. Provide dull chromium (626) finish durable door stops, holders, flush bolts, etc.
4. Provide backing behind doorstops.
5. Provide quality weather stripping on all exterior doors.
6. Computer operated proximity card access systems are allowed. Coordinate design with the University Project Manager.
7. Provide electric strikes or electric locks where required. Use of electrified hinges must be approved by the University Project Manager. Refer to 28 13 00 – Access Control for additional information.
8. Provide manual lock-down capability via locking doors or manual key override to electronic lock systems at all buildings. Egress doors must maintain all required egress characteristics.
9. Concealed rods are not permitted.
10. Coordinate door hardware with security hardware requirements. Refer to Division 28 for additional information.
11. Coordinate all hardware and access control at the University of Colorado Denver with the University Locksmith.

B. Performance Requirements

1. Key interchangeable cores at factory.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers:

1. Lock Sets:
 - a. University of Colorado Anschutz Medical Campus:
 - 1) Best 9K Series Heavy-Duty Lockset with 14D Lever Style Cylindrical Lever sets.
 - b. University of Colorado Denver:
 - 1) Schlage Falcon T Series with quantum lever 626 satin chrome finish and Schlage interchangeable everest B core
2. Automatic Door Opener:
 - a. Stanley Magic Door, Magic Swing Micro (preferred)
 - b. Dorma ED800
3. Closers:
 - a. LCN 4041
 - b. Norton 1600 Series at storefront applications
 - c. LCN Door Closer, 1460 Series Aluminum
4. Hinges:
 - a. Hager
 - b. Stanley – FBB179
 - c. Stanley – FBB168

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- 5. Exit Device:
 - a. Von Duprin (preferred)
- 6. Key Lock Box:
 - a. Knox Company, 3200 Series

2.2 MATERIALS

- A. Lock Sets:
 - 1. Lock Functions: Selected by the University locksmith through the University Project Manager. Stock numbers provided by the University Locksmith from acceptable manufactures.
- B. Door Guards:
 - 1. Kickplates: Stainless steel with 626 finish.
- C. Key Lock Box
 - 1. Recessed, heavy-duty, high-security key box with hinged door. No tamper alarm.
 - 2. Color: As determined by design team.
 - 3. Coordinate location with the University Fire and Life Safety Officer.
 - 4. Mounting Height: 5 feet above finished surface.

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 08 71 00

SECTION 09 00 00 - FINISHES

PART 1 - GENERAL

1.1 SYSTEM REQUIREMENTS

A. Design Requirements:

1. Interior design color palette proposed by the Design Professional must meet all criteria established with input and approval by the University Campus Architect through the University Project Manager.
2. Provide rubber base at both carpet and resilient flooring installations. Upgrades are permissible with approval of the University Campus Architect through the University Denver Project Manager.
3. All penetrations and/or seams in materials in BSL3, Vivaria, and other similar functional areas are to be sealed, unless otherwise noted.

B. Performance Requirements:

1. Fire-Test-Response Characteristics:
 - a. Surface-Burning Characteristics: As determined by testing per ASTM E 84.
 - 1) Flame-Spread Index: 25 or less.
 - 2) Smoke-Developed Index: 25 or less.
 - 3) Fuel Contributed Index: 15 or less.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 PREPARATION OF CONCRETE TO RECEIVE MOISTURE SENSITIVE FLOORING

- A. Prepare all concrete substrates to receive moisture sensitive floor finishes including, but not limited to, resilient sheet floor, linoleum flooring, resilient tile flooring, resinous matrix terrazzo flooring, resinous flooring, sheet carpeting and tile carpeting, according to ASTM F 710 and the following:
 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
 2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
 3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrate pH is between 7.0 and 9.0.
 4. Moisture Testing: Perform tests recommended by manufacturer and as follows. Proceed with installation only after substrates pass testing.
 - a. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
 - b. Perform relative humidity test using in situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 80 percent relative humidity level measurement.
- B. Provide moisture vapor emissions and alkalinity control system to all concrete substrates that fail alkalinity and/or moisture testing.

END OF SECTION 09 00 00

SECTION 09 22 16 - NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 SYSTEM REQUIREMENTS

- A. Design Requirements:
 - 1. Space studs at 16 inches on center maximum.
 - 2. Where interior partitions do not extend to the underside of structure, extend partition 6" above the ceiling grid and brace to structure at 4 feet on center. .
- B. Performance Requirements:
 - 1. Partitions, General: Provide metal framing systems of base-metal thickness and spacing capable of limiting lateral deflections when subjected to a 5 psf uniform lateral load to the following:
 - a. L/240 where supporting gypsum board only.
 - b. L/360 where supporting plaster or ceramic tile finishes.
 - c. L/720 where providing backup to stone or masonry.
 - 2. Partitions Enclosing Pressurized Mechanical Rooms: Provide metal framing systems of base-metal thickness and spacing capable of limiting lateral deflections to L/240 when subjected to a 15 psf uniform lateral load or the design value induced by the mechanical system, whichever is greater.
 - 3. Suspended Ceiling Design Requirements: Provide metal framing systems of base-metal thickness and spacing capable of limiting ceiling deflections to L/360 when subjected to a minimum 4 psf uniform load or the actual weight of ceiling hung materials, whichever is greater.
 - 4. Engineering design of non-structural metal framing by Contractor.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Steel Framing for Framed Assemblies:
 - 1. Steel studs and runners: 0.033-inch-thick (20 gauge) minimum.
 - 2. Dimpled steel studs and runners: 0.025-inch-thick minimum, with structural properties equivalent to 0.0329-inch-thick steel studs.

PART 3 - EXECUTION (Not Applicable)

3.1 INSTALLATION

- A. Secure with fasteners or proper crimping tools; do not weld.

END OF SECTION 09 22 16

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SECTION 09 29 00 - GYPSUM BOARD

PART 1 - GENERAL

1.1 SYSTEM REQUIREMENTS

- A. Design Requirements
 - 1. Design all walls within a vivarium to have a sound transmission class (STC) rating of 55 or better.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Interior Gypsum Board:
 - 1. Gypsum board, Type X: Provide 5/8 inch thick, typical unless noted otherwise.
 - 2. Abuse-resistant gypsum board: Provide at service corridors.
 - 3. Moisture- and mold-resistant gypsum board. Provide at all high humidity areas.
- B. Exterior Gypsum Board for Ceilings and Soffits:
 - 1. Glass-mat gypsum sheathing board.
- C. Tile-Backing Panels:
 - 1. Glass-mat, water-resistant backing board.
- D. Trim Accessories:
 - 1. Interior: Paper-faced galvanized steel sheet.
 - 2. Exterior: Hot-dipped galvanized steel sheet or rolled zinc.
- E. Auxiliary Materials
 - 1. Sound attenuation blankets.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Finishing Gypsum Board Assemblies:
 - 1. Levels of Gypsum Board Finish: At a minimum, comply with recommendations in GA-214, "Recommended Levels of Gypsum Board Finish."

END OF SECTION 09 29 00

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SECTION 09 30 00 - TILING

PART 1 - GENERAL

1.1 SYSTEM REQUIREMENTS

- A. Design Requirements:
 - 1. Provide tile selection as approved by the University Campus Architect through the University Project Manager.
 - 2. Provide waterproof membrane under all tile installations above occupied space.

PART 2 - PRODUCTS

2.1 TILE PRODUCTS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. American Olean; Division of Dal-Tile International Inc.
 - 2. Daltile; Division of Dal-Tile International Inc.
 - 3. United States Ceramic Tile; a Roca Tile Group company.
- B. Floor Tile: Unglazed ceramic mosaic tile.
 - 1. Size: 2 by 2 inches, factory mounted onto sheets with mesh, dot, net or other backing method.
- C. Wall Tile: Glazed wall tile.
 - 1. Size: 4-1/4 by 4-1/4 inches, cushion edge.
- D. Other Tile: Only as approved by the University Campus Architect through the University Project Manager.
- E. Trim Shapes:
 - 1. Wainscot cap: Surface bullnose.
 - 2. Base: Coved base.
 - 3. Outside Corners: Surface bullnose.
 - 4. Inside Corners:
 - 5. Jambs: Surface bullnose where tile projects from jamb.

2.2 ACCESSORY MATERIALS

- A. Thresholds: Stone.
- B. Waterproof Membrane: Chlorinated polyethylene sheet; fluid applied membranes are not permitted.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide The Noble Company, NobleSeal TS or comparable product.
- C. Crack Isolation Membrane: Chlorinated polyethylene sheet.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide The Noble Company, NobleSeal CIS or comparable product.
- D. Metal base and edge strips: Where tile trim shapes are not available use metal accessories:
 - 1. Coved Metal Base: Subject to compliance with requirements, provide Schluter-DILEX-EHK or comparable product.

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2. Coved Metal Inside Corner: Subject to compliance with requirements, provide Schluter-DILEX-EHK or comparable product.
3. Edge Protection: Subject to compliance with requirements, provide Schluter-SCHIENE or comparable product.
4. Outside Corner: Subject to compliance with requirements, provide Schluter-QUADEC or comparable product.
5. Wainscot Cap: Subject to compliance with requirements, provide Schluter-JOLLY, Schluter-QUADEC or comparable product.
6. Transition Strips: As required where adjacent floor finish is of different thickness.

PART 3 - EXECUTION

3.1 INTERIOR TILE INSTALLATION SCHEDULE

- A. Interior Floors on Concrete:
 1. TCNA F113: Thin-set mortar.
 - a. Mortar: Latex-portland cement mortar.
 - b. Grout: Polymer-modified.
 2. TCNA F122: Thin-set mortar on waterproof membrane.
 - a. Mortar: Latex-portland cement mortar.
 - b. Grout: Polymer-modified.
 3. TCNA F125A: Thin-set mortar on crack isolation membrane.
 - a. Mortar: Latex-portland cement mortar.
 - b. Grout: Polymer-modified.
- B. Interior Walls, Masonry or Concrete:
 1. TCNA W202: Thin-set mortar.
 - a. Mortar: Latex-portland cement mortar.
 - b. Grout: Polymer-modified.
- C. Interior Walls, Metal Studs or Furring:
 1. TCNA W245: Thin-set mortar on coated glass-mat, water-resistant gypsum backer board.
 - a. Mortar: Latex-portland cement mortar.
 - b. Grout: Polymer-modified.
- D. Shower Receptor and Walls, Concrete or Masonry:
 1. TCNA B421: Thin-set mortar on waterproof membrane.
 - a. Mortar: Latex-portland cement mortar.
 - b. Grout: Polymer-modified.
- E. Shower Receptor and Walls, Metal Studs or Furring:
 1. TCNA B420: Thin-set mortar on coated glass-mat, water-resistant backer board.
 - a. Mortar: Latex-portland cement mortar.
 - b. Grout: Polymer-modified.

END OF SECTION 09 30 00

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SECTION 09 51 13 - ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.1 SYSTEM REQUIREMENTS

- A. Design Requirement:
 - 1. Provide patterns, colors and finishes approved by the University Campus Architect through the University Project Manager.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Acoustical Ceiling Panels: Fire-resistance rated where required; ASTM E 1264.
 - 1.
 - 2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Armstrong World Industries, Inc.
 - b. CertainTeed Corp.
 - c. USG Interiors, Inc.
 - 3. Type and Form for typical installations: Type III, Form 1, nodular; sag resistant with anti-microbial treatment.
 - 4. Type and Form for Laboratories: Type IV, mineral base with membrane overlay; Form 2, water felted; with fiberglass-fabric face; sag resistant with anti-microbial treatment.
 - 5. Pattern: E (lightly textured).
 - 6. LR: Approximately 0.90.
 - 7. NRC: Approximately 0.70.
 - 8. CAC: Approximately 35.
 - 9. Thickness: 3/4 inch.
 - 10. Modular Size: 24 by 24 inches or 24 by 48 inches scored to look like 24 by 24 inches.
- B. Metal Suspension Systems: ASTM C 635.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Armstrong World Industries, Inc.
 - b. CertainTeed Corp.
 - c. Chicago Metallic Corporation.
 - d. USG Interiors, Inc.
 - 2. Wire hangers, braces, and ties.
 - 3. Wide-Face, 15/16-inch, Capped, Double-Web, Fire-Rated where required, Steel: Intermediate duty.
- C. Metal Edge Moldings and Trim: Roll-formed sheet metal.
- D. Ceiling Panel Plenum Access, Identification Markings:
 - 1. Removable ceiling tiles may provide access to mechanical and electrical components located above the ceiling. Where required, mark ceiling panel with colored map tacks glued in place according to the following:
 - a. Waste Valves and Unions: Blue.
 - b. Waste Cleanouts: Black.
 - c. Ventilation Test Areas and Dampers: Purple.
 - d. Fire Dampers or Fire Detectors: Red.
 - e. Electrical transformers or resistance heaters: Orange.

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- f. Natural Gas, Oxygen, and Steam Valves or Unions: Yellow.
- g. Nitrogen, Compress Air, and Vacuum Valves or Unions: Green.
- h. Miscellaneous Mechanical Items: Gray.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Installation: ASTM C 636.

END OF SECTION 09 51 13

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SECTION 09 65 00 - RESILIENT FLOORING

PART 1 - GENERAL (Not Applicable)

PART 2 - PRODUCTS

2.1 RESILIENT BASE AND ACCESSORIES

- A. Resilient Base:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Johnsonite.
 - b. Musson, R.C. Rubber Co.
 - c. Roppe Corporation, USA.
 - 2. Material Requirement: Rubber.
 - 3. Style: Cove at all locations.
 - 4. Minimum Thickness: 0.125 inch.
 - 5. Height: 4 inches.
 - 6. Lengths: Coils in manufacturer's standard lengths.
 - 7. Outside Corners: Preformed.
 - 8. Inside Corners: Preformed.
- B. Resilient Molding Accessory: Rubber.
 - 1. Edge Strips: 0.125 inch thick, 1 inch wide, with tapered or bullnose edge.
- C. Abrasive Strips: Self-adhesive, 1 inch wide, with aluminum oxide grit.

2.2 RESILIENT TILE

- A. Vinyl Composition Floor Tile:
 - 1. Class: Through pattern.
 - 2. Wearing Surface: Smooth.
 - 3. Thickness: 0.125 inch.
 - 4. Size: 12 by 12 inches.

2.3 RESILIENT SHEET FLOORING

- A. Vinyl Sheet Floor Covering: ASTM F 1303, Type I, Grade 1, with Class B backing.
 - 1. Thickness: 0.080 inch thick.
 - 2. Wearing Surface: Smooth.
 - 3. Sheet Width: As standard with manufacturer.
 - 1. Seaming Method: Heat welded at medical labs (BSL2); standard otherwise.
- B. Linoleum Floor Coverings:
 - 1. Sheet Flooring: In manufacturer's standard length by not less than 78 inches wide.
 - 2. Seaming Method: Heat welded at medical labs (BSL2); standard otherwise.
 - 3. Thickness: 0.08 inch.

2.4 INSTALLATION MATERIALS

- 1. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based provided or approved by manufacturer for applications indicated and capable of taper to feather edge.
- 2. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.

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3. Floor Polish: Provide stripper, sealer and polish recommended by the University Environmental Health and Safety (EHS) through the University Project Manager.

PART 3 - EXECUTION

3.1 CLEANING AND PROTECTION

- A. Floor Polish: Strip factory seal and apply finish recommended by the University EHS through the University Project Manager.

END OF SECTION 09 65 00

SECTION 09 68 13 - TILE CARPETING

PART 1 - GENERAL

1.1 SUBMITTALS

- A. Review shop drawings for pattern match, if any, for matching during installation and possible waste factors in ordering required amounts. Provide copy of approved shop drawings on job site during installation.
- B. Verification Samples: Submit two full size samples illustrating color and pattern for each carpet material specified.
- C. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

1.2 QUALITY ASSURANCE

- A. Manufacturer Qualifications
 - 1. Upon request, provide a representative to assist in project start-up and to inspect installation while in process and upon completion.
 - a. Representative will notify designated contact if any installation instructions are not followed.
 - b. Representative will be present at 6 month and 11 month punch walks.
 - 2. 5-year documented experience in manufacturing of carpet tile.
- B. Installer Qualifications
 - 1. Flooring contractor must be certified by the carpet manufacturer prior to bid.
 - 2. Flooring contractor to be a specialty contractor normally engaged in this type of work and has prior experience in the installation of carpet tiles.
 - 3. Flooring contractor will be responsible for proper product installation, including floor testing and preparation, as specified by the carpet manufacturer and job conditions herein.
- C. Single Source Responsibility: Obtain each type of carpet from one source and by a single manufacturer.

1.3 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to the site in manufacturer's original packaging listing manufacturer's name, product name, identification number, and related information.
- B. Store in a dry location, between 60 degrees F and 80 degrees F and a relative humidity below 65%. Protect from damage and soiling. Stack carpet in boxes.
- C. Make stored materials available for inspection by The University's representative.
- D. Store materials in area of installation for minimum period of 48 hours prior to installation.

1.4 PROJECT CONDITIONS

- A. Sub-floor preparation is to include all required work to prepare the existing floor for installation of the product as specified in this document and Manufacturer's installation instructions.

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- B. Comply with 09 00 00 – Finishes, Part 3.1 for preparation of concrete to receive moisture sensitive flooring.
- C. Provide all material used in sub-floor preparation and repair as recommended by the carpet manufacturer and chemically and physically compatible with the carpet system being bid.
- D. Maintain minimum 65 degrees F ambient temperature and 65% Relative Humidity for 72 hours prior to, during, and 48 hours after installation.
- E. Do not install carpet until space is enclosed and weatherproof, wet-work in space is completed and nominally dry, work above ceilings is complete, and ambient temperature and humidity conditions are and will be continuously maintained at values near those indicated for final occupancy.
- F. Extra Materials: Refer to Section 01 78 46 – Extra Stock Materials.

1.5 WARRANTY

- A. Warranty to be sole source responsibility of the Manufacturer. Second source warranties and warranties that involve parties other than the carpet manufacturer are unacceptable.
- B. If the product fails to perform as warranted when properly installed and maintained, repair or replace the affected area at the discretion of the Manufacturer.
- C. Chair Pads are not required for carpet warranty coverage.
- D. Include carpet product installed on stairs in warranty provided it is properly installed and maintained.
- E. Provide warranty for a specifically defined non-prorated period of 15 years to cover the following. “Lifetime” warranties are not acceptable.
 - 1. Excessive Surface Wear: More than 15% loss of pile fiber weight
 - 2. Excessive Static Electricity: More than 3.0 kV per AATCC 134
 - 3. Resiliency Loss of the Backing: More than 10% loss of backing resiliency
 - 4. Delamination
 - 5. Edge Ravel
 - 6. Zippering
- F. Provide an additional warranty for a minimum non-prorated period of two years and cover against shrinkage, cupping, and doming.
- G. Tuft Bind warranty in lieu of edge ravel and zippering is not acceptable.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. FIBER
 - 1. Nylon Fiber: Fiber must be premium branded nylon. Mill extruded nylon will not be accepted
 - 2. Apply durable stain inhibitor to the fiber during product manufacturing to resist fiber staining and soiling. (Minimum average of three fluorine analyses of a single composite sample per CRI TM-102: 500 ppm.)
 - 3. Fiber to contain carbon-core filament for permanent static control (*AATCC 20: Cross Section with Photo, Report on Determination of Antistat Existence*). Topical treatments not allowed.
 - 4. Dye Method: Fiber to be minimum 95% solution dyed

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2.2 BACKING CHARACTERISTICS

1. Primary Backing: Synthetic Woven or Non-Woven.
2. Pre-Coat (Fusion Coat): Sealant Vinyl
3. Secondary Backing: Vinyl Hardback. 100% reclaimed-content, nylon reinforced vinyl matrix backing is preferred and should be provided if available.
 - a. Density (ASTM D-1667): Minimum 65 lbs/cu ft +/- 5%
 - b. Fiberglass Reinforced.
 - c. 24" x 24" or 60cm

2.3 PERFORMANCE CHARACTERISTICS

- A. Test reports for the following performance assurance testing to be submitted upon request. Submitted results shall represent average results for production goods of the referenced style.
- B. Requirements listed below must be met by all products.
 1. Flooring Radiant Panel; ASTM E-648 / NFPA 253: Class 1 (CRF: 0.45 watts/sq cm or greater)
 2. Federal Flammability : CPSC FF 1-70: Passes
 3. Smoke Density: ASTM E-662 / NFPA 258: < 450 Flaming Mode
 4. Electrostatic Propensity: AATCC 134 (Step & Scuff): 3.0 kV or less
 5. Static Coefficient of Friction: ASTM C-1028: Passes ADA Requirements for Accessible Routes (minimum 0.60)
 6. Delamination of Secondary Backing of Pile Floor Coverings: ASTM D-3936: Minimum 15 lbs.
 7. Lightfastness: AATCC 16E: > 4 @ 100 hours
 8. Vetterman Drum: ASTM D-5417: Minimum 3 @ 22,000 cycles
 9. VOC Chamber Testing
 - a. ASTM D-5116: Product inclusive of "dry" adhesive system meets criteria established by the State of Washington Indoor Air Quality Specification for Carpet and/or Carpet & Rug Institute's (CRI) Indoor Air Quality Carpet Testing Program. If "dry" adhesive (2.02D) not available from manufacturer and "wet" adhesive is used to install the product, carpet and adhesive to meet CRI's Green Label requirements.
 10. Dimensional Stability: Aachen / ISO 2551: Maximum Change +/- 0.149%

2.4 SUBSTITUTES/ALTERNATES

- A. Subject to compliance with all requirements, "or equal" must match the selected colors, have similar aesthetic appearance and tuft density, vinyl backing – preferably 100% reclaimed. Substitution sample and submittals to be considered must be submitted for written approval of quality and color in accordance with bidding documents. Sample of proposed substitute must be inclusive of both the face and proposed backing (color-only sample not acceptable).

2.5 ACCESSORIES

- A. Adhesives: Product to be installed using manufacturer's recommended adhesive. Non adhesive methods are preferred and should be provided if available.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Prepare sub-floor to comply with criteria established in Manufacturer's installation instructions. Use only preparation materials that are acceptable to the Manufacturer.
 1. Remove all deleterious substances from substrate(s) that would interfere with or be harmful to the installation. (*i.e. floor wax*)
 2. Remove sub-floor ridges and bumps. Fill cracks, joints, holes, and other defects.

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- B. Verify that sub-floor is smooth and flat within specified tolerances and ready to receive carpet.
- C. Verify that substrate surface is dust-free and free of substances that would impair bonding of product to the floor.
- D. There will be no exceptions to the provisions stated in the Manufacturer's installation instructions.

3.2 INSTALLATION, GENERAL

- A. Where demountable partitions or other items are indicated for installation on top of finished carpet tile floor, install carpet tile before installation of these items.
- B. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings.
- C. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
- D. Install borders parallel to walls (where applicable).
- E. Trim carpet neatly at walls and around interruptions.
- F. Completed carpet is to be smooth and free of bubbles, puckers, and other defects.

3.3 TESTING, CLEANING, AND CERTIFICATION

- A. Remove excess adhesive and/or seam sealer from floor and wall surfaces without damage.
- B. All rubbish, wrappings, debris, trimmings, etc. to be removed from site and disposed of properly.
- C. Clean and vacuum carpet surfaces per manufacturer's instructions.
- D. After each area of carpet is installed, protect from soiling and damage by other trades.

END OF SECTION 09 68 13

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SECTION 09 72 00 - WALL COVERINGS

PART 1 - GENERAL

1.1 SYSTEM REQUIREMENTS

A. Design Requirements

1. Vinyl Wall Covering:

- a. Vinyl wall covering must be approved for desired location through the University Project Manager. The surface should be smooth and resistant to high alkaloid cleansers.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Vinyl Wall Covering: Type II, Medium or Type III, Heavy Duty per FS CCC-W-408D and CFFA-W-101D, mildew resistant and with stain-resistant coating.

1. Strippable, complying with ASTM F 793 for one of the following:

- a. Category IV, Type I, Commercial Serviceability
- b. Category V, Type II, Commercial Serviceability
- c. Category VI, Type III, Commercial Serviceability.

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 09 72 00

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SECTION 09 91 23 - INTERIOR PAINTING

PART 1 - GENERAL

1.1 SYSTEM REQUIREMENTS

- A. Design Requirements:
 - 1. Single-Source Responsibility: Provide primers and undercoats produced by and certified compatible with each other and with topcoat.
 - 2. Quality: Provide manufacturer's first line commercial products.
 - 3. Locally Available: Provide products readily available within the Denver metropolitan area in 1- and 5-gallon containers. Readily available means within 24-hours of placing order.
 - 4. Dry Film Thickness (DFT): Apply all coatings in strict conformance with manufacturer's recommendations for minimum DFT.

1.2 SUBMITTALS

- A. MSDS: Contractor to provide Material Safety Data Sheets (MSDS) for all coatings to the University Project Manager prior to application.

1.3 QUALITY ASSURANCE

- A. MPI Standards: Provide products that comply with Master Painter Institute (MPI) standards indicated and that are listed in its "MPI Approved Products List."
- B. All painting must be of journeyman level craftsmanship, paying special attention to preparation, etching, priming and undercoating.

PART 2 - PRODUCTS

2.1 BLOCK FILLERS

- A. Block Filler, Acrylic/Latex, Interior/Exterior for Concrete Masonry Unit Substrates: MPI #4

2.2 PRIMERS/SEALERS

- A. Primer, Alkali Resistant, Water Based, for Concrete Substrates: MPI #3
- B. Primer Sealer, Interior, Institutional Low Odor/No VOC, for Gypsum Board and Plaster Substrates: MPI #149
- C. Primer, Latex, for Interior Wood Substrates: MPI #39
- D. Wood-Knot Sealer: Sealer recommended in writing by topcoat manufacturer for use in paint systems indicated.

2.3 METAL PRIMERS

- A. Primer, Rust-Inhibitive, Water Based, for Ferrous-Metal Substrates: MPI #107
- B. Primer, Galvanized, Water Based, for Zinc-Coated Metal Substrates: MPI #134
- C. Primer, Quick Dry, for Aluminum Substrates: MPI #95

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2.4 WATER-BASED PAINTS

- A. Latex, Interior, Gloss (Gloss Level 6, except minimum gloss of 65 units at 60 degrees): MPI #114.
- B. Latex, Interior, Institutional Low Odor/No VOC, Flat (Gloss Level 1): MPI #143.
- C. Latex, Interior, Institutional Low Odor/No VOC, Egg-Shell (Gloss Level 2) MPI #144 or (Gloss Level 3) MPI #145.
- D. Latex, Interior, Institutional Low Odor/No VOC, Semi-Gloss (Gloss Level 5): MPI #147.

2.5 DRY FOG/FALL COATINGS

- A. Dry Fall, Latex, Flat: MPI #118.
- B. Dry Fall, Water Based, for Galvanized Steel, Flat (Gloss Level 1): MPI #133.

2.6 FLOOR COATINGS

- A. Sealer, Water Based, for Concrete Floors: MPI #99.

PART 3 - EXECUTION

3.1 INTERIOR PAINTING SCHEDULE

- A. Concrete Substrates, Nontraffic Surfaces: The following system is acceptable, high performance coating specified in SECTION 09 96 00 preferred.
 - 1. Institutional Low-Odor/No VOC Latex System: MPI INT 3.1M
 - a. Prime Coat: Primer sealer, interior, institutional low odor/No VOC, MPI #149.
 - b. Intermediate Coat: Latex, interior, institutional low odor/No VOC, matching topcoat.
 - c. Topcoat: Latex, interior, institutional low odor/No VOC, semi-gloss (Gloss Level 5), MPI #147.
- B. Concrete Substrates, Traffic Surfaces: At all concrete traffic surfaces scheduled to receive sealer.
 - 1. Water-Based Clear Sealer System: MPI INT 3.2G
 - a. First Coat: Sealer, water based, for concrete floors, MPI #99.
 - b. Topcoat: Sealer, water based, for concrete floors, MPI #99.
- C. CMU Substrates: The following system is acceptable, high performance coating specified in SECTION 09 96 00 preferred.
 - 1. Institutional Low-Odor/No VOC Latex System: MPI INT 4.2E
 - a. Block Filler: Block filler, latex, interior/exterior, MPI #4.
 - b. Intermediate Coat: Latex, interior, institutional low odor/No VOC, matching topcoat.
 - c. Topcoat: Latex, interior, institutional low odor/No VOC, semi-gloss (Gloss Level 5), MPI #147.
- D. Steel Substrates: At all steel substrates not indicated to receive high-performance coatings specified in SECTION 09 96 00.
 - 1. Water-Based Dry-Fall System (for overhead work only): MPI INT 5.1C
 - a. Prime Coat: Shop primer to be specified in Division 05.
 - b. Topcoat: Dry fall, latex, flat, MPI #118.
 - 2. Institutional Low-Odor/No VOC Latex System: MPI INT 5.1S
 - a. Prime Coat: Primer, rust-inhibitive, water based MPI #107.
 - b. Intermediate Coat: Latex, interior, institutional low odor/No VOC, matching topcoat.

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- c. Topcoat: Latex, interior, institutional low odor/No VOC, semi-gloss (Gloss Level 5), MPI #147.
- E. Galvanized-Metal Substrates: At all galvanized metal substrates not indicated to receive high-performance coatings specified in SECTION 09 96 00.
 - 1. Water-Based Dry-Fall System (for overhead work only): MPI INT 5.3H
 - a. Prime Coat: Dry fall, water based, for galvanized steel, flat (Gloss Level 1), MPI #133.
 - b. Topcoat: Dry fall, water based, for galvanized steel, flat (Gloss Level 1), MPI #133.
 - 2. Institutional Low-Odor/No VOC Latex System: MPI INT 5.3N
 - a. Prime Coat: Primer, galvanized, water based, MPI #134.
 - b. Intermediate Coat: Latex, interior, institutional low odor/No VOC, matching topcoat.
 - c. Topcoat: Latex, interior, institutional low odor/No VOC, semi-gloss (Gloss Level 5), MPI #147.
- F. Aluminum (Not Anodized or Otherwise Coated) Substrates:
 - 1. Institutional Low-Odor/No VOC Latex System: MPI INT 5.4G
 - a. Prime Coat: Primer, quick dry, for aluminum, MPI #95.
 - b. Intermediate Coat: Latex, interior, institutional low odor/No VOC, matching topcoat.
 - c. Topcoat: Latex, interior, institutional low odor/No VOC, semi-gloss (Gloss Level 5), MPI #147.
- G. Wood Substrates:
 - 1. Institutional Low-Odor/No VOC Latex System: MPI INT 6.1Q, MPI INT 6.2L, MPI INT 6.3V, and MPI INT 6.4T
 - a. Prime Coat: Primer, latex, for interior wood, MPI #39.
 - b. Intermediate Coat: Latex, interior, institutional low odor/No VOC, matching topcoat.
 - c. Topcoat: Latex, interior, institutional low odor/No VOC, semi-gloss (Gloss Level 5), MPI #147.
- H. Gypsum Board and Plaster Substrates:
 - 1. Latex System: MPI INT 9.2A. At gypsum board, GFRG, and plaster substrates scheduled to receive gloss paint.
 - a. Prime Coat: Primer sealer, latex, interior, MPI #50.
 - b. Intermediate Coat: Latex, interior, matching topcoat.
 - c. Topcoat: Latex, interior; gloss, (Gloss Level 6, except minimum gloss of 65 units at 60 degrees), MPI #114.
 - 2. Institutional Low-Odor/No VOC Latex System: MPI INT 9.2M. At all gypsum board, GFRG, and plaster substrates, unless indicated otherwise.
 - a. Prime Coat: Primer sealer, interior, institutional low odor/No VOC, MPI #149.
 - b. Intermediate Coat: Latex, interior, institutional low odor/No VOC, matching topcoat.
 - c. Topcoat: Latex, interior, institutional low odor/No VOC; Provide one of the following as indicated in Finish Schedule:
 - 1) Flat (Gloss Level 1), MPI #143
 - 2) Egg-shell (Gloss Level 2), MPI #144 or (Gloss Level 3), MPI #145
 - 3) Semi-gloss (Gloss Level 5), MPI #147
 - d. Typical Sheen: Egg-shell (Gloss Level 2 or 3) unless indicated otherwise.

END OF SECTION 09 91 23

SECTION 10 14 00 - SIGNAGE

PART 1 - GENERAL

1.1 SYSTEM REQUIREMENTS

- A. Design Requirements
 - 1. Comply with Part 1.6, B for room and door numbering and Part 1.6, C for elevator numbering.
 - 2. Include all interior signs within the construction contract.
 - 3. Update existing signage to meet current standards for renovation projects.
 - a. The signage system may be customized with input from the Facility Operations, the building administrator through the University Project Manager.
 - b. Exemption: Lawrence Street Center and CU Denver Building. Match signage to existing building signage.

1.2 DEFINITIONS

- A. Way Finding Signs:
 - 1. Type A1 – Directional by Department: Place one wall mounted sign at each corridor junction and main entry points in each building. Two signs may be used as required. Indicate which direction to go for each department, conference room, etc. Location to be most readily visible to the preponderance of the traffic flow at the intersection. The size of the sign can vary depending on the quantity of department names desired.
 - 2. Type A2 – Directional by Room Number: Place one overhead sign at each corridor junction where a wall is not available to accept a Type A1 sign. Indicate room number ranges in lieu of departments.
 - 3. Type B1 - Room Identification (Room Number with Paper Insert):
 - a. At each active corridor entrance to a room, install a sign with the room number. Not used for mechanical, electrical, janitorial, telecom, restrooms, or most storage rooms.
 - b. Paper insert (Sign Type H) content may vary and can include the following information: Administrative unit name, the name(s) of each individual(s) working in the room, and individual's title (this will be the department's option). Coordinate with the University Project Manager.
 - c. Top of sign to be 60" from the finished floor surface on the latch side of the door, with the sign edge one inch from the door frame. Where architectural constraints preclude this location, the Building Administrator will determine an alternate location through the University Project Manager.
 - 4. Type B2 – Suite Identification (Room Number with Paper Insert):
 - a. At each active corridor entrance to a suite, install a sign with the range of room numbers. Not used for mechanical, electrical, janitorial, telecom, restrooms, or most storage rooms.
 - b. Paper insert (Sign Type H) content may vary and can include the following information: Administrative unit name, the name(s) of each individual(s) working in the room, and individual's title (this will be the department's option). Coordinate with the University Project Manager.
 - c. Top of sign to be 60" from the finished floor surface on the latch side of the door, with the sign edge one inch from the door frame. Where architectural constraints preclude this location, the Building Administrator will determine an alternate location through the University Project Manager.
 - 5. Type B3 – Room Identification (no number): Typically used for additional suite or room information. Mount directly below sign type B1 or B2.
 - 6. Type B4 – Identification Frame: Typically used to hold unique sign plaques.
 - 7. Type C - Room Number: Where Room Identification Signs (Type B1 or B2) are not installed, provide a room number sign at each doorway from a corridor into a room, and each doorway from

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- one room into an adjoining room. These signs are used for mechanical, electrical, janitorial, telecom, restrooms, and most storage rooms.
- a. Provide room number signs on the corridor side of the door frame.
 - b. Mount on the head of the door frame, centered above the door.
 - c. Mount at door header height when used to identify lab alcoves and bays.
8. Type D - Restroom Identification: Used in addition to sign type C. Provide at the corridor side to designate use as men, women, unisex or shower. Sign information will show ADA accessibility as applicable.
 - a. Top of sign to be 60" from the finished floor surface on the latch side of the door, with the sign edge one inch from the door frame. Where architectural constraints preclude this location, the Building Administrator will determine an alternate location through the University Project Manager.
 9. Type E - Unique Door Identification: Where a door number is not the same as a room number (i.e. more than one door into a room) or where doors separate portions of corridors and are not associated with a room number, install signs identifying the "unique" door number.
 - a. Mount right justified on the corridor side of the door header.
 - b. Mount right justified on the both sides of the door header at doors separating portions of corridors or between two rooms.
 10. Type F - Exterior Door Identification: At the exterior face of all exterior doors, mount exterior door identification signs on the head of the door frame, centered above the door to identify the designated door number.
 11. Type G - Elevator Identification: Mount centered on elevator door frame head at each elevator. Include the University building number and elevator cab number.
 12. Type H - Paper Insert: For use with Type B1, B2, and B4. Coordinate information to be printed on paper insert with the University Project Manager.
- B. Safety/Code Signs:
1. Type L - Room Capacity: Locate at the main exit from the room.
 2. Type M1 - Outside the Stair/Stairwell: Mount adjacent to door leading into the stairwell.
 3. Type M2 - Outside the Transitional Stair/Stairwell: Mount adjacent to door leading into the stairwell.
 4. Type N - Inside the Stair/Stairwell: Mount adjacent to door leading out of the stairwell.
 5. Type P - Caution: Provide at entry to lab suites, lab alcoves, procedure rooms, dark rooms and environmental rooms. For use with Type B4. Mount below Type B signs, where applicable.
 6. Type Q - Emergency Quick Reference Guide: Mount in every public space or room, classrooms, laboratories, meeting spaces, and near red phones. Can be used to display non-emergency information.
- C. Notices and Displays: Coordinate locations with the University Project Manager.
1. Type S - Elevator Notice and Display Panels: Mount inside the elevator cab.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis of Design: ASI Sign Systems; ASI Interior 20 Series.
- B. Acceptable Manufacturers: Subject to compliance with requirements, provide products from one of the following:
1. ASI Sign Systems, Inc; 303-755-0997
 2. Forum Engraving; 303-761-8084
 3. Art Form Signs; 303-975-4641

2.2 SIGNAGE MATERIALS/COMPONENTS

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- A. Product
 - 1. Ceiling Mounted, Projected, and Wall Mounted Signs:
 - a. Text or Graphic Technique: Screen process
 - 2. Interior “Paperflex” “Inhouse” Updatable Signs
 - 3. Vinyl Die Cut Characters
- B. Materials and Components
 - 1. Fixture Aluminum Panels: Extruded aluminum, alloy AA6060, with high temperature cured polyester color coating. Provide one piece formed aluminum/photopolymer panel for ADA-Ready sizes of 3-1/4” (82.5mm) high and above.
 - 2. Face Components:
 - a. ADA-Ready Panels: Aluminum-based ASI Intouch photopolymer tactile and Braille characters with high temperature cured polyester color coating.
 - b. Graphic Panels: High-strength, cold-rolled, 1/32” (0.75 mm) aluminum alloy with high temperature cured polyester coating.
 - c. Flexible Modules: Individual injection molded Noryl letter tiles press fit to cast polycarbonate knob foil textured base.
 - 3. End Clips:
 - a. ASI 6” and 8” ADA-Ready Panels Extruded aluminum, alloy AA6060, with high temperature cured polyester color coating or similar.
 - b. ASI Panels: Injection molded plastic or similar
 - 4. Mounting Hardware:
 - a. Wall Rails: Extruded aluminum, alloy AA6060, track-type rail mounted to wall with manufacturer recommended mechanical fasteners or similar.
 - b. Adhesive: 3M VHB Adhesive Transfer Tape.
- C. Finishes:
 - 1. Colors:
 - a. Type B Room Identification Signs:
 - 1) Main Background Color: SC-903 Medium Grey
 - 2) Room number and dash: SC-906 Cool Grey
 - 3) Rule line: SC-906 Cool Grey
 - 4) Paper Insert: White
 - b. All Other Signs:
 - 1) Main Background Color: SC-903 Medium Grey
 - 2) Font: SC-922 Bone
 - 3) Rule line: SC-906 Cool Grey (where applicable)
 - 2. Surface Treatment Finish: Manufacturer’s standard two-phase finishing process.
 - a. Phase One: Chromatized priming with 2u depth chrome layer for optimum surface coat adhesion and weatherability.
 - b. Phase Two: Painting process employing two component, water-based, non-toxic, lead-free, zero emissions, high temperature cured polyester coating of 20-30u deep.
- D. Way Finding Signs: (Refer to Part 4 – Illustrations for graphical representation and sizes.)
 - 1. Type A1 – Directional by Department:
 - a. Header Panel: Provide 1-1/2” Helvetica Regular font for floor level number, and 3/4” Helvetica Regular font for building name.
 - b. Tenant Panel: Provide 5/8” Helvetica Regular font.
 - c. Mount: Wall Rails with Adhesive.
 - 2. Type A2 - Directional by Room Number:
 - a. Double Faced or Single Faced
 - b. Text: 3” Helvetica Regular, #, Condensed 80% font. Provide uppercase letters only.
 - c. Mount: Ceiling Mounted.
 - 3. Type B1 Room Identification (Room Number with Paper Insert):

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- a. Header Panel: Provide raised text, 5/8" Helvetica Regular font with 24 pt, grade II Braille 3/8" below copy. Provide uppercase letters at all letters within the room number text except the last character, where applicable.
 - b. Paper insert content, font, and character size may vary per building. Coordinate with the University Project Manager. Provide paper for insert and computer program with all fonts to the University.
 - c. Mount: Wall Rails with Adhesive.
 4. Type B2 – Suite Identification (Room Number with Paper Insert):
 - a. Header Panel: Provide raised text, 5/8" Helvetica Regular font with 24 pt, grade II Braille 3/8" below copy. Provide uppercase letters only.
 - b. Paper insert content, font, and character size may vary per building. Coordinate with the University Project Manager. Provide paper for insert and computer program with all fonts to the University.
 - c. Mount: Wall Rails with Adhesive.
 5. Type B3 – Room Identification (no number):
 - a. Provide 5/8" Helvetica Regular font. Coordinate text with the University Project Manager.
 - b. Option: Silk Screen Symbol. Coordinate with the University Project Manager.
 6. Type B4 – Identification Frame:
 - a. Mount: Wall Rails with Adhesive.
 7. Type C – Room Number:
 - a. Provide 5/8" Helvetica Regular font. Provide uppercase letters at all letters within the room number text except the last character, where applicable.
 - b. Provide second surface silk-screened copy on 1/8" phenolic.
 - c. Mount: Adhesive
 8. Type D Restroom Identification:
 - a. Header Panel: Provide 5/8" Helvetica Regular font with 24 pt, grade II Braille 3/8" below copy. Provide uppercase letters only.
 - b. Mount: Wall Rails with Adhesive.
 9. Type E – Unique Door Identification:
 - a. Provide 5/8" Helvetica Regular font. Provide uppercase letters at all letters within the door number text except the last character, where applicable.
 - b. Vinyl die-cut alpha numeric characters.
 - c. Provide appropriate contrast with door frame color to meet all applicable code requirements.
 10. Type F – Exterior Door Identification:
 - a. Provide Door Number information in 5/8" Helvetica Regular. Provide uppercase letters only.
 - b. Provide second surface silk-screened copy on 1/8" phenolic.
 - c. Mount: Adhesive
 11. Type G – Elevator Identification:
 - a. Provide 5/8" Helvetica Regular. Provide uppercase letters only.
 - b. Vinyl die-cut alpha numeric characters.
 12. Type H – Paper Insert:
 - a. Paper insert content, font, and character size may vary per building. Coordinate with the University Project Manager.
 - b. Provide paper for insert and computer program with all fonts to the University.
- E. Safety/Code Signs: (Refer to Part 4 – Illustrations for graphical representation and sizes.)
1. Type L - Room Capacity:
 - a. Provide 3/8" Helvetica Regular for text; 1/2" Helvetica Regular for numerical characters. Provide uppercase letters only.
 - b. Mount: Adhesive
 2. Type M1 - Outside the Stairwell:
 - a. Header Panel: Provide 5/8" Helvetica Regular font with 24 pt, grade II Braille 3/8" below copy. Provide uppercase letters only.

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- b. Main Panel: Provide silk screened stair symbol.
 - c. Mount: Wall Rails with Adhesive.
 - 3. Type M2 – Outside the Transitional Stair/Stairwell:
 - a. Header Panel: Provide 5/8" Helvetica Regular font with 24 pt, grade II Braille 3/8" below copy. Provide uppercase letters only.
 - b. Main Panel: Provide 1/2" Helvetica Regular. Provide uppercase letters only. Provide silk screened stair symbol.
 - c. Mount: Wall Rails with Adhesive.
 - 4. Type N – Inside the Stairwell:
 - a. Provide Helvetica Regular font with 24 pt, grade II Braille 3/8" below copy. Provide uppercase letters only.
 - b. Comply with UFC text size requirements
 - c. Mount: Adhesive
 - 5. Type P – Caution:
 - a. Coordinate with Environmental Health and Safety (EHS) through the University Project Manager.
 - 6. Type Q – Emergency Quick Reference Guide:
 - a. Basis of Design: Deflect-O Classic Image Wall Mount Sign Holder, Clear, 8-1/2"x11" Portrait
 - b. Mount: Anchors set in wall surface.
- F. Notices and Displays
 - 1. Type S – Elevator Notice and Display Panels
 - a. Provide window sign with 1/8" Clear Acrylic Panels.
 - b. Provide 1/4" stainless steel accent strips at header and footer panels. Refer to Part 4 - Illustration.
 - c. Provide Gyford Aluminum 3/16" barrel with cap; Brushed finish. Adhere caps.
 - d. Mount: Anchors set in wall surface.

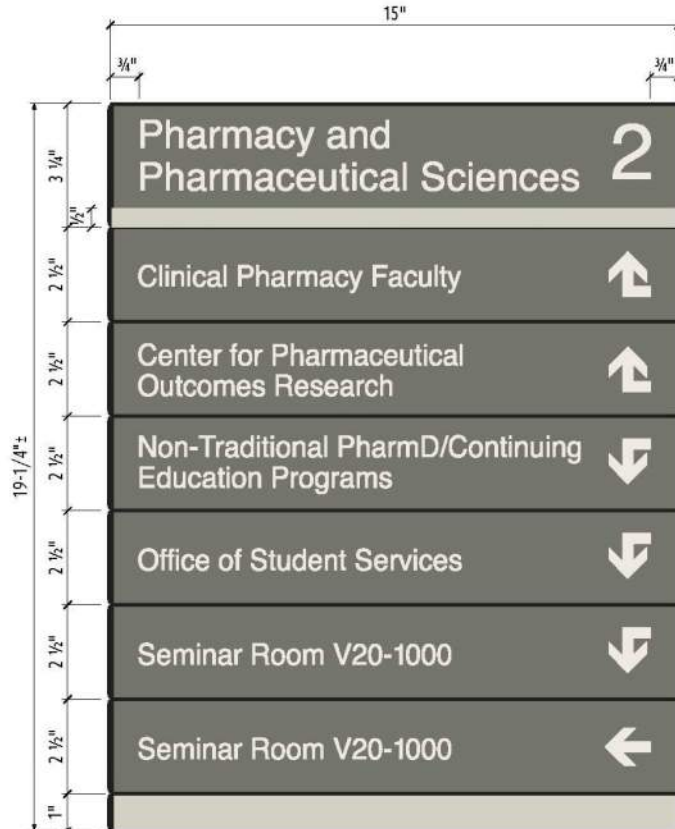
PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Mounting
 - 1. Mount all signs in accordance with ICC/ANSI 117.1-2003 and ADAAG requirements.

PART 4 - ILLUSTRATIONS

4.1 Type A1 – Directional by Department



Typical A1 Sign



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Shorter A1 Sign Option

4.2 Type A2 – Directional by Room Number



4.3 Type B1 – Room Identification (Room Number with Paper Insert)



4.4 Type B2 – Suite Identification (Room Number with Paper Insert)

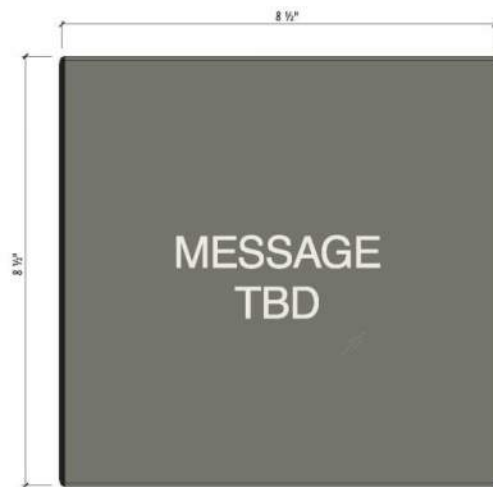
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4.5 Type B3 – Room Identification (no number)

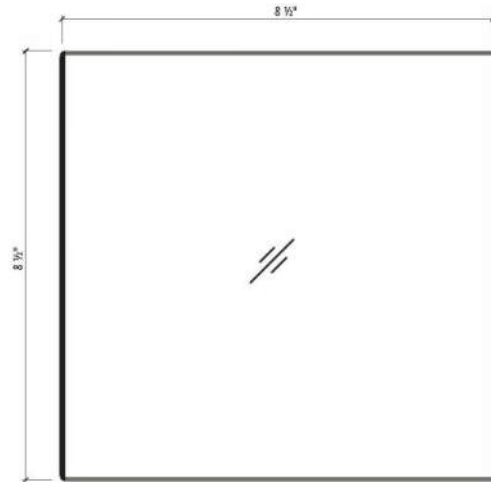


4.6 Type B4 – Identification Frame

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4.7 Type C – Room Number



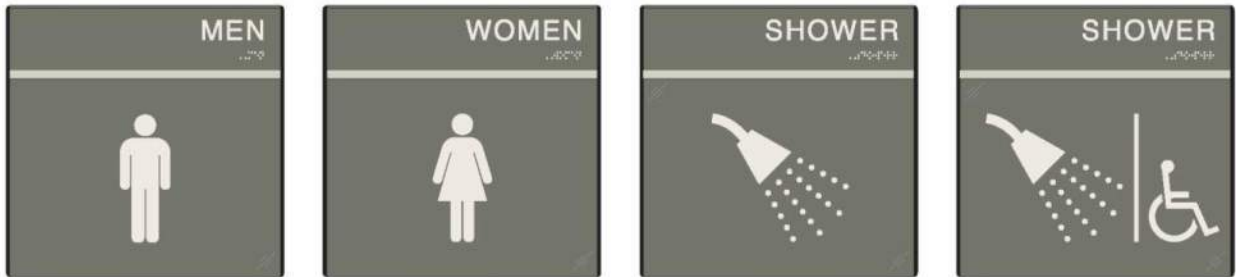
4.8 Type D - Restroom Identification



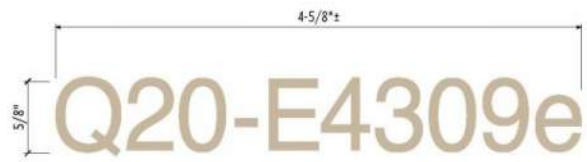
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4.9 Type E – Unique Door Identification



4.10 Type F - Exterior Door Identification



4.11 Type G - Elevator Identification

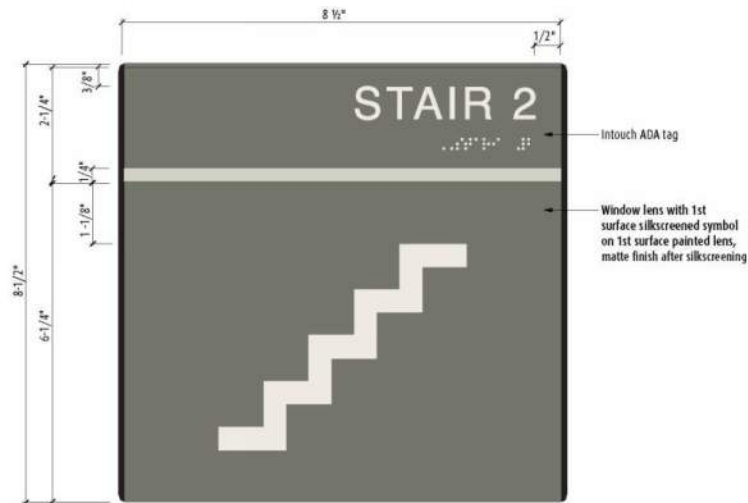


4.12 Type H – Paper Insert: No Illustration Provided.

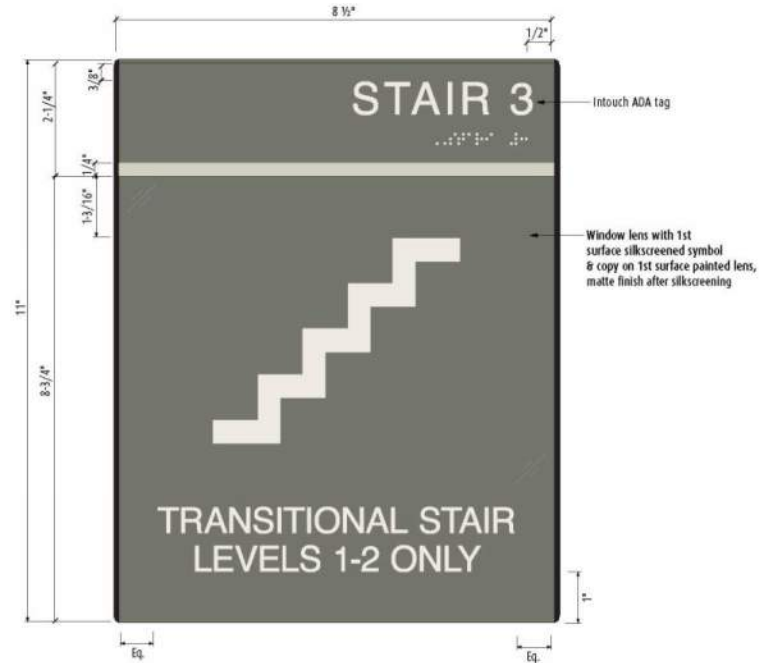
4.13 Type L: Room Capacity



4.14 Type M1: Outside the Stair/Stairwell



4.15 Type M2: Outside the Transitional Stair/Stairwell



4.16 Type N: Inside the Stair/Stairwell



4.17 Type P: Caution

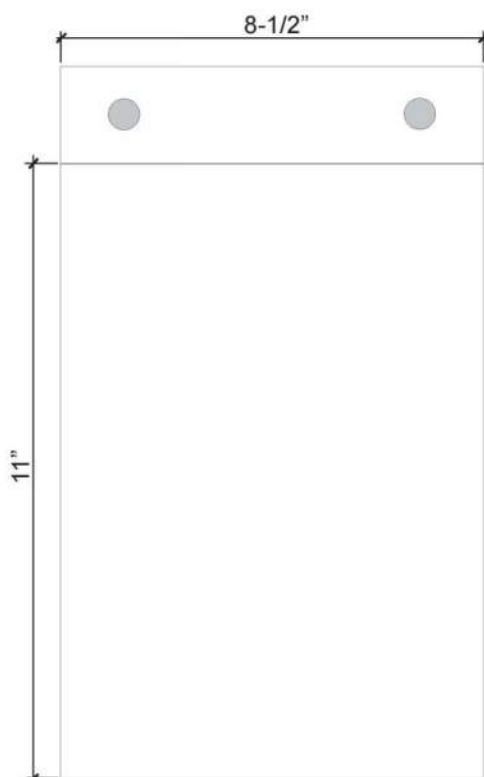
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4.18 Type Q – Emergency Quick Reference Guide

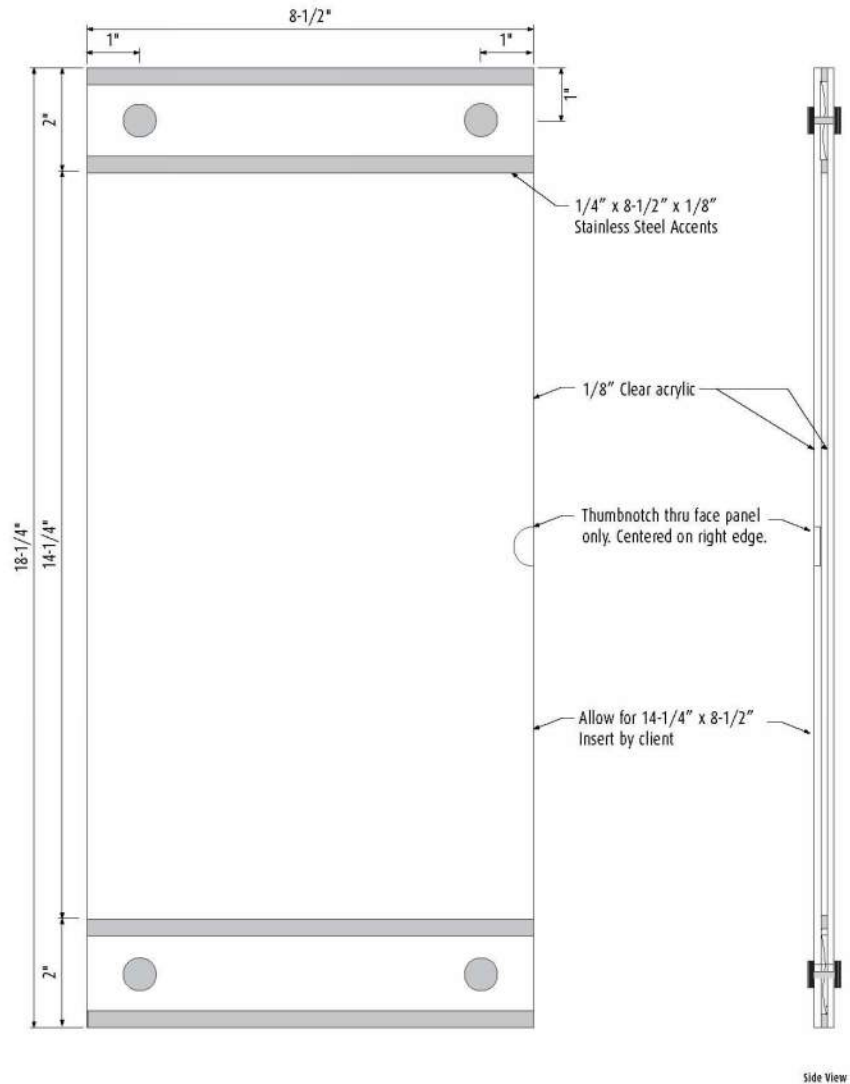


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4.19 Type S: Elevator Notice and Display Panels



END OF SECTION 10 14 00

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SECTION 11 00 00 - EQUIPMENT

PART 1 - GENERAL

1.1 SYSTEM REQUIREMENTS

- A. Design Requirements:
 - 1. Provide drains at all dock levelers.
 - 2. Fixed and Movable Equipment:
 - a. Fixed equipment shall generally be furnished and installed by the General Contractor as part of the construction contract.

PART 2 - PRODUCTS

2.1 ICE FLAKER

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Ice-O-Matic; EF-250-A-32S or a comparable product by one of the following:
 - 1. Crystal Tips.
 - 2. Scotsman.
- B. Free Standing Ice Flaker Unit
 - 1. Size: Approximately 32 inches wide, 41 inches high, 28 inches deep.
 - 2. Storage Capacity: Minimum 140 lb. self-contained insulated storage bin.
 - 3. Production Capacity: Minimum 400 lbs. of ice per 24 hour period at ambient room air temperature of 70 deg F and a water inlet temperature of 50 deg F.

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 11 00 00

SECTION 22 00 10 - PLUMBING GENERAL PROVISIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Refer to specification section 23 0010 "Mechanical General Provisions" for general provisions of the plumbing division.
- B. Refer to specification section 23 0050 "Basic Materials and Methods" for basic materials and methods also required of the plumbing division.
- C. Refer to specification section 23 0518 "Escutcheons" for requirements of the plumbing division.
- D. Refer to specification section 230553 "Identification" for piping and equipment tagging and labeling requirements for the plumbing division.

END OF SECTION 22 00 10

SECTION 22 10 06 - PLUMBING PIPING SPECIALTIES

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Backflow preventers.
- B. Water hammer arrestors.
- C. Thermostatic mixing valves.

1.2 RELATED REQUIREMENTS

- A. Section 03 3000 - Cast-in-Place Concrete
- B. Section 22 1005 - Plumbing Piping.

1.3 REFERENCE STANDARDS

- A. ASME A112.6.3 - Floor and Trench Drains; The American Society of Mechanical Engineers; 2001 (R2007).
- B. ASSE 1011 - Hose Connection Vacuum Breakers; American Society of Sanitary Engineering; 2004 (ANSI/ASSE 1011).
- C. ASSE 1012 - Backflow Preventer with Intermediate Atmospheric Vent; American Society of Sanitary Engineering; 2002 (ANSI/ASSE 1012).
- D. ASSE 1013 - Reduced Pressure Principle Backflow Preventers and Reduced Pressure Fire Protection Principle Backflow Preventers; American Society of Sanitary Engineering; 2005.
- E. ASSE 1019 - Vacuum Breaker Wall Hydrants, Freeze Resistant Automatic Draining Type; American Society of Sanitary Engineering; 2004, and Errata 2005 (ANSI/ASSE 1019).
- F. ASTM C 478 - Standard Specification for Precast Reinforced Concrete Manhole Sections; 2007.
- G. PDI-WH 201 - Water Hammer Arresters; Plumbing and Drainage Institute; 2006.

1.4 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures. 01 33 00 -Submittal Procedures
- B. Product Data: Provide component sizes, rough-in requirements, service sizes, and finishes.
- C. Shop Drawings: Indicate dimensions, weights, and placement of openings and holes.

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- D. Manufacturer's Instructions: Indicate Manufacturer's Installation Instructions: Indicate assembly and support requirements.
- E. Project Record Documents: Record actual locations of equipment, cleanouts, backflow preventers, water hammer arrestors and other plumbing specialties.
- F. Maintenance Data: Include installation instructions, spare parts lists, exploded assembly views.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Accept specialties on site in original factory packaging. Inspect for damage.

PART 2 - PRODUCTS

2.1 FLOOR DRAINS

A. Standard Floor Drain

- 1. Drain shall be with adjustable 5 round top with secured slotted grate polished nickel brass strainer and push-on pipe connection. Acceptable manufacturers:
 - a. Zurn, model FD-2320-R5 with polished brass strainer, basis of design.
 - b. Wade
 - c. Josam
 - d. Approved equivalent.

2.2 CLEANOUTS

A. Cleanouts:

- 1. Floor cleanouts shall be flush with floor with adjustable round nickel brass top, and shall be the same size as the pipe except that cleanout plugs larger than 4 inches will not be required.
- 2. Wall cleanouts shall be mounted securely in vertical stack piping and sized equal to that piping. Plugs for the wall cleanouts shall be fully recessed behind the finished face of the wall and shall accept a finished metal access cover plate.
- 3. Adjustable Top Assemblies: Top assemblies shall vary with the floor finish where it is applied. Verify floor finishes for proper top configuration with Contractor.
- 4. Acceptable products:
 - a. FCO:
 - 1) Zurn CO2500, basis of design.
 - 2) Josam
 - 3) Wade
 - 4) Approved equivalent.
 - b. WCO:
 - 1) Zurn CO2430, basis of design.
 - 2) Josam
 - 3) Wade
 - 4) Approved equivalent.

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B. Access Covers (Finished Areas)

1. Cleanouts in or behind walls shall have a round stainless steel access cover and frame embedded flush with the finished wall. The cover shall be of ample size to provide a clear access to the cleanout. Do not install access covers on cleanouts in unfinished areas.
2. Acceptable manufacturers:
 - a. Zurn CO2530, basis of design.
 - b. Josam
 - c. Wade
 - d. Approved equivalent.

2.3 BACKFLOW PREVENTERS

A. Reduced Pressure Backflow Preventers:

1. ASSE 1013; bronze body with bronze internal parts and stainless steel springs; two independently operating, spring loaded check valves; diaphragm type differential pressure relief valve located between check valves; third check valve that opens under back pressure in case of diaphragm failure; non-threaded vent outlet; assembled with two butterfly valves, strainer, and four test cocks.
2. 2" AND SMALLER
 - a. The Reduced Pressure Zone Assembly shall consist of a pressure differential relief valve located in a zone between two positive seating check valves. Back-siphonage protection shall include the provision to admit air directly into the reduced pressure zone via a separate channel or directly into the supply pipe via a separate vent. The assembly shall include two tightly closing shutoff valves before and after the assembly, test cocks, and a protective strainer upstream of the number one shutoff valve. The assembly shall be rated for temperatures up to 140degF and shall meet the requirements of ASSE Standard 1013; AWWA Standard C-511-92 CSAB64,4; FCCCHR of USC Manual Section 10. Listed by IAPMO 9UPC).
 - b. Watts Model 909.

2.4 WATER HAMMER ARRESTORS

A. Manufacturers:

1. Watts Regulator Company; Model SG: www.wattsregulator.com.
2. Zurn Industries, Inc: www.zurn.com.
3. Substitutions: See Section 01 60 00 - Product Requirements.

B. Water Hammer Arrestors:

1. Stainless steel construction, bellows type sized in accordance with PDI-WH 201, precharged suitable for operation in temperature range -100 to 300 degrees F and maximum 250 psi working pressure.

2.5 MIXING VALVES

A. Thermostatic Mixing Valves:

1. Manufacturers:

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- a. Speakman; Model SE 362: www.speakmancompany.com, basis of design.
- b. Leonard Valve Company: www.leonardvalve.com.
- c. Lawler Valve Company: www.lawlervalve.com
2. Substitutions: See Section 01 60 00 - Product Requirements. Valve: Chrome plated cast brass body, stainless steel or copper alloy bellows, integral temperature adjustment.
3. Capacity: 3 gpm at 95 degrees F.
4. Fail in full cold flow mode.
5. User adjustable temperature control.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Extend cleanouts to finished floor or wall surface. Lubricate threaded cleanout plugs with mixture of graphite and linseed oil. Ensure clearance at cleanout for rodding of drainage system.
- C. Install floor cleanouts at elevation to accommodate finished floor.
- D. Install approved portable water protection devices on plumbing lines where contamination of domestic water may occur; on boiler feed water lines, janitor rooms, fire sprinkler systems, premise isolation, irrigation systems, flush valves, interior and exterior hose bibbs.
- E. Pipe relief from backflow preventer to nearest drain.
- F. Install water hammer arresters on hot and cold water supply piping to each fixture or group of fixtures (each washroom). Fabricate same size as supply pipe or 3/4 inch minimum, and minimum 18 inches long.

3.2 PIPE CLEANOUTS

- A. Cleanouts installed in connection with cast iron soil pipe shall consist of a long sweep 1/4 bend or one or two 1/8 bends extended to place of access or as shown on the drawings. An extra heavy cast brass ferrule with countersunk head screw plug shall be caulked into the hub of the fitting and shall be flush with the floor. Cleanouts in connection with other pipe shall be T pattern, 90-degree branch drainage fittings with screw cast brass plugs of the same size as the pipe up to and including 4 inches. Cleanout tee branches with screw plug shall be installed at the foot of soil and waste stacks and on each building drain outside the building. Cleanout tee branches may be omitted on stacks in single story buildings with slab on grade construction or where less than 18 inches of crawl space is provided under the floor. Cleanouts on pipe concealed in partitions and walls shall be provided with chromium plated cast brass covers secured to plugs.

3.3 ACCESS COVERS

- A. Access covers shall be installed to provide easy and complete access to the cleanout plug. Due consideration of wall construction must be given to allow for proper installation of frame and the installation shall be coordinated with the Contractor.

END OF SECTION 22 10 06

SECTION 23 00 10 - MECHANICAL GENERAL PROVISIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The General Conditions, Special Conditions and Contract Documents are part of these specifications. Consult them further instructions and be governed by the requirements thereunder.

1.2 DESCRIPTION

A. Work Included

- 1. Furnish all labor and materials and perform all operations necessary for the installation of complete and operating mechanical systems subject to the conditions of the contract. The work also includes the completion of such mechanical and electrical details not mentioned or shown which are necessary for the successful operation of all systems; this includes the furnishing of all materials for filling systems to make them operable, including water, refrigerant, oil, grease, antifreeze and brine. Prove satisfactory operation of all equipment and controls to the MECHANICAL ENGINEER on request.

B. Work Not Included

- 1. Certain labor and materials may be furnished and/or installed under other divisions of these specifications. Coordinate with other trades and arrange the work to make the parts fit together. The following items are to be accomplished under other divisions of these specifications.
 - a. Temporary Heat: See "Temporary Heat" Paragraph in Part 1 of this Specification Section and Division 01.
 - b. Concrete: See "Concrete" Paragraph in Part 3 of this Specification Section.
 - c. Electrical Equipment and Wiring: See "Electrical Equipment and Wiring for Mechanical Division" Paragraph in Part 3 of this Specification Section.

C. Equipment Furnished by Owner

- 1. The Owner will award contracts, which will commence concurrently with this contract. Specifically this work will include:
 - a. Equipment Installation: Refer to appropriate drawings for equipment furnished by the Owner.
- 2. Rough-in service pipes to locations as required by architectural and mechanical drawings and equipment shop drawings. Provide service valves on all pipes except waste and vent pipes, plug or cap these. Final connections to equipment shall be made by Contractor.

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1.3 PROVISIONS

- A. Work performed under this division of the specifications shall conform to the requirements of Division 1, and the mechanical drawings and all items hereinafter specified.
 - 1. Prior to any work being performed under this division, examine architectural, and electrical specifications. If any discrepancies occur between them and the mechanical drawings and specifications, report discrepancies to the Architect in writing and obtain written instructions for the work.
 - 2. Mechanical drawings are diagrammatic, but shall be followed as closely as actual construction of the building will permit. All changes from drawings necessary to make the mechanical work conform to the building as constructed shall be made without additional cost to the Owner.
 - 3. Coordinate the mechanical work with the General Contractor and be responsible to him for satisfactory progress of the work. Coordinate mechanical work with all other trades on the project without additional cost to the Owner.
 - 4. All work and materials covered by drawings and specifications shall be subject to review at any time by representatives of the Architect and Owner. If the Architect or Owner's agent finds any materials or installation that does not conform to these drawings and specifications, Contractor shall remove the material from the premises and correct the installation to the satisfaction of the agent.
 - 5. In acceptance or rejection of installed mechanical systems, no allowance will be made for lack of skill on the part of the installers.

1.4 EXAMINATION OF PREMISES/SITE

- A. Visit the premises site before submitting bid as no extras will be allowed for lack of knowledge of existing conditions.

1.5 CODES AND STANDARDS

- A. Conform to applicable sections of NFPA 13 and 24.
- B. Conform to the National Electrical Code, 2014 Edition.
- C. Conform to all applicable State and Local Codes.
- D. In case of difference between these specifications, codes, laws, industry standards, and/or utility company regulations the most stringent shall govern.
- E. Americans with Disabilities Acts (ADA) and American National Standards Institute (ANSI) 117.
- F. American Institute of Architects (AIA) "Guidelines for Design and Construction of Hospital and Healthcare Facilities 2006 Edition.
- G. Joint Commission for Accreditation of Healthcare Organizations (JCAHO).

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1.6 PERMITS, FEES AND NOTICES

- A. Apply for and pay for all permits, fees, licenses and inspections for this Division of work.
- B. Notify proper authorities when work is ready for inspections required by applicable codes, rules and regulations, allowing sufficient time for inspections to be made without hindering progress of the work. Furnish to the Owner copies of inspection certificates of acceptance.

1.7 EXISTING CONDITIONS

- A. Existing systems and conditions shown on drawings for existing buildings are to be noted "for guidance only". The Mechanical Contractor shall field check all existing conditions prior to bidding and is to include in his bid an allowance for removal and/or relocation of existing ductwork, piping, fixtures, or other equipment and adapt new and existing mechanical system to all other work as required.
- B. Existing ductwork, equipment, piping, etc. which are not indicated for reuse become the property of the Contractor. However, fixtures, pumps, fans, fire protection equipment, etc. shall become the property of the Owner unless noted otherwise.
- C. System outages shall be permitted only at times approved by Owner-in writing. Work which could result in an accidental outage shall be performed with the Owner's maintenance personnel advised of such work.
- D. Service shall be maintained to existing areas during construction.

1.8 DRAWINGS

- A. Mechanical drawings are diagrammatic and are not to be scaled for dimensions. Take all dimensions from Architectural drawings, certified equipment drawings, and from the structure itself before fabricating any work. Verify all space requirements, coordinating with other trades, and install the systems in the space provided without extra charges to the Owner.
- B. Conceal all piping in finished areas of the building except where otherwise noted on the drawings.
- C. Install all equipment in accordance with manufacturer's recommendations, unless approval is given in writing by the MECHANICAL ENGINEER for deviation.

1.9 EXAMINATION OF BIDDING DOCUMENTS

- A. Each bidder shall examine the bidding documents carefully, and not later than seven days prior to the date of receipt of bids, shall make written request to the Architect for interpretation or correction of any discrepancies, ambiguity, inconsistency, or error therein which he may discover. Any interpretation or correction will be issued as an addendum by the Architect. Only a written interpretation or correction by addendum shall be binding. No bidder shall rely upon interpretations or corrections given by any other method. If discrepancies, ambiguity, inconsistency, or error are not covered by addendum or written directive, Contractor shall

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include in his bid, labor materials and methods of construction resulting in higher cost. After award of contract, no allowance or extra compensation will be made on behalf of the Contractor due to his failure to make the written requests as described above.

- B. The person submitting the request will be responsible for its prompt delivery. Failure to so request clarification of any inadequacy, omission, or conflict will not relieve the Contractor of responsibility. The signing of the Contract will be considered as implicitly denoting that the Contractor has a thorough comprehension of full intent and scope of the working drawings and specifications.

1.10 ROUGH-IN

- A. Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment.
- B. Refer to equipment specifications in other Divisions for additional rough-in requirements.

1.11 ACCESS DOORS

- A. Furnish access doors of type suitable to Architect and provide to General Contractor to construct into the building. Access doors should be provided in all locations where access is required.
- B. Provide painted, steel (unless noted otherwise) access doors with key lock suitable for the surface in which they are installed and satisfactory to the Architect.
 - 1. Plaster finish walls and ceilings: Recessed style.
 - 2. Acoustical tile ceilings: Recessed type.
 - 3. Drywall walls and ceilings: Flush panel.
 - 4. Remodel Applications: Flanged flush panel.
 - 5. Corrosive environments, including but not limited to, restrooms, locker rooms, pool equipment rooms, and natatoriums: Panel and frame shall be aluminum or stainless steel. All associated hardware and fasteners shall be stainless steel.
 - 6. Panels in fire and/or smoke rated assemblies shall be listed for the application and carry the appropriate rating for the assembly in which they are installed.

1.12 COORDINATION DRAWINGS

- A. Prepare and submit a set of coordination drawings showing major elements, components, and systems of mechanical equipment and materials in relationship with other building components. Prepare drawings to an accurate scale of 1/4"=1'-0" or larger. Indicate the locations of all equipment and materials, including clearances for servicing and maintaining equipment. Indicate movement and positioning of large equipment into the building during construction.
- B. Prepare floor plans, reflected ceiling plans, elevations, sections, and details to conclusively coordinate where space is limited, and where sequencing and coordination of installations are of importance to the efficient flow of the Work, including (but not necessary limited) to the following:
 - 1. Ductwork
 - 2. Hydronic Piping
 - 3. Plumbing Piping
 - 4. Fire sprinkler piping
 - 5. Electrical conduit mains

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1.13 MECHANICAL INSTALLATIONS

- A. Coordinate mechanical equipment and materials installation with other building components.
- B. Verify all dimensions by field measurements.
- C. Arrange for chases, slots, and openings in other building components to allow for mechanical installations.
- D. Sequence, coordinate, and integrate installations of mechanical materials and equipment for efficient flow of the Work. Give particular attention to large equipment requiring positioning prior to closing-in the building.
- E. Coordinate the cutting and patching of building components to accommodate the installation of mechanical equipment and materials.
- F. Where mounting heights are not detailed or dimensioned, install mechanical services and overhead equipment to provide the maximum headroom possible, and in accordance with minimum required clearances as specified in codes and regulations.
- G. The word “concealed” as used in this specification refers to such spaces as pipe and duct chases, pipe and duct trenches, above plastered ceilings, in walls and buried where pipe and/or duct is inaccessible when building is complete. “Exposed” is intended to be within equipment rooms, unfinished areas, above “push up” ceilings, accessible pipe and duct tunnels.
- H. The term “furnish” means supply and deliver to Project, unless otherwise defined in greater detail. The term “install” is used to describe operations at Project, from inspecting and unloading, to completion in place, ready for intended use. The term “provide” means furnish and install, complete and ready for intended use, unless otherwise defined in greater detail.

1.14 SUBMITTALS

- A. Submit under provisions of Division 1.
- B. Proposed Product List: Include Products specified in Divisions 21, 22 and 23 specifications.
- C. Submit shop drawings and product data grouped to include complete submittals of related systems, Products, and accessories in a single submittal.
- D. Mark dimensions and values in units to match those specified.
- E. Submit miscellaneous items specified on the drawings, but not covered in the specifications. Make no substitutions without prior approval from the Architect.

1.15 SHOP DRAWINGS

- A. Submit shop drawings on all equipment, Temperature Controls and Fire Protection. Provide shop drawings to the Architect and Engineer showing locations of all access panels.
- B. Shop drawings required for this project are as follows:
 - 1. Plumbing fixtures

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2. Insulation
 3. Fire Protection
 4. Piping, Valves and appurtenances.
 5. Temperature controls
 6. VAV terminals
- C. Present shop drawing submittal data at one time, indexed in a neat and orderly manner. Partial submittals will not be accepted. Provide five sets of submittal data, unless noted otherwise in Division 1. Do not begin work until one (1) copy is returned.
- D. Place orders for all equipment in time to prevent any delay in construction schedule or completion of project. If any materials or equipment are not ordered in time, additional charges made by equipment manufacturers to complete their equipment in time to meet construction schedule, together with any special handling charges, shall be borne by the Contractor.
- E. Contractor agrees that shop drawing submittals processed by the engineer are not change orders. The purpose of shop drawing submittals by the Contractor is to demonstrate to the engineer that the Contractor understands the design concept, that he demonstrates his understanding by indicating which equipment and material he intends to furnish and install and by detailing the fabrication and installation methods he intends to use. Contractor further agrees that if deviations, discrepancies, or conflicts between shop drawing submittals and contract documents in the form of design drawings and specifications are discovered either prior to or after shop drawings and specifications shall control and shall be followed.
- F. Contractor to provide manufacturers' recommended installation manuals for equipment.
- G. Review of shop drawings does not relieve this Contractor from the responsibility of furnishing equipment and materials of proper dimension, size, quantity, quality and all performance characteristics to efficiently perform the requirements and intent of the contract documents. Review does not relieve this Contractor from responsibility for errors on the shop drawings. If the shop drawings deviate from the contract documents, advise the MECHANICAL ENGINEER of the deviations in writing accompanying the shop drawings, including the reasons for the deviations. Coordinate all required changes with the other trades affected. If the changes are occasioned by the Contractor, he shall pay any costs involved.
- 1.16 PROJECT/SITE CONDITIONS
- A. Install Work in locations shown on Drawings, unless prevented by Project conditions.
- B. Prepare drawings showing proposed rearrangement of Work to meet Project conditions, including changes to Work specified in other sections. Obtain permission of Architect before proceeding.
- 1.17 PROJECT RECORD DRAWINGS
- A. During the process of the work, maintain an accurate record of the installation of the mechanical systems. Upon completion of the mechanical systems installation, transfer all record data to blue-line prints of the original drawings. Drawings shall include all addendum items, charge orders, alternations, reroutings, etc. As a condition of acceptance of the project, deliver to the Architect one copy of the record drawings.

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1.18 WARRANTY

- A. All materials and equipment shall be new unless otherwise specified.
- B. Guarantee all workmanship, materials and equipment and replace any found defective without cost to the Owner, for one year after final acceptance, as defined in General Conditions.
- C. Each warranty for longer than the one year described above (that comes with equipment used on the job) shall be passed on to the owner with dates of start and end of the warranty.

1.19 ENGINEERING BY CONTRACTOR

- A. The construction of this building requires the contractor to design several systems or subsystems. All such design shall be the completed responsibility of the contractor.
- B. Systems or subsystems which require engineering responsibility by the contractor include, but are not limited to:
 - 1. Fire sprinkler.
 - 2. Equipment supports, not fully detailed in the drawings.
 - 3. Pipe hangers and anchors not specified in these documents, or catalogued by the manufacturer.
 - 4. Temperature controls.

PART 2 - PRODUCTS

2.1 EQUIPMENT MANUFACTURER

- A. Equipment in the following categories shall be of one manufacturer or available through one manufacturer for each category to facilitate ease of maintenance for the Owner.
 - 1. Temperature Controls shall be by Johnson Controls, Inc.
 - 2. Plumbing Fixture Trim
 - 3. Thermometers
 - 4. Pressure Gauges
 - 5. Butterfly Valves
 - 6. Plug Valves
 - 7. Globe Valves
 - 8. Check Valves
 - 9. Balancing Valves
 - 10. Traps
 - 11. Dielectric Unions
 - 12. Air Filters
 - 13. Access Doors

2.2 SUBSTITUTIONS (PRIOR APPROVALS)

- A. Bidder's Choice
 - 1. Materials, equipment or services listed by several identifying names are intended to be bidder's

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choice, and any of the listed names may be bid without soliciting prior acceptance. Where more than one name is given in the specifications, the first named manufacturer's material, equipment or services is contemplated and any changes and their costs, required to accommodate the other named material or equipment as well as space requirements for the other named materials or equipment, must be assumed by the Contractor in his bid. (See Shop Drawing Requirement).

B. Performance Specification

1. When any product is specified only by requirement to meet an industry standard or regulating body standard (such as U.L., AGA, AWWA, ANSI, etc.) and the item proposed carries approval of that body, no prior acceptance by the MECHANICAL ENGINEER is needed.
2. When any product or service is specified by requirement to meet a performance standard or is specified by a generic specification, (no manufacturers name listed) no prior acceptance by the MECHANICAL ENGINEER is needed except as specifically called for in these specifications.

C. Acceptance

1. Material and equipment specified is used as a basis of standard, and while not specifically mentioned, material gauges, weights, appearance and space requirements must be met by any substitutions.
2. Action for substitutions specified herein will be given only after the receipt of complete data showing performance over entire range, physical dimensions and material construction all SPECIFICALLY marked for the individual item. Letter of transmittal with at least one (1) copy and one (1) marked up copy of all descriptive data shall be submitted to the MECHANICAL ENGINEER'S Office.
3. Submit shop drawings for all materials and equipment other than the first named in theses specifications showing any changes required in piping, ducting, electrical wiring, space allocation etc. Be responsible to make all changes required to accommodate and to pay for these changes. Coordinate changes required with all other trades. Pay for all changes resulting from re-arranging equipment.
4. See General Conditions for method of notification of acceptance.

2.3 SAFETY PROVISIONS

- A. Any refrigeration system containing CFC-11, CFC-12, HCFC-123, HCFC-22, or any of the other refrigerants listed in the Clean Air Act as a Class I or Class II Ozone Depleting Compound shall comply with the Clean Air Acts.
- B. As a minimum all systems shall be equipped with refrigerant recovery service valves, relief valves capable of resetting after activation, and for system with more than 50 pounds of charge, and isolateable receiver and/or condenser capable of holding the complete charge.

PART 3 - EXECUTION

3.1 STORAGE

- A. Provide for proper storage of all materials and equipment and assume responsibility for losses due to any cause. All storage shall be within the contact limit lines of the building site. Cover and store all equipment and materials out of elements; any rusted or weather damaged item shall not be used.

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3.2 PRODUCT INSTALLATION

A. Manufacturer's Instructions

1. Except where more stringent requirements are indicated, comply with the product manufacturer's instructions and recommendations.
2. Consult with manufacturer's technical representatives, who are recognized as technical experts, for specific instructions on special project conditions.
3. If a conflict exists, notify the Architect/Engineer in writing and obtain his instruction before proceeding with the work in question.

B. Movement of Equipment

1. Wherever possible, arrange for the movement and positioning of equipment so that enclosing partitions, walls and roofs will not be delayed or need to be removed.
2. Otherwise, advise Contractor of opening requirements to be maintained for the subsequent entry of equipment.

C. Heavy Equipment

1. Coordinate the movement of heavy items with shoring and bracing so that the building structure will not be overloaded during the movement and installation.
2. Where mechanical products to be installed on the existing roof are too heavy to be hand-carried, do not transport across the existing roof deck; position by crane or other device so as to avoid overloading the roof deck.

D. Clearances

1. Install piping and ductwork:
 - a. Straight and true.
 - b. Aligned with other work.
 - c. Close to walls and overhead structure (allowing for insulation).
 - d. Concealed, where possible, in occupied spaces.
 - e. Out-of-the-way with maximum passageway and headroom remaining in each space.
2. Except as otherwise indicated, arrange mechanical services and overhead equipment with a minimum of:
 - a. 7'0" headroom in storage spaces.
 - b. 8'6" headroom in other spaces.
3. Do not obstruct windows, doors or other openings.
4. Give the right-of way to piping systems required to slope for drainage (over other service lines and ductwork).
5. Offsets, transitions and changes in direction in pipes and ducts shall be made as required to maintain proper head room and pitch of sloping pipes whether or not indicated on the drawings. Furnish and install all traps, air vents, sanitary vents, etc., as required to affect these offsets, transitions and changes in direction.

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E. Access

1. Install all work to permit removal (without damage to other parts) of coils, heat exchanger bundles, boiler tubes, fan shafts and wheels, filters, belt guards, sheaves and drives, and all other parts which might require periodic replacement or maintenance. Arrange pipes, ducts, and equipment to permit ready access to valves, traps, starters, motors, control components and to clear the openings of doors and of access panels. Furnish access panels for all mechanical equipment and valves requiring access in concealed locations for installation by contractor.

3.3 PROTECTION OF WORK AND PROPERTY

- A. Where there are existing facilities, be responsible for the protection thereof, whether or not such facility is to be removed or relocated. Moving or removing any facility must be done so as not to cause interruption of the work of Owner's operation.
- B. Close all pipe and duct openings with caps or plugs during installation. Cover all fixtures and equipment and protect against injury. At the final completion, clean all work and deliver in an unblemished condition, or refinish and repaint at the discretion of the Architect.
- C. Do not allow any fans in the HVAC system to operate before the area served by the fan has been cleaned and vacuumed of all debris and dust which might enter the system.
- D. Any equipment, duct or piping systems found to have been damaged or contaminated above "MILL" or "SHOP" conditions shall be replaced or cleaned to the Engineer's satisfaction.
- E. Initial fill of traps
 1. Provide initial water seal fill for all waste p-traps, condensate traps, or similar traps.

3.4 PROTECTION OF POTABLE WATER SYSTEMS

- A. All temporary water connections shall be made with an approved back flow preventer.
- B. All hose bibbs shall have, as a minimum, a vacuum breaker to prevent back flow.
- C. Direct connections to hydronic systems shall only be made through a reduced pressure back flow preventer.

3.5 PROTECTION OF SYSTEMS SERVING OCCUPIED SPACES

- A. Where work is being performed in occupied spaces, or occupancy is to be phased in with ongoing construction contractor shall prevent contamination of all systems serving the occupants including but not limited to:
 1. Supply or return air
 - a. Systems shall be capped or provided with adequate particulate and gas phase filtration to prevent dust, chemical, or biological contamination. Particulate filters shall be as a minimum equivalent to those specified for the completed system.

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2. Domestic Water

- a. Isolate sterilized portions from non-sterilized portions.

3.6 REFRIGERATION SYSTEMS

- A. All technicians involved in the installation of refrigeration systems shall be certified and trained in accordance with the applicable sections of the Clean Air Act.
- B. No refrigerant shall be intentionally vented to the atmosphere. All refrigerant shall be recovered before opening a closed system for charging, evacuation, service, installation, or demolition.

3.7 ASBESTOS

- A. The identification and/or abatement of asbestos hazards is not part of this contract.
1. If asbestos is encountered, contact Owner for instructions.

3.8 DEMONSTRATION

- A. Refer to Division 1 sections of the specifications regarding requirements of Record Drawings and Operation and maintenance Manual submittal and systems demonstration.
1. Demonstrate that each system operates properly.
2. Explain the operation of each system to the Owner's Representative. Explain use of O&M manual in operating and maintaining systems.
- B. Date and time of demonstration will be determined by the Owner.

3.9 CONCRETE

- A. All poured in place concrete shall be furnished under the Architectural Divisions of these Specifications.

3.10 ELECTRICAL EQUIPMENT AND WIRING FOR MECHANICAL DIVISION

- A. Unless otherwise indicated, all motors and controls shall be furnished, set in place and wired in accordance with the following schedule. (MD is Mechanical Division - ED is Electrical Division).

ITEM	FURNISHED UNDER	SET IN PLACE OR MOUNTED UNDER	WIRED AND CONNECTED UNDER
1. Equipment Motors and Thermal overloads, resistance heaters (c).	MD	MD	ED
2. Motor Controllers; magnetic starters, reduced voltage starters and overload relays.	MD	ED(a)	ED
3. Disconnect switches, fused or unfused,	ED(a)	ED(a)	ED

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	H.P. rated switches, thermal overload switches and fuses, manual operating switches.			
4.	Push-button stations, pilot lights, multi-speed switches, float switches, thermostats, control relays, time clocks, control transformers, control panels, motor valves, damper motors, solenoid valves, EP and PE switches and interlocks.	MD	MD(b)	MD(b)
5.	120 volt power for Building Automation System (BAS) panels, fire protection and boiler controls	ED	ED	ED
6.	Fire/smoke dampers, elevator vent dampers	MD	MD	ED(c)

Notes:

- a. If furnished as part of factory wired equipment, wiring and connections only by ED.
- b. If any of these devices carry the full load current to any motor or resistive element(s) they shall be connected by ED. Control devices carrying full load current furnished by MD and wired by ED shall be located at the device being controlled, unless shown on drawings or mutual agreement is made between the contractors with no change in the contract price.
- c. Wiring from alarm contacts to alarm system by ED; all control function wiring by MD. Duct detectors furnished by ED, set in place by MD.

General Note: The above list does not attempt to include all components. All items necessary for a complete system shall be included in the base contract.

- B. Connections to all controls directly attached to ducts, piping and mechanical equipment shall be made with flexible connectors.

3.11 IDENTIFICATION

- A. Refer to Section 230553 "Identification for HVAC Piping and Equipment" for pipe, duct, and equipment labeling and valve tagging and scheduling requirements.

3.12 FLUSHING, CLEANING & STERILIZING

- A. Intent: It is the intent of this specification to require that all work, including the inside of equipment, be left in a clean condition with all dust, grease, and construction debris removed.
1. Piping and connection equipment to be left free of sediments, core sand, grease, etc.
 2. Clean all exposed surfaces of piping, ducts and hangers, etc., sufficiently to receive paint. Vacuum ducts as required for debris removal.
 3. Air systems shall not be operated without filters. Replace the filters or clean permanent type filters just prior to substantial completion. All air systems shall be furnished with one additional set of filters for owner replacement.
 4. Remove and clean all screens, interceptors, strainers, etc., in piping systems just prior to substantial completion.

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5. Clean and wipe dry all plumbing fixtures, exposed valves, faucets, and piping, etc. that are exposed just prior to substantial completion. Clean all equipment and fixtures per manufacturer's specifications to avoid scratching finished surfaces. Leave all plumbing fixtures ready to use.
 6. Clean interior and exterior of all air handling equipment of all construction debris. Clean exterior of all exposed ductwork just prior to substantial completion.
 7. Thoroughly clean all equipment room floors after completion of equipment, pipe and duct cleaning. A condition of final acceptance will be the cleanliness of all exposed systems, equipment, and equipment rooms.
- B. Before final connections are made in the piping systems, blow out all piping with air and then wash out with cleaning compounds. Then flush the system to remove of all foreign materials. Furnish all temporary connections, valves, etc, required for this purpose. Clean the boiler and chiller by the same procedure.
- C. Clean the boiler by the same procedure.
- D. After flushing, sterilize the domestic water system in accordance with Section 221116.

3.13 TESTING

- A. Test all drain and waste lines with standing water test of twelve feet of head, held long enough to visually inspect each joint.
- B. Test all heating water and reduced pressure domestic water piping at 150 psig hydrostatic pressure before connecting to unit.
- C. Test all high pressure steam and condensate, domestic water service lines to PRV, fire lines, radiant panel (embedded in concrete) and anti-freeze piping at 200 psig hydro static pressure.
- D. Test all air, oil and gas piping under 60 psig air pressure.
- E. Test all refrigeration piping under 150 psig pressure using oil pumped, dry nitrogen and tapping of joints if there is any loss of pressure, soap each joint to find leaks. Charge with 10 psig refrigerant and test with halide torch or electronic leak detector. Evacuate using vacuum pump to 500 microns and purge twice with oil pumped, dry nitrogen.
- F. All tests must be done to the satisfaction of the local authorities having jurisdiction, before covering.
- G. All hydrostatic tests to be held for a minimum of six hours without loss of pressure. Air tests to be held for a minimum of two hours without loss of pressure.
- H. Furnish all instruments required for testing.

3.14 PLACING IN OPERATION

- A. Clean all ducts, pipes, equipment, controls etc., of plaster and other foreign debris.
- B. Before final acceptance, clean or replace all strainers, oil or grease all bearings and clean out all drains. Clean and recoat all permanent filters, replace throwaway type filters with new filters.
- C. The systems shall be put into operation.

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1. The Contractor shall verify that all controls are set to meet operating conditions specified.
2. The contractor shall verify that all pieces of equipment are operable and that all sequences of control are being met.
3. The contractor to adjust settings through 1st year as required by MECHANICAL ENGINEER.

3.15 TESTING, ADJUSTING AND BALANCING

- A. Refer to Section 230593 Testing, Adjusting and Balancing.

3.16 OPERATION AND MAINTENANCE INSTRUCTIONS

- A. Books of Operating and Maintenance Instructions shall be personally delivered to the Owner's authorized representative and the Owner instructed as to their use and the equipment involved. (Provide two books for each building). Also, instruct the Owner's personnel on each valve and the valve chart previously specified.
- B. The book shall contain, but not be limited to, the following general items:
 1. Construction phase submittals, including engineer's response and any subsequent revised submittals.
 2. Spare parts lists for each piece of equipment.
 3. Operating manuals for each piece of equipment and control.
 4. Lubrication charts showing type of lubricant and application methods and frequencies.
 5. Filter cleaning or replacement schedule. (On Contractor's letterhead stationary).
 6. Preventive maintenance schedule for checking all items such as belt drive, safety controls and oil and refrigerant charges. Cleaning schedule of all strainers, traps, coils, tubes, tower pans, sprays, etc. (On Contractor's letterhead stationary).
 7. WNormal operating instructions including a sequence of operation for each system. (On Contractor's letterhead stationary).
 8. Instructions as to procedure to be followed for any emergency situation, such as alarms or safety items being tripped. (On Contractor's letterhead stationary).
 9. Instructions on who to call for service during guarantee period. (On Contractor's letterhead stationary).
 10. Record of equipment installed (copy of each shop drawing as set forth under "Shop Drawing" Paragraph).
 11. All warranties provided by Manufacturers on their equipment that run longer than the one year guarantee by the Contractor.
- C. Books shall be arranged in sequence to match the equipment schedules included in the specifications.
- D. Approval will not be given for final payment until the tests, balancing and operating instruction portions have been completed.

END OF SECTION 23 00 10

SECTION 23 00 50 - BASIC MECHANICAL MATERIALS & METHODS

PART 1 - GENERAL

1.1 WORK INCLUDES

- A. Work under this Section is subject to the requirements of the Contract Documents, including the Drawings, General and Supplementary Conditions, and Division 01 of the Specifications.
- B. This Section, 23 0050, applies to all other Division 23 sections.

1.2 SUMMARY

- A. This Section includes the following topics:
 - 1. Equipment Access and Installation.
 - 2. Fire Stopping Material and Installation.
 - 3. Painting.

1.3 EQUIPMENT ACCESS AND INSTALLATION

- A. All motors, valves, fire and/or smoke dampers, motorized dampers, reheat coils, individual duct filters, control devices, etc., shall be so located and sized, by these contractors, to provide easy access for operation, repair and maintenance. Coordinate installation with other trades to allow for this access. Provide access doors to all motors, coils, fans, filters, motorized dampers, fire and smoke dampers.
- B. Any rotating shafts, couplings, belt-drives, or other moving or hazardous portion of equipment and machinery shall be provided with detachable mounted guards.
- C. All equipment shall be installed with sufficient unions to allow replacement, testing and servicing without having to disassemble large portions of piping.

PART 2 - PRODUCTS

2.1 FIRE STOPPING MATERIAL

- A. Refer to section 07 84 13 - Fire Stopping

2.2 PAINTING

- A. All shop fabricated and factory built equipment not galvanized or protected by plating shall be cleansed and given one (1) shop coat of zinc-chromate primer before delivery or during construction.
- B. Protect or mask nameplates, labels, tags, stainless steel, or chromium-plated items such as valve stems, motor shafts, levers, handles, trim strips which might be painted over.
- C. No work shall be allowed to develop rust during the course of the work. Work showing evidence of rust or other corrosion shall be immediately scraped clean and rustprimed with an approved primer.

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PART 3 - EXECUTION

3.1 FIRE STOPPING

- A. Refer to Section 07 84 13.

3.2 PROTECTION OF WORK

- A. Protect work from injury by keeping all piping capped and plugged or otherwise protected. This includes damage by freezing and/or stoppage from building materials, sand, dirt, or concrete.
- B. Protect all equipment from damage during the project; provide all tarpaulins, drop cloths, barricades, or auxiliary equipment.

END OF SECTION 23 00 50

SECTION 23 05 53 - IDENTIFICATION FOR HVAC AND PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Pipe Markers.

1.2 RELATED SECTIONS

- A. Section 23 05 00 - Mechanical General Requirements

1.3 REFERENCE STANDARDS

- A. ASME A13.1 - Scheme for the Identification of Piping Systems; The American Society of Mechanical Engineers; 2007.

1.4 SUBMITTALS

- A. List: Submit list of wording, symbols, letter size, and color coding for mechanical identification.
- B. Chart and Schedule: Submit valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.
- C. Product Data: Provide manufacturers catalog literature for each product required.
- D. Project Record Documents: Record actual locations of tagged valves.

PART 2 - PRODUCTS

2.1 IDENTIFICATION APPLICATIONS

- A. Piping: Tags printed with service and direction of flow.

2.2 MANUFACTURERS

- A. Brady Corporation: www.bradycorp.com.
- B. Champion America, Inc: www.Champion-America.com.
- C. Seton Identification Products: www.seton.com/aec.
- D. Brimar.

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2.3 PIPE MARKERS

- A. All piping systems will be labeled, color coded with the type of service, (for refrigerant piping, indicate the type) and the direction of flow. Labels to be factory fabricated, flexible, semi-rigid plastic, preformed to fit around pipe or pipe covering. Lettering will be placed at intervals of approximately 20' on straight runs of piping including risers and drops, adjacent to each valve and fitting, and at each side of penetrations of structure or enclosure. Lettering will be visible from the floor. For pipes $\frac{3}{4}$ " and smaller, permanent phenolic tags will be used. Insulated piping will be labeled as "non asbestos." Schedule for banding and labeling of pipe and conduit will conform to ANSI A13.1
- B. Acceptable manufacturers: Seton Name Plate Corporation, W.H. Brady Company or Westline Products Company.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Degrease and clean surfaces to receive adhesive for identification materials.
- B. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.

3.2 INSTALLATION

- A. Placement - Provide Identification Markers:
 - 1. On all exposed covered and uncovered pipes at 20 foot intervals.
 - 2. On all branches and valves.
 - 3. On both sides of walls where pipes pass through wall.
 - 4. At changes of flow direction.
 - 5. On each riser at a point 5 feet above floor or platform.
- B. Markers shall be applied so they can be read from the floor.
- C. After applying each marker, wrap one turn of pipe banding tape completely around the circumference of the pipe at each end of the marker. Overlap ends of marker with the tape and overlap the tape upon itself a minimum of 1-inch. The pipe banding tape shall match the background color of the marker.
- D. Install plastic pipe markers in accordance with manufacturer's instructions.
- E. Identify piping, concealed or exposed, with plastic pipe markers. Use tags on piping $\frac{3}{4}$ inch diameter and smaller. Identify service, flow direction, and pressure. Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and Tee, at each side of penetration of structure or enclosure, and at each obstruction.
- F. Where a service is indicated on the drawings as a circulating system, the pipe marker legend for the particular service shall be followed by either the word "supply" or "return" to clarify the line function. An arrow designating direction of flow shall follow the legend on each marker.
- G. FLOW INDICATORS
 - 1. Provide an arrow marker at each identification marker, with arrow pointed away from legend in

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the direction of flow. When flow may be both ways, provide double-headed arrows.

END OF SECTION 23 05 53

SECTION 26 00 10 - ELECTRICAL GENERAL PROVISIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The General Conditions, Special Conditions, and Contract Documents are part of these specifications. Consult them further for instructions and be governed by the requirements contained there under.

1.2 DESCRIPTION

- A. Work Included
 - 1. Work shall consist of furnishing all labor, equipment, supplies and materials, unless otherwise specified, necessary for the installation of complete electrical systems as required by the specifications and as shown on the drawings, subject to the terms and conditions of the contract. The work shall also include the completion of those details of electrical work not mentioned or shown which are necessary for the successful operation of all electrical systems.

1.3 PROVISIONS

- A. Work performed under this division of the specifications shall conform to the requirements of Division 1, the electrical drawings, and all items hereinafter specified.
 - 1. Prior to any work being performed under this division, examine architectural, structural, civil, mechanical, specialty systems and interior design drawings and specifications. If any discrepancies occur between them and the electrical drawings and specifications, report discrepancies to the Architect in writing and obtain written instructions for the work.
 - 2. Electrical drawings are diagrammatic, but shall be followed as closely as actual construction of the building will permit. All changes from drawings necessary to make the electrical work conform to the building as constructed shall be made without additional cost to the Owner.
 - 3. Coordinate the electrical work with the General Contractor and be responsible to him for satisfactory progress of the same. Coordinate electrical work with all other trades on the project without additional cost to the Owner.
 - 4. All work and materials covered by drawings and specifications shall be subject to review at any time by representatives of the Architect and Owner. If the Architect or Owner's agent finds any materials or installation that does not conform to these drawings and specifications, Contractor shall remove the material from the premises and correct the installation to the satisfaction of the agent.
 - 5. In acceptance or rejection of installed electrical systems, no allowance will be made for lack of skill on the part of the installers.

1.4 CODES AND STANDARDS

- A. The latest editions of the following standards (including supplements and official interpretations) are minimum requirements:
 - 1. NFPA 70 - National Electrical Code (NEC).

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2. NFPA 72 – National Fire Alarm Code.
3. NFPA 101 – Life Safety Code.
4. NFPA 110 – Emergency Power Systems
5. Conform to all applicable State and Local Codes.
6. American National Standards Institute (ANSI).
7. National Electrical Safety Code (NESC).
8. Americans with Disabilities Acts (ADA) and American National Standards Institute (ANSI) 117.
9. National Electrical Manufacturer’s Association (NEMA).
10. A.I.A. “Guidelines for Design and Construction of Hospital and Healthcare Facilities.”
11. Underwriter’s Laboratories (UL).
12. Insulated Cable Engineers Association (ICEA).
13. International Building Code.
14. International Mechanical Code.
15. International Fire Code.
16. Institute of Electrical and Electronic Engineers (IEEE).
17. Sheet Metal and Air Conditioning Contractors National Association (SMACNA).
18. University of Colorado Design and Construction Standards.

1.5 SPECIAL REQUIREMENTS

- A. Definitions: “Provide” shall mean “furnish and install”. “Furnish” means to supply all materials, labor, equipment, testing apparatus, controls, tests, accessories and all other items customarily required for the proper and complete application. “Install” means to join, unit, fasten, link, attach, set up or otherwise connect together before testing and turning over to Owner, complete and ready for regular operation. The words “accept” or “acceptable” denote only that the equipment items are in general conformance with the design concept of the project.
- B. Drawings:
 1. The drawings indicate the general arrangement of circuits and outlets, locations of switches, panelboards and other work. Information shown on the drawings is schematic, however, re-circuiting will not be permitted without specific acceptance. Drawings and specifications are complementary to each other. What is called for by one shall be as binding as if called for by both. Data presented on these drawings is accurate as planning can be determined, but accuracy is not guaranteed and field verification of all dimensions, locations, levels, etc., to suit field conditions is directed. Review all Architectural, Structural and Mechanical Drawings and Specifications; adjust all work to conform to all conditions shown therein. The Architectural drawings shall take precedence over all other drawings.
 2. Discrepancies between different plans, between plans and specifications, between specifications or regulations and codes governing this installation shall be brought to the attention of the Architect in writing before the date of bid opening. In the event such discrepancies exist, and the Architect is not so notified, the adjudication of responsibility shall be solely at the discretion of the Architect.

1.6 EXAMINATION OF BIDDING DOCUMENTS

- A. Each bidder shall examine the bidding documents carefully, and not later than seven days prior to the date of receipt of bids, shall make written request to the Engineer for interpretation or correction of any discrepancies, ambiguity, inconsistency, or error therein which he may discover. Any interpretation or correction will be issued as an addendum by the Architect. Only a written interpretation or correction by addendum shall be binding. No bidder shall rely upon interpretations or corrections given by any other method. If discrepancies, ambiguity, inconsistency, or error are not covered by addendum or written directive, Contractor shall include in his bid, labor materials and methods of construction resulting in

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higher cost. After award of contract, no allowance or extra compensation will be made on behalf of the Contractor due to his failure to make the written requests as described above.

- B. Failure to request clarification during the bid period of any inadequacy, omission, or conflict will not relieve the Contractor of their responsibilities. The signing of the contract will be considered as implicitly denoting that the Contractor has a thorough comprehension of the full intent and scope of the working drawings and specifications.

1.7 PERMITS, FEES & NOTICES

- A. Obtain and pay for all necessary permits, inspections and certificates that may be necessary for the full completion of the work. Furnish the Owner with a certificate of final inspection and approval from the AHJ over the electrical installation.
- B. Notify proper authorities when work is ready for inspections required by applicable codes, rules and regulations, allowing sufficient time for inspections to be made without hindering progress of the work. Furnish to the Owner copies of inspection certificates of acceptance.

1.8 TESTS

- A. Upon completion of all work and adjustment of all equipment, provide complete operational tests of all electrical equipment provided under this division.

1.9 WARRANTY

- A. Guarantee that all work governed by this division shall be free of defects in workmanship, materials and parts for a period of one (1) year after written acceptance. Promptly repair, revise, and replace defects as directed with no additional cost to the Owner (lamps and fuses are exempt).

1.10 RECORD DRAWINGS

- A. Maintain a current set of electrical drawings at the site. Neatly mark all changes and deviations from the original drawings. Use a color which contrasts with the prints. This shall be a separate set of drawings, not used for construction purposes, and shall be kept up to date as the job progresses and shall be made available for inspection by the Architect at all times. These updated progress drawings shall be used to produce the final record drawings that shall be in AutoCad electronic format media upon project completion.
- B. Upon completion of the contract, both sets (electronic and hard copy drawings) of record drawings shall be delivered to the Architect.
- C. The Contractor shall mark all record drawings on the front lower right hand corner with a stamp impression that reads 'RECORD DRAWINGS' or similar.

1.11 PROJECT/SITE CONDITIONS

- A. Install work in locations shown on Drawings, unless prevented by Project conditions.

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- B. Prior to submitting a bid, visit the site of job and ascertain all conditions affecting the proposed installation and adjust all work accordingly. Make provisions for these costs.
- C. Coordinate the work with that of all other trades. Where conflicts of work occur and departure from the indicated arrangements are necessary, consult with other Contractors involved; come to agreement as to changed locations and elevations, etc., and obtain written acceptance from the Architect of proposed changes before proceeding with work.
- D. All outages of electrical service shall be scheduled with the Owner and Utility Company five (5) days in advance of proposed outage. Include an overtime allowance in the bid for the performance of all work requiring outages at such time as it is approved by the Owner. Outages shall be at a time and of such duration as accepted by the Owner.

1.12 SEQUENCING AND SCHEDULING

- A. Construct Work in sequence under provisions of Division 1.

1.13 USE OF THE ARCHITECT'S AND/OR ENGINEER'S DRAWINGS

- A. The Contractor shall obtain, at the Contractor's expense, from the Architect or Engineer a set of AutoCAD or compatible format architectural and engineering drawings on electronic media where desired by the Contractor and/or required by the Specifications for use in preparing the shop drawings, coordination drawings, and record drawings. The Contractor shall provide to the Architect and Engineer a written release of liability acceptable to the Architect and Engineer prior to receiving the electronic media.

PART 2 - GENERAL

2.1 STANDARD FOR MATERIALS

- A. All materials shall conform to current applicable industry standards. Workmanship and neat appearance shall be as important as the electrical and mechanical operation. Defective or damaged materials shall be replaced or repaired, prior to final acceptance, in a manner acceptable to the Architect or Owner at no additional cost to the Owner.
- B. All electrical materials shall be acceptable for installation only if labeled or listed by a nationally recognized testing laboratory and if accepted by local authorities.

2.2 SUBMITTALS

- A. Submit under provision of Division 1.
- B. Listing of Equipment: The Contractor shall submit, within thirty days after the award of the contract, a complete typewritten list of those items of equipment which will be furnished under this contract. Include the name or description of the item, name of manufacturer, model, type, and catalog number.
- C. Present shop drawing submittal data at one time, bound in three-ring binders, indexed in a neat and orderly manner. Partial submittals will not be accepted. Do not begin work until (1) copy is returned.

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- D. Submit five (5) copies of shop drawings, layouts, manufacturer's data, wiring diagrams and material schedules that may be requested by the Architect for his review. The review by the Architect will not constitute concurrence with any deviation from the plans and specifications unless such deviations are specifically identified by the method described below, nor shall it relieve the Contractor of responsibility for errors or omissions in the submitted data.
- E. Processed shop drawings shall not be construed as change orders. The shop drawings shall demonstrate that the Contractor understands the design concept, indicate which equipment and materials he intends to provide, and detail the fabrication and installation methods he intends to use. If deviations, discrepancies or conflicts between shop drawing submittals and the design drawings and specifications are discovered, the design drawings and specifications shall govern.
- F. Contractor shall be responsible for dimensions (which he shall confirm and correlate at the job site), fabrication processes and techniques of construction and coordination of his work with that of other trades. The Contractor shall check and verify all measurements and review shop drawings before submitting them and sign a statement on the shop drawings which signifies that they comply with plans and specifications and that equipment is dimensionally suitable for the application. If any deviations from the specified requirements for any item of material or equipment exist, such deviation shall be expressly stated in writing and incorporated with the submittal. The Owner's copies (two of each) of the reviewed submittals shall be retained by the Contractor until completion of the project and presented in bound form to the Owner.

2.3 BID ALTERNATE(S)

- A. Refer to Division 1 and all contract documents for additional information.
- B. Alternate(s) for Material and Equipment
 - 1. Equipment and material bid alternate(s) shall be proposed as additive or deductive alternate(s) to specified items by submitting it as a separate line item from the base bid on the Bidder's letterhead.
 - 2. Such bid alternate proposals shall not be substituted or included in the base bid. Bid alternate proposal(s) must be accompanied by full descriptive data on the proposed equipment, together with a statement of the cost to be added or deducted for each item. The bid alternate shall include all materials, equipment, labor, electrical connections, coordination with all other trades, etc. for a complete and operational system.
 - 3. The Contractor shall submit the bid alternates at the time the base bids are due.

2.4 SUBSTITUTION AND APPROVALS (Prior Approvals)

- A. Prior to Bidding: Where items of equipment or materials are specified by a manufacturer's name, type, model, or catalog number, only those items may be used in the base bid unless prior written acceptance of other material has been published by addendum.
 - 1. Submit applications for this review in triplicate at least ten (10) calendar days prior to bid opening.
 - 2. Applications for review shall be accompanied by a typewritten list of the specified manufacturer and catalog number and shall state all significant details in which each item differs from the item specified. Failure to list this information shall not relieve the Contractor from providing properly functioning or fitting materials regardless of the review action taken by the Architect. The

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Contractor will provide only materials which have been specified or accepted prior to bid opening, under his base bid.

3. Equipment and materials not listed as equivalents may be proposed as deductive alternates to specified items by submitting it as a separate line item from the base bid on the Bidder's letterhead.
4. Such substitution proposals shall not be substituted or included in the base bid. Substitution proposal must be accompanied by full descriptive data on the proposed equipment, together with a statement of the cost to be deducted for each item. If any such substitutions are considered, the Contractor shall submit a list of the proposed substitution items within 14 days of award of contract. The request for proposed substitutions shall not be accepted by the Engineer due to scheduling or delivery concerns.

B. Substitutions of Material after Award of Contract

1. Other items of material and equipment may be offered (at the Contractor's option) as alternates to specified items, either as provided for in the Proposal Forms or, if no provisions are made, by submitting it with his bid on the Bidder's letterhead.
2. Such alternate proposal shall not be included under the base bid and must be accompanied by full descriptive data on the proposed equipment, together with a statement of the cost to be added or deducted for each item. If any such alternate material proposals are considered, the Contractor shall submit a list of the proposed alternate substitution items in accordance with the requirements of "Review of Proposed Substitutions".

2.5 SUBSTITUTIONS (CONTRACTOR AND/OR OWNER INITIATED)

- A. Materials or equipment listed by several manufacturers' names are intended to be bidder's choice, and any of the listed manufacturers may be used in the base bid. Materials or equipment not listed are considered substitutions.
- B. Performance Specification: When any item is specified by requirement to meet a performance, industry or regulating body standard or is specified generically (no manufacturer's name listed), no prior review by the Consulting Electrical Engineer is needed unless specifically called for in these specifications.
- C. Contractor to be responsible for any changes and costs to accommodate any equipment except the first named in the specification.
- D. Substitutions for Material
 1. Equipment and materials not listed as equivalents may be proposed as deductive alternates to specified items by submitting it as a separate line item to the base bid on the Bidder's letterhead.
 2. Such substitutions shall not be substituted for the base bid and must be accompanied by a full description of the difference between the Contract Document requirements and that of the substitution, the comparative features of each, and the effect of the change on the end result performance. Include the impact of all changes on other contractors and acknowledge the inclusion of additional costs to the other trades. If any such alternates are considered, the Contractor shall submit a list of the proposed alternate substitution items within 14 days of award of contract. Late requests for proposed substitutions will not be accepted by the Engineer due to scheduling or delivery concerns.

PART 3 - EXECUTION

3.1 WORKMANSHIP AND COMPLETION OF INSTALLATION

- A. Contractor's personnel and subcontractors selected to perform the work shall be well versed and skilled in the trades involved.
- B. Coordinate electrical equipment and materials installation with other building components.
- C. Sequence, coordinate, and integrate installations of electrical materials and equipment for efficient flow of the Work. Give particular attention to large equipment requiring positioning prior to closing-in the building.
- D. Any changes or deviations from the drawings and specifications must be accepted in writing by the Architect/Engineer. All errors in installation shall be corrected at the expense of the Contractor. All specialties shall be installed as detailed on the drawings. Where detail or specific installation requirements are not provided, manufacturer's recommendations shall be followed.
- E. Upon completion of work, all equipment and materials shall be installed complete, thoroughly checked, correctly adjusted, and left ready for intended use or operation. All work shall be thoroughly cleaned and all residue shall be removed from surfaces. Exterior surfaces of all material and equipment shall be delivered in a perfect, unblemished condition.
- F. Contractor shall provide a complete installation, including all required labor, material, cartage, insurance, permits, and taxes.

3.2 PROGRESS OF WORK

- A. Order the progress of electrical work to conform to the progress of the work of the other trades. Complete the entire installation as soon as the condition of the building will permit. Any cost resulting from defective or ill-timed work performed under this Section shall be borne by this Contractor.

3.3 CHASES, OPENINGS, CUTTING, AND PATCHING

- A. Carefully lay out all work in advance so as to eliminate where possible, cutting, channeling, chasing or drilling of floors, walls, partitions, ceilings and roofs. Any damage to the building, structure, piping, ducts, equipment or any defaced finish shall be repaired by skilled mechanics of the trades involved at no additional cost to the Owner and to the satisfaction of the Architect. Any necessary cutting, channeling, drilling or anchoring of raceways, outlets, or other electrical equipment shall be performed in a careful manner, and as accepted by the Architect.
- B. All openings made in fire-rated walls, floors, or ceilings shall be patched and made tight in a manner to conform to the fire rating for the surface penetrated.
- C. All penetrations required through existing concrete construction shall be core drilled at minimum size required. Precautions shall be taken when drilling to prevent damage to structural concrete. Contractor shall obtain permission from the Architect before proceeding with drilling.

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- D. Provide all cutting, trenching, backfilling, patching and refinishing or resurfacing required for electrical work in a manner meeting the approval of the Engineer and at no additional cost to the Owner.

3.4 DELIVERY AND STORAGE OF MATERIALS

- A. Arrange and be held responsible for delivery and safe storage of materials and equipment for electrical installation.
- B. Store materials and equipment for easy inspection and checking.
- C. Carefully mark and store all materials.
- D. Deliver materials to the job site in stages of the work that will expedite the work as a whole.
- E. Carefully check materials furnished to this Contractor for installation, and provide receipt acknowledging acceptance of delivery and condition of the materials received. Thereafter, assume full responsibility for its safekeeping until the final installation has been reviewed and accepted.

3.5 PROTECTION OF WORK AND PROPERTY

- A. Where there are existing facilities, be responsible for the protection thereof, whether or not such facility is to be removed or relocated. Moving or removing any facility must be done so as not to cause interruption of the work of Owner's operation.
- B. Close all conduit openings with caps or plugs during installation. Cover all fixtures and equipment and protect against injury. At the final completion, clean all work and deliver in an unblemished condition, or refinish and repaint at the discretion of the Architect.
- C. Any equipment or conduit systems found to have been damaged or contaminated above "MILL" or "SHOP" conditions shall be replaced or cleaned to the Engineer's satisfaction.

3.6 FINAL ACCEPTANCE

- A. Final acceptance by the Owner will not occur until all operating instructions are received and Owner's personnel have been thoroughly indoctrinated in the maintenance and operation of all equipment.
- B. Operating manual, parts lists, and indoctrination of operating and maintenance personnel: Furnish the services of a qualified representative of the supplier for each item or system itemized below who shall instruct specific personnel, as designated by the Owner, in the operation and maintenance of that item or system.
- C. Instruction shall be made when the particular system is complete and shall be of the number of hours indicated and at the time requested by the Owner. A representative of the Electrical Contractor shall be present for all demonstrations.
- D. Deliver three (3) complete operating manuals and parts lists to the Owner (or his designated representative) at the time of the above required indoctrination. Fully explain the contents of the manuals as part of required indoctrination and instruct the Owner's personnel in the correct procedure in obtaining service, both during and after the guarantee period. The operating manual and parts lists shall give complete information as to whom the Owner shall contact for service and parts, including the address and

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phone number. Furnish evidence that an authorized service organization regularly carries a complete stock of repair parts for these items (or systems), and that the organization is available for service. Service shall be furnished within twenty four (24) hours after requested.

- E. Clean up: Remove all materials, scrap, etc., relative to the electrical installation and leave the premises and all equipment, lamps, fixtures, etc. in a clean, orderly condition. Any costs to the Owner for clean up of the site will be charged against the Contractor.
- F. Acceptance Demonstration: Upon completion of the work, at a time to be designated by the Architect, the Contractor shall demonstrate for the Owner the operation of the entire installation, including all systems provided under this contract.

3.7 CONSTRUCTION LIGHTING AND POWER

- A. Provide all temporary facilities required to supply construction power and light. Install and maintain facilities in a manner that will protect the public and workmen. Comply with all applicable laws and regulations.
- B. Upon completion of the work, remove all temporary facilities from the site.
- C. The General Contractor shall pay for all power and light used by him and his subcontractors where construction power is separately metered, or is taken from the permanent project metered service solely for construction use.

3.8 MECHANICAL EQUIPMENT WIRING AND CONNECTIONS

- A. Furnish, set in place, and wire, except as indicated, all heating, ventilating, air conditioning, plumbing, fire protection, motors and controls in accordance with the following schedule. Carefully coordinate with work performed under the Mechanical Division of these specifications.

ITEM	FURNISHED UNDER	SET IN PLACE OR MTD. UNDER	WIRED CONNECTED UNDER
1. Equipment motors and thermal overload, resistance heaters. (3)	MD	MD	ED
2. Disconnect switches, fused or unfused, h.p. rated switches, thermal overload switches and fuses, manual operating switches.	ED(a)	ED(a)	ED

MD=Mechanical, Division 15.

ED=Electrical, Division 16.

- a. If furnished as part of factory wired equipment, then wiring and connections only by ED.
- B. Where motor controllers are furnished by others, install controller and provide connections at line and load side of controllers.

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3.9 REMODELING PROVISIONS

- A. Existing systems and conditions shown on the drawings are provided for guidance only. The Electrical Contractor shall field check all existing conditions prior to bidding and shall include in his bid an allowance for the removal and relocation of existing conduits, wires, devices, fixtures, or other equipment as indicated on the plans or as required to coordinate and adapt new and existing electrical systems to all other work required for this project.
- B. Connect new work to existing in a manner that will assure proper raceway grounding throughout in conformance with the National Electrical Code.
- C. Remodel Work Cutting and Patching: The Contractor shall perform cutting, channeling, chasing, drilling, etc., as required to install or remove electrical equipment in areas of remodeling. This work shall be performed so as to minimize damage to portions of wall finishes, surfaces, plastering, or the structure which are to be reused, resurfaced, plastered or painted under another division of these specifications.
- D. Carefully coordinate with the required remodeling work, cutting and patching etc., performed by the other trades. Remove or relocate existing electrical conduits, wires, devices, fixtures and other equipment as necessary.
- E. All outages on portions of existing electrical systems shall be minimized and shall be at a time and of duration as accepted by the Owner.

3.10 ELECTRICAL DEMOLITION

- A. Examination
 - 1. Verify field measurements and circuiting arrangements are as shown on drawings.
 - 2. Verify that abandoned wiring and equipment serve only abandoned facilities.
 - 3. Demolition drawings are based on casual field observation and existing record documents. Report discrepancies to Architect before disturbing existing installation.
 - 4. Beginning of demolition means installer accepts existing conditions.
- B. Preparation
 - 1. Disconnect electrical systems in walls, floors, and ceilings scheduled for removal.
 - 2. Coordinate outages with Architect/Owner.
 - 3. Provide temporary wiring and connections to maintain existing systems in service during construction. When work must be performed on energized equipment or circuits, use personnel experienced in such operations.
- C. Demolition and Extension of Existing Electrical Work
 - 1. Demolish and extend existing electrical work under provisions of Division 1, Division 2, and this section.
 - 2. Remove, relocate, and extend existing installations to accommodate new construction.
 - 3. Remove abandoned wiring to source of supply.
 - 4. Remove exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes. Cut conduit flush with walls and floors, and patch surfaces.

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5. Disconnect abandoned outlets and remove devices. Remove abandoned outlets if conduit servicing them is abandoned and removed. Provide blank cover for abandoned outlets, which are not removed.
6. Disconnect and remove electrical devices and equipment serving utilization equipment that has been removed.
7. Repair adjacent construction and finishes damaged during demolition and extension work.
8. Maintain access to existing electrical installations, which remain active. Modify installation or provide access panel as appropriate.
9. Extend existing installations using materials and methods compatible with existing electrical installation, or as specified in individual section.

D. Cleaning and Repair

1. Clean and repair existing materials and equipment, which remain or are to be reused.
2. Panelboards: Clean exposed surfaces and check tightness of electrical connections. Replace damaged circuit breakers and provide closure plates for vacant positions. Provide typed circuit directory showing revised circuiting arrangement.

E. Installation

1. Install relocated materials and equipment under the provisions of Division 1.

3.11 OWNER PROVIDED EQUIPMENT

- A. Provide electrical connections to owner furnished equipment.
- B. Inspect owner furnished equipment for damage, defects, missing components, etc. Report deficiencies to the Owner immediately. Do not install or connect deficient equipment.
- C. Provide supports, fastenings, and auxiliary hardware necessary for a complete installation in accordance with the finished building conditions.

END OF SECTION 26 00 10

SECTION 26 05 00 - COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.1 DESIGN REQUIREMENTS

1.2 DEFINITIONS

- A. Refer to Article 100 of the currently adopted National Electrical Code for definitions as applicable to this project.
- B. Other definitions:
 - 1. "Concealed": Embedded in masonry, concrete or other construction, installed in furred spaces, within double partitions or hung ceilings, in trenches, in crawl spaces, or in enclosures.
 - 2. "Exposed": Not installed underground or "concealed" as defined above.
 - 3. "Furnish" or "Provide": To supply, install and connect up complete and ready for safe and regular operation of particular work unless specifically otherwise noted.
 - 4. "Install": To erect, mount and connect complete with related accessories.
 - 5. "Indicated", "Shown" or "Noted": As indicated, shown or noted on drawings or specifications.
 - 6. "Related Work" includes, but is not necessarily limited to, mentioned work associated with, or affected by, the work specified.
 - 7. "Reviewed", "Satisfactory", "Accepted", or "Directed": As reviewed, satisfactory, accepted, or directed by or to Engineer.
 - 8. "Similar": Equal in materials, weight, size, design, construction, capacity, performance, and efficiency of specified product.
 - 9. "Supply": To purchase, procure, acquire and deliver complete with related accessories.
 - 10. "Wiring": Raceway, fittings, wire, boxes and related items.

1.3 SUBMITTALS

- A. Submittals shall be made in accordance with General Conditions of Contract and the requirements of Section 01 33 00.
- B. Shop drawings shall include equipment catalog cuts or manufacturer's printed data identifying: dimensions, weights, recess openings, equipment arrangements, electrical characteristics with bus size, electrical rating, material, wiring diagrams indicating circuit arrangement and NEMA rating for, but not limited to the following:
 - 1. Panel boards
 - 2. Enclosed Switches and Circuit Breakers
 - 3. Wiring Devices
 - 4. Interior and Exterior Lighting
 - 5. Hangers and Supports for Electrical Systems
 - 6. Grounding and Bonding
 - 7. Fire Detection and Alarm
- C. Submit composite coordination drawings to include location and routing of the electrical system components in relation to the mechanical ducts, piping and structural beams.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store and handle products in accordance with manufacturer's instructions, and the requirements of Section 01 10 00.

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1.5 WARRANTY

- A. All electrical equipment, materials and workmanship warranties shall be provided in accordance with the requirements of Section 01 78 36 and the following:
 - 1. The Contractor warrants the electrical system, material and workmanship, for a period of one year from the date of the University final acceptance of the installation unless as otherwise noted in Commissioning.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. All equipment and materials installed shall be new, unless otherwise specified. Defective or damaged materials shall be replaced or repaired, prior to final acceptance, in a manner acceptable to the Engineer or The university and at no additional cost to the University.
- B. All electrical materials shall be acceptable for installation only if labeled or listed UL and, if accepted, by the authority having jurisdiction.
- C. All major equipment components shall have the manufacturer's name, address, model number, and serial number permanently attached in a conspicuous location.
- D. Fire Seals:
 - 1. Material: Fire stopping material shall be asbestos free, 100% intumescent, have code approval under BOCA, ICBO, SSBC, NFPA 101, NFPA 70, and be capable of maintaining an effective barrier against flame and gases in compliance with the following requirements.
 - 2. Flame Spread: 25 or less, ASTM E84
 - 3. Fire Resistance and Hose Stream Tests: Fire stopping materials shall be rated "F" and "T" in accordance with ASTM E 814 or UL 1479. Rating periods shall conform to the following:

(F)	3	(T)	3	Time-rated floor or wall assemblies.
(F)	3	(T)	3	Openings between floor slabs & curtain wall.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Construct Work in sequence under provisions of Division 1 where applicable.
- B. Electrical Contractor shall coordinate Divisions 26, 27, and 28 work with the installer of Division 21, 22 and 23 and other work to ensure that code required clearances relating to space required for access to electrical equipment is properly maintained.
- C. Install Work using procedures defined in NECA Standard of Installation.
- D. Workmanship shall conform to highest industry standards for each trade involved in installation of the Work.
- E. Upon completion of work, all equipment and materials shall be installed complete, thoroughly checked, correctly adjusted, and left ready for intended use or operation. All work shall be thoroughly cleaned and all residues shall be removed from surfaces.
- F. Exterior surfaces of all material and equipment shall be delivered in a perfect, unblemished condition.

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- G. Carefully lay out all work in advance so as to eliminate where possible, cutting, channeling, chasing, or drilling of floors, walls, partitions, ceilings and roofs. Any damage to the building, structure, piping, ducts, equipment or any defaced finish shall be repaired by skilled mechanics of the trades involved at no additional cost to the University.
- H. All openings made in fire-rated walls, floors, or ceilings shall be patched and made tight in a manner to conform to the fire rating for the surface penetrated. Paint to match surface when visible.
- I. All penetrations required through completed concrete construction shall be core drilled at minimum size required. Precautions shall be taken when drilling to prevent damage to structural concrete. The Contractor shall obtain permission from the Architect and Structural engineer before proceeding with drilling.
- J. Sleeve Seals: Provide sleeve seals for penetrations located in foundation walls below grade, or in exterior walls, of one of the following:
 - 1. Caulk between sleeve and raceway with approved Caulk material.
 - 2. Mechanical Sleeve Seals: Modular mechanical type, as manufactured by Thunder line Corp., consisting of interlocking synthetic rubber links shaped to continuously fill annular space between raceway and sleeve, connected with bolts and pressure plates which cause rubber sealing elements to expand when tightened, providing watertight seal.
- K. Install equipment and materials to provide required Code clearances and access for servicing and maintenance. Coordinate the final location with piping, ducts, and equipment of other trades to insure proper access for all trades. Coordinate locations of concealed equipment, disconnects, and boxes with access panels and doors. Allow ample space for removal of parts, fuses, lamps, etc., that require replacement or servicing according to the National Electric code and the AHJ.
- L. Extend all conduits so that junction and pull boxes are in accessible locations.
- M. Install access panel or doors where equipment or boxes are concealed behind finished surfaces in areas such as restrooms. These access doors shall be a minimum of twenty by twenty inches or as required to accommodate full pull box or equipment access.
- N. Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be connected.
- O. Electrical system layouts indicated on drawings are generally diagrammatic but shall be followed as closely as actual construction and work of other trades will permit. Govern exact routing of raceways and locations of outlets by structure and equipment served. Take all dimensions from engineering drawings.
- P. Consult all other drawings. Verify all scales and report any dimensional discrepancies or other conflicts to Engineer before submitting bid.
- Q. All home runs to panel boards are indicated as starting from outlet nearest panel and continuing in general direction of that panel. Continue such circuits to panel as though routes were completely indicated.
- R. Furnish and install all necessary hardware, hangers, blocking, brackets, bracing, runners, etc. required for equipment specified under this Division.
- S. Provide all power feeds and final connections to motors and other electric equipment furnished under Divisions 21, 22, and 23.

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1. Install and wire through all control devices which directly handle full load motor or electric heating equipment current, such as magnetic starters, line voltage thermostats, P.E. switches, etc. which are furnished by Electrical Contractor. Located where shown on the electrical drawings.
2. Provide disconnects for all mechanical equipment as indicated on project drawings.
3. Provide all power and control wiring which directly handles full load current of motors or electric heating equipment.

3.2 TESTING, CLEANING AND CERTIFICATION

- A. Clean-Up: Remove all materials, scrap, etc., relative to the electrical installation, and leave the premises and all equipment, lamps, fixtures, etc. in a clean, orderly condition. Any costs to the University for clean up of the site will be charged against the Contractor.

3.3 COMMISSIONING (DEMONSTRATION)

- A. Acceptance Demonstration: Upon completion of the work, at a time to be designated, the Contractor shall demonstrate for the University the operation of the entire installation, including all systems provided under this contract.
- B. The Contractor shall furnish the services of a qualified representative of the supplier of each item or system who shall instruct specific personnel, as designated by the University, in the operation and maintenance of that item or system.
 1. Instruction shall be given when the particular system is complete, and shall be of the number of hours indicated. A representative of the Contractor shall be present for all demonstrations.

END OF SECTION 26 05 00

SECTION 26 05 19 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 SUBMITTALS

- A. Product data shall be submitted for in accordance with the requirements of Section 26 05 00 each of the following:
 - 1. Wires
 - 2. Cables
 - 3. Connectors

1.2 QUALITY ASSURANCE

- A. Wire and cable shall be provided and installed in accordance with the requirements of Section 26 05 00.
- B. Installer Qualifications and Certifications: Firms with at least 3 years of successful installation experience with projects utilizing electrical wiring cabling work similar to that required for this project.
- C. Regulatory Requirements: Conform to applicable code relations regarding toxicity of combustion products of insulating materials
- D. Manufacturers: Firms regularly engaged in manufacture of electrical wire and cable products of types, sizes, and ratings required, whose products have been in satisfactory use in similar service for not less than 5 years.

1.3 DELIVERY, STORAGE, AND HANDLING

- A. Wire and cable shall be delivered, stored and handled in accordance with the requirements of Section 26 05 00.
- B. Deliver wire and cable properly packaged in factory-fabricated type containers, or wound on NEMA-specified type wire and cable reels.
- C. Store wire and cable in clean dry space in original containers. Protect products from weather, damaging fumes, construction debris and traffic.
- D. Handle wire and cable carefully to avoid abrading, puncturing and tearing wire and cable insulation and sheathing. Ensure that dielectric resistance integrity of wires/cables is maintained.

1.4 WARRANTY

- A. Wire and cable warranties shall be provided in accordance with the requirements of Section 26 05 00.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers: Subject to compliance with requirements, provide products by the following (for each type of wire, cable, and connector):
 - 1. Wire and cable:

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- a. Triangle - PWC
- b. American Wire and Cable Co.
- c. Anaconda-Ericsson Inc; Wire and Cable Div.
- d. Belden Div; Cooper Industries
- e. General Cable Corporation
- f. General Electric
- g. Okonite
2. Connectors:
 - a. O-Z/Gedney Co.
 - b. AMP, Inc.
 - c. Burndy Corporation
 - d. Ideal Industries, Inc.
 - e. 3M Company
 - f. Thomas and Betts Corp.

2.2 MATERIALS, GENERAL

A. Wires and Cables:

1. Provide new wire and cable suitable for the temperature, conditions, and location where installed. All cable shall be new and shall conform to or exceed IPCEA requirements. Building wire shall be insulated with THHN/THWN/THW or XHHW insulation, rated 600 volt.
2. Conductors: Provide solid conductors for power and lighting circuits 12 AWG and smaller. Provide stranded conductors for 10 AWG THHN/THWN and larger. In sizes 250 MCM and larger use type THW or THWN. In sizes #1 AWG and smaller all conductors shall have heat/moisture resistant thermoplastic insulation type THW or THWN (75 degree C), except as follows:
 - a. Where conduit temperature will exceed 100 degree F, use type THHN (90 degree C). Type XHHW (90 degree C) permissible in dry locations.
 - b. In 120-volt incandescent fixtures, type AF (150 degree C).
 - c. In wire ways of fluorescent lighting fixtures types THW-MTW, THHN (90 degree C).
3. Conductor Material: Provide copper for all wires and cables.
4. Metal Clad cable is acceptable.
5. Use colors of wires as specified in paragraph 3.5 of this section.
6. For general applications, other than special use, use THHN insulated wire.
7. Type NM, NMC, NMS cable are not acceptable for any application.
8. Use copper wire only.
9. No wire splices shall be allowed in the conduit or conduit fittings. All splices shall be done in an approved box.
10. Grounding conductors shall be copper type THHN with green integrally-colored insulation, sized to meet NEC.
11. Plenum rated cable when required by Plenum conditions.

B. Connectors:

1. Provide UL type factory-fabricated, solder less metal connectors of sizes, ampacity ratings, materials, types and classes for applications and for services indicated. Use connectors with temperatures equal to or greater than those of the wires upon which used.

C. Wiring to Light Fixtures:

1. Type THHN to fluorescent light fixtures, 12-gauge minimum.
2. Type THHN to incandescent fixtures, 12-gauge minimum.

D. Wire Connectors:

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1. For wires size #8 AWG and smaller, insulated pressure type (with live spring) rated 105 degree C, 600 volt, for building wiring and 1000 volt in signs or fixtures. 3M or Ideal.
2. For wires size #6 AWG and larger, T & B or equivalent compression type with 3M #33 or #88 tape insulation.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that mechanical work likely to damage cable has been completed.

3.2 INSTALLATION, GENERAL

- A. Install electrical cables, wires and connectors in compliance with applicable requirements of NEC, NEMA, UL, and NECA's "Standard of Installation", and in accordance with recognized industry practices.
- B. Coordinate wire/cable installation work, including electrical raceway and equipment connection work, with other work. Pull no wire into any portion of conduit system until all construction work, which might damage the wire, has been completed.
- C. Wires and Cables:
 1. Use pulling means including, fish tape, cable, rope and basket weave wire/cable grips which will not damage cables or raceway. Do not use rope hitches for pulling attachment to wire or cable. Do not exceed manufacturer's tension requirements.
 2. Keep conductor splices to minimum. Install all wire continuous from outlet to outlet or terminal to terminal. Splices in cables when required shall be made in hand holes, pull boxes, or junction boxes and shall be in strict accordance with cable manufacturer's recommendations utilizing solder less connectors NEMA/UL approved for the use. Splice only in accessible junction boxes. Use splices and tap connectors which are compatible with conductor material.
 3. Install splices and tapes, which possess equivalent or better mechanical strength and insulation ratings than conductors being spliced.
 4. Tighten electrical connectors and terminals, including screws and bolts, in accordance with manufacturer's published torque tightening values. Where manufacturer's torque requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL Standard 486 for copper.
 5. Support cables above accessible ceilings, do not rest on ceiling tiles. Use spring clips and hanger rods, bridle rings or 'J' hooks, independent from the ceiling suspension system to support cables from structure.
 6. Provide adequate length of conductors within electrical enclosures and form the conductors to terminal points with no excess. Bundle multiple conductors, with conductors larger than 10 AWG cables to individual circuits. Make terminations so there is no bare conductor at the terminal.
 7. Make up splices in outlet boxes with 8-inch minimum of correctly color-coded tails left in box. Splices in wires size #8 AWG and smaller shall be made with insulated spring type wire connectors, "Scotchlok" or equivalent. Splices in larger wire and cables shall be made with indent connectors NEMA/UL approved for the purpose.
 8. Use split bolt connectors for copper wire splices and taps, 6 AWG through 1 AWG. Tape un-insulated conductors and connectors with electrical tape to 150% of the insulation value of conductor. Rubber, friction and 3M-33 or 88 or better. Two (2) layers minimum each.
 9. Use copper compression connectors for copper wire splices and taps, 1/O AWG and larger. Tape un-insulated conductors and connectors with electrical tape to 150% of the insulation value of the conductor. Rubber, friction and 3M-33 or 88.
 10. Make splices, taps and terminations to carry full ampacity of conductors without perceptible temperature rise.

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11. Thoroughly tape the ends of spare conductors in boxes and cabinets.
12. Install exposed cable, parallel and perpendicular to surfaces, or exposed structural member, and follow surface contours, where possible.
13. Make all ground, neutral and line connections to receptacle and wiring device terminals as recommended by manufacturer. Provide ground jumper from outlet box to individual ground terminal of devices.
14. Parallel conductors shall be cut to the same length and be the same type of wire.
15. All splices in control panels, terminal junction boxes, low voltage control circuits and fire alarm conductors shall be on numbered terminal strip.
16. When routed in a wall, install all thermostat wire, fire alarm, computer cable, low voltage cable, and other communication cable in conduit.
17. All junction boxes shall be fully accessible.
18. All wiring shall be routed through an acceptable raceway regardless of voltage application, unless specified otherwise under other sections of these standards.

3.3 TESTING, CLEANING AND CERTIFICATION

- A. Refer to Section 26 05 00 for testing, cleaning, and certification requirements.
- B. Prior to energizing circuitry, check installed wires and cables with megaohm meter to determine insulation resistance levels to ensure requirements are fulfilled. Test shall be made on all feeders regardless of size and on all branch circuits with No. 4 AWG and larger conductors.
- C. Prior to energizing, test wires and cables for electrical continuity and for short-circuits.
- D. Subsequent to wire and cable hook-up, energize circuitry and demonstrate functioning in accordance with requirements. Where necessary, correct malfunctioning units, and then retest to demonstrate compliance.

3.4 COMMISSIONING (DEMONSTRATION)

3.5 SCHEDULES

- A. Color code secondary service, feeder, and branch circuit conductors as follows:

120/208 Volts	Phase	277/480 Volts
Black	A	Brown
Red	B	Orange
Blue	C	Yellow
White	Neutral	Gray
Green	Ground	Green
Switch leg - Pink		
3 & 4 way travelers - Purple		

- B. Conductors shall be solid color for entire length.
- C. EXCEPTION:
 1. Conductors 8 AWG and larger may be black and shall be with color-coded at each termination and in each box or enclosure. For a distance of 6 inches use half-lapped 3/4 inch plastic tape in the specified color. Do not cover cable identification markings. Adjust tape locations to prevent covering of markings.

END OF SECTION 26 05 19

SECTION 26 05 26 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL (NOT APPLICABLE)

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. All grounding materials shall be copper with the exception of ground rod, which may be copper clad steel.
- B. Grounding and Bonding for Communications Systems. Provide code-sized ground cable bonding jumpers, installed with ground clamps, across all conduit expansion couplings and fittings.
- C. Provide a corrosion-resistant finish to field connections, buried metallic bonding products, and where factory applied protective coatings have been destroyed, where subject to corrosive action.
- D. Provide equipment-grounding conductor in all branch circuits. Route to switches, receptacles, equipment enclosures, equipment, and panels etc. and ground as required.
- E. Use mechanical grounding connectors for all grounding connections. Exothermic welded connections may be used underground or to building steel.
- F. Provide grounding bushings and bonding jumpers for all conduits terminating in reducing washers, concentric, eccentric or oversized knockouts at panel boards, cabinets, and gutters.
- G. Provide bonding wire in all flexible conduits.

END OF SECTION 26 05 26

SECTION 26 05 29 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL (NOT APPLICABLE)

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Conduit Hangers: Galvanized steel with special accessories for purpose and adequate to support load imposed.
- B. Coatings: Supports, support hardware, and fasteners shall be protected with zinc coating or with treatment of equivalent corrosion resistance-using NEMA/UL approved alternative treatment, finish, or inherent material characteristic. Products for use outdoors shall be hot-dip galvanized.
- C. Raceway Supports: Clevis hangers, riser clamps, conduit straps, threaded C-clamps with retainers, ceiling trapeze hangers, and wall brackets.
- D. Fasteners: Types, materials, and construction features as follows:
 - 1. Expansion Anchors: Carbon steel wedge or sleeve type.
 - 2. Toggle Bolts: All steel springhead type.
- E. Conduit Sealing Bushings: Factory-fabricated watertight conduit sealing bushing assemblies suitable for sealing around conduit, or tubing passing through concrete floors and walls. Construct seals with steel sleeve, malleable iron body, neoprene sealing grommets or rings, metal pressure rings, pressure clamps, and cap screws.
- F. U-Channel Systems: 16-gauge steel channels, with 9/16-inch-diameter holes, at a minimum of 8 inches on center, in top surface. Provide fittings and accessories that mate and match with U-channel and are of the same manufacture.
- G. Supports: Provide supporting devices of types, sizes and materials indicated; and having the following construction features:
 - 1. One-Hole Conduit Straps or Minerallac: For supporting 3/4 inch and smaller conduit, galvanized steel.
 - 2. Two-Hole Conduit Straps or Minerallac or industry approved equal: For supporting 1 inch and larger conduit, galvanized steel; 3/4 inch strap width; and 2-1/8 inch between center of screw holes.
- H. Fabricated Supporting Devices:
 - 1. General: Shop- or field-fabricated supports or manufactured supports assembled from U-channel components.
 - 2. Steel Brackets: Fabricated of angles, channels, and other standard structural shapes. Connect with welds and machine bolts to form rigid supports.
 - 3. Pipe Sleeves: Provide pipe sleeves of one of the following:
 - a. Sheet Metal: Fabricate from galvanized sheet metal; round tube closed with snap lock joint, welded spiral seams, or welded longitudinal joint.
 - b. Fabricate sleeves from the following gauge metal for sleeve diameter noted:
 - 1) 3-inch and Smaller: 20 gauge

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- 2) 4-inch to 6-inch: 16 gauge
- 3) Over 6-inch: 15 gauge
- c. Steel Pipe: Fabricate from Schedule 40 galvanized steel pipe.
- d. EMT, IMC, or Rigid Conduit.

I. J-Hooks and Bridle Rings

- 1. J-hooks and bridle rings may be used to support low voltage wiring systems.

J. The following are prohibited.

- 1. Plastic or fiber anchors.
- 2. Drilling or structured steel members.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Conduit Hangers: Support individual conduit 1-1/2 inch and larger and all multiple conduit runs with hangers. Clamp conduits individually to each support.

B. Supports and Hangers:

- 1. Support and align all raceways, cabinets, boxes, fixtures, etc., in an accepted manner and as herein specified. Support raceways on accepted types of wall brackets, specialty steel clips or hangers, ceiling trapeze hangers or malleable iron straps. Provide lead expansion shields in concrete, machine screws, bolts or welding on metal surfaces, and wood screws on wood construction. Use of powder-driven studs is prohibited without express permission from the University Project Manager.
 - a. Mount all conduits to structure a minimum of 7 inches above any accessible type ceiling, or with spacing as required to permit relocation of recessed fixtures to any location.
- 2. Where outlets are installed in steel stud type systems, provide additional cross bracing, bridging and/or straps as required to make outlet completely rigid prior to application of wall facing material.
- 3. Design hangers and wall brackets so that maximum deflection will be no greater than 1/8 inch.
- 4. Install supporting devices to fasten electrical components securely and permanently in accordance with NEC requirements.
- 5. Coordinate with the building structural system and with other electrical installation.

C. Raceway Supports: Comply with the NEC and the following requirements:

- 1. Conform to manufacturer's recommendations for selection and installation of supports.
- 2. Strength of each support shall be adequate to carry present and future load multiplied by a safety factor of at least four. Where this determination results in a safety allowance of less than 200 pounds, provide additional strength until there is a minimum of 200 pounds safety allowance in the strength of each support.
- 3. Install individual and multiple (trapeze) raceway hangers and riser clamps as necessary to support raceways. Provide U-bolts, clamps, attachments, and other hardware necessary for hanger assembly and for securing hanger rods and conduits.
- 4. Use of ceiling support wires is unacceptable.
- 5. Support parallel runs of horizontal raceways together on trapeze-type hangers. Use 3/8-inch diameter or larger threaded steel rods for support. Threaded rod shall be covered by 1/2 inch conduit from bottom of (trapeze) support to 6-inches above cable tray.
- 6. Support individual horizontal raceways by separate pipe hangers.

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7. Space supports for raceways in accordance with NEC.
 8. In all runs, arrange support so the load produced by the weight of the raceway and the enclosed conductors is carried entirely by the conduit supports with no weight load on raceway terminals.
 9. Threaded rod supports to have bottoms cut off at a maximum length equal to rod diameter below bottom double nut. Remove sharp edges.
- D. Miscellaneous Supports: Support miscellaneous electrical components separately and as required to produce the same structural safety factors as specified for raceway supports. Install metal channel racks for mounting cabinets, panel boards, disconnects, control enclosures, pull boxes, junction boxes, transformers, and other devices.
- E. Sleeves: Install in walls and all other fire-rated floors and walls for raceways and cable installations as required. Where sleeves through floors are installed, extend above finish floor. For sleeves through fire rated-wall or floor construction, apply UL listed fire stopping sealant in gaps between sleeves and enclosed conduits and cables. See Engineering plans for location and extent of fire rated assemblies.
- F. Fastening: Unless otherwise indicated, fasten electrical items and their supporting hardware securely to the building structure, including but not limited to conduits, raceways, cables, cable trays, bus ways, cabinets, panel boards, transformers, boxes, disconnect switches, and control components in accordance with the following:
1. Fasten by means of wood screws or screw-type nails on wood, toggle bolts on hollow masonry units, concrete inserts or expansion bolts on concrete or solid masonry, and machine screws, welded threaded studs, or spring-tension clamps on steel. Powder-driven studs are not acceptable. Do not weld conduit, pipe straps, or items other than threaded studs to steel structures. In partitions of light steel construction, use sheet metal screws.
 2. Holes cut to depth of more than 1-1/2 inches in reinforced concrete beams or to depth of more than 3/4 inch in concrete shall not cut the main reinforcing bars. Fill holes that are not used.
 3. Ensure that the load applied to any fastener does not exceed 25% of the proof test load. Use vibration- and shock-resistant fasteners for attachments to concrete slabs.

END OF SECTION 26 05 29

SECTION 26 05 33 - RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL (NOT APPLICABLE)

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Conduit: Allied
 - a. Republic
 - b. Carlon
2. Fittings and Bodies:
 - a. O/Z Gedney
 - b. Regal was purchased by Bridgeport
 - c. Bridgeport
 - d. Raco
 - e. Appleton
3. Conduit Seals:
 - a. Chase-Foam CTC PR-855, or approved equal

2.2 MATERIALS, GENERAL

A. Metal Conduit and Tubing:

1. Electrical Metallic Tubing (EMT):
 - a. Conduit: Galvanized steel tubing, galvanized on the outside and coated on the inside with a hard smooth lacquer finish. Fittings: Steel compression fittings for rain-tight and concrete-tight applications. Steel set-screw for interior connections. Set-screw quick fit type for 2-1/2 inch and larger may be used. Bushings shall be threaded and have nylon insulated throat or nylon bushing.
2. Flexible Metal Conduit:
 - a. Conduit: Continuous spiral wound, interlocked, zinc-coated steel, NEMA/UL approved for grounding.
 - b. Fittings: Cadmium plated, malleable iron. Straight connector shall be one-piece body, female end with clamp and deep slotted machine screw for securing conduit, and threaded male end provided with a locknut. Angle connectors shall be two-piece body with removable upper section, female end with clamp and deep slotted machine screw for securing conduit, and threaded male end provided with a locknut. All fittings 1 inch and larger shall be terminated with threaded bushings having nylon insulated throats.
 - c. Maximum length of 6 feet.
 - d. Minimum size of 1/2 inch.
3. Liquid-Tight Flexible Metal Conduit:
 - a. Conduit: Continuous spiral wound, interlocked zinc-coated steel with polyvinyl chloride (PVC) jacket, NEMA/UL approved for grounding.
 - b. Fittings: Cadmium plated malleable iron. Straight and angle connectors shall be the same as used with flexible metal conduit but shall be provided with a compression type steel ferrule and neoprene gasket sealing rings.

B. Conduit Bodies:

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1. General: Types, shapes and sizes, as required to suit individual applications and National Electric Code (NEC) requirements. Provide matching gasket covers secured with corrosion-resistant screws.
2. Metallic Conduit and Tubing: Use metal conduit bodies. Use bodies with threaded hubs for threaded raceways and in hazardous locations.
3. Telephone EL's are not acceptable.

2.3 MATERIALS, GENERAL

- A. Sheet Steel: Flat rolled, code-gage, galvanized steel.
- B. Fasteners for General Use: Corrosion resistant screws and hardware including cadmium and zinc plated items.
- C. Fasteners for damp or wet locations: Stainless steel screws and hardware.
- D. Exterior Finish: Gray baked enamel for items exposed in finished locations except as otherwise indicated.
- E. Metal outlet, device, and small wiring boxes:
 1. General: Boxes shall be of type, shape, size, and depth to suit each location and application.
 2. Steel Boxes: Boxes shall be sheet steel with stamped knockouts, threaded screw holes and accessories suitable for each location including mounting brackets and straps, cable clamps, exterior rings and fixture studs.
- F. Outlet Boxes, Pull and Junction Boxes (J-Boxes):
 1. General: Boxes shall have screwed or bolted-on covers of material same as box and shall be of size and shape to suit application.
 2. Steel Boxes: Sheet steel with welded seams. Where necessary to provide a rigid assembly, construct with internal structural steel bracing.
 3. Hot dipped galvanized steel boxes: Sheet steel with welded seams. Where necessary to provide a rigid assembly, construct with internal structural steel bracing. Hot-dip galvanized after fabrication. Cover shall be gasketed.
 4. Outlet Boxes: Hot-dipped galvanized of required size, 4 inch square, 2" depth minimum or octagonal and of depth required for flush mounted devices and lighting fixtures. Cast-type with gasketed covers for surface-mounted devices. All outlets for exterior application shall be cast, weatherproof type with gasket and cast cover plate.
 5. Junction and Pull Boxes: Use outlet boxes as J-boxes wherever possible. Larger J-boxes pull boxes shall be accessible and shall be fabricated from sheet steel, sized according to code.
- G. Non metallic boxes are not permitted.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Conduit Sizes:
 1. The conduit shall be sized in accordance with NEC.
 - a. For power and lighting circuits, the minimum conduit size shall be 3/4"
 - b. Flexible and Liquid-tight Flexible Conduit: 1/2 inch for all runs. Maximum 6-foot length.

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- c. Conduits used for home runs shall contain only the conductors for the circuits indicated on the drawings. Combining unrelated multiple home runs into a single conduit would not be permitted.

B. Type of Conduit Used

1. Electrical Metallic Tubing (EMT):
 - a. Interior concealed spaces.
 - b. Interior exposed above 10 feet to floor.
 - c. Not permitted underground, in concrete, and in hazardous or corrosive areas.
2. Sealtite metal conduit shall be provided for: Makeup of motor, transformer or equipment, and/or raceway connections where isolation of sound and vibration transmission is required. For connections in locations exposed to weather, or in interior locations subject to moisture, watertight flexible conduit shall be used.

C. General: Install electrical raceway in accordance with manufacturer's written installation instructions, applicable requirements of NEC, and as follows:

1. Conceal all conduits unless indicated otherwise, within finished walls, ceilings, and floors. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot water pipes.
2. Elevation of Raceway: Where possible, install horizontal raceway runs above water and steam piping, keep close to structure.
3. Complete installation of electrical raceways before starting installation of conductors within raceways.
4. Provide supports for raceways as required per NEC. Prevent foreign matter from entering raceways by using temporary closure protection.
5. Make bends and offsets so the inside diameter is not effectively reduced. Unless otherwise indicated, keep the legs of a bend in the same plane and the straight legs of offsets parallel. All bends shall be made in an approved bending machine or factory-made. Hickey bends will not be permitted in conduits larger than 3/4 inch. Refer to Section 27 05 28 for special bending requirements for Telecommunications Systems.
6. Use raceway fittings that are of types compatible with the associated raceway and suitable for the use and location. Install expansion fittings across all structural construction joints and expansion/deflection couplings across all structural expansion joints and in every 200 feet of linear conduit run. A flexible bonding jumper at least three times the nominal width of the joint shall be installed.
7. Run concealed raceways parallel and perpendicular to building elements at right angles.
8. Install exposed raceways parallel and perpendicular to nearby surfaces or structural members and follow the surface contours as much as practical. Paint all exposed raceways to match surrounding area.
9. Run exposed and parallel raceways together. Make bends in parallel runs from the same centerline so that the bends are parallel. Factory elbows may be used only where they can be installed parallel. In other cases, provide field bends for parallel raceways.
10. Make raceway joints tight. Where joints cannot be made tight, use bonding jumpers to provide electrical continuity of the raceway system. Make raceway terminations tight. Where terminations are subject to vibration, use bonding bushings or wedges to assure electrical continuity. Where subject to vibration or dampness, use insulating bushings to protect conductors. Joints in non-metallic conduits shall be made with solvent cement in strict accordance with manufacturer's recommendations.
11. Terminations: Where raceways are terminated with locknuts and bushings, align the raceway to enter squarely and install the locknuts with dished part against the box. RGC shall be secured with double locknuts and an insulated metallic bushing. EMT shall be secured with one locknut and shall have nylon-insulated throats or threaded nylon bushings from 1/2 inch to 1 inch. 1-1/4 inch and above shall be metal with nylon insulated throats. Use grounding type bushings for feeder conduits at switchboards, panel boards, pull boxes, transformers, motor control centers, VFDs, etc.

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12. Where terminating in threaded hubs, screw the raceway or fitting tight into the hub so the end bears against the wire protection shoulder. Where chase nipples are used, align the raceway so the coupling is square to the box, and tighten the chase nipple so no threads are exposed.
13. Install pull wires in empty raceways. Use #14 AWG zinc-coated steel or monofilament plastic line having not less than 200-pound tensile strength. Leave not less than 12 inches of slack at each end
14. Telecommunications and Signal Systems Raceways: Refer to Section 27 05 28 Pathways for Communications.
15. Install raceway-sealing fittings in accordance with the manufacturer's written instructions. Locate fittings at suitable, approved, accessible locations and fill them with UL Listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway-sealing fittings at the following points and elsewhere as indicated:
 - a. Where required by the NEC.
16. Flexible Connections: Use short length (maximum of 6 feet) of flexible conduit for recessed and semi-recessed lighting fixtures, for equipment subject to vibration, noise transmission, or movement; and for all motors. Use liquid tight flexible conduit in wet locations. Install separate ground conductor in all flexible connections.
17. Conduit Seals: Conduit passing through concrete walls shall be sealed.
18. Where conduits are to be installed through structural framing members, the contractor shall provide sleeves. Cut all openings in concrete with rotary type drill, or other method as approved by the University Project Manager. Holes cut with pneumatic hammer will not be accepted. For areas where sleeves have not been provided, the Engineer's written approval must be obtained prior to cutting, notching or drilling of structural framing members.
19. Ream the ends of all cut and/or threaded conduit. Ends shall be cut square.
20. Use of running threads for rigid metallic conduit are not permitted. When threaded couplings cannot be used, provide 3-piece union or solid coupling.
21. Conduits shall not cross pipe shafts or ventilation duct openings "access panel".
22. Conduit shall not obstruct full and direct access to equipment requiring maintenance. This includes but is not limited to valves, actuators and terminal box controllers.
23. Install an insulated ground conductor in all conduits.
24. Where individual conduits penetrate fire-rated walls and floors, provide pipe sleeve one size larger than conduit; pack void around conduit with fire rated insulation and seal opening around conduit with UL Listed foam silicone elastomer compound. Conduits on trapeze type support system shall require fire taping only.
25. Where conduit sleeves penetrate fire rated floors or walls for installation of system cables, AC or MC cables, or modular wiring cables, pack void around cables or empty sleeve with fire rated insulation and fill ends with fire-resistive compound. Seal opening around sleeve with UL Listed foam silicone elastomer compound.
26. Provide separate raceway systems for each of the following:
 - a. Lighting
 - b. Power Distribution
 - c. Low voltage systems, including telephone and communications, EQ alarm, security, fire alarm.
27. Provide for waterproofing of all raceways, fittings, etc., which penetrate the roof to preserve the weatherproof integrity of the building. Installation of materials shall conform to the following:
 - a. General:
 - 1) Install all raceways concealed except at surface cabinets, for motor and equipment connections and in mechanical equipment rooms. Install a minimum of 6 inch from flues, steam pipes or other heated pockets for water-flashing and counter-flashing or pitch pockets for waterproofing of all raceways, outlets, fittings, etc., which penetrate roof. Route exposed raceways parallel or perpendicular to building lines with right angle turns and symmetrical bends. Concealed raceways shall be run in a direct line, and where possible, with long sweep bends and offsets.
 - 2) Provide raceway expansion joints with necessary bonding conductor at building expansion joints and where required to compensate for raceway or building thermal

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expansion and contraction. Terminate raceways 1-1/4 inch and larger with insulated bushing or rain tight connections with insulated throats.

28. If type MC or AC cable is used for branch circuits, the home run conduit will be EMT and must run from the panel to within 10 feet horizontally of the first device served.

D. Raceway Installation:

1. Surface raceways, where indicated on drawings, shall be metal and of a size approved for number and size of wires to be installed, shall be installed in a neat, workmanlike manner, with runs parallel or perpendicular to walls and partitions. Raceways, elbows, fittings, outlets and devices shall be of same manufacturer, and designed for use together.
2. Wire ways, where indicated, complete with elbows, tees, connectors, adaptors, etc., with all parts factory-fabricated and of same manufacture.

3.2 INSTALLATION, GENERAL

A. Boxes:

1. Every J-box shall be secured, independent of conduit entries into the box. Boxes shall be secured to the building structure. Ceiling wire shall not be used to support (secure) J-boxes.
2. Box fill shall be governed by code requirements. Only the allowable amount of conduit entries shall be allowed into the box.
3. Box covers shall be marked so as to indicate the voltage, panel number, and circuit number of the enclosed conductors.
4. Each J-box shall have only one voltage installed.
5. Cap unused knockout holes where blanks have been removed and plug unused conduit hubs.
6. Sizes shall be adequate to meet NEC volume requirements, but in no case smaller than sizes indicated.
7. Remove sharp edges where they may come in contact with wiring or personnel.
8. All conduits connected to a flush panel shall be concealed.

B. Outlet Boxes:

1. Exact location of outlets and equipment shall be governed by structural conditions and obstructions or other equipment items. When necessary, relocate outlets so that when fixtures or equipment are installed, they will be symmetrically located according to room layout and will not interfere with other work or equipment. Verify final location of all outlets, panels, equipment, etc. with the University Project Manager.
2. Switch Outlet and Panel board height dimensions to meet ADA requirements.
3. Above counters, benches, special equipment, baseboards, fin tube radiators, etc., or at wainscoting, outlets shall be mounted minimum 6 inches above to prevent interferences to service equipment, or as noted on drawings.
4. Fire rated poke-through shall be installed in areas to miss beams and ductwork in ceiling below. Floors shall be X-rayed before core drilling.
5. Outlets at windows and doors: Locate close to window trim in an accessible location. For outlets indicated above doors center outlets above the door opening except as otherwise indicated.
6. Column and pilaster locations: Locate outlet boxes for switches and receptacles on columns or pilasters so the centers of the columns are clear for future installation of partitions. Locate in an accessible location.
7. Locations in special finish materials: For outlet boxes for receptacles and switches mounted in desks or furniture cabinets or in glazed tile, concrete block marble, brick, stone or wood walls, use rectangular shaped boxes with square corners and straight sides. Install such boxes without plaster rings. Saw cut all recesses for outlet boxes in exposed masonry walls.
8. Mounting: Mount outlet boxes for switches and receptacles with the long axis vertical or as indicated. Three or more gang boxes shall be mounted with the long axis horizontal. Locate box

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covers or device plates so they will not span different types of building finishes either vertically or horizontally. Locate boxes for switches near doors on the strike side, close to door trim. Provide far side box supports for electrical boxes installed on metal studs.

9. Ceiling outlets: For fixtures, where wiring is concealed, use outlet boxes 4-inches square by 1-1/2 inches deep, minimum.
10. Protect outlet boxes to prevent entrance of plaster, and/or debris. Thoroughly clean foreign material from boxes before conductors are installed.
11. Existing outlet boxes: Where extension rings are required to be installed, drill new mounting holes on the existing boxes where existing holes are not aligned.
12. Back to back outlet boxes are not permitted. Separate boxes a minimum of 6 inches in standard walls and 24 inches in acoustical walls.

C. Installation of Pull and J-Boxes:

1. Box selection: For boxes in main feeder conduit runs, use minimum 8-inches square by 4-inches deep or as needed per NEC. Do not exceed 6 entering and 6 leaving raceways in a single box.
2. Cable supports: Install clamps, grids, or devices to which cables may be secured. Arrange cables so they may be readily identified. Support cable at least every 30 inches inside boxes.
3. Mount pull boxes in inaccessible ceilings with the covers flush with the finished ceiling.
4. Every J-box shall be secured, independent of conduit entries into the box. Boxes shall be secured to the building structure. Provide rigid supports for all J-boxes, ceiling wire supports are not acceptable.
5. Box fill shall be governed by code requirements. Only the allowable amount of conduit entries shall be allowed into the box.
6. Box covers shall be marked so as to indicate the voltage, panel numbers, and circuit number of the enclosed conductors. Use pre-printed labels, marking cover with permanent marker is not acceptable.

D. Grounding:

1. Electrically ground metallic cabinets, boxes, and enclosures. Where wiring to item includes a grounding conductor, provide a grounding terminal in the interior of the cabinet, box or enclosure.

E. Outlets:

1. Provide zinc-coated or cadmium-plated sheet steel outlet boxes not less than 4 inch octagonal or square, unless otherwise noted. Equip fixture outlet boxes with 3/8-inch no-bolt fixture studs. Where fixtures are mounted on or in an accessible type ceiling, provide a J-box and extend flexible conduit, maximum 6' to each fixture. Outlet boxes in finished ceilings or walls shall be fitted with appropriate covers, set to come flush with the finished surface. Where more than one switch or device is located at one point, use gang boxes and covers unless otherwise indicated. Sectional switch boxes or utility boxes will not be permitted. Provide tile box or a 4-inch square box with tile ring where "drywall" type materials are applied.

F. Pull and J-Boxes and Cabinets:

1. Construct J-boxes or pull boxes not over 150 cubic inches in size as standard outlet boxes, and those over 150 cubic inches the same as "Cabinets," with hinged covers of same gauge metal. Removable covers must be accessible at all times.
2. Provide a standard access panel having a hinged metal door neatly fitted into a flush metal trim, where a J-box or equipment is located above non-accessible ceilings or behind finished walls. Coordinate location and type with the University Project Manager. Access panels shall be minimum 24"x24" or 6" larger than pull box.
3. All cabinets shall be set rigidly in place with fronts straight and plumb, center panel board interiors in door openings.

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END OF SECTION 26 05 33

SECTION 26 05 53 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUBMITTALS

1. Samples of each color, lettering style, and other graphic representation required for identification materials; samples of labels and signs.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Ideal Industries, Inc.
2. LEM Products, Inc.
3. Markal Corp.
4. Panduit Corp.
5. W.H. Brady, Co.

2.2 MATERIALS, GENERAL

- A. Nameplates: Engraved plastic laminate, black letters on white background for normal systems and white letters on red background for emergency systems.
- B. Electronic Labels: 9mm self-adhesive tape, black letters on clear for normal systems and red letters on clear for emergency systems. Embossed DymoType labels are not accepted.
- C. Wires and Cable Markers: Cloth markers, split sleeve and tubing type.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Lettering and Graphics: Coordinate names, abbreviations, colors, and other designations used in electrical identification work with corresponding designations specified or indicated. Install numbers, lettering, and colors as approved in submittals and as required by code.
- B. Sequence of Work: Where identification is to be applied to surfaces that require finish, install identification after completion of finish work. Degrease and clean surfaces to receive nameplates and labels.
- C. Conduit Identification: Use adhesive marking labels at 40 foot intervals to identify all conduits run exposed or located above accessible ceilings. Conduits located above non-accessible ceiling or in floors and walls shall be labeled within 3 feet of becoming accessible. Use the following colors:
1. 600 Volt and Below: Black letters on orange background indicating feeder identification and
 2. Other Systems: Provide color banding as specified below.
- D. Identify System Raceways with Color Banding: Band exposed or accessible raceways of the following systems for identification. Bands shall be pre-tensioned, snap-around colored plastic sleeves, colored adhesive marking tape, or a combination of the two. Make each color band 2 inches wide, completely encircling conduit, and place adjacent bands of two-color markings in contact, side by side. Install bands

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at changes in direction, at penetrations of walls and floors, and at 40-foot maximum intervals in straight runs. Provide Brady B-946 vinyl or equivalent. Colored duct tape is not acceptable. Apply the following colors:

1. Fire Alarm Systems: Red with Red Cable.
- E. Identify Junction, Pull, and Connection Boxes: Identification of systems and circuits shall be pressure-sensitive, self-adhesive label indicating system voltage and identity of contained circuits on outside of box cover. Color code shall be same as conduits for pressure sensitive labels. Use pressure-sensitive plastic labels at exposed locations and indelible marker (black or red) at concealed boxes. All fire alarm boxes shall have covers painted red.
- F. Power Circuit Identification: Tag or label conductors as follows:
1. Multiple Circuits: Where multiple branch circuits or control wiring or communications/signal conductors are present in the same box or enclosure label each conductor or cable including neutrals. Provide legend indicating source, voltage, circuit number, and phase for branch circuit wiring. Phase and voltage of branch circuit wiring may be indicated by means of coded color of conductor insulation. For control and communications/signal wiring, use color coding or wire/cable marking tape at terminations and at intermediate locations where conductors appear in wiring boxes, troughs, and control cabinets. Use consistent letter/number conductor designations throughout on wire/cable marking tapes.
 2. Match identification markings with designations used in panel boards shop drawings, Contract Documents, and similar previously established identification schemes for the facility's electrical installations.
- G. Install equipment/system circuit/device identification as follows:
1. Apply equipment identification labels of engraved plastic-laminate on each major unit of electrical equipment in building, including central or master unit of each electrical system. This includes communication/signal/alarm systems, unless the unit is specified with its own self-explanatory identification. Text shall match terminology and numbering of the Contract Documents and shop drawings. Identification must include equipment name, voltage, phase, amperage, and fed from. Apply labels for each unit of the following categories of electrical equipment.
 - a. Switchboards, switchgear, panelboards and enclosures, 1/2" high lettering.
 - b. Access doors and panels for concealed electrical items, 1/4" letters
- H. Apply circuit/control/item designation labels of engraved plastic laminate for disconnect switches, breakers, pushbuttons, pilot lights, motor control centers, and similar items for power distribution and control components above, except panel boards and alarm/signal components, where labeling is specified elsewhere.
- I. For panel boards, provide framed, typed circuit schedules (label all spares and spaces in pencil) with explicit description and identification of items controlled by each individual breaker.
- J. Install labels at locations indicated and at locations for best convenience of viewing without interference with operation and maintenance of equipment.
- K. Provide tape labels for identification of individual receptacle and switch wall plates. Locate tape on front of plate and identify branch circuit serving the receptacle or switch.

END OF SECTION 26 05 53

SECTION 26 09 23 - LIGHTING CONTROL DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Indoor occupancy sensors.
 - 2. Standalone daylight-harvesting switching and dimming controls.
- B. Related Requirements:
 - 1. Section 262726 "Wiring Devices" for wall-box dimmers, wall-switch occupancy sensors, and manual light switches.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Show installation details for occupancy and light-level sensors.
 - 1. Interconnection diagrams showing field-installed wiring.
 - 2. Include diagrams for power, signal, and control wiring.

1.4 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For each type of lighting control device to include in emergency, operation, and maintenance manuals.

PART 2 - PRODUCTS

2.1 INDOOR OCCUPANCY SENSORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Bryant Electric.
 - 2. Cooper Industries, Inc.
 - 3. Hubbell Building Automation, Inc.
 - 4. Leviton Manufacturing Co., Inc.
 - 5. Lightolier Controls.
 - 6. Lithonia Lighting; Acuity Brands Lighting, Inc.

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7. Lutron Electronics Co., Inc.
8. NSi Industries LLC; TORK Products.
9. RAB Lighting.
10. Sensor Switch, Inc.
11. Square D.
12. Watt Stopper.

B. General Requirements for Sensors: Wall- or ceiling-mounted, solid-state indoor occupancy sensors with a separate power pack.

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Operation: Unless otherwise indicated, turn lights on when coverage area is occupied, and turn them off when unoccupied; with a time delay for turning lights off, adjustable over a minimum range of 1 to 15 minutes.
3. Sensor Output: Contacts rated to operate the connected relay, complying with UL 773A. Sensor is powered from the power pack.
4. Power Pack: Dry contacts rated for 20-A ballast load at 120- and 277-V ac, for 13-A tungsten at 120-V ac, and for 1 hp at 120-V ac. Sensor has 24-V dc, 150-mA, Class 2 power source, as defined by NFPA 70.
5. Mounting:
 - a. Sensor: Suitable for mounting in any position on a standard outlet box.
 - b. Relay: Externally mounted through a 1/2-inch knockout in a standard electrical enclosure.
 - c. Time-Delay and Sensitivity Adjustments: Recessed and concealed behind hinged door.
6. Indicator: Digital display, to show when motion is detected during testing and normal operation of sensor.
7. Bypass Switch: Override the "on" function in case of sensor failure.
8. Automatic Light-Level Sensor: Adjustable from 2 to 200 fc; turn lights off when selected lighting level is present.

C. Dual-Technology Type: Ceiling mounted; detect occupants in coverage area using PIR and ultrasonic detection methods. The particular technology or combination of technologies that control on-off functions is selectable in the field by operating controls on unit.

1. Sensitivity Adjustment: Separate for each sensing technology.
2. Detector Sensitivity: Detect occurrences of 6-inch- minimum movement of any portion of a human body that presents a target of not less than 36 sq. in., and detect a person of average size and weight moving not less than 12 inches in either a horizontal or a vertical manner at an approximate speed of 12 inches/s.
3. Detection Coverage (Standard Room): Detect occupancy anywhere within a circular area of 1000 sq. ft. when mounted on a 96-inch- high ceiling.

2.2 CONDUCTORS AND CABLES

- A. Power Wiring to Supply Side of Remote-Control Power Sources: Not smaller than No. 12 AWG. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."**
- B. Classes 2 and 3 Control Cable: Multiconductor cable with stranded-copper conductors not smaller than No. 18 AWG. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."**

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- C. Class 1 Control Cable: Multiconductor cable with stranded-copper conductors not smaller than No. 14 AWG. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

PART 3 - EXECUTION

3.1 SENSOR INSTALLATION

- A. Coordinate layout and installation of ceiling-mounted devices with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, smoke detectors, fire-suppression systems, and partition assemblies.
- B. Install and aim sensors in locations to achieve not less than 90 percent coverage of areas indicated. Do not exceed coverage limits specified in manufacturer's written instructions.

3.2 WIRING INSTALLATION

- A. Wiring Method: Comply with Section 260519 "Low-Voltage Electrical Power Conductors and Cables." Minimum conduit size is 1/2 inch.
- B. Wiring within Enclosures: Comply with NECA 1. Separate power-limited and nonpower-limited conductors according to conductor manufacturer's written instructions.
- C. Size conductors according to lighting control device manufacturer's written instructions unless otherwise indicated.
- D. Splices, Taps, and Terminations: Make connections only on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures.

3.3 IDENTIFICATION

- A. Identify components and power and control wiring according to Section 260553 "Identification for Electrical Systems."
 - 1. Identify controlled circuits in lighting contactors.
 - 2. Identify circuits or luminaires controlled by photoelectric and occupancy sensors at each sensor.

3.4 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:
 - 1. Operational Test: After installing time switches and sensors, and after electrical circuitry has been energized, start units to confirm proper unit operation.
 - 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- B. Lighting control devices will be considered defective if they do not pass tests and inspections.

END OF SECTION 26 09 23

SECTION 26 20 00 - LOW VOLTAGE ELECTRICAL DISTRIBUTION

PART 1 - GENERAL (NOT APPLICABLE)

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Cartridge Fuses:
 - a. Bussmann Div., Cooper Industries, Inc.
 - b. Littelfuse Inc.
 - c. Or equal
2. Fusible Switches:
 - a. Square D Co.
 - b. Allen-Bradley Co.
 - c. General Electric Co.
 - d. Eaton-Cutler Hammer
3. Panelboards:
 - a. General Electric Co. Siemens – Energy Automation
 - b. Square D
 - c. Eaton-Cutler Hammer
 - d. Siemens

2.2 MATERIALS, GENERAL

A. Panelboards:

1. Panelboards shall be bolt on, circuit breaker type. Panelboard bus shall be copper and shall be size to meet the continuous and short circuit rating as shown on the drawings.
2. All panel covers will be factory painted with low gloss enamel (not flat wall paint) suitable for metal. No field painting will be permitted. Toggle type covers not acceptable.
3. Panelboards shall be of door-in-door construction.

B. Over current Protective Device:

1. General: Provide OCPDs in indicated types, as integral components of panelboards, switchboards, and other related equipment; and also as individually enclosed and mounted single units.
2. Where OCPDs are to be installed in existing panelboards, switchboards, and motor control centers, they shall be of the same manufacture and type as those existing in the equipment.

C. Cartridge Fuses:

1. General: Unless indicated otherwise, provide nonrenewable cartridge fuses of indicated types, classes, and current ratings that have voltage consistent with the circuits on which used.
2. All fuses used for main, feeder, or branch-circuit protection shall be UL listed, current limiting fuses with 200,000 ampere interrupting rating and shall be so labeled. Fuses used for supplementary protection (other than branch circuit protection) shall be as specified above or shall be UL approved or component recognized for such purposes. The same manufacturer shall furnish all fuses provided. Should equipment provided require a different UL class or size of fuse, the

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- engineer shall be furnished sufficient data to ascertain that system function will not be adversely affected.
3. To simplify fuse replacement, reduce spare fuse inventory and insure adequate thermal protection, all fuses 600 amperes and below shall be true dual-element time-delay fuses with separate spring-loaded thermal overload elements in all ampere ratings. All ampere ratings shall be designed to open at 400 degree F or less when subjected to a non-load oven test.
 4. To eliminate induction heating, all fuse ferrules and end caps shall be non-ferrous and shall be bronze or other alloy not subject to stress cracking.
 5. Class L Fuses: UL 198C, "High-interrupting Capacity Fuses, Current-limiting Type."
 6. Class RK1 and RK5 Dual Element Time-delay Fuses: UL 198E, "Class R Fuses."

D. Fusible Switches:

1. General: UL 98 "Enclosed and Dead Front Switches" and NEMA KS-1 "Enclosed Switches," quick-make, quick-break, heavy-duty units.
2. Rating: Load-breaking capacity in excess of the normal horsepower rating for the switch.
3. Withstand Capability: In excess of the let-through current permitted by its fuse when subject to faults up to 100,000 RMS symmetrical amperes.
4. Operation: By means of external handle.
5. Interlock: Prevents access to switch interior except when in "off" position.
6. Fuse Clips: Rejection type.
7. Padlocking Provisions: For 2 padlocks whether open or closed.
8. Enclosure for Independent Mounting: NEMA Type 1 enclosure except as otherwise indicated or required to suit environment where located.
9. Contacts shall be NEMA rated 75 degree C.
10. Provide fuses for safety switches and other equipment of classes, types, and rating needed to fulfill electrical requirements for services indicated.

E. Safety Switches:

1. Heavy-duty type, horsepower rated for motors. Quick-make, Quick-break, load interrupter enclosed knife switch with externally operable handle. Handle shall be lockable in the "off" position.
2. Standard enclosure NEMA 1 indoors and NEMA 3R weather-tight outdoors.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Independently Mounted OCPDs: Locate as indicated and install in accordance with manufacturer's written installation instructions.
- B. OCPDs in distribution and branch circuit equipment shall be factory installed.
- C. Connections: Check connectors, terminals, bus joints, and mountings for tightness. Tighten field-connected connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque tightening values. Where manufacturer's torque requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL 486A and UL 486B.
- D. Grounding: Provide equipment-grounding connections for individually mounted OCPD units as indicated and as required by NEC. Tighten connectors to comply with tightening torques specified in UL Standard 486A to assure permanent and effective grounding.
- E. Panel boards:

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1. Except as otherwise noted, locate panel boards as follows: Dimensions given are from finished floor.
 - a. 6'-6" to top of trim.
 2. Contractors who are modifying or installing new electrical panels must redo the panel directory making the directory current. In the case of a new panel, the panel directory must coincide with actual (correct) building room numbers. Panel schedules need to be updated when extra circuits are added or when the entire panel is upgraded, such as with remodel jobs. Final directory shall be typed, hand written directories are not acceptable.
 3. Only one wire per breaker will be allowed.
 4. Wire shall be neatly formed to contour with the panel box. Remove all excess wire lengths.
 5. An energized panel shall not be left exposed or unlocked to the general public, such as in a hallway, office, or other pedestrian walkway. Panel covers shall be reinstalled at the end of the workday.
 6. Panel identification is imperative. The panel shall be identified on the outside of the panel cover per Section 26 05 53.
 7. Panel cover hardware shall be replaced if broken or not operating properly.
 8. Breakers shall be labeled odd numbers on left side; even numbers on right side.
 9. Match existing building equipment wherever possible and/or coordinate with the University Project Manager.
- F. Electrical panels, and any kind of electrical distribution boards shall not be worked hot.
- G. All mechanical ductwork and piping not directly serving the electrical room shall be prohibited in electrical room. All plumbing piping, and storm drains are prohibited to be routed through electrical rooms.
- H. Provide a framed record drawing of the complete and final electrical distribution one-line. Mount in the main electrical room.

END OF SECTION 26 20 00

SECTION 26 27 26 - WIRING DEVICES

PART 1 - GENERAL (NOT APPLICABLE)

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers: Subject to compliance with requirements, provide wiring devices of one of the following:

1. Devices:
 - a. Harvey Hubbell Inc.
 - b. Leviton Mfg. Co.
 - c. Pass and Seymour Inc.
 - d. Bryant Electric Co.
 - e. General Electric Co.
2. Wall (Local) Switches: Numbers used below are those of Hubbell. Equivalent Cooper, P & S, or Leviton.

2.2 MATERIALS, GENERAL

- A. Receptacles:

1. Duplex receptacles shall be of the heavy-duty type, NEMA 5-20 Rconfigurations. They shall be capable of being side or back wired, with clamp type terminals for back wiring. The grounding blades shall be aligned in such a manner that they are parallel to the longitudinal plane of the receptacle. Plus type receptacles are not permitted.
2. All duplex, single, and special receptacles shall be heavy duty, standard grade listed by Underwriter's Laboratories, and have a single brass mounting strap with self-grounding and have a hex-head green grounding screw and be side and back wired. Each device shall bear the UL/FS Label.
3. Convenience Receptacle Configuration: NEMA WD 1; Type 5-20R.. All receptacles connected to emergency circuits shall have a red face. Color selection for normal devices shall be verified with Engineer prior to ordering.
4. Special Purpose Receptacles: Provide where shown on drawings. Standard grade, standard color, and of the appropriate code and NEMA configuration to match the supply circuit and load involved. Provide proper grounding through receptacle for equipment.

- B. Switches:

1. Wall Switches for Lighting Circuits: NEMA WD1; FS W-S-896E; AC, quiet type, specification grade, listed by Underwriter's Laboratories with toggle handle, rated 20 amperes or greater at 277 volts AC, unless noted otherwise. Mounting straps shall be metal and be equipped with a green hex-head ground screw. Each switch shall bear the UL/FS Label.
2. Handle: Verify color for normal power devices with Engineer prior to ordering.
3. Locator Type: Continuously lighted handle.

Single-Pole Switches	#1221	20 amps	277 volts
Three-Way Switches	#1223	20 amps	277 volts
Four-Way Switches	#1224	20 amps	277 volts
Switch with Pilot	Series 1200		

- C. Wiring Device Accessories:

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1. Wall Plates: Provide Wall plates for single and combination wiring devices, of types, sizes, and with ganging and cutouts as indicated. Select plates which mate and match wiring devices to which attached. Construct with metal screws for securing plates to devices; screw heads colored to match finish of plates. Identify all wall plates used for receptacles with branch circuit number. Provide blank wall plates for all cable, data, telephone and junction and outlet boxes. Where cables are routed through the wall plate, provide grommets in wall plate openings to protect cables. Provide plates possessing the following additional construction features:
 - a. Material and Finish: Stainless steel smooth or match existing.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify boxes are installed at proper height and openings are neatly cut and will be completely covered by wall plates.
- B. Verify branch circuiting wiring installation is completed, tested, and ready for connection to wiring devices.

3.2 INSTALLATION, GENERAL

- A. Install wiring devices of type as indicated on drawings. All connections shall be made up tight and device set plumb. Use care in installing device in order to prevent damage to device and wire in outlet box. Install wiring devices as indicated, in accordance with manufacturer's written instruction, applicable requirements of NEC and in accordance with recognized industry practices to fulfill project requirements.
- B. Coordinate with other work, including painting, electrical boxes and wiring work, as necessary to interface installation of wiring devices with other work.
- C. Install wiring devices only in electrical boxes that are clean; free from excess building materials, dirt, and debris.
- D. Install wiring devices after wiring work has been installed and wall finishes have been completed. Install wall plates plumb and level, after painting work is completed. Provide a device plate for each outlet to suit device installed and install blank plates or covers for J-boxes and empty outlets.
- E. Tighten connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque tightening values for wiring devices or as required per UL Standards 486A.
- F. Upon installation of wall plates and receptacles, advise Contractor regarding proper and cautious use of convenience outlets. At time of Final Completion, replace those items that have been damaged, including those burned and scored by faulty plugs.
- G. Provide equipment grounding connections for wiring devices, unless otherwise indicated.

3.3 TESTING, CLEANING, AND CERTIFICATION

- A. Refer to Standard Section 26 05 00 for testing, cleaning, and certification requirements.
- B. Prior to energizing circuitry, test wiring for electrical continuity, and for short-circuits. Ensure proper polarity of connections is maintained. Subsequent to energization, test wiring devices to demonstrate compliance with requirements.

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- C. Test ground fault interrupter operation with both local and remote fault simulations in accordance with manufacturer recommendations.

END OF SECTION 26 27 26

SECTION 26 51 00 - INTERIOR LIGHTING

PART 1 - GENERAL

1.1 DESIGN REQUIREMENTS

1.2 SUBMITTALS

1.3 Product Data: Submit product data with mounting type and installation instructions for each proposed types of luminary and accessories. DELIVERY, STORAGE AND HANDLING

- A. Deliver luminaries in factory-fabricated containers or wrappings, which properly protect them from damage.
- B. Store luminaries in original packaging. Store inside well-ventilated area protected from weather, moisture, soiling, extreme temperatures, humidity, laid flat, and blocked off ground.
- C. Handle luminaries carefully to prevent damage, breaking, and scoring of finishes. Do not install damaged units or components; replace with new.

PART 2 - PRODUCTS

2.1 MANUFACTURES

2.2 MATERIALS, GENERAL

- A. Wiring: Provide electrical wiring within luminary suitable for connecting to branch circuit wiring as follows:
 - 1. NEC Type THHN for 120 volt, minimum #18 AWG
 - 2. NEC Type THHN for 277 volt, minimum #18 AWG
 - 3. Provide a green grounding wire in flexible conduit connection to all recessed fixtures. Provide green grounding wire to all power outlets. Provide green grounding wire in all runs from panels to fixtures and devices.
- B. Lenses: Diffusers for fluorescent fixtures shall be acrylic A12.125.
- C. Exit Signs: Housing shall be extruded aluminum. Face shall be translucent white with green lettering. Directional arrows shall be universal for field adjustment. Mounting shall be as indicated on project drawings. Battery shall be provided if an emergency source is not available. Lamp shall be LED type. Input voltage shall be as shown on drawings. H-3 radioactive exit signs must not be specified.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions under which lighting is to be installed, and substrate for supporting lighting. Notify Contractor in writing of conditions detrimental to proper completion of the work. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.2 INSTALLATION, GENERAL

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- A. Install lighting at locations and heights as indicated, in accordance with manufacturer's written instructions, applicable requirements of NEC, NECA's "Standard of Installation," NEMA standards, and with recognized industry practices to ensure that lighting fulfills requirements.
- B. Provide luminaries and/or outlet boxes with hangers to properly support luminary weight. Comply with IBC luminary support requirements.
- C. Install flush-mounted luminaries properly to eliminate light leakage between frame and finished surface.
- D. Provide plaster frames for recessed luminaries installed in other than suspended grid-type acoustical ceiling systems. Brace frames temporarily to prevent distortion during handling.
- E. Fasten luminaries securely to indicate structural supports; and ensure that pendant luminaries are plumb and level. Provide individually mounted pendant luminaries longer than 2 feet with twin hangers. Mount continuous rows of luminaries with one more aircraft cable support greater than number of luminaries in the row.
- F. Tighten connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque tightening values for equipment connectors. Where manufacturer's torque requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL Standards 486A and 486B, and the National Electrical Code (NEC).
- G. Provide additional supports for all surface-mounted luminaries greater than 2 feet in length in addition to the outlet box.
- H. Grounding: Provide equipment-grounding connections for lighting as indicated. Tighten connections to comply with tightening torques specified in UL Standard 486A to assure permanent and effective grounds.
- I. Install exit signs per manufactures recommendations.

3.3 TESTING, CLEANING, AND CERTIFICATION

- A. Clean luminaries of dirt and construction debris upon completion of installation, and again prior to project turnover. Clean fingerprints and smudges from lenses.
- B. Protect installed luminaries from damage during remainder of construction period.
- C. At Date of Final Completion, replace lamps in luminaries that are observed to be noticeably dimmed after Contractor's use and testing, as judged by Engineer.
 - 1. Refer to Division 1 sections for the replacement/restoration of lamps in lighting where used for temporary lighting prior to Date of Final Completion.

END OF SECTION 26 51 00

SECTION 28 31 00 - FIRE DETECTION AND ALARM

PART 1 - GENERAL

- A. Project Scope: The existing facility fire alarm panel will be modified to accommodate the indicated new fire alarm devices. All of the existing fire alarm devices in the Primary Care and the Dental Clinic wings of the facility will be removed and replaced with new as indicated on the drawings. The existing fire alarm panel will be updated to indicate the new / modified devices.
- B. The existing fire alarm panel is an addressable type system.
- C. Failsafe Operation: To increase the system's ability to survive damage from fire, malicious or accidental damage, premature component failure, etc., the fire alarm system shall provide the following functionality:
1. The system shall have the capacity to operate FACP, as required per NFPA PCs for two hours, and then operate the fire alarm indicating devices for at least 15 minutes, per NFPA requirements. When commercial power is restored, the system shall transfer automatically to primary power. System power supply shall be equipped with battery charging circuits sufficient to recharge fully depleted batteries to within 70 percent of their maximum capacity within 12 hours.
- D. Color code and minimum wire sizes for the fire alarm system as follows:
1. All wire is solid copper:
 2. All insulation colors shall be continuous for the full length of the wire.
 3. Wire Jackets shall be stamped with the "Circuit Type" designation or shall have an affixed label designating the "Circuit Type" every twenty lineal feet at a minimum.

Circuit Type	Colors		Size
	Wire	# Of Conductors	
Initiating Circuits	(+) Red (-) Black	2	18 (THHN)
Signaling Circuits	(+) Red (-) White	2	16 Twisted
Speaker Circuits	(+) Orange (-) Brown	2	14 Twisted
Strobe Circuits	(+) Yellow (-) Blue	2	14 Twisted
Door Holder Circuit	(+) Red (-) Black	2	14 Twisted

- E. Intelligent Features:
1. The following additional features shall be provided:
 - a. The fire alarm detector cleaning shall be annunciated at the FACP as a trouble condition by the device.

1.2 SUBMITTAL

- A. Provide shop drawings as follows:
1. Floor plans with device layout, address and wiring.

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2. FACP layout.
 3. Riser diagrams.
 4. Battery calculation.
 5. Sequence of operation
 6. Equipment cut sheets
- B. CADD generated layouts for FACT screen graphics.
- C. Operating and Maintenance Manuals.
- D. Fire alarm shop drawings shall be submitted and approved by the Denver Fire Department prior to the beginning of any fire alarm installation or removal.
- E. Project Record Documents:
1. Prior to submittal of the as-built documents, submit a complete package of shop drawings to the university Facilities Operations Fire and Safety office for review. Drawings shall include floor plans and graphic maps for each building and/or floors.
 2. Submit record documents in accordance with the requirements of Section 01 78 39 and the following:
 - a. As-built point-to-point wiring diagrams depicting every device, including correct university room numbers.
 - b. Revised schematic, wiring, and interconnection diagrams of all circuits, internal and external, for all equipment installed and exact locations for all devices. These schematics shall include the conductor color-coding and terminal number identification system, location of all terminal boxes complete with numbering and each device address.
 - c. Complete, as-installed, riser diagrams indicating the wiring sequence of all alarm initiating devices, supervisory devices, and all signaling appliances on all signaling circuits.
 - d. A complete description of the system operation, including a schedule of relay abbreviations used on the drawings, list of relay functions, and the sequence of relay operation during supervisory trouble and alarm conditions.
 - e. Complete wiring and control diagrams for control and shutdown circuits for fan systems.

1.3 QUALITY ASSURANCE

- A. Manufacturer: Company specializing in Intelligent Fire Management Systems.
- B. Installer: Company with certified personnel specializing in smoke detection and fire alarm systems with five years' documented experience as a fire alarm installing contractor.
- C. Fire Management system installer shall keep all smoke heads in the building covered until final building turn over. Failure to comply will mandate a complete cleaning of the individual heads on the system.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Monaco Enterprise Inc. – (509) 926-6277 – Ken Olson

2.2 APPROVED INSTALLERS

- A. Metroplex Control System (MCS) – 6950 South Tucson Way, Unit D, Centennial, CO 80112, (720) 875-0303.

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- B. Advanced Electronic System – 801 Main Street, Windsor, CO 80550, (970) 686-6200
- C. FAS (Fire Alarm Services) – 4800 W 60th Ave, Arvada CO, 80003 (303) 466-8800
- D. Meridian Fire and Security – 7173 S. Havana St Ste 400 Centennial CO, 80112 (303) 790-2520
- E. Intermountain Electric, Inc. – 5050 Osage Street, Suite #500, Denver, Colorado, 80221 (303)733-7248

2.3 MATERIALS, GENERAL

- A. All equipment and materials used shall be standard components, regularly manufactured, and regularly utilized in the manufacturer's system.
- B. All systems and components shall have been thoroughly tested and proven in actual use.
- C. All equipment shall be listed and labeled by Underwriters Laboratories.
- D. All sensors shall be of the intelligent type and shall mount on a common base. This base shall be incompatible with conventional detectors.
- E. Where equipment of different manufacturers is used, such equipment shall be included under the required over-all UL system listing as a component of the integrated fire alarm system.
- F. The system shall be designed to operate with unshielded wire, to the maximum practicable extent. Shielded wire may be used. FO cable shall be utilized, as required or as indicated by the design documents.
- G. Fire Alarm System Devices:
 - 1. General:
 - a. Each device shall be assigned a unique address. Address selection by jumpers is not acceptable. Devices which take their address from their position in the circuit are unacceptable. It is preferred that the address of the intelligent device be part of the device base rather than the device itself.
 - b. Devices shall receive power and communication from the same pair of wires. For fault-tolerant circuits, any separate power wiring shall also be made fault-tolerant.
 - 2. Analog Sensors (Photoelectric and Thermal):
 - a. Each sensor shall contain an LED, which blinks each time it is scanned by the FACP. The sensor LED is to remain illuminated to indicate alarm. All sensors not visible from the corridor shall have a remote light mounted in the corridor as shown on the drawings.
 - 3. Control Modules:
 - a. The Control Module shall provide an addressable output for a separately powered alarm-indicating circuit or for a control relay.
 - b. The relay contacts shall be SPST (Form "C" rated at 2 amps at 28V DC).
 - c. The module shall mount in a standard electrical box.
 - d. Control voltage's connected to intelligent control relays shall not exceed 24VAC/24VDC. Isolation relays shall be used on control voltages on excess of 24VAC/24VDC.
 - 4. Fault Isolator Module (only if approved by the University Project Manager):
 - a. The Fault Isolator Module shall detect and isolate a short-circuited segment of a fire-alarm loop.
 - b. Modules shall be placed on every floor to limit the number lost addressable devices in case of a short-circuit on the intelligent circuit.
 - 5. Intelligent manual pull stations shall be single action, mounted on standard electrical box.
 - a. For public places, use single action pull stations with "Stopper II" cover.

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H. Other Devices:

1. Speaker/Strobes:
 - a. Strobes shall be synchronized.
 - b. The speaker shall provide for minimum sound level of 95 dBA at 10 feet.
2. Voice Evacuation Speaker/Strobe units shall be UL listed for use in voice evacuation systems. Audible and visual indications shall operate independently or in unison.

I. Special System Requirements:

1. The communications board shall include two FO transmit and two FO receive modules mounted as an integral part of the board. Detached FO transmit and receive modules will not be permitted. All FO transmit and receive modules shall include automatic gain control.

J. FO Jumper Cable:

1. Provide plenum-rated FO cable, tight buffer type, with attenuation less than 3.5 dB/Km at 850 nm.
2. Jumper shall consist of two type ST connectors and the required length of 50/125 or 62.5/125 micron FO cables. Jumper cable to match trunk system cable to which the FACP is to be connected to.
3. Connectors shall meet or exceed the following requirements:
 - a. Attenuation: < 1.0 dB at 850 nm per mated pair.
 - b. Durability: < 0.2 dB increase in attenuation per 1000 matings.
 - c. Operating temperature: -40°to +60°C.
 - d. Connector construction shall incorporate ceramic ferrule, nickel-plated zinc housing and estane boot.

PART 3 - EXECUTION

3.1 INSTALLATION – FIRE ALARM

- A. Installation shall be supervised and tested by the manufacturer of the system equipment.
- B. Low Voltage/Wire and Cable: All LV/W&C shall be run in conduit in floors, walls and non accessible spaces. In hallways, LVW/C can be run in bridle rings attached to the common telecom and other low voltage system cable tray. LV/W&C must be run in a conduit sleeve, minimum 2” dia. with plastic bushings, from the point it leaves the bridle ring on the cable tray to the interior side of a room. Once the LV/W&C enters the room it can be supported from bridle rings or j-hooks. Wiring shall comply with Division 27 and approved NEC.
- C. Outlet pull and junction boxes shall be painted red on the exterior.
- D. Devices: Locate devices per ADA standards
- E. In construction areas where there is existing equipment, the equipment must be protected during construction and the devices taken off line to eliminate false alarms. All devices associated with modifications to an existing system must match existing devices.
- F. Contractor is liable for damage. The university must be notified at the completion of each project to ensure that the system is returned to normal.
- G. If room numbers are changed or new room numbers established, the University Project Manager must be notified before implementation so that the system can be re-programmed and is accurate in the event of an alarm.

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- H. All devices mounted in ceiling tile to be supported by T-bar hanger bracket and appropriate box. Plaster ring is not acceptable.
- I. Labeling:
 - 1. Observe the university fire alarm color code guide.
 - 2. Label each splice with correct information.
 - 3. Label each initiating device with correct device address. Use Kroy labeler or equal.
 - 4. Final, correct university room numbers (not design/construction room numbers) must be provided for correct programming.
 - 5. All detectors to have factory dust covers installed until after the final inspection and clean up is complete.
 - 6. All shielded wiring to be bonded together at each device and insulated from contact with the conduit or box.
 - 7. All equipment and associated wiring removed from service will be returned to the University Project Manager for proper disposal.
 - 8. Avoid locating detectors above countertops and/or shelving.
 - 9. Locate detectors at least eight feet from supply or return air diffusers.
 - 10. Use fixed heat detectors near autoclaves and steam sterilizers.
 - 11. Mount remote lights for room detectors above door to corridor, centered.
- J. Construction Requirements:
 - 1. Integrity of Structure: Do not drill or pierce structural members without prior approval from the University Project Manager and Structural Engineer.
 - 2. Penetration of Walls, Etc.: Fire caulks or seal all penetrations made through walls, floors, and ceilings around the conduit. Maintain the integrity of fire ratings within the structure. Where visible, paint to match surface.
 - 3. Wherever possible, install conduits and raceways in a concealed manner, except at surface-mounted cabinets.
 - 4. Access to Existing Facilities: Install all conduit and pull boxes to maintain or provide access to existing valves; covers to existing pull boxes; wire ways or access doors; electrical outlets; switches; motors, etc.
 - 5. Support bridle rings/"J" Hooks independently from structure, may have separate point of attachment to cable tray.
 - 6. No other wiring or systems to be installed with fire alarm.
- K. Prior to start of construction, disable existing fire alarm devices, as necessary. A minimum of two working days notice, prior to construction, shall be coordinated through the University Project Manager.

3.2 TESTING, CLEANING AND CERTIFICATION

- A. When installation is complete, system shall be tested in accordance with NFPA72 requirements. A representative of the system manufacturer shall submit a written report of the findings to the A/E with copy of to the FD. System testing shall include, at the least, verifying the following:
 - 1. The functional operation of each re-settable initiating device (manual stations, detectors, etc.) and circuit.
 - 2. All notification appliances shall be tested for a minimum of ten minutes under normal alarm conditions.
 - 3. The functional operation of each and every alarm device and circuit.
 - 4. The functional operation of each monitored device circuit.
 - 5. The functional operation of each control circuit, including fan controls.
 - 6. The supervision functions of each initiating, indicating, monitoring, control and supply circuit.
 - 7. Control station automatic signaling.

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8. That all software protocol, access codes and operation instructions have been supplied.
 9. All installed or modified fire alarm systems for remodels or new projects shall be tested and certified by a Factory Representative. Upon a system test completion a "Letter of Certification" shall be issued to the university.
- B. All testing and verifications shall be conducted in the presence of the university Facilities Operations Fire and Safety personnel.
- C. There shall be an operational test by the Denver Fire Department.

END OF SECTION 28 31 00