PROJECT MANUAL FOR

100% Construction Documents
December 15, 2017

UCD
LSC GARAGE DRY PIPE SPRINKLER REPLACEMENT PROJECT

1380 LAWERANCE STREET
DENVER, COLORADO

UCD Project No: 790625
BG Buildingworks Project No: 9418.00

PREPARED FOR:
UCD
SECTION 00 01 00 – TABLE OF CONTENTS

DIVISION 01 - GENERAL REQUIREMENTS

01 10 00  SUMMARY
01 25 00  SUBSTITUTION PROCEDURES
01 26 00  CONTRACT MODIFICATION PROCEDURES
01 29 00  PAYMENT PROCEDURES
01 31 00  PROJECT MANAGEMENT AND COORDINATION
01 32 00  CONSTRUCTION PROGRESS DOCUMENTATION
01 33 00  SUBMITTAL PROCEDURES
01 40 00  QUALITY REQUIREMENTS
01 41 00  REGULATORY REQUIREMENTS
01 42 00  REFERENCES
01 60 00  PRODUCT REQUIREMENTS
01 70 00  EXECUTION
01 77 00  CLOSEOUT PROCEDURES
01 78 23  OPERATION AND MAINTENANCE DATA
01 78 39  PROJECT RECORD DOCUMENTS

DIVISION 21 - FIRE SUPPRESSION

21 05 00  FIRE SUPPRESSION
21 05 10  FIRE PROTECTION GENERAL REQUIREMENTS
21 05 53  IDENTIFICATION FOR FIRE SUPPRESSION PIPING AND EQUIPMENT

DIVISION 26 - ELECTRICAL

26 00 10  ELECTRICAL GENERAL PROVISIONS
26 05 00  COMMON WORK RESULTS FOR ELECTRICAL
26 05 29  HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS
26 05 33  RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS
26 05 53  IDENTIFICATION FOR ELECTRICAL SYSTEMS

DIVISION 28 - ELECTRONIC SAFETY AND SECURITY

28 31 00  FIRE DETECTION AND ALARM

END OF SECTION 00 01 00
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.
   7. Access to site.
   8. Coordination with occupants.
   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: LSC Garage Dry Sprinkler Replacement
   1. Project Location: Denver, Colorado

B. Principal Representation: University of Colorado Denver.
   1. University's Representative: Dan Argersinger, University of Colorado – Denver, Campus Services Building, 1945 North Wheeling Street, Mail Stop F418, Aurora, Colorado 80045=

C. Architect/Engineer: BG Buildingorks, 1626 Cole Blvd, Suite 300, Bldg 7, Lakewood Colorado, 80401

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. Replace the Dry Sprinkler System within the parking structure at LSC. Work include demolition of existing piping, demolition of existing air compressor, installation of new air compressor,
installation of new piping, staging and coordinating replacement activities in a manner that maintains fire protection throughout the work process

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 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.

1.7 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 City and County of Denver requirements.
   3. Access to the site will be as permitted by the University. Prearrange delivery 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 and County of Denver for any disruption to or temporary closures of public city streets. Coordinate procurement of permits with University Project Manager.
D. Construction Parking:
   1. General: Contractor parking will not be provided; make arrangements and pay for all required parking.
   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.
      b. There is no free parking on campus. Displacement or use of existing parking spaces by Contractor, either for parking or for staging, is at 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.

1.8 COORDINATION WITH OCCUPANTS

A. University will 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 of activities producing dusty conditions, excessive fumes or odors during off-hours.
   5. 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.
6. 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.

1.9 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.

B. Contractor will be given access to a limited amount of the garage for work each day. This space will be free from vehicles to allow efficient work space for the Contractor(s). This work space and the rest of the garage shall be returned to the Owner for use from 4:30 PM to 7:30 AM each weekday.

C. Normal Working Hours: All work performed by the contractor shall be performed between the hours of 7:30 AM and 4:30 PM Monday through Friday. No work shall be performed outside these hours or on weekends.

D. Whenever fire protection systems are disabled from normal, automatic, unsupervised operation, Contractor shall provide Fire Watch including all hours in which Construction operations are not permitted and when Construction operations are permitted, but not underway.

E. Materials delivery, staging, etc. will be permitted during Normal Working Hours. Notify University Project Manager of all proposed work during 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.

F. 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 Working Hours: Identify potentially disruptive construction activities at weekly Progress Meeting and adjust active time of day to reduce significant impacts on occupants.
      a. The maximum permissible noise level is 75 decibels (dBA), measured at the adjacent property line.

G. 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.
   3. Work with University Project Manager and Building Maintenance and Operations staff to get identification badge activated.
   4. Work with University Project Manager and Building Maintenance and Operations staff to set up identification badge for access to construction areas secured by card reader.

H. Use of Existing Elevators: Use “freight” elevators only and protect finishes during transport. Elevators may not be used for transport of construction materials between 7:30am – 9:00am, 11:30am – 1:30pm, and from 3:00pm – 4:30pm.
1. Do not block corridors, aisles, passageways or doors leading to elevator except as, and only to the extent approved by University Project Manager.

I. 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.
3. Electrical, mechanical and sensitive research space may require University escort in lieu of issuing keys.

J. Dock Deliveries: Notify University Project Manager and limit deliver time to a maximum of 20 minutes.

K. 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.

L. 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.

M. Nonsmoking Campus: Smoking, chewing tobacco, and other related tobacco product use is not permitted at any location on campus except outside in designated areas.

N. 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.

O. Designated Eating Areas: Restrict consumption of food on project site to designated eating areas as approved by University Project Manager.

1.10 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.
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 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 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 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 University that are not required in order to meet other Project requirements but may offer advantage to Contractor or University.

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 University and separate contractors that will be necessary to accommodate proposed substitution.
c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.

d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.

e. Certificates and qualification data, where applicable or requested.

f. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.

g. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.

h. Research reports evidencing compliance with building code in effect for Project, from ICC-ES.

i. 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.

j. Cost information, including a proposal of change, if any, in the Contract Sum.

k. 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.

l. 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 University 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 University 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.
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 University 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.
   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 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.

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.
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.
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.
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 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.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 26 00
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.

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.
         1) Construction Manager’s Fee.
         2) Estimated Project General Conditions Costs.

   2. Submit schedule of values and hold a conference with the 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.
3. Subschedules for Separate Elements of Work: Where the Contractor's construction schedule defines separate elements of the Work, provide subschedules showing values coordinated with each element.

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 Engineer.
      c. Engineer's project number.
      d. Contractor's name and address.
      e. Date of submittal.
   2. Arrange schedule of values consistent with format of AIA Document G703.
   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.
      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. 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.
   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.
13. Initial progress report.

K. Application for Payment at Substantial Completion: After 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.
   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.

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.

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.

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) Fire Alarm/Sprinkler Disable Request Form
      6) Hot Work Permit Form

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 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. 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.

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 less maintenance. Connect equipment for ease of disconnecting, with minimum of interference with other work.
   e. Locate operating and control equipment and devices for easy access. Furnish access panels where units are concealed by finishes and similar work.
   f. Integrate mechanical work in ceiling plenums with suspension system, light fixtures and other work, so that required performances of each will be achieved.
   g. Give the right-of-way to piping systems required to slope for drainage over other service lines and ductwork.
   h. 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.

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:

<table>
<thead>
<tr>
<th>ITEM</th>
<th>FURNISHED BY</th>
<th>MOUNTED BY</th>
<th>LOW VOLTAGE WIRED BY</th>
<th>POWER WIRED &amp; CONNECTED BY</th>
<th>LOW VOLTAGE CONTROL CONNECTED BY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equipment motors</td>
<td>I</td>
<td>MI</td>
<td>MI</td>
<td>EI</td>
<td>--</td>
</tr>
<tr>
<td>Motor starters, contactors and overload heaters</td>
<td>MI</td>
<td>EI</td>
<td>EI</td>
<td>EI</td>
<td>MI</td>
</tr>
<tr>
<td>Fused and unfused disconnect switches</td>
<td>EI**</td>
<td>EI**</td>
<td>EI**</td>
<td>EI</td>
<td>--</td>
</tr>
<tr>
<td>Manual operating</td>
<td>MI</td>
<td>EI</td>
<td>EI</td>
<td>EI</td>
<td>EI</td>
</tr>
</tbody>
</table>
PROJECT MANAGEMENT AND COORDINATION

<table>
<thead>
<tr>
<th>switches, speed switches, push-button stations and pilot lights</th>
<th>MI</th>
<th>MI</th>
<th>MI</th>
<th>--</th>
<th>MI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motor and solenoid valves, damper motors, PE and EP switches</td>
<td>MI</td>
<td>MI</td>
<td>MI</td>
<td>EI</td>
<td>MI</td>
</tr>
<tr>
<td>Refrigeration equipment, cooling tower and controls</td>
<td>MI</td>
<td>MI</td>
<td>MI</td>
<td>EI</td>
<td>MI</td>
</tr>
</tbody>
</table>

I = Installer of equipment requiring electrical service
EI = Electrical Installer
MI = Mechanical Installer

* 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.)

** Disconnects for AH units are factory mounted.

***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.

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.

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.

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 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. 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.

6. Fire-Protection System: Show the following:
a. Locations of mains piping, branch lines, pipe drops, and sprinkler heads.

7. 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.

8. Coordination Drawing Prints: Prepare coordination drawing prints according to requirements in Section 01 33 00 "Submittal Procedures."

C. 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.
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.


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.

E. 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 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.
   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:
   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.
   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. 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.
q. Building Operations.
r. University Work Related Policies.
s. Contractor Contacts.
t. University Contacts.
u. University Process Forms.
   1) Key Request Form.
   2) Access Control Badge Application Form.
   3) Fire Alarm/ Sprinkler Disable Request Form.
   4) Hot Work Permit Form.
   5) Air Quality (IAQ) Plan.

4. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.

C. 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:
b. Options.
c. Related RFIs.
d. Related Change Orders.
e. Purchases.
f. Deliveries.
g. Submittals.
h. Possible conflicts.
i. Compatibility requirements.
j. Time schedules.
k. Weather limitations.
l. Manufacturer's written instructions.
m. Warranty requirements.
n. Compatibility of materials.
o. Acceptability of substrates.
p. Temporary facilities and controls.
q. Space and access limitations.
r. Regulations of authorities having jurisdiction.
s. Testing and inspecting requirements.
t. Installation procedures.
u. Coordination with other work.
v. Required performance results.
w. Protection of adjacent work.
x. 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.

5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.

D. Project Closeout Conference: Schedule and conduct a project closeout conference, at a time convenient to University and Architect/Engineer, but no later than 90 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.
   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 preparing operations and maintenance data.
f. Requirements for delivery of material samples, attic stock, and spare parts.
g. Requirements for demonstration and training.
h. University’s partial occupancy requirements.
i. Installation of University’s furniture, fixtures, and equipment.
j. Responsibility for removing temporary facilities and controls.

4. Minutes: Entity conducting meeting will record and distribute meeting minutes.

E. Progress Meetings: Conduct progress meetings at weekly intervals.
1. Coordinate dates of meetings with preparation of payment requests.
2. Attendees: 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.
   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. Air Quality Management monitoring.
   d. Quality:
      1) Quality and work standards.
      2) Status of correction of deficient items.
      3) Progress cleaning.
      4) Field observations.
   e. Status of submittals.
   f. Status of RFIs.
   g. Status of Changes including:
      1) Change Order Bulletins.
2) Change Order Proposals.
3) Change Orders.
4) Pending claims and disputes.

h. Review present and future needs of each entity present including:
   1) Access.
   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.

F. 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, Superintendent 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 32 00 - CONSTRUCTION PROGRESS DOCUMENTATION

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 documenting the progress of construction during performance of the Work, including the following:
   1. Startup construction schedule.
   2. Contractor's construction schedule.
   3. Construction schedule updating reports.
   4. Daily construction reports.
   5. Monthly project status reports.
   6. Material location reports.
   7. Site condition reports.
   8. Special reports.

B. Related Requirements:
   1. Section 01 33 00 "Submittal Procedures" for submitting schedules and reports.
   2. Section 01 40 00 "Quality Requirements" for submitting a schedule of tests and inspections.

1.3 DEFINITIONS

A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.
   1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
   2. Predecessor Activity: An activity that precedes another activity in the network.
   3. Successor Activity: An activity that follows another activity in the network.

B. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.

C. Event: The starting or ending point of an activity.

D. Float: The measure of leeway in starting and completing an activity.
   1. Float time is not for the exclusive use or benefit of either University or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.
2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.

E. Resource Loading: The allocation of manpower necessary for the completion of an activity as scheduled.

1.4 INFORMATIONAL SUBMITTALS

A. Format for Submittals: Submit required submittals in the following format:
   1. Working electronic copy of schedule file, where indicated.
   2. PDF electronic file and four paper copies.

B. Startup construction schedule (bar chart).
   1. Approval of cost-loaded, startup construction schedule will not constitute approval of schedule of values for cost-loaded activities.

C. Construction Schedule Updating Reports: Submit draft for discussion at monthly project schedule and pay application review meeting. Submit final report with monthly Application for Payment.

D. Daily Construction Reports: Submit at weekly intervals.

E. Material Location Reports: Submit at monthly intervals.

F. Site Condition Reports: Submit at time of discovery of differing conditions.

G. Special Reports: Submit at time of unusual event.

1.5 QUALITY ASSURANCE

A. Scheduling Consultant Qualifications: An experienced specialist in CPM scheduling and reporting, with a minimum of 5 years experience and capability of producing CPM reports and diagrams within 24 hours of Architect/Engineer's request.

B. Prescheduling 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 the preliminary construction schedule and Contractor's construction schedule, including, but not limited to, the following:
   1. Review software limitations and content and format for reports.
   2. Verify availability of qualified personnel needed to develop and update schedule.
   3. Discuss constraints, including phasing, work stages, area separations, interim milestones, and partial University occupancy, as may be applicable.
   4. Review delivery dates for University-furnished products.
   5. Review schedule for work of University's separate contracts.
   6. Review submittal requirements and procedures.
   7. Review time required for review of submittals and resubmittals.
   8. Review requirements for tests and inspections by independent testing and inspecting agencies.
   9. Review time required for Project closeout and University startup procedures, including commissioning activities.
  10. Review and finalize list of construction activities to be included in schedule.
  11. Review procedures for updating schedule.
1.6 COORDINATION

A. Coordinate Contractor's construction schedule with the schedule of values, list of subcontracts, submittal schedule, progress reports, payment requests, and other required schedules and reports.
   1. Secure time commitments for performing critical elements of the Work from entities involved.
   2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

PART 2 - PRODUCTS

2.1 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

A. Time Frame: Extend schedule from date established for commencement of the Work to date of Substantial Completion.
   1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date is not permitted. Contract completion date may only be modified by Change Order.

B. Activities: Treat each story or separate area as a separate numbered activity for each main element of the Work. Comply with the following:
   1. Activity Duration: Define activities so no activity is longer than 21 calendar days, unless specifically allowed by Architect/Engineer.
   2. Procurement Activities: Include procurement process activities for long lead items and major items, requiring a cycle of more than 60 calendar days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
   3. Submittal Review Time: Include review and resubmittal times indicated in Section 01 33 00 "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's construction schedule with submittal schedule.
   4. Startup and Testing Time: Include adequate time for startup, testing and commissioning.
   5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect/Engineer's administrative procedures necessary for issuing Notice of Substantial Completion.

C. Constraints: Include the following constraints and work restrictions as indicated in the Contract Documents and as applicable in schedule; show how the sequence of the Work is affected.
   1. Phasing: Arrange list of activities on schedule by phase.
   2. Work by University: Include a separate activity for each portion of the Work performed by University.
   3. Products Ordered in Advance: Include a separate activity for each product. Include delivery date indicated in Section 01 10 00 "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
   4. University-Furnished Products: Include a separate activity for each product. Include delivery date indicated in Section 01 10 00 "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
   5. Work Restrictions: Show the effect of the following items, as applicable, on the schedule:
      a. Coordination with existing construction.
      b. Limitations of continued occupancies.
      c. Uninterruptible services.
      d. Partial occupancy before Substantial Completion.
      e. Use of premises restrictions.
      f. Environmental control.
6. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:
   a. Submittals.
   b. Mockups.
   c. Fabrication.
   d. Sample testing.
   e. Deliveries.
   f. Installation.
   g. Tests and inspections.
   h. Building flush-out.
   i. Startup and placement into final use and operation.

7. Construction Areas: As applicable, identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:
   a. Structural completion.
   b. Temporary enclosure and space conditioning.
   c. Permanent space enclosure.
   d. Completion of mechanical installation.
   e. Completion of electrical installation.
   f. Substantial Completion.

D. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Commencement of Work, Substantial Completion, Notice of Occupancy and Use, and Final Acceptance. As applicable, also include milestones for Partial Substantial Completion and Partial Notice of Occupancy and Use.

E. Recovery Schedule: When periodic update indicates the Work is 14 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, and equipment required to achieve compliance, and date by which recovery will be accomplished.

F. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules and as approved by University and Architect/Engineer.

2.2 STARTUP CONSTRUCTION SCHEDULE (BAR CHART)

A. Bar-Chart Schedule: Submit startup, horizontal, bar-chart-type construction schedule within seven calendar days of date established for commencement of the Work.

B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line. Outline significant construction activities for first 90 calendar days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.

2.3 CONTRACTOR'S CONSTRUCTION SCHEDULE (BAR CHART OR GANTT CHART)

A. Bar-Chart or Gantt-Chart Schedule: Submit startup, horizontal, bar-chart-type or a comprehensive, fully developed, horizontal, Gantt-chart-type construction schedule within 30 calendar days of date established for commencement of the Work. Base schedule on the startup construction schedule and additional information received since the start of Project.
B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line. Use the same breakdown of construction activities as indicated in the Schedule of Values.
   1. For construction activities that require three months or longer to complete, indicate an estimated completion percentage in 10 percent increments within time bar. With each required construction schedule update, place a contrasting mark in each bar to indicate actual completion.

C. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using a network fragment to demonstrate the effect of the proposed change on the overall project schedule.

D. Initial Issue of Schedule: Prepare initial network diagram from a sorted activity list indicating straight "early start-total float." Identify critical activities. Prepare tabulated reports showing the following:
   1. Contractor or subcontractor and the Work or activity.
   2. Description of activity.
   3. Main events of activity.
   4. Immediate preceding and succeeding activities.
   5. Early and late start dates.
   6. Early and late finish dates.
   7. Activity duration in workdays.
   8. Total float or slack time.
   10. Dollar value of activity (coordinated with the schedule of values).

E. Schedule Updating: Concurrent with making revisions to schedule, prepare tabulated reports showing the following:
   1. Identification of activities that have changed.
   2. Changes in early and late start dates.
   3. Changes in early and late finish dates.
   5. Changes in the critical path.
   6. Changes in total float or slack time.

F. Summary Reports: With each schedule update, at a minimum provide the following hard copy cost and resource reports:
   1. Cost report showing activity dollar value, dollar value of work in place to-date and dollar value for current period.
   2. Cost report showing activity dollar value, dollar value of work in place to-date, and dollar value for current period summarizing to schedule of values.
   3. Resource report showing man-day allocations by specific trade on each activity.
   5. Cash flow report showing monthly projections of expenditures.
   6. Narrative schedule report documenting:
      a. Description of the actual work accomplished during the reporting period.
      b. Description of any problem areas.
      c. Description of current and anticipated delays with recommended corrective actions to mitigate such delays.
      d. A list of proposed modifications, additions, deletions, and changes in logic to the approved construction schedule.
2.4 REPORTS

A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:
   1. List of subcontractors at Project site.
   2. List of separate contractors at Project site.
   3. Approximate count of personnel at Project site.
   4. Equipment at Project site.
   5. Material deliveries.
   6. High and low temperatures and general weather conditions, including presence of rain or snow.
   7. Accidents.
   8. Meetings and significant decisions.
   9. Unusual events (see special reports).
   10. Stoppages, delays, shortages, and losses.
   11. Emergency procedures.
   12. Orders and requests of authorities having jurisdiction.
   13. Change Orders received and implemented.
   14. Services connected and disconnected.
   15. Equipment or system tests and startups.
   16. Partial completions and occupancies.
   17. Substantial Completions authorized.

B. Material Location Reports: At monthly intervals, prepare and submit a comprehensive list of materials delivered to and stored at Project site. List shall be cumulative, showing materials previously reported plus items recently delivered. Include with list a statement of progress on and delivery dates for materials or items of equipment fabricated or stored away from Project site. Indicate the following categories for stored materials:
   1. Material stored prior to previous report and remaining in storage.
   2. Material stored prior to previous report and since removed from storage and installed.
   3. Material stored following previous report and remaining in storage.

C. Site Condition Reports: Immediately on discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

2.5 SPECIAL REPORTS

A. General: Submit special reports directly to University within one calendar day(s) of an occurrence. Distribute copies of report to parties affected by the occurrence.

B. Reporting Unusual Events: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, response by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise University in advance when these events are known or predictable.
PART 3 - EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule draft update schedule for discussion and review at monthly project progress schedule and pay application review meeting.
1. Revise schedule immediately after each meeting and issue updated schedule concurrently with submittal of monthly Application for Payment.
2. Include summary reports with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
3. As the Work progresses, indicate final completion percentage for each activity.
4. Schedule updates may change logic but may not change milestone or critical path without prior approval of University and Architect/Engineer.

B. Distribution: Distribute copies of approved schedule to Architect/Engineer University, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.
1. Post copies in Project meeting rooms and temporary field offices.
2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

END OF SECTION 01 32 00
SECTION 01 33 00 - SUBMITTAL 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 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.
   5. Insurance certificates.
   7. Schedule of Values.
   8. Inspection and test results.
   10. Coordination drawings.
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.


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.

2. 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.

3. 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.
   h. Scheduled date of fabrication.

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

D. Paper Submittals: Place a permanent label or title block on each submittal item for identification.
   1. Indicate name of firm or entity that prepared each submittal on label or title block.
   2. Provide a space approximately 6 by 8 inches on label or beside title block to record Contractor's review and approval markings and action taken by Architect/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:).
SUBMITTAL PROCEDURES

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.
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.

E. Options: Identify options requiring selection by Architect/Engineer.

F. 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.

G. Contractor Certification: On transmittal include Contractor's certification that information complies with Contract Document requirements.

H. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
1. Note date and content of previous submittal.
2. Note date and content of revision in label or title block and clearly indicate extent of revision.
3. Resubmit submittals until they are marked with approval notation from Architect/Engineer's action stamp.

I. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

J. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect/Engineer's action stamp.

K. 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.”

L. 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.

1. 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.

2. 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.

3. 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.


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.
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.

3. 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.

4. 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.

5. 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.

D. 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.

E. Coordination Drawing Submittals: Comply with requirements specified in Section 01 31 00 "Project Management and Coordination."

F. Contractor's Construction Schedule: Comply with requirements specified in Section 01 32 00 "Construction Progress Documentation."

G. Application for Payment and Schedule of Values: Comply with requirements specified in Section 01 29 00 "Payment Procedures."

H. Test and Inspection Reports and Schedule of Tests and Inspections Submittals: Comply with requirements specified in Section 01 40 00 "Quality Requirements."

I. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Section 01 77 00 "Closeout Procedures."

J. Maintenance Data: Comply with requirements specified in Section 01 78 23 "Operation and Maintenance Data."

K. 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.

L. 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.
M. 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.

N. 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.

O. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.

P. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.

Q. 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.

R. 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.

S. 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.

T. 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.

U. 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.

V. 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.

W. 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.

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."

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 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 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.

C. 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.

D. 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.
E. 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.

F. Posting of Permit: Post the Permit in a visible and protected location near the access to the project.

G. 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.

H. 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.

I. 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 and County of Denver for site utility inspections.
   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.

J. 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, 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.

1.4 MS4 STORM WATER AND WATER QUALITY PERMITS

A. Obtain necessary State of Colorado and City and County of Denver Permits to the extent that Project impacts site.
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.
      a. [Link]
      a. Use the most restrictive interpretation where NFPA 101 conflicts with the IBC requirements.
      a. [Link]
      a. [Link]
   17. OSHA “Occupational Safety and Health Standards” (29 CFR 1910).
   18. CDC-NIH Biosafety in Microbiological and Biomedical Laboratories (BMBL); latest edition.
      a. [Link]

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.”
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
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.

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  (202) 737-0202
         www.aabc.com

   AAMA  American Architectural Manufacturers Association  (847) 303-5664
         www.aamanet.org

   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)  
         www.concrete.org  (248) 848-3700

   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

REFERENCES
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<th>Description</th>
<th>Phone Numbers</th>
<th>Website</th>
</tr>
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<tr>
<td>AF&amp;PA</td>
<td>American Forest &amp; Paper Association</td>
<td>(800) 878-8878, (202) 463-2700</td>
<td><a href="http://www.afandpa.org">www.afandpa.org</a></td>
</tr>
<tr>
<td>AGA</td>
<td>American Gas Association</td>
<td>(202) 824-7000</td>
<td><a href="http://www.aga.org">www.aga.org</a></td>
</tr>
<tr>
<td>AHAM</td>
<td>Association of Home Appliance Manufacturers</td>
<td>(202) 872-5955</td>
<td><a href="http://www.aham.org">www.aham.org</a></td>
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<tr>
<td>AI</td>
<td>Asphalt Institute</td>
<td>(859) 288-4960</td>
<td><a href="http://www.asphaltinstitute.org">www.asphaltinstitute.org</a></td>
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<tr>
<td>AIA</td>
<td>American Institute of Architects (The)</td>
<td>(800) 242-3837, (202) 626-7300</td>
<td><a href="http://www.aia.org">www.aia.org</a></td>
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<tr>
<td>AISC</td>
<td>American Institute of Steel Construction</td>
<td>(800) 644-2400, (312) 670-2400</td>
<td><a href="http://www.aisc.org">www.aisc.org</a></td>
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<td>AISI</td>
<td>American Iron and Steel Institute</td>
<td>(202) 452-7100</td>
<td><a href="http://www.steel.org">www.steel.org</a></td>
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<td>AITC</td>
<td>American Institute of Timber Construction</td>
<td>(303) 792-9559</td>
<td><a href="http://www.aite-glulam.org">www.aite-glulam.org</a></td>
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<td>ANSI</td>
<td>American National Standards Institute</td>
<td>(202) 293-8020</td>
<td><a href="http://www.ansi.org">www.ansi.org</a></td>
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<td>AOSA</td>
<td>Association of Official Seed Analysts, Inc.</td>
<td>(607) 256-3313</td>
<td><a href="http://www.aosaseed.com">www.aosaseed.com</a></td>
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<td>APA</td>
<td>APA - The Engineered Wood Association</td>
<td>(253) 565-6600</td>
<td><a href="http://www.apawood.org">www.apawood.org</a></td>
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<td>APA</td>
<td>Architectural Precast Association</td>
<td>(239) 454-6989</td>
<td><a href="http://www.archprecast.org">www.archprecast.org</a></td>
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<td>API</td>
<td>American Petroleum Institute</td>
<td>(202) 682-8000</td>
<td><a href="http://www.api.org">www.api.org</a></td>
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<td>ARI</td>
<td>Air-Conditioning &amp; Refrigeration Institute (See AHRI)</td>
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<td>ARI</td>
<td>American Refrigeration Institute (See AHRI)</td>
<td>(202) 207-0917</td>
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<td>ARMA</td>
<td>Asphalt Roofing Manufacturers Association</td>
<td>(202) 207-0917</td>
<td><a href="http://www.asphaltroofing.org">www.asphaltroofing.org</a></td>
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<td>ASCE</td>
<td>American Society of Civil Engineers</td>
<td>(800) 548-2723</td>
<td><a href="http://www.asce.org">www.asce.org</a></td>
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<tr>
<td>ASCE/SEI</td>
<td>American Society of Civil Engineers/Structural Engineering Institute</td>
<td>(703) 295-6300</td>
<td>(See ASCE)</td>
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<td>ASHRAE</td>
<td>American Society of Heating, Refrigerating and Air-Conditioning Engineers</td>
<td>(800) 527-4723</td>
<td><a href="http://www.ashrae.org">www.ashrae.org</a></td>
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<tr>
<td>ASME</td>
<td>ASME International (American Society of Mechanical Engineers)</td>
<td>(404) 636-8400</td>
<td><a href="http://www.asme.org">www.asme.org</a></td>
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<td>ASSE</td>
<td>American Society of Safety Engineers (The)</td>
<td>(847) 699-2929</td>
<td><a href="http://www.asse.org">www.asse.org</a></td>
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<tr>
<td>ASSE</td>
<td>American Society of Sanitary Engineering</td>
<td>(440) 835-3040</td>
<td><a href="http://www.asse-plumbing.org">www.asse-plumbing.org</a></td>
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<tr>
<td>ATIS</td>
<td>Alliance for Telecommunications Industry Solutions</td>
<td>(202) 628-6380</td>
<td><a href="http://www.atis.org">www.atis.org</a></td>
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<td>AWEA</td>
<td>American Wind Energy Association</td>
<td>(202) 383-2500</td>
<td><a href="http://www.awea.org">www.awea.org</a></td>
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<td>AWI</td>
<td>Architectural Woodwork Institute</td>
<td>(571) 323-3636</td>
<td><a href="http://www.awinet.org">www.awinet.org</a></td>
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<td>AWMAC</td>
<td>Architectural Woodwork Manufacturers Association of Canada</td>
<td>(403) 453-7387</td>
<td><a href="http://www.awmac.com">www.awmac.com</a></td>
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<td>AWPA</td>
<td>American Wood Protection Association</td>
<td>(205) 733-4077</td>
<td>(Formerly: American Wood-Preservers' Association) <a href="http://www.awpa.com">www.awpa.com</a></td>
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<td>AWS</td>
<td>American Welding Society</td>
<td>(800) 443-9353</td>
<td><a href="http://www.aws.org">www.aws.org</a></td>
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<td>AWWA</td>
<td>American Water Works Association</td>
<td>(305) 443-9353</td>
<td><a href="http://www.awwa.org">www.awwa.org</a></td>
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<td>BHMA</td>
<td>Builders Hardware Manufacturers Association</td>
<td>(800) 926-7337</td>
<td><a href="http://www.buildershardware.com">www.buildershardware.com</a></td>
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<td>BIA</td>
<td>Brick Industry Association (The)</td>
<td>(303) 794-7711</td>
<td><a href="http://www.gobrick.com">www.gobrick.com</a></td>
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<td>BICSI</td>
<td>BICSI, Inc.</td>
<td>(212) 297-2122</td>
<td><a href="http://www.bicsi.com">www.bicsi.com</a></td>
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<td></td>
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<td>(703) 620-0010</td>
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<td>(800) 242-7405</td>
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www.bicsi.org (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

CDA Copper Development Association
www.copper.org (800) 232-3282
(212) 251-7200

CEA Canadian Electricity Association
www.electricity.ca (613) 230-9263

CDA 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

CRI Carpet and Rug Institute (The)
www.carpet-rug.org (706) 278-3176

CRRC Cool Roof Rating Council
www.crrc.org (866) 465-2523
<table>
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<td>CRSI</td>
<td><a href="http://www.crsi.org">www.crsi.org</a></td>
<td>(800) 328-6306 (847) 517-1200</td>
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<td>CSA</td>
<td><a href="http://www.csa.ca">www.csa.ca</a></td>
<td>(800) 463-6727 (416) 747-4000</td>
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<td>CSA International (Formerly: IAS - International Approval Services)</td>
<td><a href="http://www.csa-international.org">www.csa-international.org</a></td>
<td>(866) 797-4272 (416) 747-4000</td>
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<td>CSI</td>
<td><a href="http://www.csinet.org">www.csinet.org</a></td>
<td>(800) 689-2900 (703) 684-0300</td>
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<td><a href="http://www.cedarbureau.org">www.cedarbureau.org</a></td>
<td>(604) 820-7700</td>
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<td>(281) 583-4087</td>
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<td>(216) 241-7333</td>
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<td>(703) 222-2010</td>
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<td>EIMA</td>
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<td>(800) 294-3462 (703) 538-1616</td>
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<td>EVO</td>
<td>Efficiency Valuation Organization</td>
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<td>Fédération Internationale de Basketball (The International Basketball Federation)</td>
<td>41 22 545 00 00</td>
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<td>FIVB</td>
<td>Fédération Internationale de Volleyball (The International Volleyball Federation)</td>
<td>41 21 345 35 45</td>
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<td>(781) 762-4300</td>
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<td>FM Global</td>
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<td>(401) 275-3000</td>
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<td>FRSA</td>
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<td>(407) 671-3772</td>
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<td>Fluid Sealing Association</td>
<td>(610) 971-4850</td>
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<td>FSC</td>
<td>Forest Stewardship Council U.S.</td>
<td>(612) 353-4511</td>
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<td>GA</td>
<td>Gypsum Association</td>
<td>(301) 277-8686</td>
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<td>GANA</td>
<td>Glass Association of North America</td>
<td>(785) 271-0208</td>
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<td>GS</td>
<td>Green Seal</td>
<td>(202) 872-6400</td>
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<td>(973) 267-9700</td>
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<td>HPVA</td>
<td>Hardwood Plywood &amp; Veneer Association</td>
<td>(703) 435-2900</td>
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<td>H. P. White Laboratory, Inc.</td>
<td>(410) 838-6550</td>
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<td>IAPSC</td>
<td>International Association of Professional Security Consultants</td>
<td>(415) 536-0288</td>
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<td>LPI</td>
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<td>Metal Framing Manufacturers Association, Inc.</td>
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<td>MHIA</td>
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<td>Marble Institute of America</td>
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<td>Moulding &amp; Millwork Producers Association</td>
<td>(Formerly: Wood Moulding &amp; Millwork Producers Association)</td>
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<td>MPI</td>
<td>Master Painters Institute</td>
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<td>MSS</td>
<td>Manufacturers Standardization Society of The Valve and Fittings Industry Inc.</td>
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<td>NAAMM</td>
<td>National Association of Architectural Metal Manufacturers</td>
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</table>
NACE  NACE International  (National Association of Corrosion Engineers International)  www.nace.org

NADCA  National Air Duct Cleaners Association  www.nadca.com

NAIMA  North American Insulation Manufacturers Association  www.naima.org

NBGQA  National Building Granite Quarries Association, Inc.  www.nbgqa.com

NCAA  National Collegiate Athletic Association (The)  www.ncaa.org

NCMA  National Concrete Masonry Association  www.ncma.org

NEBB  National Environmental Balancing Bureau  www.nebb.org

NECA  National Electrical Contractors Association  www.necanet.org

NeLMA  Northeastern Lumber Manufacturers Association  www.nelma.org

NEMA  National Electrical Manufacturers Association  www.nema.org

NETA  InterNational Electrical Testing Association  www.netaworld.org

NFHS  National Federation of State High School Associations  www.nfhs.org

NFPA  NFPA  (National Fire Protection Association)  www.nfpa.org

NFPA  NFPA International  (See NFPA)

NFRC  National Fenestration Rating Council  www.nfrc.org

NHLA  National Hardwood Lumber Association  www.nhla.com

NLGA  National Lumber Grades Authority  www.nlga.org
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<td>NOFMA</td>
<td>National Oak Flooring Manufacturers Association (See NWFA)</td>
<td><a href="http://www.nofma.org">www.nofma.org</a></td>
<td>(888) 516-8585</td>
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<td>NOMMA</td>
<td>National Ornamental &amp; Miscellaneous Metals Association</td>
<td><a href="http://www.nomma.org">www.nomma.org</a></td>
<td>(888) 846-7622</td>
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<td>NRCA</td>
<td>National Roofing Contractors Association</td>
<td><a href="http://www.nrca.net">www.nrca.net</a></td>
<td>(800) 323-9545</td>
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<td>NRMCA</td>
<td>National Ready Mixed Concrete Association</td>
<td><a href="http://www.nrmca.org">www.nrmca.org</a></td>
<td>(800) 673-6275</td>
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<td>NSF</td>
<td>NSF International (National Sanitation Foundation International)</td>
<td><a href="http://www.nsf.org">www.nsf.org</a></td>
<td>(800) 323-9736</td>
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<td>NSPE</td>
<td>National Society of Professional Engineers</td>
<td><a href="http://www.nspe.org">www.nspe.org</a></td>
<td>(847) 299-9070</td>
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<td>NSSGA</td>
<td>National Stone, Sand &amp; Gravel Association</td>
<td><a href="http://www.nssga.org">www.nssga.org</a></td>
<td>(800) 342-1415</td>
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<td>NTMA</td>
<td>National Terrazzo &amp; Mosaic Association, Inc. (The)</td>
<td><a href="http://www.ntma.com">www.ntma.com</a></td>
<td>(800) 323-9736</td>
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<td>NWFA</td>
<td>National Wood Flooring Association</td>
<td><a href="http://www.nwfa.org">www.nwfa.org</a></td>
<td>(800) 422-4556</td>
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<td>PCI</td>
<td>Precast/Prestressed Concrete Institute</td>
<td><a href="http://www.pci.org">www.pci.org</a></td>
<td>(636) 519-9663</td>
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<td>PDI</td>
<td>Plumbing &amp; Drainage Institute</td>
<td><a href="http://www.pdionline.org">www.pdionline.org</a></td>
<td>(312) 786-0300</td>
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<td>PLASA</td>
<td>PLASA (Formerly: ESTA - Entertainment Services and Technology Association)</td>
<td><a href="http://www.plasa.org">www.plasa.org</a></td>
<td>(800) 589-8965</td>
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<td>RCSC</td>
<td>Research Council on Structural Connections</td>
<td><a href="http://www.boltcouncil.org">www.boltcouncil.org</a></td>
<td>(706) 882-3833</td>
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<td>RFCI</td>
<td>Resilient Floor Covering Institute</td>
<td><a href="http://www.rfci.com">www.rfci.com</a></td>
<td>(925) 935-1499</td>
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<td>RIS</td>
<td>Redwood Inspection Service</td>
<td><a href="http://www.redwoodinspection.com">www.redwoodinspection.com</a></td>
<td>(877) 606-7323</td>
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<td>SAE</td>
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<td><a href="http://www.sae.org">www.sae.org</a></td>
<td>(724) 776-4841</td>
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<td>SCTE</td>
<td>Society of Cable Telecommunications Engineers</td>
<td>(800) 542-5040</td>
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<td>(610) 363-6888</td>
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<td>SDI</td>
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<td>(847) 458-4647</td>
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<td>Steel Door Institute</td>
<td>(440) 899-0010</td>
<td><a href="http://www.steeldoor.org">www.steeldoor.org</a></td>
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<td>SEFA</td>
<td>Scientific Equipment and Furniture Association</td>
<td>(877) 294-5424</td>
<td><a href="http://www.sefalabs.com">www.sefalabs.com</a></td>
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<td>SIA</td>
<td>Security Industry Association</td>
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<td>(843) 293-1995</td>
<td><a href="http://www.steeljoist.org">www.steeljoist.org</a></td>
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<td>SMA</td>
<td>Screen Manufacturers Association</td>
<td>(773) 636-0672</td>
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<td>Sheet Metal and Air Conditioning Contractors' National</td>
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<td>SMPTE</td>
<td>Society of Motion Picture and Television Engineers</td>
<td>(914) 761-1100</td>
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<td>SPFA</td>
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<td>(800) 523-6154</td>
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<td>Southern Pine Inspection Bureau</td>
<td>(850) 434-2611</td>
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<td>SPRI</td>
<td>Single Ply Roofing Industry</td>
<td>(781) 647-7026</td>
<td><a href="http://www.spri.org">www.spri.org</a></td>
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<td>SSINA</td>
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<td>(800) 982-0355</td>
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<td>(202) 342-8630</td>
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<td>(412) 281-2331</td>
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<td>(847) 438-8265</td>
<td><a href="http://www.steeltank.com">www.steeltank.com</a></td>
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<td>SWI</td>
<td>Steel Window Institute</td>
<td>(216) 241-7333</td>
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<td>TCA</td>
<td><a href="http://www.tilt-up.org">www.tilt-up.org</a></td>
<td>(319) 895-6911</td>
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<td>TCNA</td>
<td><a href="http://www.tileusa.com">www.tileusa.com</a></td>
<td>(864) 646-8453</td>
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<td>TEMA</td>
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<td>(914) 332-0040</td>
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<td>TPI</td>
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<td>UBC</td>
<td><a href="http://www.usgbc.org">www.usgbc.org</a></td>
<td>(800) 795-1747</td>
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<td>UL</td>
<td><a href="http://www.ul.com">www.ul.com</a></td>
<td>(877) 854-3577</td>
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<td>UNI</td>
<td><a href="http://www.uni-ball.org">www.uni-ball.org</a></td>
<td>(972) 243-3902</td>
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<td>USAV</td>
<td><a href="http://www.usavolleyball.org">www.usavolleyball.org</a></td>
<td>(888) 786-5539</td>
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<td>(719) 228-6800</td>
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<td>USGBC</td>
<td><a href="http://www.usgbc.org">www.usgbc.org</a></td>
<td>(800) 938-7488</td>
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<tr>
<td>USITT</td>
<td><a href="http://www.usitt.org">www.usitt.org</a></td>
<td>(315) 463-6463</td>
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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.                  49 30 2601-0  
              www.din.de

IAPMO        International Association of Plumbing and Mechanical Officials (909) 472-4100  
              www.iapmo.org

ICC          International Code Council                         (888) 422-7233  
              www.iccsafe.org

ICC-ES       ICC Evaluation Service, LLC                        (800) 423-6587  
              www.icc-es.org (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                              (202) 761-0011  
              www.usace.army.mil

CPSC         Consumer Product Safety Commission                  (800) 638-2772  
              www.cpsc.gov (301) 504-7923

DOC          Department of Commerce                               (301) 975-4040
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<td>National Institute of Standards and Technology</td>
<td><a href="http://www.nist.gov">www.nist.gov</a></td>
<td>(215) 697-2664</td>
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<tr>
<td>DOD</td>
<td>Department of Defense</td>
<td>(202) 586-9220</td>
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<td><a href="http://dodssp.daps.dla.mil">http://dodssp.daps.dla.mil</a></td>
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<tr>
<td>DOE</td>
<td>Department of Energy</td>
<td>(202) 272-0167</td>
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<td></td>
<td><a href="http://www.energy.gov">www.energy.gov</a></td>
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<td>EPA</td>
<td>Environmental Protection Agency</td>
<td>(866) 835-5322</td>
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<td><a href="http://www.epa.gov">www.epa.gov</a></td>
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<td>FAA</td>
<td>Federal Aviation Administration</td>
<td>(202) 512-1800</td>
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<td>www/faa.gov</td>
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<td>FG</td>
<td>Federal Government Publications</td>
<td>(800) 488-3111</td>
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<td><a href="http://www.gpo.gov">www.gpo.gov</a></td>
<td>(202) 619-8925</td>
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<td>GSA</td>
<td>General Services Administration</td>
<td>(202) 708-1112</td>
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<td><a href="http://www.gsa.gov">www.gsa.gov</a></td>
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<td>HUD</td>
<td>Department of Housing and Urban Development</td>
<td>(510) 486-4000</td>
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<td>LBL</td>
<td>Lawrence Berkeley National Laboratory</td>
<td>(800) 321-6742</td>
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<td></td>
<td>Environmental Energy Technologies Division</td>
<td>(202) 647-4000</td>
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<td>OSHA</td>
<td>Occupational Safety &amp; Health Administration</td>
<td>(202) 334-2934</td>
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<td><a href="http://www.osha.gov">www.osha.gov</a></td>
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<tr>
<td>SD</td>
<td>Department of State</td>
<td>(202) 334-2934</td>
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<td><a href="http://www.state.gov">www.state.gov</a></td>
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<tr>
<td>TRB</td>
<td>Transportation Research Board</td>
<td>(202) 334-2934</td>
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<td>National Cooperative Highway Research Program</td>
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<td>USDA</td>
<td>Department of Agriculture</td>
<td>(202) 720-3656</td>
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<td>Agriculture Research Service</td>
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<td>U.S. Salinity Laboratory</td>
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<td>USDA</td>
<td>Department of Agriculture</td>
<td>(202) 720-2791</td>
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<td>USDJ</td>
<td>Department of Justice</td>
<td>(202) 307-0703</td>
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<td>Office of Justice Programs</td>
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<td>National Institute of Justice</td>
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<td><a href="http://www.ojp.usdoj.gov">www.ojp.usdoj.gov</a></td>
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<tr>
<td>USP</td>
<td>U.S. Pharmacopeia</td>
<td>(800) 227-8772</td>
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<td><a href="http://www.usp.org">www.usp.org</a></td>
<td>(301) 881-0666</td>
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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 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.

USPS United States Postal Service
www.usps.com (202) 268-2000

D. Standards and Regulations

<table>
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<tr>
<th>Abbreviation</th>
<th>Description</th>
<th>Phone/Website</th>
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<tr>
<td>DOD</td>
<td>Department of Defense</td>
<td>(215) 697-2664</td>
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<td>DSCC</td>
<td>Defense Supply Center Columbus</td>
<td>(See FS)</td>
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<td>FED-STD</td>
<td>Federal Standard</td>
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<tr>
<td>FS</td>
<td>Federal Specification</td>
<td>(215) 697-2664</td>
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<td>MILSPEC</td>
<td>Military Specification and Standards</td>
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<td>USAB</td>
<td>United States Access Board</td>
<td>(800) 872-2253</td>
</tr>
<tr>
<td>USATBCB</td>
<td>U.S. Architectural &amp; Transportation Barriers Compliance Board</td>
<td>(202) 272-0080</td>
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</table>
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.
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.

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

C. Warranty Requirements:
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.


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.

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.

   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.

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 73 00 - EXECUTION

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 general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:
   2. Field engineering.
   3. Installation of the Work.
   4. Cutting and patching.
   5. Coordination of University-installed products.
   6. Progress cleaning.
   7. Starting and adjusting.
   8. Protection of installed construction.

B. Related Requirements:
   1. Section 01 10 00 "Summary" for limits on use of Project site and procedures related to utility interruptions.

1.3 DEFINITIONS
A. Cutting: Removal of in-place construction necessary to permit installation or performance of other work.

B. Patching: Fitting and repair work required to restore construction to original conditions after installation of other work.

1.4 INFORMATIONAL SUBMITTALS
A. Qualification Data: For land surveyor or professional engineer.

B. Cutting and Patching Plan and Request: Submit plan and request describing procedures at least 21 calendar days prior to the time cutting and patching will be performed.
   1. Submit request whenever cutting and patching operation affect:
      a. Work of the University or any separate contractor.
      b. Structural value or integrity of any element of the Project.
      c. Integrity or effectiveness of weather-exposed or moisture-resistant elements or systems.
      d. Efficiency, operational life, maintenance or safety of operational elements.
1. **EXECUTION**

   e. Visual qualities of sight-exposed elements.
   f. Cutting new openings in existing structural concrete walls, floors and suspended slabs.
   g. Cutting new openings in existing roofs and roofing materials.
   h. Cutting exterior walls.
   i. Cutting into shafts.

2. Include the following information:

   a. **Extent**: Describe reason for and extent of each occurrence of cutting and patching, including explanation of why cutting and patching operation cannot be reasonable avoided.
   b. **Changes to In-Place Construction**: Describe cutting and patching methods and anticipated results. Include changes to structural elements and operating components as well as changes in building appearance and other significant visual elements.
   c. **Products**: List products to be used for patching and firms or entities that will perform patching work.
   d. **Trades**: Indicate trades and subcontractors who will perform the work.
   e. **Dates**: Indicate when cutting and patching will be performed.
   f. **Utilities and Mechanical and Electrical Systems**: List services and systems that cutting and patching procedures will disturb or affect. Include changes to structural elements and operating components as well as changes in building appearance and other significant visual elements.
      1) Include description of provisions for temporary services and systems during interruption of permanent services and systems.
      2) Comply with requirements of Section 01 10 00 “Summary” related to existing utility and system interruptions.
   g. **Structural Elements**: Where cutting and patching structural elements requires the addition of reinforcement, submit details and calculations signed and sealed by an Engineer registered in the State of Colorado. Indicate how new reinforcing will be integrated with original structure.

3. **Limitations**: Approval of cutting and patching request does not waive right of Architect/Engineer or University to later require complete removal and replacement of work found to be unsatisfactorily cut and patched.

1.5 **QUALITY ASSURANCE**

   A. **Land Surveyor Qualifications**: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.

   B. **Cutting and Patching**: Comply with requirements for and limitations on cutting and patching of construction elements.
      1. **Structural Elements**: When cutting and patching structural elements, notify Architect/Engineer of locations and details of cutting and await directions from Architect/Engineer before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection.
      2. **Operational Elements**: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety. Operational elements include but are not limited to the following:
         a. Primary operational systems and equipment.
         b. Fire separation assemblies.
         c. Air or smoke barriers.
         d. Fire-suppression systems.
         e. Mechanical systems piping and ducts.
3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety. Other construction elements include but are not limited to the following:
   a. Water, moisture, or vapor barriers.
   b. Membranes and flashings.
   c. Exterior curtain-wall construction.
   d. Sprayed fire-resistive material.
   e. Equipment supports.
   f. Piping, ductwork, vessels, and equipment.
   g. Noise- and vibration-control elements and systems.
   h. Fire-detection and -alarm systems.
   i. Conveying systems.
   j. Electrical wiring systems.
   k. Operating systems of special construction.

4. Visual Elements: Do not cut and patch construction exposed to the exterior or exposed in occupied spaces in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect/Engineer's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

5. Hazardous Materials: Do not proceed with cutting and patching operations until University has examined existing construction for the presence of asbestos and/or lead-based coatings. Comply with requirements in Section 01 35 00 “Special Procedures.”

C. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Comply with requirements specified in other Sections.
   1. For projects requiring compliance with sustainable design and construction practices and procedures, use products for patching that comply with requirements in Division 01 Section “Sustainable Design Requirements.”

B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
   1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect/Engineer for the visual and functional performance of in-place materials.

C. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.
   1. Use cleaning products that comply with Green Seal's GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.
PART 3 - EXECUTION

3.1 EXAMINATION

A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, mechanical and electrical systems, and other construction affecting the Work. Notify University Project Manager and Architect/Engineer and obtain approval prior to disturbing, moving or penetrating soil.

1. Arrange for locating buried utilities including water and sewer lines within construction limits. Obtain location information and stake all known utilities prior to commencing construction activities.
   a. Contact Utility Notification Center of Colorado (UNCC), 1-800-922-1987, and comply with UNCC guidelines.

2. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; underground electrical services, and other utilities.

3. Furnish location data for work related to Project that must be performed by public utilities serving Project site.

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

1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.

2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.

3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

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

3.2 PREPARATION

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

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

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

D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Architect/Engineer according to requirements in Section 01 31 00 "Project Management and Coordination."
3.3 CONSTRUCTION LAYOUT

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

B. General: Engage a land surveyor or professional engineer to lay out the Work using accepted surveying practices.
   1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
   2. Establish limits on use of Project site.
   3. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
   4. Inform installers of lines and levels to which they must comply.
   5. Check the location, level, and plumb, of every major element as the Work progresses.
   6. Notify Architect/Engineer when deviations from required lines and levels exceed allowable tolerances. Record deviation which are accepted (i.e., not corrected) on record drawings in accordance with the requirements of Section 01 78 39 “Project Record Documents.”
   7. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.

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

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

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

3.4 FIELD ENGINEERING

A. Identification: University will identify existing benchmarks, control points, and property corners.

B. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.
   1. Do not change or relocate existing benchmarks or control points without prior written approval of Architect/Engineer. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Architect/Engineer before proceeding.
   2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.

C. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.
   1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.
3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.

3.5 INSTALLATION

A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
   1. Make vertical work plumb and make horizontal work level.
   2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
   3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated to the extent they are more explicit or stringent than requirements of the Contract Documents.

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

D. Isolate each part of complete installation from incompatible material as needed to prevent deterioration.

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

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

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

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

I. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned, true and level as applicable, with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.
   1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect/Engineer.
   2. Allow for building movement, including thermal expansion and contraction.
   3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

J. Attachment to Concrete:
1. No drilled inserts or powder-actuated fasteners are permitted in pre-stressed concrete except as specifically authorized by Contractor and carried out under the direct supervision of its Superintendent.

2. Only those devices with a maximum controlled penetration of 3/4 inch or less will be permitted. Make holes through slabs by means of sleeves placed no closer than 2 inch from tensioning cables. Core drilling will not be permitted unless unavoidable and as specified for cutting and patching in this Section.

K. Joints: Unless indicated otherwise, make joints of uniform width. Where joint locations in exposed work are required but not indicated, arrange joints for the best visual effect. Confirm arrangement with Architect/Engineer before proceeding. Fit exposed connections together to form hairline joints.

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

3.6 CUTTING AND PATCHING

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

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

B. Responsibility: Provide cutting and patching work, including attendant excavation and backfill required to complete the Work or to:

1. Make components fit together properly.
2. Uncover portions of the Work to provide for installation of ill-timed work.
3. Remove and replace defective work or work not conforming to requirements of Contract Documents.
4. Remove samples of installed work as specified for testing.
5. Provide routine penetrations of non-structural surfaces for installation of piping and electrical conduit.

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

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

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

F. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching according to requirements in Section 01 10 00 "Summary."

G. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to minimize interruption to occupied areas, coordinate cutting and patching according to requirements in Section 01 10 00 "Summary."
H. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
   1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
   2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
   3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
   4. Excavating and Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations. Employ methods which will prevent settlement or damage to other work.
   5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
   6. Proceed with patching after construction operations requiring cutting are complete.

I. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements, including tolerance, specified in other Sections, where applicable.
   1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
   2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
      a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
      b. Restore damaged pipe covering to its original condition.
   3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
      a. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
   4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
   5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.

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

3.7 UNIVERSITY-INSTALLED PRODUCTS

A. Site Access: Provide access to Project site for University's construction personnel.

B. Coordination: Coordinate construction and operations of the Work with work performed by University's construction personnel.
1. Construction Schedule: Inform University of Contractor's preferred construction schedule for University's portion of the Work. Adjust construction schedule based on a mutually agreeable timetable. Notify University if changes to schedule are required due to differences in actual construction progress.

2. Preinstallation Conferences: Include University's construction personnel at preinstallation conferences covering portions of the Work that are to receive University's work. Attend preinstallation conferences conducted by University's construction personnel if portions of the Work depend on University's construction.

3.8 PROGRESS CLEANING

A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
   2. Do not hold waste materials more than seven calendar days during normal weather or three calendar days if the temperature is expected to rise above 80 deg F.
   3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
      a. Use containers intended for holding waste materials of type to be stored.

B. Collection Point: Review location with University and obtain approval.

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

D. Wind Blown Debris: Prevent spread of trash, debris, cartons, packing material, or other waste on or off Project site by wind.

E. Dust: Sprinkle dusty debris with water.

F. Packing Materials: Immediately after uncrating or unpacking materials or equipment, remove all crating, lumber, excelsior, wrapping or other like combustible materials from building to central collection facility.

G. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
   1. Remove liquid spills promptly.
   2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

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

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

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

K. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Section 01 74 19 "Construction Waste Management and Disposal."
L. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

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

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

O. Streets: At frequency required by University and/or governing authority, clean adjacent and nearby streets of dirt resulting from construction operations.

3.9 STARTING AND ADJUSTING

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

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

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

D. Manufacturer's Field Service: Comply with qualification requirements in Section 01 40 00 "Quality Requirements."

3.10 PROTECTION OF INSTALLED CONSTRUCTION

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

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

C. Limiting Exposures: Supervise construction activities to ensure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period. Where applicable, such exposures include, but are not limited to, the following:
   1. Excessive static or dynamic loading.
   2. Excessive internal or external pressures.
   3. Excessively high or low temperatures.
   4. Thermal shock.
   5. Excessively high or low humidity.
   6. Air contamination or pollution.
   7. Water or ice.
   8. Solvents.
  10. Light.
  11. Radiation.
12. Puncture.
13. Abrasion.
14. Heavy traffic.
15. Soiling, staining and corrosion.
16. Bacteria.
17. Rodent and insect infestation.
19. Electrical current.
20. High speed operation.
21. Improper lubrication.
22. Unusual wear or other misuse.
23. Contact between incompatible materials.
24. Misalignment.
25. Excessive weathering.
27. Improper shipping or handling.
28. Theft.
29. Vandalism.

END OF SECTION 01 73 00
SECTION 01 77 00 - CLOSEOUT 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 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.

B. Certificate of Insurance: For continuing coverage.

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.
   4. Final Completion Schedule: Submit schedule for performing and completing all work indicated on the Contractor’s 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).
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.

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.

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.
      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.
CLOSEOUT PROCEDURES

100% Construction Documents

PN 790625 / LSC Garage Dry Pipe Sprinkler Replacement

CLOSEOUT PROCEDURES

01 77 00 - 6

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.
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 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.

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
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:
   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.
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

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."

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.

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.

H. 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.
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.
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.
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:
   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.


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.
   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.
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.
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.
2. Flood.
5. Power failure.
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. 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.

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.

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.
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 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.

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
SECTION 21 05 00 - FIRE SUPPRESSION

PART 1 - GENERAL

1.1 REFERENCES

A. Section 230000 - General Mechanical Provisions
B. Section 210553- Mechanical Identification

1.2 DESIGN REQUIREMENTS

A. Automatic Fire Sprinklers:
1. Zone system according to location. Annunciate each zone at the building fire annunciator in accordance with NFPA regulations. Provide separate zones for each flow switch and each tamper switches.
2. Install recessed sprinklers in 8-foot ceilings. Provide wire guards on sprinklers, which protrude beyond the ceiling and are lower than 8 feet. Wire guards may be painted.
3. The type of sprinkler to be installed must be specified and approved no later than final design completion.
4. Consult the University CBO, through the University Project Manager, for fire protection and life safety concerns.
5. Supply all connections to the dry fire protection system from the existing wet fire protection system.
6. Provide dry fire sprinkler systems for the two parking garage levels in the building and the plaza level siamese connection. Provide sprinklers throughout the garage areas. Discuss any areas without sprinklers with the University Project Manager.

B. System Design:
1. General:
   a. Base design on requirements of NFPA 13, including Appendices.
   b. Verify fire hydrant flow test according to NFPA 13 and NFPA 291. Use hydrant flow results for system design calculations.
   c. Base design of sprinkler system on hydraulic calculations for group and occupancy listed in NFPA 13. Include outside hose flows upon the same hazard as the building. No allowance will be made for inside hose station flows. Include a safety factor of 10 psi in hydraulic calculations.
   d. Room design method is not acceptable.
   e. Protect all areas of each facility with an automatic sprinkler system unless specifically waved by the University Project Manager.
   f. Provide a separate zone on each floor for buildings exceeding 3 floor levels including the basement.
2. Dry Pipe Systems:
   a. Provide dry pipe systems in areas susceptible to freezing. Dry pipe systems are preferred over antifreeze systems. Condensate collector drain valve shall be full-port ball valve type.
   b. Maintain air pressure by a nitrogen system or automatic air compressor powered from a dedicated circuit supplied from the building emergency circuit, where available. Use of a reliable plant air supply, in lieu of or in addition to an air compressor, is acceptable.
   c. Monitor piping for low air pressure.
1.3 SUBMITTALS

A. Submittals for the following shall be made in accordance with Section 210510.
   1. Submit sample of each type and finish of sprinkler and escutcheon plate to be installed.
   2. Submit shop drawings showing all details as defined by NFPA 13. Show pipe routing and coordination of all building components.
   3. Submit hydraulic calculations including summary sheet, detailed work sheets, graph sheet, and water supply information as outlined in NFPA 13. Designer shall seal and sign hydraulic calculations, drawings, and work sheets.
   5. Submit copies of Contractor’s Material and Test Certificates similar to those in NFPA 13.

1.4 QUALITY ASSURANCE

A. Design shall be performed by a NICET Level III or IV Technician, Registered Fire Protection Engineer, or Registered Professional Engineer with experience in fire protection design and registered for the design and installation for fire protection systems in the State of Colorado.

B. Installer shall have a minimum of five years of experience in the design and installation of automatic fire sprinkler systems and employ workmen experienced and skilled in this trade.

C. Installer shall have the capability of providing a full service maintenance, testing, and inspection program in accordance with NFPA standards and where applicable, be certified to perform these services.

D. Installer shall have an emergency service capability for response to emergency conditions and shall be capable of responding within four hours or receiving notification with 24 hour service capability.

E. Qualifications for Welding Processes and Operators: Comply with the requirements of AWS D10.9, Specifications of Qualifications of Welding Procedures and Welders for Piping and Tubing, Level AR-3.

F. Regulatory Requirements: Comply with the following codes:
   1. NFPA 13 - Standard for the installation of sprinkler System.
   2. FPA 14 - Standard for the Installation of Standpipe and Hose Systems.
   3. NFPA 24 - Installation of Private Fire Service Mains and their applications.
   5. UL Compliance: Fire protection system materials and components shall be Underwriter’s Laboratories listed and labeled for the application anticipated.
   7.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers: Subject to compliance with requirements, provide products by the following:
   1. Gate Valves:
      a. Nibco Inc.
      b. Mueller
      c. Grinnell
   2. Butterfly and Ball Valves:
      a. Victaulic
      b. Nibco Inc.
   3. Grooved Mechanical Couplings:
      a. Victaulic Company of America
2.2 MATERIALS, GENERAL

A. Piping:
1. ASTM A 53 black steel pipe with anti microbial coating pipe for dry pipe systems.
2. Schedule 40 for all pipe sizes and joined with threaded or cut grooved fittings.

B. Fittings:
1. Pipe size NPS 2 and smaller: Shall be one of the following.
   a. Threaded: Cast-iron threaded fittings according to ASME B16.4, Class 125 or Malleable-iron threaded fittings according to ASME B16.3, Class 150. Threaded fittings are preferred in architecturally exposed or sensitive areas.
   b. Grooved: In accordance with specifications for NPS 2-1/2 and larger.
2. Pipe size NPS 2-1/2 and larger: ASTM A 536, Grade 65-45-12 ductile iron; ASTM A 47, Grade 32510 malleable iron; ASTM A 53, Type F, E, or S, Grade B fabricated steel; or ASTM A 106, Grade B steel fittings with grooves or shoulders constructed to accept grooved-end couplings; with nuts, bolts, locking pin, locking toggle, or lugs to secure grooved pipe and fittings. Couplings: Ductile- or malleable-iron housing and EPDM or nitrile gasket of central cavity pressure-responsive design; with nuts, bolts, locking pin, locking toggle, or lugs to secure grooved pipe and fittings.
3. Do not use Copper pipe or fittings.
4. Provide Class 300 malleable iron fittings for all Nitrogen piping upstream of the pressure relief safety valve.

C. General: Equipment shall bear the UL listing for the intended use.

D. Valves:
1. General Requirements
   a. Suitable for a minimum of 175 psi. working pressure unless the project requirements demand higher pressures.
   b. Riser and Sectional Control Valves: Provide indicating type suitable for supervisory contact switch.

E. Check Valves:
1. 1-1/2 inch and smaller: All bronze with screwed ends.
2. 1 inch and larger: Iron or brass body.
3. Alarm Check Valve: Same size as riser. Provide with a retarding device.

F. Miscellaneous Valves:
1. Ball Drip Valves: Brass with 1/2 inch NPT.
3. Gauge Assembly Valves: 1/4 inch globe or angle 3-way valves with screwed bonnet and renewable composition disc.
4. Combination Test/Drain Valve: UL listed approved.

G. Dry Pipe Valve:
1. Differential or latching differential type, sized by hydraulic calculations and supplied by pipe of equal or greater size.
2. Positive latching clapper.
3. Trim, accelerators, and exhausters provided by same manufacturer as dry pipe valve.

H. Gauges:
1. Water Pressure: Brass bourdon tube with 3-1/2 inch diameter case rated for 300 psi water pressure in 5 pound increments. Equip with 1/4-inch shut-off valve.
2. Air Pressure: Brass bourdon tube with 3-1/2 inch diameter case rated for 100 psi air pressure in 1 psi increments. Equip with 1/4-inch shut-off valve.

I. Fire Department Connections:
1. Siamese connection, double 2-1/2 inch clapper, swivel plugs, and chain, threads matching local fire district equipment, and bronze escutcheon plate identifying system.
2. Single 2-1/2 inch, threads matching local fire district equipment. Use if the riser is less than 3-inches.
3. Interconnect multiple fire department connections so the entire sprinkler system is fed by each fire department connection.

J. Sprinklers:
1. Nominal 1/2 inch orifice for “ordinary temperature classification except where higher temperature heads are required or shown.
2. Use quick response sprinklers where allowed by NFPA 13 and suitable for the specific project.
5. Non-finished areas: Brass finish, ordinary temperature rating.
7. Localized areas with potential for freezing: Dry pendant or dry pendant sidewall sprinklers.
8. Metal Cabinet and Spare Sprinklers: Refer to Section 01 78 46 – Extra Stock Materials.
9. Guards: Provide on sprinklers subject to damage or located within 7 feet of the floor, or as otherwise indicated for special conditions.
10. Spare Parts: Refer to Section 01 78 46 – Extra Stock Materials.

K. Electrical Equipment:
1. General: Electrical equipment, tamper switches, and devices must be compatible with the fire alarm system.
2. Supervisory Switches: Weatherproof switch housing, and cover with tamper resistant screws, automatic reset capabilities, and capable of being wired in normally open/closed position.
3. Water Flow Detectors: Electronic vane type or pressure activated, with field adjustable built-in retard device, tamper resistant screws. Switch to activate when flow of 10 gallons per minute or more occurs.
4. Low Pressure Supervisory Switches: Provide for dry pipe or supervised pre-action sprinkler systems. 1/2 inch NPT enclosure, field adjustable between 20 psi and 175 psi, weatherproof housing and cover with tamper proof screws.
5. Exterior Alarm Signals: Exterior electric bell with flashing strobe, minimum 6-inch diameter, and audible level of 85 dBA at ten feet. Mount above fire department connection at a height of ten to fifteen feet above grade.

L. Gas Maintenance Device:
1. UL listed and approved for fire protection use.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Coordinate the installation of fire protection materials and equipment above and below ceilings with suspension system, light fixtures, and other building components.

B. Where mounting heights are not detailed or dimensioned, install overhead fire protection services and equipment to provide maximum headroom possible. Install a minimum 1-1/4 inch threaded capped connection on the end of each cross main to facilitate flushing.

C. Do not attach the system riser to the supply connection until the underground piping is flushed, tested, and accepted by the Authority having Jurisdiction.

D. Conceal piping in all areas except mechanical rooms and areas noted on the drawings.

E. Pipe 2-inch main drain to safe location to allow for full flow testing.

F. Install tamper switches on all system shutoff valves.

G. Identification:
1. General Provide identification in accordance with NFPA 13 and Division 21 Section “Identification for Fire Suppression”.
2. Valves: identify and label all sprinkler valves. Attach caution signs to all valves controlling water to sprinkler systems.
3. Miscellaneous Fire Lines: Label inspector’s test drain lines, main drain, and fire lines.
4. Nameplate: Mount hydraulic designed information nameplate at alarm valve.

3.2 TESTING, CLEANING, AND CERTIFICATION
A. Record inspections and testing on a copy of Material and Test Certificates as shown in NFPA 13.

B. Prior to any test on sprinkler/standpipe systems, flush piping to remove any foreign matter.

C. Hydrostatically test all systems, including fire department connection, to not less than 200 psi for 2 hours. Read test pressure from gauge located at low point of system.

D. Additionally, test dry-pipe systems with an air pressure of 40 psi which is allowed to stand 24 hours. Stop all leaks that allow a loss of pressure over 1-1/2 psi over 24 hours.

E. Correct leaks immediately. On threaded pipe, tighten joints. If necessary, dismantle and replace section. Caulking, preening, or stop-leak compounds are not permitted.

F. Function Trip Test:
   1. Dry Pipe and Pre-action Systems: Functionally trip test system components and alarms by opening the inspector’s test connection. Maximum dry valve trip test time shall be 15 seconds from the time the inspector’s test valve is completely open.Maximum water delivery time to the inspector’s test shall be 60 seconds from the time the inspector’s test valve is completely open.

3.3 COMMISSIONING (DEMONSTRATION)

A. Provide 4 hours of instruction to the University Facilities Operations personnel. Include valve and drain locations, pipe routing, maintenance and testing procedures.

3.4 INTERFACE WITH OTHER PRODUCTS

A. Ensure required devices are installed and connected as required to fire alarm system.

**END OF SECTION 21 05 00**
SECTION 21 05 10 - FIRE PROTECTION GENERAL REQUIREMENTS

PART 1 - GENERAL

1.1 WORK INCLUDES

A. These specifications include all labor, materials, equipment and related items required to complete work within the intent of the drawings and specifications, whether or not specifically mentioned. For this reason, the Contractor shall visit the site before submitting his bid and familiarize himself with the areas in which work is to be done.

B. Set all sleeves and cut and patch all miscellaneous holes necessary for the convenient and proper installation of the work. Required holes through existing masonry and concrete construction with an area less than 35 square inches shall be considered miscellaneous holes.

C. Any work installed without regard to the work of other crafts which must, in the opinion of the Owner or Architect/Engineer, be moved to permit the installation of other work, shall be moved and replaced as a part of this work without extra charge.

D. All work shall be furnished and installed in complete accordance with NFPA 13, 200 & NFPA 14. 2007.

E. All work shall be furnished and installed in complete accordance with Code seismic requirements.

F. Rough-in for and connect, as shown on the drawings, all equipment furnished by the Owner under a separate contract.

1.2 RELATED WORK

A. Specified elsewhere: Division 26, when issued by the Owner, are hereby incorporated herein:

1.3 RELATED DOCUMENTS

A. All drawings and applicable provisions of the General Conditions of the Contract.

1.4 QUALITY ASSURANCE

A. Qualifications of contractor: All materials and equipment shall be new and all work shall be executed with the maximum speed consistent with current accepted trade practices. Furnish materials and equipment promptly after authorization to proceed, and proceed with work in progress with the other contractors on the project. Perform all work included in contract in a manner that will not cause interferences or delays to, or interfere with, the progress of other contractors.

B. Referenced standards:
   1. Comply with specified codes and standards. If conflict exists between codes or standards and drawings, project manual or addenda requirements, the most stringent applies.
   2. Conform to the installation rules and regulations of the standards listed including all subsequently
published amendments thereto issued prior to the date of the bidding documents.

3. Conform to the requirements of all local, state and federal agencies which have authority over this project. Include all items of labor and material required to meet such requirements regardless of the failure to specify in the project manual or indicated on the drawings each individual item.

4. All equipment, apparatus and systems shall be rated, tested, fabricated and installed with the applicable industry standards.

5. The applicable portions of the following standards form a part of this project manual to the same force and effect as if repeated herein.
   a. American National Standards Institute (ANSI)
   b. National Fire Protection Association (NFPA)
   c. American National Standards Institute (ANSI)
   d. American Gas Association, Inc. (AGA)
   e. American Society for Testing Materials (ASTM)
   f. American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE)
   g. American Society of Mechanical Engineers (ASME)
   h. American Water Works Association (AWWA) of Missouri
   i. National Electrical Code (NEC)
   j. National Electric Manufacturers Association (NEMA)
   k. National Fire Protection Association (NFPA)
   l. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA)
   m. Underwriters Laboratories, Inc. (UL)
   n. Environmental Protection Agency (EPA)
   o. Department of Public Health (DPH)
   p. University of Colorado Design Standards

6. At all times when work is not in progress, keep all open ends of pipe, ductwork, fittings, equipment/fixtures securely closed and protected.

7. All welding shall comply with the requirements/recommendations of the American Welding Society and all applicable codes.
   a. Weld metal shall not project creating an obstruction.
   b. Chip or grind out all weld metal before rewelding.
   c. Caulking / preening of welds is NOT allowed.
   d. Welder shall be certified to work on service/utility indicated

1.5 PLANS AND SPECIFICATIONS

A. The intention of the plans and specifications is to provide all piping, sprinklers, and equipment. Contractor shall furnish all material and equipment and shall perform all labor to achieve this intent, whether or not such material or equipment is indicated herein. Wherever the term "provide" is used, it shall mean "furnish and install".

B. All plans and specifications including architectural, site, structural, electrical, plumbing and HVAC plans shall be examined by Contractor prior to submission of quotations to determine systems interface and conditions which could cause interference or deviations in equipment locations and routing. Errors or discrepancies on plans or in specifications shall be referred to the Architect/Engineer prior to submittal of bid to the Owner.

C. All changes from the plans necessary to make the work conform to buildings as constructed and to fit work of other trades, or to conform to rules of all governing authorities and regulations, shall be met by each Contractor without extra cost to the Owner.

D. Contractor shall also refer to the Architectural Plans for details and large scale Drawings and to approved Shop Drawing of equipment furnished under other Contracts or Sections of the Specifications for exact
location of his service connections. The equipment Shop Drawings will be furnished to the Contractor before roughing in. Contractor shall not install any piping or ductwork for said equipment until he has received approved Coordination Drawings for same.

E. Routing of piping and location of equipment and other devices are shown on plans for general guidance. This Contractor shall coordinate his work with other Contractors and shall provide necessary deviations in routing as far as 10 feet from those shown to provide systems as specified or implied, without interference and pursuant to these requirements at not additional cost to the Owner, Architect, or Engineer.

F. Manufacturer's drawings and instructions shall be followed in all cases where the makers of devices and equipment furnish directions covering point not shown on the drawings or described in the specifications.

G. Layout and installation of fire protection work shall be coordinated with the overall construction schedule of various trades to prevent delay in completion of the project. Complete drawings and specifications for the entire job shall be maintained and updated at the job site.

H. Priority of interpretation of discrepancies in Contract Documents shall be complimentary from specifications to drawings. Where discrepancies occur between various specifications, drawings and specifications or codes and standards, the most demanding requirement shall take precedence, except where written interpretation from the Architect/Engineer indicates otherwise.

1.6 BIDS AND SUBSTITUTES

A. If the Contractor wishes to submit an alternate to the named manufacturer(s) for any equipment, he shall submit a voluntary alternative in writing to Architect, prior to bid, stating the manufacturer's name, model number, and detailed product data. In all cases, if the alternate manufacturer is used, this Contractor shall bear all additional costs including, but not limited to, responsibility of coordination with all other trades, any changes incurred in plumbing, electrical, mechanical, general, etc., which result from equipment or material substitution.

B. Where materials or equipment are specified by name, the proposed material or equipment must be identical to the specified material or equipment in all characteristics of quality, function and serviceability, regardless of application in the Project and, in addition, when the Architect deems that aesthetic significance is important, the equal material or equipment must be identical in all characteristics of visual appearance, design, color and texture. Work performed or constructed with unapproved materials/equipment is at Contractor's risk, and any required correction of Work incorporating unapproved materials/equipment shall be at Contractor's sole cost and expense.

C. In all instances, Contractor shall assume full responsibility for proof of equality of the statute to the equipment hereinafter specified. All data and information necessary for proof of equality, function and space requirements shall be prepared and accompany the submittal of the substitution to the Architect/Engineer. Approval by the Architect/Engineer of equipment other than the specified does NOT relieve Contractor of this Responsibility.

1.7 SUBMITTALS

A. Review of the Shop Drawings is rendered as a service only and shall not be considered as a guarantee of measurements or of building conditions; nor shall it be construed as relieving the Contractor's of basic responsibilities under his Contract. Architect/Engineer will check shop drawings only for conformance with design concept of the project. Review shall not be construed:

1. As permitting any departure from the contract requirements.
FIRE PROTECTION GENERAL REQUIREMENTS

2. As relieving the Contractor of the responsibility for any error in details, dimensions or otherwise that may exist.
3. As approved departures from additional details or instructions previously furnished by the Architect/Engineer.

B. Shop Drawings:
1. This Contractor shall submit a complete list of all material and equipment he proposes to use in the installation. This list shall include manufacturer, catalog numbers and other identifying information. SHOP DRAWINGS WILL NOT BE REVIEWED UNTIL THIS LIST HAS BEEN SUBMITTED AND REVIEWED. After review of this list by the Engineer, the Contractor shall submit shop drawings and descriptive literature of equipment to be furnished under this contract. Drawings shall state capacities, sizes, etc., of all equipment and shall be certified. See General Conditions and Supplementary Conditions for additional requirements.
2. Each shop drawing, catalog cut and/or specification sheet shall be marked with the name and location of the project. The shop drawings shall be reviewed by the Contractor, stamped and signed certifying that he has found them to be 100% complete and accurate, prior to submission. Failure to stamp shop drawings in this way will be grounds for rejection of shop drawing.
3. Shop drawing review is for purpose of determining only that equipment submitted conforms with design intent and shall not remove responsibility from Contractor.

C. Coordination Drawings:
1. This Contractor shall provide the support role in development of a combined set of coordination electronic drawing(s). Coordination drawings shall be ¼" = 1/0" showing dimensions and height of installation of all major pieces of equipment and piping provided under their respective contracts. Drawings shall include the following:
   a. Piping elevations and size
   b. Conduit elevations and size
   c. Hanger support locations (Piping / Conduit)
   d. Fire Protection mains/branch lines/head placement with elevations and size
   e. Building structure background
   f. Proposed locations for access panels (Ductwork/Piping/Conduit/Cable Tray)
2. Order of space preference throughout the building shall be:
   a. Recessed light fixtures
   b. Ductwork
   c. Soil, Waste, vent and storm piping
   d. Domestic water piping
   e. Sprinkler piping
   f. Electrical conduit
   g. Exception: Plumbing lines below or behind plumbing fixtures shall have precedence over all other work. Electrical conduit above or below switchgear, panel boards and control panels shall have precedence over all other work. Do not install any fluid conveying piping over electrical or elevator equipment

D. By approving and submitting Shop Drawings, Product Data, Samples and similar submittals, the Contractor represents that the Contractor has determined and verified materials, field measurements and field construction criteria related thereto, or will do so, and has checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

E. The Contractor shall perform no portion of the Work requiring submittal and review of Shop Drawings, Product Data, Samples or similar submittals until the respective submittals has been approved by the Engineer.
F. Where Contractor has failed to provide proper space for equipment and required clearances (as required by local AHJ, as related to code requirements, as noted or shown on plans or as noted on submittals) Contractor shall relocate the equipment as directed by Engineer. Contractor shall be held responsible for any and all changes resulting from such relocations and shall be held responsible for any and all changes resulting from such relocations and shall bear any and all increase costs to Contractor as well as costs to other trades in making said revisions.

G. In the event the substituted material or equipment does not perform to meet the design intent, fit or meet quality standards, the Contractor shall provide the specified material or equipment and bear all costs to replace the substitute item(s).

H. Operation & Maintenance Manual:
1. Thirty (30) days Prior to Substantial Completion, submit operating and maintenance manuals for equipment to Engineer for approval. Assemble manuals into white, 3-ring binders. Insert laminated cover sheets, identifying each binder on the front and spine with all necessary information so that all volumes appear uniform and orderly (i.e. Project Name, Owner Project Number, Contractor/Architect/Engineer Information, Volume Number, General Contents Description such as Mechanical, Electrical, etc.)
2. Provide comprehensive table of contents indicating the contents of all volumes in each set. Organize and tab documents in an orderly sequence, based on the table of contents of the project manual. Within each section, organize alphabetically by system or subsystem. Include a section in the directory for each of the following: list of documents, list of systems, and list of equipment.
3. Include one copy of each submittal for record purposes, indicating the actual product installed. Include significant changes in the product delivered to project site and changes in manufacturer's written instructions for installation.
4. Provide organized warranty section in the lead binder (Contractor to provide separate binder.) Organize warranty documents into an orderly sequence in separate binder, based on the table of contents of the project manual. A copy of each warranty shall also be provided in the respective equipment section.
5. Provide organized equipment failure emergency section in the lead binder (Contractors option to provide separate binder.) Organize into separate sections for each type of emergency and include all necessary steps for safe equipment shut-down and containment. Also, include all necessary contractor and vendor contact information including 24-hour call numbers.
6. Provide comprehensive contact list in the lead binder including contractor and subcontractor's names, addresses, telephone and contact person for Owner's use.
7. Provide manufacturer's complete data sheets including assembly drawings, wiring diagrams, mechanical diagrams, installation diagrams, and instructions. Identify equipment in manual and cross-reference by including serial number of actual components.
8. In addition to Manufacturer's maintenance documentation, provide separate schedules for preventative and routine maintenance and service with standard time allotment. Include service and lubrication requirements and list of required lubricants for equipment.
9. Include record of spare parts provided including signature of Owner's representative showing acceptance of parts. Provide list of additional items recommended to be stocked as spare parts, with parts identified and cross-referenced to manufacturer's maintenance documentation and including local sources of maintenance materials and related services.
10. Provide test reports from manufacturer start-up indicating systems to be operating properly, including TAB reports, thermographics surveys, etc.
11. Provide electronic copy of final operation and maintenance manuals in full color pdf format on CD/DVD. All files shall clearly indicate specific information related to actual products installed. File structure shall be “user-friendly” and shall be prefaced with the Missouri University Project number, followed by the file description (example “CP070094 - Emergency Contacts”).

I. Record Drawings:
1. During the progress of the Work, Contractor shall maintain a current (daily) as-built set of the Drawings and Specifications, indicating thereon all Work installed at variance with such Contract Documents including, without limitation, Work covered by Addenda, Field Work Orders, Change Orders, and Engineers additional instructions, interpretations and clarifications. It shall be Contractor's responsibility to assure that said as-built sets are complete, accurate and up-to-date. Engineer shall have the right to inspect and review such record sets.

2. At the completion of the Work, Engineer shall furnish Contractor with a complete set of the latest revised record drawings in reproducible form, and Contractor shall indicate thereon all as-built changes and such additional details necessary or appropriate to provide a complete reference document for use by Engineer. If variations and details cannot be shown clearly thereon, the Contractor shall prepare supplemental drawings adequate to impart the information. These additional drawings shall also be in reproducible form. The foregoing drawings collectively shall constitute the “As-Built” drawings for the Work.

3. All indications on “As-Built” drawings shall be executed in a legible manner at Contractor's cost, using methods and legend presentations compatible with the overall scheme of the record Drawings with respect to scale, drawing sheet sizes and sequential indexing. All changes shall be marked clearly in red and clouded.

4. Engineer shall review Contractor's “As-Built” drawings and notify Contractor of observed discrepancies or deviations. Contractor shall promptly correct and resubmit revised drawings for Engineer review. Completed “As-Built” drawings shall be delivered to Owner through Architect.

5. The Contractor shall not be relieved of responsibility for deviations from requirements of the Contract Documents by the Engineer's approval of Shop Drawings, Product Data, Samples or similar submittals unless the Contractor has specifically informed the Engineer in writing of such deviation at the time of submittal and the Engineer has given written approval of the specific deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings Product Data, Samples or similar submittals by the Engineer's approval thereof.

6. Shop Drawings, Product Data, Samples and similar submittals are not Contract Documents. The purpose of their submittal is to demonstrate for those portions of the Work for which submittals are required the way the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents. Review by the Engineer is subject to the limitations per Section 1.07-K.

7. The Engineer will review and approve or take other appropriate action upon contractor's submittals such as Shop Drawings, Product Data and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Engineer's action will be taken with such reasonable promptness as to cause no delay in the Work of the Contractor or in the activities of the other Contractors, the Owner, General Contractor, or the Construction Manager, while allowing sufficient time in the Engineer's professional judgment to permit adequate review. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation of performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Engineer's review of the Contractor's submittals shall not relieve the Contractor of the obligations per the Contract Documents.

1.8 JOB CONDITIONS

A. Existing conditions:

1. In order to become familiar with the scope of the work involved, visit the existing site, before submitting bid, and carefully examine the existing condition in order to have full knowledge and understanding of the conditions and restrictions affecting the performance of the work required. Include in bid all work which is reasonably inferred by the contract drawings and specifications,
whether specifically shown or not, as a result of existing conditions, construction, irregularities and interferences which may affect work and is necessary for fully functioning system. No additional compensations will be considered for misunderstanding the conditions to be met.

2. The layout shown on the drawings is necessarily diagrammatic but shall be followed as closely as other work will permit. Changes from these drawings required to make this work conform to the building construction shall be made only with prior written approval of the Architect/Engineer. All proposed changes shall be shown on shop drawings. All measurements shall be verified by actual observation and all work shall fit in place meeting the approval of the Architect/Engineer.

3. Provide openings required in new and existing construction that may be necessary. All patching and repairing shall be done by workmen competent in the trade required, at the expense of this Contractor. Arrange work so that minimum cutting will be required. All rubbish and excess materials involved in such cutting shall be promptly removed from the site and disposed of. Cutting through the floor or roof systems or load bearing walls shall be done only with the prior written approval of the Architect/Engineer so as to avoid damaging the structural system.

B. Sequencing, scheduling:

1. Confer with the other contractors regarding the location and size of pipes, equipment, ducts, openings and special architectural treatments in order that there may be no interferences between the installation or the progress of the work of any contractor on the project.

2. In the case of interconnection of the work of two or more contractors, verify at the site or on shop drawings all dimensions relating to such work. All errors due to the failure to so verify any such dimensions shall be promptly rectified.

3. Access panels, in walls or ceilings, required (i.e., automatic or manual damper, fire or smoke damper, coil or control instrument mounted in a duct or pipe) shall be provided by the respective contractor and installed by workman competent in the trade required at the expense of this Contractor. Access panels are not required in areas where the ceiling system is lay-in tile; however, sufficient space must be available in and through the ceiling system to allow maintenance and adjustment of dampers, and cleaning of coils as necessary, or a suitable access panel shall be provided for that purpose. Access panels shall be approximately 24 inches by 24 inches wherever possible and shall be provided with flush trim and an Allen-key operated camlock fastener. Submit manufacturer's product data to Architect for approval.

4. Items of equipment may be specified in the singular however, provide and install the number of items of equipment as required for a complete system.

5. Provide excavating, pumping, backfilling and compacting required, as shown on the drawings.

6. Equipment and devices which have factory prime coat or final surface finish shall be replaced, repaired or refinished if defective or damaged during installation.

7. Arrange all work so a minimum period of interruption or outages will occur in the temporary or permanent transfer of services as required for all revisions. Not less than two (2) weeks notification to the Using Agency/Owner shall be required before approval will be granted for any disruption of services. The outage request shall include the extent of the work to be done, length of outage time required and the time at which the outage is to begin. No allowance will be made for extra payment as a result of scheduling “overtime” work necessary to perform before or after normal or regular working hours to accomplish the work intended.

8. Submit a “Sequence of Work Schedule” in respect to all temporary and permanent utility and service cutovers after final determination. This schedule shall be submitted for approval to the Architect/Engineer. The submittal shall designate priority order, service or utility affected, date of cutover, and time of day to start and finish.

1.9 SAFETY

A. The Engineer has no contractual responsibility in connection with job site safety measures or precautions as related to means, methods, techniques, sequences or procedures. Contractor shall be solely and completely
responsible for conditions of the job site, including safety of all persons and property during performance of the work. This requirement will apply continuously and not be limited to normal working hours. The Architect/Engineer's observations of the Contractor's performance are not intended to include review of the adequacy of the Contractor's safety measures in, on, or near the construction site. Contractor shall be responsible for providing all such safety measures and shall consult with the Local, State or Federal Safety Inspector for interpretation whenever in doubt as to whether safe conditions do or do not exist; or whether he is or is not in compliance with Safety Regulations.

1.10 MATERIAL AND EQUIPMENT HANDLING AND STORAGE

A. It is recognized that space at the project for storage of materials and products is limited. Coordinate the deliveries of materials and products with the scheduling and sequencing of the work so that storage requirements at the project are minimized. In general, do not deliver individual items of equipment to the project substantially ahead of the time of installation. All materials shall be covered prior to installation and protected until final acceptance.

B. Use only new materials, of the best quality of their respective kinds.

C. All materials, in general, shall be Underwriters' Laboratories listed and labeled.

1.11 FOUNDATION AND ANCHOR BOLTS

A. All concrete pad foundations for all Division 21 equipment, as noted on the drawings, shall be provided as a part of the Division 21 work. Concrete pads shall be minimum 4 inch high and anchored to the floor with dowels

1.12 MAINTENANCE OF WORK AREAS

A. During the project, this Contractor shall maintain his work area in an organized manner, shall not allow debris to accumulate, and shall store equipment, tools and supplies in a manner which shall not cause interference with the activities of others engaged on the project.

1.13 HOISTING

A. This Contractor shall be responsible for hoisting of all materials and equipment furnished or installed under this Section of the Specifications, in accordance with all city, state and federal rules and regulations.

1.14 CLEANING

A. Immediately prior to inspection for Substantial Completion, remove any remaining waste materials and rubbish from mechanical and electrical rooms. Remove protective coating, barriers and other protective devices, temporary work, and surplus materials.

B. Leave mechanical rooms and similar unfinished spaces "Broom Clean." Dust equipment, ducts, pipes, and other mechanical and electrical work in mechanical rooms and similar unfinished spaces. Remove construction dirt and debris from interior of equipment, panels, disconnects, ductwork, etc. thoroughly in accordance with manufacturer's instructions.
C. Upon completion of the contract all remaining materials and rubbish shall be removed from the building and premises and the work areas shall be left clean and free from stains, mortar, paint spots, etc.

D. Upon completion of the work, put systems into service maintaining responsibility for the equipment during all testing operations including the lubricating and turning on and off of such apparatus.

1.15 INSTRUCTION OF USING AGENCY/OWNER'S DESIGNATED PERSONNEL

A. Prepare and submit operating instructions, as required by Specification Sections, and instruct Owner's personnel in use and maintenance of operating equipment.

B. After installation is complete, schedule to meet and instruct Owner's designated personnel in use, operation, care, and cleaning of equipment. Instructions shall be given only by qualified personnel, thoroughly familiar with use and maintenance of equipment.

C. Notify the Engineer in writing a minimum of 72 hours in advance of any scheduled Owner equipment training. Following all training, provide record of Owner training including the type of training, who conducted the training, and list of attendees. Include copy in each set of O&M manuals.

D. Owner training sessions shall be video recorded to DVD media. DVDs shall be clearly labeled indicating content of equipment covered by training, and copies provided as follows: one (1) copy to the Owner, one (1) copy to the Engineer, and one (1) copy shall be included in each set of O&M manuals.

1.16 WARRANTY

A. Guarantee all work including labor, material and equipment for this project for a period of one year from date of acceptance by Using Agency/Owner.

END OF SECTION 21 05 10
SECTION 21 05 53 - IDENTIFICATION FOR FIRE SUPPRESSION PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Nameplates.
B. Tags.
C. Pipe Markers.

1.2 REFERENCE STANDARDS


1.3 SUBMITTALS

A. Product Data: Provide manufacturers catalog literature for each product required.

PART 2 PRODUCTS

2.1 NAMEPLATES

A. Identification Applications
   1. Fire protection piping
   2. Stand pipe piping
   3. Miscellaneous equipment

B. Manufacturers:
   1. Kolbi Pipe Marker Co.: www.kolbipipemarkers.com

C. Description: Laminated three-layer plastic with engraved letters.
   2. Letter Height: 1/2 inch.

2.2 TAGS

A. Manufacturers:
IDENTIFICATION FOR FIRE SUPPRESSION

PIPING AND EQUIPMENT


B. Plastic Tags:  Laminated three-layer plastic with engraved black letters on light contrasting background color.  Tag size minimum 1-1/2 inch diameter.

C. Metal Tags:  Brass with stamped letters; tag size minimum 1-1/2 inch diameter with smooth edges.

D. Valve Tag Chart:  Typewritten letter size list in anodized aluminum frame.

2.3 PIPE MARKERS

A. Manufacturers:

B. All piping systems will be labeled, color coded with the type of service, (Reference 2.01A Identification Applications) 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 3/4" and smaller, permanent phenolic tags will be used.  Schedule for banding and labeling of pipe and conduit will conform to ANSI A13.1.


D. Plastic Pipe Markers:  Factory fabricated, flexible, semi- rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid being conveyed.

E. Plastic Tape Pipe Markers:  Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.

F. Color code as follows:
   1. Fire Quenching Fluids:  Red with white letters.

2.4 VALVE AND DEVICE IDENTIFICATION CEILING TAGS

A. Provide engraved plastic ceiling identification tags for valves and above ceiling equipment components.  In addition, label all above ceiling components at each location in accordance with the University of Missouri Standards.

B. Color:  Ceiling tags to be white background with black letters.

C. Identification labels shall be engraved factory fabricated, flexible, semi-rigid plastic, fastener appropriate for ceiling material.

D. Install ceiling identification tags per University of Missouri Standards.
PART 3  EXECUTION

3.1   PREPARATION

A. Degrease and clean surfaces to receive adhesive for identification materials.

3.2   INSTALLATION

A. Install nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.

B. Install tags with corrosion resistant chain.

C. Install plastic pipe markers in accordance with manufacturer's instructions.

D. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.

E. Use tags on piping 3/4 inch diameter and smaller.
   1. Identify service, flow direction, and pressure.
   2. Install in clear view and align with axis of piping.
   3. 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. Locate ceiling tacks to locate valves above T-bar type panel ceilings. Locate in corner of panel closest to equipment.

END OF SECTION 21 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, 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 Owner. If the 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).
5. Conform to all applicable State and Local Codes.
8. Americans with Disabilities Acts (ADA) and American National Standards Institute (ANSI) 117.
9. National Electrical Manufacturer’s Association (NEMA).
10. Underwriter’s Laboratories (UL).
11. Insulated Cable Engineers Association (ICEA).
15. Institute of Electrical and Electronic Engineers (IEEE).
16. Sheet Metal and Air Conditioning Contractors National Association (SMACNA).

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 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 Engineer in writing before the date of bid opening. In the event such discrepancies exist, and the Engineer is not so notified, the adjudication of responsibility shall be solely at the discretion of the Engineer.

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 Engineer. 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 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 PROJECT/SITE CONDITIONS

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

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 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.

1.11 SEQUENCING AND SCHEDULING

A. Construct Work in sequence under provisions of Division 1.
1.12 USE OF THE ENGINEER’S DRAWINGS

A. The Contractor shall obtain from the Engineer a set of AutoCAD or compatible format 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 Engineer a written release of liability acceptable to the 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.

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 items 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 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 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.

ELECTRICAL GENERAL PROVISIONS
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.

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 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 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.

3.8 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 Engineer 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 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, 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.
   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.

3.9 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.
   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 26 00 10.

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. 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 QUALITY ASSURANCE

A. Installer Qualifications: All electrical work at the University shall be performed by a State of Colorado licensed contractor under the supervision of a licensed electrician. Contractors shall verify that electricians are currently licensed by the State of Colorado and shall supply Project Manager with names and license numbers. Contractor shall have a minimum of 3 years of satisfactory performance in conducting the type of work specified.
   3. NECA - Standard of Installation.
5. IEEE – The Institute of Electrical and Electronics Engineers.
7. International Building Code in accordance with the Campus Building Official.
8. ASTM - American Society of Testing Materials
9. IPCEA - Insulated Power Cable Engineers Association
10. Underwriter's Laboratories (UL)
11. American National Standards Institute (ANSI)
12. Other requirements as listed elsewhere in these specifications.

B. The drawings and specifications take precedence when they are more stringent than codes, statutes, or ordinances in effect. Applicable codes, ordinances, standards and statutes take precedence when they are more stringent than, or conflict with the drawings and specifications.

C. Record Documents:
1. Maintain a separate set of contract electrical drawings at the site in accordance with Section 01 74 00 to show the following:
   a. Equipment locations (exposed and concealed) dimensioned from prominent building lines.
   b. Approved substitutions, Contract Modifications, and actual equipment and materials installed.

D. Operations and Maintenance Data:
1. O and M Data shall be provided in accordance with Section 01 78 23 including the following information:
   a. Description of function, normal operating characteristics and limitations, fuse curves, engineering data and tests, and complete nomenclature and commercial numbers of all replaceable parts.
   b. Manufacturer's printed operating procedures to include start-up, break-in, routine and normal operating instructions; regulation, control, stopping, shutdown, and emergency instructions; and summer and winter operating instructions.
   c. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions.
   d. Servicing instructions and lubrication charts and schedules.
   e. Complete list of parts and wiring diagrams.
   f. Names, addresses and telephone numbers of the Contractor, Sub-contractors and local company responsible for maintenance of each system or piece of equipment.
   g. All information shall be permanently bound in a 3-ring binder. The job name and address, and Contractor's name and address shall be placed on the cover and spine of each binder in a permanent manner. Dymo-tape is not acceptable.
   h. Copies of all test reports shall be included in the manuals.

1.5 DELIVERY, STORAGE AND HANDLING

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

1.6 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:

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<th>(F)</th>
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<tr>
<td>Time-rated floor or wall assemblies.</td>
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<td>(F)</td>
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<tr>
<td>Openings between floor slabs &amp; curtain wall.</td>
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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.

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 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. Furnish and install all necessary hardware, hangers, blocking, brackets, bracing, runners, etc. required for equipment specified under this Division.

R. Remove all unused or abandoned conduit, junction boxes, panels, and other electrical components back to the source.

3.2 TESTING, CLEANING AND CERTIFICATION

A. Operating and Acceptance Tests: Provide all labor, instruments, and equipment for the performance of tests as specified below and elsewhere in these specifications.
   1. Perform a careful inspection of the main switchboard bus structure and cable connections to verify that all connections are mechanically and electrically tight.

B. 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 29 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:
   1. Hangers and supports for electrical equipment and systems.

1.3 DEFINITIONS

A. EMT: Electrical metallic tubing.

1.4 ACTION SUBMITTALS

A. Product Data: For the following:
   1. Steel slotted support systems.

B. Shop Drawings: Show fabrication and installation details and include calculations for the following:
   1. Steel slotted channel systems. Include Product Data for components.

1.5 QUALITY ASSURANCE

A. Comply with NFPA 70.

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.
HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

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.

I. The following are prohibited.
   1. Plastic or fiber anchors.
   2. Drilling or structured steel members.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. 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. Structural and post tensioned concrete members shall not be drilled or pierced without prior approval from the University Project Manager.
   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.

B. 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 ½ inch conduit from bottom of (trapeze) support to 6-inches above cable tray.

6. Support individual horizontal raceways by separate pipe hangers.

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.

C. 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.

D. In open overhead spaces, support metal boxes directly from the building structure or by bar hangers. Where bar hangers are used, attach the bar to raceways on opposite sides of the box and support the raceway with an engineer approved type of fastener not more than 24 inches from the box.

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

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. Metal conduits, tubing, and fittings.
   2. Boxes, enclosures, and cabinets.

1.3 DEFINITIONS

A. EMT: Electrical metallic tubing.

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. Rigid Aluminum Conduit:
      a. Not allowed unless otherwise noted.
3. 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.

4. 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:
   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.

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.
P. 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.
      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. Rigid Galvanized conduit or intermediate metallic steel conduit shall be installed in the following
      areas.
      a. All outdoor non-conditioned locations concealed and exposed.
      b. Interior exposed. Below 10 feet to floor. PVC coated 90 degree elbows underground when
         penetrating floor slabs.
   2. 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.
   3. 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.

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 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 conduits enter or leave hazardous locations.
   b. Where conduits pass from warm locations to cold locations, such as the boundaries of refrigerated spaces and air-conditioned spaces.
   c. Where required by the NEC.

14. 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.

15. Conduit Seals: Conduit passing through concrete walls shall be sealed.

16. 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.

17. Ream the ends of all cut and/or threaded conduit. Ends shall be cut square.

18. Use of running threads for rigid metallic conduit are not permitted. When threaded couplings cannot be used, provide 3-piece union or solid coupling.

19. Conduits shall not cross pipe shafts or ventilation duct openings “access panel”.

20. 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.

21. Install an insulated ground conductor in all conduits.

22. 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.

23. Provide separate raceway systems for each of the following:
   a. Lighting
   b. Power Distribution
   c. Emergency (Essential)
      1) Lighting
      2) Power distribution
d. Low voltage systems, including telephone and communications, EQ alarm, security, fire alarm.
e. Audio/Visual

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

25. Special areas methods for raceway installation (with appropriate seal-offs, explosion-proof fittings, etc.), in all special occupancy areas, as defined and classified in Article 500 of the National Electric Code (NEC), shall be in accordance with that Article.

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.

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. 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.

C. 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.

END OF SECTION 26 05 33
SECTION 26 05 53 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

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. Identification for raceways.
   2. Identification of power and control cables.

1.3 ACTION SUBMITTALS

A. Product Data: For each electrical identification product indicated.

B. Identification Schedule: An index of nomenclature of electrical equipment and system components used in identification signs and labels.

1.4 COORDINATION

A. Coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual; and with those required by codes, standards, and 29 CFR 1910.145. Use consistent designations throughout Project.

B. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

C. Coordinate installation of identifying devices with location of access panels and doors.

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
IDENTIFICATION FOR ELECTRICAL SYSTEMS

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 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. Security System: Blue and Yellow with Gray Cable.
   2. Telecommunications System: Green and Yellow with Blue and White Cables.
   6. Lighting Control Cabling shall be Green.

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. Install labels at locations indicated and at locations for best convenience of viewing without interference with operation and maintenance of equipment.

G. 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 28 31 00 - FIRE DETECTION AND ALARM

PART 1 - GENERAL

1.1 PROJECT DESCRIPTION

A. The existing Simplex fire alarm panel will be modified and reprogrammed for the removed and replaced dry pipe sprinkler pressure and tamper switches. The scope of this project shall also include the updating of the existing remote annunciator panel to indicate the added / modified zones.

1.2 PERFORMANCE REQUIREMENTS

A. 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.

<table>
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<tr>
<th>Circuit Type</th>
<th>Wire</th>
<th>Colors</th>
<th># Of Conductors</th>
<th>Size</th>
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<tr>
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<td>18 (THHN)</td>
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<tr>
<td>Signaling Circuits</td>
<td>(+) Red (+) White</td>
<td>2</td>
<td>16 Twisted</td>
<td></td>
</tr>
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<td>(+) Orange (+) Brown</td>
<td>2</td>
<td>14 Twisted</td>
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<tr>
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<td>(+) Yellow (+) Blue</td>
<td>2</td>
<td>14 Twisted</td>
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</tr>
<tr>
<td>Fire Fighter Phone Circuit</td>
<td>(+) Red (+) White</td>
<td>2</td>
<td>14 Twisted/ Shielded</td>
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</tr>
<tr>
<td>Fire Fighter Phone Riser Circuit</td>
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<td>2</td>
<td>14 Twisted/ Shielded</td>
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<td>Low Level Audio Riser Circuit</td>
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<tr>
<td>Door Holder Circuit</td>
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1.3 SUBMITTAL

A. Provide shop drawings as follows:
   1. Floor plans with device layout, address and wiring.
   2. FACP layout.
   3. Riser diagrams.
   4. Battery calculation.
   5. Sequence of operation
   6. Equipment cut sheets
   7. FAAP layout.

B. CADD generated layouts for FACT screen graphics.

C. Operating and Maintenance Manuals.

D. 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.

1.4 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.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Simplex.

2.2 APPROVED INSTALLERS

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

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. Other installers will be considered if they have successfully completed 3 similar projects (in size and complexity) in the past 5 years in the Denver Metro area. The installer must have a demonstrated ability to provide ongoing service to any system it installs. Alternate installers must be approved in writing by the University Project Manager through Facilities Operations 5 working day prior to Bidding on the project. Installers should be NICET certified.

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. 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.

E. 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.

F. 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. Monitor Modules:
      a. The Monitor Module shall provide an addressable input for N.O. or N.C. contact devices such as manual stations, water-flow switches, sprinkler supervisory devices, door contacts, intrusion detectors, etc.
      b. The Module shall mount in a standard electrical box.
   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.

G. Other Devices:
   1. Tamper Switches: Installed under Division 21.
   3. Differential Pressure Switch: Installed under Division 23.
   4. Relays provide addressable control and/or monitor module for each device indicated in paragraphs P. 3, 4, 5, 6 And 7 above. Include wiring to the device and to the fire alarm loop as required.
   5. Provide control relays as required to accomplish functions such as fan shutdown, damper positioning, door release, etc.
PART 3 - EXECUTION

3.1 INSTALLATION – FIRE ALARM

A. 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.

B. Low Voltage/Wire and Cable and Hallway Devices: LV/W&C running from the cable tray to devices in the hallway shall be protected by plenum rated flexible sleeving or flexible metal conduit. LV/W&C in sleeving or flexible metal conduit shall be supported per NEC and installed with UL approved connectors and plastic bushings on both ends.

C. Outlet pull and junction boxes shall be painted red on the exterior.

D. 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.

E. 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.

F. 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 shielded wiring to be bonded together at each device and insulated from contact with the conduit or box.
   6. All equipment and associated wiring removed from service will be returned to the University Project Manager for proper disposal.

G. 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.

H. 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. The functional operation of each and every alarm device and circuit.
3. The functional operation of each monitored device circuit.
4. The functional operation of each control circuit, including fan controls.
5. The supervision functions of each control circuit, including initiating, indicating, monitoring, control and supply circuit.
6. Control station automatic signaling.
7. 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 FD.

END OF SECTION 28 31 00