University of Colorado
Anschutz Medical Campus

Fitzsimons Building 5th & 6th Floors Cancer Center, Paint Patch Code Renovation

Project No. 21_155291

PROJECT MANUAL

100% Construction Documents

January 7, 2022
March 9, 2022 Permit Comments Set

Stantec

Stantec Architecture Inc.
999 18th Street; Suite 202
Denver, CO 80202-2424
Project No.: 2270274307

SECTION 00 01 04

PROJECT DIRECTORY

PART 1 - GENERAL

1.1 PROJECT DIRECTORY

A. OWNER/UNIVERSITY

1. Address:
University of Colorado Denver | Anschutz Medical Campus
Campus Services, Mail Stop F418
1945 Wheeling Street, Rm 334
Aurora, CO 80045
www.cuanschutz.edu

2. Primary Contact:
Chad Jelinek, Project Manager, Facilities Projects
720-728-9577
chad.jelinek@cuanschutz.edu

B. ARCHITECT

1. Firm & Address:
Stantect Architecture Inc. [STN]
999 18th Street, Ste. 202
Denver, CO 80202-2424
www.stantec.com

2. Primary Contact:
Brianne Serafini
W: 303-575-8423
C: 720-454-8016
brianne.serafini@stantec.com

C. MECHANICAL/ELECTRICAL/PLUMBING ENGINEER

1. Firm & Address:
RMH Group
12600 West Colfax Ave.; Ste. A-400
Lakewood, CO 80215

2. Primary Contact:
Michelle Swanson
303-903-9070
mswanson@rmhgroup.com

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 00 01 04

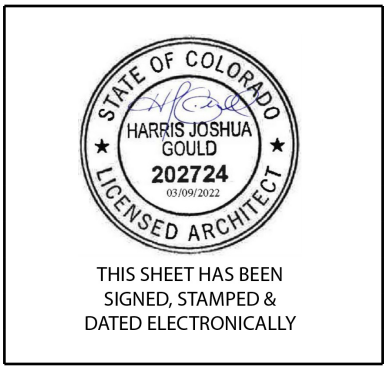
SECTION 00 01 07.01

SEALS PAGE - ARCHITECT

DESIGN PROFESSIONALS OF RECORD

Architect: Stantec Architecture Inc. [STN].

Responsible for Divisions 01-49 Sections except where indicated as prepared by other design professionals of record.



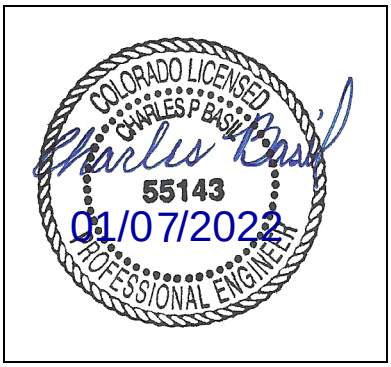
END OF SECTION 00 01 07.01

SECTION 00 01 07.02

SEALS PAGE - MEP ENGINEER

DESIGN PROFESSIONALS OF RECORD

Mechanical/Electrical/Plumbing: RMH Group [RMH].



Responsible those Sections appended with "[RMH]" on Table of Contents.

01/07/2022

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ADVERTISEMENT - REQUEST FOR PROPOSALS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS (Not Applicable)

1.2 SUMMARY

A. Section incudes administrative and procedural requirements for project advertisement.

1.3 DEFINITIONS

A. ADVERTISEMENT: Posting of project description, requirements, schedule, and related requirements necessary to solicit submittals from contractors.

1.4 ADVERTISEMENT

A. FORM: Advertisement - Request For Proposals.

B. A copy of the above noted form is attached at the end of this section. Following are the major headings in the Advertisement's Table of Contents; the PDF is bookmarked with same headings for convenience only.

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PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

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(See Advertisement - Request For Proposals on next pages)

ADVERTISEMENT - REQUEST FOR PROPOSALS
Construction Management/General Contracting Services
State of Colorado
University of Colorado Anschutz Medical Campus (GFE)
Notice Numbers: 21_155291

Notice Status:	**OPEN**
Publish Date:	**March 7th 2022**
# Notice Revisions:	**0**
Revision Publish Date:	**N/A**

`

Project Numbers:	PN 21_155291
Project Titles:	Fitz Bldg 5th 6th Cancer Ctr Pt patch code reno
Estimated Construction Cost:	**$1,000,000**

Settlement Notices

For all projects with a total dollar value above $150,000 Notice of Final Settlement is required by C.R.S. 38-26-107(1).
Final Settlement, if required, will be advertised via: Electronic Media

Project Descriptions

Please see full project descriptions outlined in the RFP

Scope of Services

The scope of services will include assistance to the State during the process of assessment, design, construction, and warranty period. Specific tasks to be performed by the Construction Manager/General Contractor (CM/GC) include those generally performed by the CM/GC construction community where the Construction Manager is also the Contractor. A sample copy of the State's CM/GC contract is contained within the RFP. A Guaranteed Maximum Price (GMP) will be required at the completion of Design Development phase.

A public construction project in the amount of five hundred thousand dollars or more shall be subject to the State prevailing wage rate, of the regular, holiday, and overtime wages paid and the general prevailing payments on behalf of employees to lawful welfare, pension, vacation, apprentice training, and educational funds in the State, for each employee needed to execute the contract. Payments to the funds must constitute an ordinary business expense deduction for federal income tax purposes by contractors and subcontractors. Contractors are required to pay

their employees at weekly intervals and shall comply with the enforcement provisions of C.R.S. §24-92-209

Minimum Qualifications

Notice is hereby given to all interested parties that all firms will be required to meet ALL of the minimum qualifications to be considered for these projects. To be considered as qualified, interested firms shall have, as a minimum:

1. Provided Construction Management/General Contracting services within the last Five (5) years for at least Four (4) projects relating to construction in existing facilities each in excess of **$1 million** (hard costs), utilizing the expertise present in their Colorado Office; and

2. Demonstrated specific Construction Management/General Contracting experience in projects of similar scope and complexity and considering abilities to work in sensitive areas on a medical research campus that can include wet research labs, classrooms, offices, etc.; and

3. Demonstrated bonding capability up to **$1.5 million** for an individual project coincidentally with current and anticipated workloads; provide letter from surety that affirms this capacity.

Firms meeting the minimum qualifications may obtain the RFP documents on the website accompanying this advertisement.

University of Colorado Anschutz Medical Campus Facilities Projects – **Request for Proposals** website:
https://www.cuanschutz.edu/offices/facilities-management/construction-projects/RFP

CORE/ColoradoVSS: https://codpa-vss.cloud.cgifederal.com/webapp/PRDVSS2X1/AltSelfService

Other Information

Preference shall be given to Colorado resident bidders and for Colorado labor, as provided by law.

Pre-Submittal Conference Meeting (mandatory)

To ensure sufficient information is available to CM/GC firms preparing submittals, a mandatory pre-submittal conference has been scheduled. The intent of this conference is to present the project, submittal process and to have University staff available to discuss these projects. Firms preparing submittals must attend and sign the attendance roster in order to have their submittals accepted.

The RFP Pre-Submittal Conference will be held on 3/17/2022 at 1:00 PM. in the Fitzsimons Building - 13001 East 17th Place Aurora CO 80045. All guests will meet at the flagpole on the South side of the Fitzsimons Building and will be escorted to the Bushnell Conference Room.

Schedule/Submission Details

1. The schedule of events for the CM/GC RFP process is as follows:
2.

Advertisement	3/7/2022
Mandatory Pre-submittal Conference	3/17/2022 – 1:00PM
Date Email Questions Due	3/31/2022 – 1:00PM
Date Email Answers Issued	4/4/2022 – 1:00PM
Submittals Due (Prequalification: Step I)	4/14/2022 - 1:00PM
Interview Short List Announced	4/28/2022 - 1:00PM
Sealed Proposal Due (Evaluation and Award: Step II)	24hrs prior to interview
Oral Interviews	Beginning of May
Selection Announced	Middle of May
Negotiation of CM/GC Contract	End of May
Contract Approval (projected)	End of May
Buy out process	Beginning of June
Anticipated CM/GC Start	Beginning of June
Anticipated Construction Start/Finish	Beginning of June 2022-Oct 2022

3. One (1) PDF copy of the Submittal of Prequalification is due on **April 14, 2022**, and shall be received no later than **1:00 PM**, as follows:

   Submittals shall be submitted online at the following website:
   https://ucdenverdata.formstack.com/forms/rfp_rfq_submission

   Please prepare submittals as follows:

   a. Submittals should not exceed 20 (letter size) PDF pages of content.
   b. Cover page and section title pages do not count towards the 20-page limit.
   c. Please, no smaller than 10 point fonts.
   d. Submittals should be ordered and contain the five sections as outlined in section II. SUBMITTAL REQUIREMENTS. Separate each section by a title page.
   e. Submittals are limited to 25 MB by submission website.

4. The above schedule is tentative. Responding firms shall be notified of revisions in a timely manner by email. Respondents may elect to verify times and dates by email, but no earlier than 36 hours before the schedule date and time.

Comments: **Late submissions will be rejected without consideration. The University of Colorado Denver | Anschutz Medical Campus (GFE) and the State of Colorado assume no responsibility for costs related to the preparation of Submittals.**

Agency: University of Colorado Anschutz Medical Campus
Contact Name : Chad Jelinek
Email: Chad.Jelinek@cuanschutz.edu

Point of Contact/Clarification

Name:	Chad Jelinek
Agency:	University of Colorado Anschutz Medical Campus (GFE)
Phone:	720-728-9577
Email:	Chad.Jelinek@cuanschutz.edu

This Notice is also available on the web at www.colorado.gov/pacific/osa/cdnotices

Media of Publication(s):	**University of Colorado Anschutz Medical Campus Facilities Projects Website Colorado CORE/ColoradoVSS**
Publication Dates:	3/7/2022

NOTICE LETTER TO CONTRACTORS TEMPLATE

October 06, 2021

All Contractors Working within CU Denver/Anschutz Medical Campus Facilities

Subject: Vaccination Requirements

Dear Contractor:

On August 31, 2021, pursuant to the Sixth Amended Public Health Order 20-38, Limited COVID Restrictions, all State Contractors and State Contractor Workers who physically enter a State Facility shall comply with the Vaccination Requirements included in Section III of the Order. All State Contractors and State Contractor Workers, including individuals who have been infected with and recovered from COVID-19, shall have received their first dose in a two dose COVID-19 series no later than September 30, 2021 and be Fully Vaccinated by October 31, 2021.

On September 30, 2021 the Seventh Amended Public Health Order 20-38 (PHO or Order), allowed for State Contractor Workers to participate in twice weekly COVID-19 testing if they have an employer approved medical or religious exemption or are unvaccinated.

You are receiving this letter because your company has a contract with University of Colorado Denver/Anschutz Medical Campus and, as part of the performance of that contract, certain of your company's personnel (including any subcontractor personnel) are required to or likely will provide contracted goods or services in person and on-site. Therefore, as a contractor, your company is subject to the vaccination or testing requirements set forth in the Order.

As permitted by the Order, University of Colorado Denver/Anschutz Medical Campus State Contractors shall assume responsibility for verification of full COVID-19 vaccination, approving all exemptions for medical or religious beliefs and determining any accommodations needed for such exemptions.

State Contractors shall verify that each of the identified State Contractor Workers is Fully Vaccinated, or that each of the identified State Contractor Works that is unvaccinated or has a medical or religious exemption is participating in twice weekly COVID-19 testing.

Please be aware that the University of Colorado Denver/Anschutz Medical Campus retains the right to inquire into compliance with the Order's requirements at any time, to include requesting a State Contractor to provide proof of vaccination or a recent negative COVID-19 test.

The State of Colorado values your firm as a contract partner to deliver needed goods or services. Accordingly, we are hopeful that your company will comply with the Order and help the state reduce the spread of the virus. In the meantime, please see COVID-19 Vaccination Requirements for State Contractors FAQs.(https://dhr.colorado.gov/covid-19-vaccination-requirements-for-state-contractors)

University of Colorado Denver/Anschutz Medical Campus

STATE OF COLORADO
OFFICE OF THE STATE ARCHITECT
STATE BUILDINGS PROGRAM

REQUEST FOR PREQUALIFICATION / PROPOSAL FOR AN INTEGRATED PROJECT DELIVERY METHOD UTILIZING CONSTRUCTION MANAGEMENT/GENERAL CONTRACTING (CM/GC) SERVICES

For The

UNIVERSITY OF COLORADO | ANSCHUTZ MEDICAL CAMPUS

For The

Fitz Bldg 5th 6th Cancer Ctr Paint and patch PN 21_155291

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3. Project Management Approach
4. Prior Project Experience/Success
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b. Budget Considerations
c. Quality
d. Services Disruption
e. Project Acceptability
f. Compliance

5. Miscellaneous Considerations
a. Claims/Litigation History
b. Apprenticeship Training Program
c. Other

B. ORAL INTERVIEWS/COST PROPOSALS CRITERIA

1. Qualifications of the Firm(s)
2. Qualifications of the Management Team Members
3. Project Management Approach
4. Prior Project Experience/Success
5. Miscellaneous Considerations

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Appendix J:	**Covid Policies and Procedures**

REQUEST FOR PROPOSALS FOR AN INTEGRATED PROJECT DELIVERY METHOD UTILIZING CONSTRUCTION MANAGEMENT/GENERAL CONTRACTING (CM/GC) SERVICES

UNIVERSITY OF COLORADO | ANSCHUTZ MEDICAL CAMPUS

Settlement Notice

For all projects with a total dollar value above $150,000 Notice of Final Settlement is required by C.R.S. §38-26-107(1). Final Settlement, if required, will be advertised in the same location as the original solicitation.

I. GENERAL INFORMATION

A. INTRODUCTION/DESCRIPTION OF PROJECT

Tenant Finish of partial 5th Floor and full 6th Floor at the Fitzsimons Building (Building 500) on the Anschutz Medical Campus. Project Area is 32,000 GSF. The space was previously built out to be used as office space and this project will upgrade finishes & furniture throughout, build new fire rated exit passageways to allow for more occupants on the floor and upgrade millwork at (2) break rooms for ADA compliance. This project will also address the fire rating of abandoned flooring penetrations and expansion joints that are currently not rated. Fixed Limit of construction is $1,115,958.00 and an approximant 150-day construction duration.

The *UNIVERSITY OF COLORADO | ANSCHUTZ MEDICAL CAMPUS* anticipates using a Construction Manager/General Contractor (CM/GC) approach to project delivery. A Guaranteed Maximum Price (GMP) and an updated project duration schedule will be established by the Architect/Engineer and the Construction Manager/General Contractor in conjunction with the *UNIVERSITY OF COLORADO | ANSCHUTZ MEDICAL CAMPUS*. The CM/GC will evaluate, among other things, availability of materials and labor, project schedule, project costs as they relate to the established budget, constructability, and will work closely with the Architect/Engineer and the |throughout the planning, design and construction phases of the project. Construction is estimated to commence Spring/Summer 2022

The process to be used in the selection of the CM/GC is comprised of two steps. STEP I is the Submittal of Prequalification as described in Section II (D). STEP II is the Oral Interview/Cost Proposal as described in detail in Section III. A Jury Panel of individuals who will be involved in the project and/or understand the required services associated with Construction Management/General Contracting will evaluate responses to this RFP for both STEPS. Upon completion of the evaluation of the Submittals of Prequalification, a limited number of firms will be invited to the oral interviews. Sealed fee proposals will be required only from those firms who are interviewed and are to be submitted as indicated in this RFP. Both qualifications and cost will be considered in the final ranking of firms with qualifications given 60% of the value of the weighted criteria and fees for the Cost/ Proposal given 40%.

Selection and award of this project will be based on a combination of qualifications and costs that represents the best overall value to the State.

B. MINIMUM QUALIFICATIONS

Notice is hereby given to all interested parties that all firms will be required to meet ALL of the minimum qualifications to be considered for these projects. To be considered as qualified,

interested firms shall have, as a minimum:

1. Provided Construction Management/General Contracting services within the last Five (5) years for at least Four (4) interior renovation projects, within an occupied building. Each in excess of $ 1.2 Million (hard costs), utilizing the expertise present in their Colorado Office; and

2. Demonstrated specific Construction Management/General Contracting experience in projects of similar scope and complexity; and

3. Demonstrated bonding capability up to $ 2 million for an individual project coincidentally with current and anticipated workloads; provide letter from surety that affirms this capacity. 4) Per C.R.S. §24-92-115 unless prohibited by applicable federal law, contract for any public project in the amount of one million dollars or more, that does not receive federal money, including shall require the general contractor to which the contract is awarded to submit, at the time the mechanical, electrical, or plumbing subcontractor is put under contract, documentation that Identifies the contractors or subcontractors that will be used for all mechanical, sheet metal, fire suppression, sprinkler fitting, electrical, and plumbing work required on the project and certifies that all firms identified participate in apprenticeship programs registered with the United States department of labor's employment and training administration or state apprenticeship councils recognized by the United States department of labor and have a proven record of graduating a minimum of 15% of its apprentices for at least three of the past five years.

5) Per C.R.S. §24-92-Part 2, a public construction project in the amount of five hundred thousand dollars or more shall be subject to the State prevailing wage rate, of the regular, holiday, and overtime wages paid and the general prevailing payments on behalf of employees to lawful welfare, pension, vacation, apprentice training, and educational funds in the State, for each employee needed to execute the contract. Payments to the funds must constitute an ordinary business expense deduction for federal income tax purposes by contractors and subcontractors. Contractors are required to pay their employees at weekly intervals and shall comply with the enforcement provisions of C.R.S. §24-92-209. Contractors awarded a project of this size will be required to utilize the LCPTracker cloud-based labor compliance and certified payroll application.

C. SCOPE OF SERVICES

The scope of services will include assistance to the State during the process of assessment, design, construction, and warranty period. Specific tasks to be performed by the Construction Manager/General Contractor (CM/GC) include those generally performed by the CM/GC construction community where the Construction Manager is also the Contractor. A sample copy of the State's CM/GC contract is contained within the RFP. A Guaranteed Maximum Price (GMP) will be required.

A public construction project in the amount of five hundred thousand dollars or more shall be subject to the State prevailing wage rate, of the regular, holiday, and overtime wages paid and the general prevailing payments on behalf of employees to lawful welfare, pension, vacation, apprentice training, and educational funds in the State, for each employee needed to execute the contract. Payments to the funds must constitute an ordinary business expense deduction for federal income tax purposes by contractors and subcontractors. Contractors are

required to pay their employees at weekly intervals and shall comply with the enforcement provisions of C.R.S. §24-92-209. Contractors awarded a project of this size will be required to utilize LCPTracker cloud based labor compliance and certified payroll application

II. PREQUALIFICATION SUBMITTALS (STEP I)

A. SCHEDULE

1. The schedule of events for the RFP process and an outline of the schedule for the balance of the project is as follows:

Advertisement	3/7/2022
Mandatory Pre-submittal Conference and Tour	3/17/2022 - 1:00 pm
Date Email Questions Due	3/31/2022 - 1:00 pm
Date Email Answers Issued	4/4/2022 - 1:00 pm
Submittals Due (Prequalification: Step I)	4/14/2022 - 1:00 pm
Interview Short List Announced	4/28/2022 - 1:00PM
Sealed Proposal Due (Evaluation and Award: Step II)	24hrs. prior to interviews
Oral Interviews	Beginning of May
Selection Announced	Middle of May
Negotiation of CM/GC Contract	End of May
Contract Approval (projected)	End of May
Buy out Process	Beginning of June
Anticipated CM/GC Start	Beginning of June
Anticipated Construction Start/Finish	Beginning of June 2022 - October 2023

2. One (1) Electronic copy of the submittal are due *4/14/2022* and shall be received no later than 1:00 *PM (MD/ST),* Via Form Stack at the following address

   https://ucdenverdata.formstack.com/forms/rfp_rfq_submission

3. The above schedule is tentative. Responding firms shall be notified of revisions in a timely manner by email. Respondents may elect to verify times and dates by email, but no earlier than 36 hours before the schedule date and time.

B. MANDATORY PRE-SUBMITTAL CONFERENCE

1. To ensure sufficient information is available to firms preparing submittals, a mandatory pre-submittal conference has been scheduled. The intent of this conference is to tour the site and to have *UNIVERSITY OF COLORAD | ANSCHUTZ MEDICAL CAMPUS*] staff able to discuss the project. Firms preparing submittals must attend and sign-in in order to have their submittals accepted. The pre-submittal conference will be held at:

   Address: **13001 East 17th Place Aurora CO 80045**
   Room: **Fitzsimons Building At the flagpole on the south side of the building.**
   Date/Time: 3/17/2022 - 1:00 pm

C. CLARIFICATIONS

1. Owner initiated changes to this RFP will be issued under numerically sequenced email addenda. Addenda generally consist of the following items:

   a. Clarifications
   b. Scope Changes
   c. Time and/or Date Changes

   Respondents must acknowledge all issued addenda in their submittal and proposal.

2. Respondent initiated email requests for clarification will be received on before to *3/31/2022 at 1:00pm MST* All State responses will be issued by email addenda on or before *4/4/2022 1:00 PM*

D. GENERAL INFORMATION

1. All respondents accept the conditions of this RFP, including, but not limited to, the following:

   a. All submittals shall become the property of the State of Colorado and will not be returned.

   b. Late submittals shall not be evaluated. Facsimile submittals shall not be accepted.

   c. Any restriction as to the use of submitted materials must be clearly indicated as proprietary. The requested limitation or prohibition of use or release shall be identified in writing on a cover sheet. Blanket claims of proprietary submittals will not be honored. Fee proposals will be considered proprietary.

   d. The State reserves the right to reject any or all proposals on the basis of being unresponsive to this RFP or for failure to disclose requested information.

   e. The State shall not be liable for any costs incurred by respondents in the preparation of submittals and proposals nor in costs related to any element of the selection and contract negotiation process.

   f. The respondent has reviewed Appendix B and by responding has agreed that the terms and conditions of the sample Construction Management/General Contracting Agreement are expressly workable without reservation.

E. PREQUALIFICATION SUBMITTALS (STEP I)

1. Respondent must comply with the following items, a through f. The State retains the right to waive any minor irregularity or requirement should it be judged to be in the best interest of the State**. (Note that the primary focus of the Prequalification evaluation will be the firm(s)' capabilities).**

   a. Submit One (1) PDF complete copies of all material Via Form Stack at the website below

https://ucdenverdata.formstack.com/forms/rfp_rfq_submission

b. Submittals shall be formatted and tabbed in the exact form and numeric sequence of the Evaluation Form (1 through 5) in Appendix A.

c. A one -to- two-sided single page cover letter addressed to the *UNIVERSITY OF COLORAD | ANSCHUTZ MEDICAL CAMPUS* outlining the firm(s) qualifications is required at the front of the submittal.

d. Not counting the cover letter and required Acknowledgement and Attestation form, the entire submittal is to be no more than 20 doubled sided pages limited to 25 MB.

e. Submittals shall be evaluated in accordance with criteria as indicated in SECTION IV. A. PREQUALIFICATION SUBMITTAL CRITERIA and ranked on the corresponding Evaluation Form in Appendix A.

f. Response to all items shall be complete.

g. All references shall be current and relevant.

h. Complete and execute the appropriate Acknowledgment and Attestation Form as provided in Section VI and submit at the back of the Prequalification Submittal.

III. ORAL INTERVIEWS/COST PROPOSALS (STEP II)

A. SHORT LIST

From the submittals received, a short list of qualified respondents shall be identified using the scoring indicated on the enclosed Evaluation Form, Appendix A.

Firms failing to meet the minimum required qualifications will not receive further consideration.

B. ORAL INTERVIEW

1. Mandatory oral interviews shall be conducted for the short-listed firm(s) only. Interview times and location will be arranged by the *UNIVERSITY OF COLORAD | ANSCHUTZ MEDICAL CAMPUS* and all short listed firms will be notified in advance. At the option of the State, a visit to the short-listed firm(s) managing home office and/or representative field office may be required. **(Note that the primary focus of the Oral Interview evaluation in addition to the Cost Proposal will be the proposed Project Management Team members' capabilities).**

C. COST PROPOSALS

1. Only those firms short listed for interview are required to submit their sealed proposals. (Only one copy is required on the scheduled submission date.) Cost Proposals will remain sealed until after the qualitative scoring and will then be opened. The Cost Proposal will then be considered (equivalent to 40 percent of the weighted criteria) in conjunction with the qualitative score from the response and interview (equivalent to 60 percent of the weighted criteria).

2. Cost Proposals shall be submitted on the form provided in Section VII, without modification. A Cost Proposal shall be accompanied with sufficient detail to clearly identify the fee for service and include a detailed schedule of estimated (not-to-exceed) reimbursable and non-reimbursable costs. Percentage of the cost of work is not an acceptable value. The Cost Proposal should be prepared independently in accordance with the following:

    a. Any specific services requested in the RFP and its appendices that are not included should be clearly identified. Exclusion of any required service may result in the proposal being found non-responsive.

    b. Provide a CM/GC staff schedule with staff by name, position and man-hours (assume 8 hour days) per month estimated on the project.

    c. Provide a detailed estimate of reimbursable costs including breakdown of direct salaries and payroll fringes (DPE) for on-site CM/GC personnel associated with the services. Not-to-exceed reimbursable expenses shall be provided at direct cost.

    d. Provide a detailed estimate of non-reimbursable expenses (included in fee).

    e. The State reserves the right to reject any Cost Proposal not prepared in the above manner. Proposals that exceed the available funds may be rejected outright but the State reserves the right to negotiate a reasonable fee for service within the available funds. The CM/GC contract will be a bonded lump sum contract including not-to-exceed reimbursables with a Guaranteed Maximum Price to encompass all construction work; some not-to-exceed allowances may be included as directed by the State.

3. This Fee Proposal is a binding offer to perform the services associated with the Scope of Services described in this RFP and the Designated Services and Method of Payment Matrix in Appendix B. The State reserves the right to negotiate a cost adjustment based on scope clarification subsequent to selection and prior to contract execution.

D. METHOD OF SELECTION AND AWARD

The Jury Panel shall complete a combined evaluation of qualifications and fee in accordance with the criteria as indicated in SECTION IV, B. ORAL INTERVIEWS/COST PROPOSALS/EVALUATION CRITERIA. Numerical ranking and selection of the most qualified firm (including fee) will then occur on the corresponding evaluation forms in Appendix A1.

The final fee amount and scope of services may be negotiated at the State's discretion. Award and contract will be contingent on availability of key proposed Project Management Team staff.

IV. EVALUATION CRITERIA

A. PREQUALIFICATION SUBMITTAL CRITERIA

(Note that the primary focus of the Prequalification evaluation will be the Firm(s) capabilities).

1. QUALIFICATIONS OF THE FIRM(s)

- Provide a description of the composition and management structure of your firm. Identify the firm's roles and responsibilities and relevant experience with projects of similar scope and complexity and similar fast track project delivery methods. Describe how the firm's experience will relate to the success of this project.
- Provide a description and separate graphic organizational chart complete with working titles identifying the lines of authority, responsibility and coordination.
- Provide a detailed description of the process of how your firm selects qualified sub-contractors and manages them effectively on complex multi-phased projects.
- Provide a detailed description of how your firm will maximize the Colorado construction work force on this project.
- Provide your firms' safety record over the last ten years and describe your firms' efforts to retain and support employees.

2. QUALIFICATIONS OF THE MANAGEMENT TEAM MEMBERS

- Describe the qualifications and relevant experience of the superintendent including demonstrated experience working on projects of similar scope and complexity and time commitment for this project.
- Describe the qualifications and relevant experience of other key in-house staff and time commitments for this project.
- Identify all current office locations of the assigned staff and any other resident expertise intended to be provided under this RFP.

3. PROJECT MANAGEMENT APPROACH

- Provide a strategic project approach summary: Include discussion of your firm's approach in providing successful Construction Management/General Contracting services based on prior experience in cost, schedule and quality effectiveness. Include specific examples (1-2 page excerpts) of actual products (estimates, progress reports, schedules, constructability reviews, value engineering studies, forms, general conditions budgets, organizational structures, etc.).
- Provide a description of construction work Project Management Team has capability to competitively bid and self-perform, including qualifications to do such. It is the perception of the *UNIVERSITY OF COLORAD | ANSCHUTZ MEDICAL CAMPUS]* subcontracting CM/GC construction work is in the State's best interest in terms of price competition. The *UNIVERSITY OF COLORAD | ANSCHUTZ MEDICAL CAMPUS]* may, at its discretion, limit the types and amount of work Project Management Team bids and self-performs.

4. PRIOR PROJECT EXPERIENCE/SUCCESS

Select your Four (4) most relevant projects and provide, at a minimum, the following:

- The project/contract name
- Description of services provided
- Overall construction cost of project, as applicable, including initial contract value and change orders including reasons for change orders
- Organizational structure of service delivery under the contract (include the owner's organization as it interfaced with the respondent's contract)

- Key assigned in-house staff (name and title)
- Subcontracts (service) used in the performance of the contract
- Schedule history
- Reference(s) for Owner and Architect as described in IV.E
- Continuing services, if any

a. Timeliness

In general, Construction Management/General Contracting work is seen as successful if it is on time, on budget, and of high quality of workmanship. Timeliness is generally based on completion by the originally scheduled date and is indicated by a Certificate of Occupancy. Please demonstrate for each of the above projects how timely delivery occurred.

b. Budget Considerations

Similar to timeliness, being on budget historically means the work was completed within the originally identified available budget. For purposes of this RFP, the State is interested not only in being within budget but also in the respondent's ability to address and implement the following issues as well:

1. Conceptual estimating
2. Value analysis
3. Alternate solutions
4. Scope reduction that maintains project function
5. Cost/benefit analysis

Demonstrate for the above projects examples of how you accomplished the above cost control services.

c. Quality

Construction quality has the obvious traditional connotations (workmanlike, in compliance with the specifications, normal standard of care, etc.). Demonstrate for the above project examples how a high quality of workmanship was achieved.

d. Services Disruption

Demonstrate how your services on the above project examples dealt with issues of disruption at existing facilities, etc. if applicable.

e. Project Acceptability

Please discuss how your Construction Management/General Contracting services helped achieve owner satisfaction with regard to project quality and acceptability on your project examples.

f. Compliance

Provide information on how compliance with industry standards of care, building codes, etc. was achieved.

5. MISCELLANEOUS CONSIDERATIONS

a. Claims/Litigation History of Firm

Provide information on any past, current or anticipated claims (i.e., knowledge of pending claims) on respondent contracts; explain the litigation, the issue, and its outcome or anticipated outcome.

b. Apprenticeship Training Program (Optional for Step I)

Where an Apprentice Training Program certified by the Office of Apprenticeship located in the Employment and Training Administration in the United States Department of Labor exists in the State, or a comparable program for the training of apprentices is available in the State:

1. Each submitter shall demonstrate access to the certified program or a comparable alternative (Note that it is the responsibility of the submitter to demonstrate the comparability of a non-certified program) and,
2. Each submitter's subcontractor at any tier with a contract value of two hundred fifty thousand dollars or more shall demonstrate access to the certified program or a comparable alternative.

c. Other

This category is included for other items provided by the submitter. Inclusions may include standard firm promotional literature, testimonials, awards, corporate memberships in professional organizations or sponsorships, additional project/contract histories, etc., intended to demonstrate why your firm is uniquely qualified for this project.

B. <u>ORAL INTERVIEWS/COST PROPOSALS EVALUATION CRITERIA</u>
(Note that the primary focus of the Oral Interview evaluation in addition to the Cost Proposal will be the proposed project management team members' capabilities).

1. QUALIFICATIONS OF THE FIRM

- Explain the composition and structure of your project management team and how the firm will support their efforts in the field throughout this project.
- Are the lines of authority, responsibility and coordination clearly identified?

2. QUALIFICATIONS OF THE MANAGEMENT TEAM MEMBERS

- Explain the prior experience with projects of similar scope and complexity and similar fast track project delivery methods of the superintendent and all other project management team members. Explain their roles and responsibilities and authority and why they are the right team members for this project.
- Explain anticipated project management team staff current and projected workload.

- Identify all current office locations and the resident expertise intended to be provided under this RFP. Identify the location of the staff for the performance of this contract, their expertise, and generic equipment that will be located in Colorado and act in

support of the anticipated contract.

3. PROJECT MANAGEMENT APPROACH

- Explain the strategic project approach for this project in summary: Include discussion of your team's approach in providing successful CM/GC services based on the needs of this specific project utilizing the team's prior past experience including cost, schedule, and quality control.
- Explain the construction work the project management team has the capability to competitively bid and self-perform including qualifications to do such work.
- Provide a detailed description of how your project management team will select qualified sub-contractors and manage them effectively on this project.

4. PRIOR PROJECT EXPERIENCE/SUCCESS

- Explain the most relevant projects the superintendent and the team members have completed together and/or separately and what their role was. *UNIVERSITY OF COLORAD* | *ANSCHUTZ MEDICAL CAMPUS* at its discretion contact references and/or conduct independent performance analysis on projects on which the team member has worked).
- Provide descriptions of other related experience of superintendent and other project management team members.

5. MISCELLANEOUS CONSIDERATIONS

- Craft Labor Capabilities
  Describe the availability of resources that will be utilized to successfully complete the project.
- Apprenticeship Training Program (Mandatory for Step II)
  Describe access to federal or state-approved apprenticeship programs, as available.
- Other
  This category is included for other items provided by the presenter. Inclusions may include testimonials, awards, corporate memberships in professional organizations or sponsorships, additional project/contract histories, etc., intended to demonstrate why this management team is uniquely qualified for this project.

V. CM/GC CONTRACT INFORMATION

A. Carefully review the CM/GC Contract sample (Appendix B) before initiating your response submittal. Any exceptions to the contract must be communicated formally in accordance with the written questions schedule in II.A.

B. Appendix C of this RFP is the Certification and Affidavit Regarding Illegal Immigrants, a mandatory portion of the contract agreement.

C. Appendix E and F of this RFP includes mandatory State apprenticeship and prevailing wage requirements based on the construction value of the project.

D. The State reserves the right to make non-material changes to the appended model agreement, including additions and /or modifications that may be necessary to more completely describe the services defined or implied herein.

E. Any approved reimbursable expenses made under the terms of the final agreement shall be a direct pass-on cost with no adjustment to the fee described therein.

F. Any and all products, systems, methods, and procedures developed, as a result of this agreement shall remain the exclusive property of the State.

VI. ACKNOWLEDGEMENT AND ATTESTATION FORM

A. Several versions of the Acknowledgment and Attestation Form follow this section. Proper completion of the appropriate form is a mandatory requirement for a respondent to be considered responsive to this RFP Prequalification Submittal.

B. Qualifications made by a respondent in executing this form may render a submittal non-responsive as determined by the State.

VII. COST PROPOSAL FORM

A. Immediately following the Acknowledgement and Attestation Form is a Cost Proposal Form to be utilized to summarize the fee proposal for the services. Only those firms short-listed will be required to submit fee proposals as directed by *UNIVERSITY OF COLORAD | ANSCHUTZ MEDICAL CAMPUS.*

B. This RFP document, it's appendices, and any written addenda issued prior to the submittal of proposals, and written clarifications prior to the interview shall serve as the only basis for proposals.

C. The respondent, by submitting this proposal, does hereby accept that minor changes by the State to the exhibited contract and its exhibits, which do not adversely affect the respondent, shall not be cause for withdrawal or modification of the amounts submitted herein. Exceptions to the RFP documents and/or modification of the proposal may render the proposal non-responsive.

D. Upon due consideration and review of this document along with its appendices, written addenda, and written clarifications prior to the interview, the respondent does hereby submit the following proposal for Construction Management/General Contracting fees, consistent with the schedules provided in the Scope of Services. Respondents are hereby advised that it is the State's desire to accelerate design and construction schedules where reasonably possible, without adverse cost impact.

E. Respondent should complete the Cost Proposal Form by filling in all blanks on the form that follows.

F. Respondents should include a separate detailed not-to-exceed reimbursable estimate

End of RFP

ACKNOWLEDGEMENT AND ATTESTATION FORM
(Partnership Format)

Date: _____

Page 1 of 1

By responding to this RFP, the respondent(s) certify that he/she has reviewed the Construction Management/General Contracting sample contract, and its exhibits contained herein, and is familiar with their terms and conditions and finds them expressly workable without change or modification.

We certify and declare that the foregoing is true and correct.

Subscribed on _____ at _____
Date City

_____, State of _____
County State

1) _____
Partner Signature

Typed Name: _____

2) _____
Partner Signature

Typed Name: _____

Notary: _____ _____
Date

Commission Expires: _____

Note: Add additional signatures if there are more than two partners.

ACKNOWLEDGEMENT AND ATTESTATION FORM
(Joint Venture Format)

Date: _____

Page 1 of 1

By responding to this RFP, the respondent(s) certify that he/she has reviewed the Construction Manager/General Contractor sample contract, and its exhibits contained herein, and is familiar with their terms and conditions and finds them expressly workable without change or modification.

We certify and declare that the foregoing is true and correct.

Subscribed on _____ (Date) at _____ (City),

_____ (County), State of _____ (State).

1) _____ (Venture Partner) _____ (Binding Signature) _____ (Date)

_____ (Type of Business) Typed Name: _____

Title: _____

_____ (Witness) _____ (Date)

Typed Name: _____

2) _____

_____ (Venture Partner) _____ (Binding Signature) _____ (Date)

_____ (Type of Business) Typed Name: _____

Title: _____

_____ (Witness) _____ (Date)

Typed Name: _____

Note:

1. Add additional venture partners as necessary.
2. Witnesses of venture partners shall be corporate secretary for corporations, partners for partnerships, and notaries for sole proprietorships.
3. Attach venture agreement
4. Type of business shall identify the venture partner as a corporation, venture, partnership, sole proprietorship, or other legal entity.

ACKNOWLEDGEMENT AND ATTESTATION FORM
(CORPORATE FORMAT)

Date: _____

Page 1 of 1

By responding to this RFP, the respondent(s) certify that he/she has reviewed the Construction Management/General Contracting sample contract, and its exhibits contained herein, and is familiar with their terms and conditions and finds them expressly workable without change or modification.

We certify and declare that the foregoing is true and correct.

Subscribed on _____ (Date) at _____ (City),

_____ (County), State of _____.

(State)

_____ _____

Corporate Officer Signature (Date)

_____ _____

Secretary (Date)

Note: Use full corporate name and attach corporate seal here.

(SEAL)

ACKNOWLEDGEMENT AND ATTESTATION FORM
(Sole Proprietorship Format)

Date: _____

Page 1 of 1

By responding to this RFP, the respondent(s) certify that he/she has reviewed the Construction Management/General Contracting sample contract, and its exhibits contained herein, and is familiar with their terms and conditions and finds them expressly workable without change or modification.

We certify and declare that the foregoing is true and correct.

Subscribed on _____ (Date) at _____ (City),

_____ (County), State of _____ (State).

_____ _____
Respondent Date

Typed Name: _____

Notary: _____ _____
Date

Commission Expires: _____

COST PROPOSAL FORM
CONSTRUCTION MANAGER/GENERAL CONTRACTING (CM/GC) SERVICES

Date:_____

_____
Project Title

1. CM/GC Preconstuction Fee
$ _____

2. CM/GC Construction Fee
$ _____

3. General Conditions On-Site CM/GC Staff $ _____

4. Other Reimbursable General Conditions (NTE)
$_____

Total CM/GC Fee $ _____

Fees are to be calculated per Exhibit A (SC-6.5), CM/GC Designated Services and Method of Payment.

Please provide a detailed breakdown to adequately describe the CM/GC staff provided, term of their services, and associated anticipated reimbursable costs so as to demonstrate as complete an understanding as possible of the services provided.

Reimbursable general condition expenses are generally confined to the on-site CM/GC construction phase staff reimbursed at direct personnel expense, plus those on-site materials, equipment and facilities to support the work of the CM/GC staff and construction subcontractors.

Acknowledge receipt of Addendum Nos. _____

Anticipates Services outside the United States or Colorado* ☐ Yes ☐ No

If the respondent anticipates services under the contract or any subcontracts will be performed outside the United States or Colorado, the respondent shall provide in a written statement which must include, but need not be limited to the type of services that will be performed at a location outside the United States or Colorado and the reason why it is necessary or advantageous to go outside the United States or Colorado to perform such services. (Does not apply to any project that receives federal moneys)

Will comply with 80% Colorado Labor ☐ Yes ☐ No

For State Public Works Project per C.R.S 8-17-10, Colorado labor shall be employed to perform at least 80% of the work. “Colorado Labor” means any person who is a resident of the state of Colorado at the time of the Public Works project. Respondents indicating that their bid proposal will not comply with the 80% Colorado Labor requirement are required to submit written justification along with the bid submission. A governmental body that allows a waiver shall post notice and justification for the waiver on its web site. (Does not apply to any project that receives federal moneys)

Bidder is a Service-Disabled Veteran Owned Small Business* ☐ Yes ☐ No

A Service-Disabled Veteran Owned Small Business (SDVOSB) per C.R.S. 24-103-905, means a business that is incorporated or organized in Colorado or maintains a place of business or has an office in Colorado and is officially registered and verified by the Center for Veteran Enterprise within the U.S. Department of Veteran Affairs. Attach proof of certification along with the proposal submission.

**Does not apply to projects for Institutions of Higher Education that have opted out of the State Procurement Code.*

`

Applicant or Corporate Officer Signature

Title

Appendix A

STATE BUILDINGS PROGRAM
PREQUALIFICATION SUBMITTAL/EVALUATION FORM
CONSTRUCTION MANAGEMENT/GENERAL CONTRACTING (CM/GC) SERVICES

Name of Firm:_____
Name of Project:_____
Evaluator No:_____ Date: _____

RFP REFERENCE
MINIMUM REQUIREMENTS Y_____N _____

If the minimum requirements (including letter from surety) have not been met, specify the reason(s):

_____
_____

Acknowledgement and Attestation included: Y_____N _____

SCORE

	Weight[2]	x	Rating[3]	=	Score
1. QUALIFICATIONS OF THE FIRM(s)[1]					
▫ Qualifications of the firm	5	x		=	
▫ Organizational structure/lines of authority	2	x		=	
▫ Subcontractor selection and management	4	x		=	
▫ Colorado workforce	1	x		=	
▫ Safety/employee support	5	x		=	
2. QUALIFICATIONS OF THE MANAGEMENT TEAM MEMBERS[1]					
▫ Qualifications and relevant experience of superintendent	5	x		=	
▫ Qualifications and relevant experience of in-house staff	4	x		=	
▫ Location/Access	1	x		=	
3. PROJECT MANAGEMENT APPROACH[1]					
▫ Approach to successful CM/GC Services					
a. Cost effectiveness	5	x		=	
b. Schedule effectiveness	4	x		=	
c. Quality effectiveness	5	x		=	
▫ Competitively Bid/Self Performed Work	2	x		=	

4. PRIOR PROJECT EXPERIENCE/SUCCESS[1]

- ☐ Project #1 — 5 x _____ = _____
  - a. Timeliness
  - b. Budget Considerations
  - c. Quality
  - d. Disruption
  - e. Acceptability
  - f. Compliance
- ☐ Project #2 — 5 x _____ = _____
  - a. Timeliness
  - b. Budget Considerations
  - c. Quality
  - d. Disruption
  - e. Acceptability
  - f. Compliance
- ☐ Project #3 — 5 x _____ = _____
  - a. Timeliness
  - b. Budget Considerations
  - c. Quality
  - d. Disruption
  - e. Acceptability
  - f. Compliance
- ☐ Project #4 — 5 x _____ = _____
  - a. Timeliness
  - b. Budget Considerations
  - c. Quality
  - d. Disruption
  - e. Acceptability
  - f. Compliance
- ☐ Related experience of the firm — 3 x _____ = _____

5. MISCELLANEOUS[1]

- ☐ Claims/litigation history — 1 x _____ = _____
- ☐ Apprenticeship Training Program — 2 x _____ = _____

TOTAL SCORE: _____[4]

NOTES:

1. **Criteria**: Agencies/Institutions are encouraged to include additional criteria that reflect unique characteristics of the project under each category to help determine the submitter's overall qualifications.
2. **Weights**: Agency/Institutions to assign weights, using whole numbers, to all criteria on evaluation forms for inclusion into RFQ document and prior to evaluations.
3. **Ratings**: Evaluator to assess the strength of each firms qualifications and assign a numerical rating of 1 to 5 with 5 being the highest rating. (Use whole numbers)
4. **Total Score**: Includes the sum of all criteria. Note: a passing score (as a percentage of the total points available) is optional and should be assigned by the agency/institution prior to evaluation.

Appendix A1

STATE BUILDINGS PROGRAM
ORAL INTERVIEWS/COST PROPOSALS EVALUATION FORM
CONSTRUCTION MANAGEMENT/GENERAL CONTRACTING (CM/GC) SERVICES

Name of Firm:_____
Name of Project:_____
Evaluator No:_____ Date:_____

SCORE

	Weight[2]	x	Rating[3]	= Score
1. QUALIFICATIONS OF THE TEAM[1]	25	x	_____	= _____
2. QUALIFICATIONS OF THE MANAGEMENT TEAM MEMBERS	15	x	_____	= _____
3. PROJECT MANAGEMENT APPROACH[1]	25	x	_____	= _____
4. PRIOR PROJECT EXPERIENCE/SUCCESS[1]	20	x	_____	= _____
5. MISCELLANEOUS[1]				
▫ Craft Labor Capabilities	5	x	_____	= _____
▫ Apprenticeship Training Program	5	x	_____	= _____
▫ Overall presentation	5	x	_____	= _____

TOTAL SCORE: _____[4]

NOTES:

1. **Criteria**: Agencies/Institutions are encouraged to include additional criteria that reflect unique characteristics of the project under each category to help determine the submitter's overall qualifications.
2. **Weights**: Agency/Institutions to assign weights, using whole numbers, to all criteria on evaluation forms for inclusion into RFQ document and prior to evaluations.
3. **Ratings**: Evaluator to assess the strength of each firms qualifications and assign a numerical rating of 1 to 5 with 5 being the highest rating. (Use whole numbers)
4. **Total Score**: Includes the sum of all criteria. Note: a passing score (as a percentage of the total points available) is optional and should be assigned by the agency/institution prior to evaluation.

Appendix A2

STATE BUILDINGS PROGRAM
SUBMITTAL AND ORAL INTERVIEW RANKING MATRIX

QUALIFICATIONS 60%/FEE 40%

FIRM	QUALIFICATIONS[1]						AVERAGE QUALS[2]	QUALS SCORE[3]	FEE SCORE[4]	QUALS & FEE SCORE[5]	RANK[6]
	EVAL #1	EVAL #2	EVAL #3	EVAL #4	EVAL #5	EVAL #6					

NOTES:

1. Insert total score from each evaluator's PREQUALIFICATION SUBMITTAL or ORAL INTERVIEW/ COST PROPOSALS/EVALUATION FORMS. (Note that the use of the Matrix for the PREQUALIFICATION SUBMITTAL EVALUATION does not consider cost proposals only qualifications). DO NOT combine the scores of the two evaluation forms.

2. Add all evaluators' total scores and divide by the number of evaluators to determine the average score for each firm's qualifications.

3. The highest score for qualifications on the evaluation form is to receive 60 points and the other team scores are to be determined as a percentage of the 60 points. To score each average qualification score, use the example formula.

   Assume the highest score is 60.

   SCORING OF QUALIFICATIONS

   FIRM A: $\frac{600}{600} \times 60 \text{ points} = 60 \text{ points}$

   FIRM B: $\frac{500}{600} \times 60 \text{ points} = 50 \text{ points}$

   FIRM C: $\frac{400}{600} \times 60 \text{ points} = 40 \text{ points}$

4. Determine score for each firm's sealed cost proposal with the lowest fee being equivalent to a score of 40 points. To score each fee, use the example formula.

   Assume the lowest fee was $100,000.

   SCORING OF FEES

   FIRM A: $\frac{\$100,000}{\$100,000} \times 40 \text{ points} = 30 \text{ points}$

   FIRM B: $\frac{\$100,000}{\$125,000} \times 40 \text{ points} = 32 \text{ points}$

   FIRM C: $\frac{\$100,000}{\$150,000} \times 40 \text{ points} = 27 \text{ points}$

5. Add the average qualification score to the fee score to determine cumulative qualifications and fee score.

6. Numerically rank all firms with the highest scoring firm being the most qualified.

Appendix B

CONSTRUCTION MANAGER/GENERAL CONTRACTOR (CM/GC) AGREEMENT
(FORM SC-6.51)
(Sample)

HTTPS://DOCS.GOOGLE.COM/DOCUMENT/D/1JOCVBRQIV3WPELMSAXFIHP1SJZLIQUBU/EDIT?USP=SHARING&OUID=113697161025769927384&RTPOF=TRUE&SD=TRUE

Appendix C

CERTIFICATION AND AFFIDAVIT REGARDING Unauthorized Immigrants (Form UI-1)

https://docs.google.com/document/d/0ByG39KP3LPlCQlNOeUxSV2JmN1k/edit?usp=sharing&ouid=113697161025769927384&resourcekey=0-oyYb-0jV7ZJ210ewmIqWCg&rtpof=true&sd=true

Appendix D

DIRECT LABOR BURDEN (SBP-6.18)

https://docs.google.com/document/d/1dZ6w4PSvNQUAeDbOvY9ZZyFWKE2oN4lw/edit?usp=sharing&ouid=113697161025769927384&rtpof=true&sd=true

Appendix E

APPLICABLE PREVAILING WAGE RATES

TO BE VERIFIED BY CONTRACTOR THROUGH OFFICE OF STATE ARCHITECT

https://drive.google.com/file/d/1H1Jjs388YUX1GxgtXl-eD_XtmT1-Ntyh/view?usp=sharing

Appendix G

CONSTRUCTION DOCUMENTS

See Facilities Web Site for Construction Documents

http://www.ucdenver.edu/about/departments/FacilitiesManagement/FacilitiesProjects/RFP/Pages/RFP.aspx

Appendix H

CM/GC Exhibit A – Designed Service and Method of Payment

CONSTRUCTION MANAGER/GENERAL CONTRACTOR AGREEMENT
CMGC *STANDARD FORMAT*
(STATE FORM SC-6.4)

EXHIBIT A

CMGC DESIGNATED SERVICES AND METHOD OF PAYMENT

Exhibit A
Designated Services and Method of Payment
Clarifications

Exhibit A, Designated Services and Method of Payment, requests the CM/GC to include the following items in their estimates for the general conditions. This additional information/clarification is intended to augment the descriptions and requirements included within the actual matrix. Wherever the matrix includes more specific information or this document conflicts with the requirements noted in the matrix, the requirements included in the matrix govern.

1. A/E Trailer – (Temporary Facilities) - Will not be required.
2. Construction Manager's Payment & Performance Bonds – (Insurance and Bonds) - Base upon preliminary budget, will be adjusted if necessary.
3. General Liability, Automobile, Product Liability, and Excess Liability Insurance – (Insurance and Bonds) - Base upon preliminary budget, will be adjusted as necessary.
4. Builder's Risk Insurance – (Insurance and Bonds) - Base upon preliminary budget, will be adjusted as necessary. Costs begin when the construction starts.
5. Construction (Site) Fencing – (Temporary Facilities) - Assume fencing the entire site for the duration of the construction period.
6. Handrails & Toe Boards – (Temporary Facilities) - Provide allowance based on what would be reasonable for a project of this type and schedule.
7. Opening Protection – (Temporary Facilities) - Provide allowance based on what would be reasonable for a project of this type and schedule.
8. Temporary Stairs – (Temporary Facilities) - Provide allowance based on what would be reasonable for a project of this type and schedule.
9. Temporary Power Service – (On-Site Utilities and Services) - Provide allowance based on what would be reasonable for a project of this type and schedule.
10. Temporary Heating – (Temporary Heating) – The Temporary Heating Phase of Exhibit A contains and allocates many elements of anticipated reimbursable general conditions and direct costs. Provide appropriate allowances for these elements of reimbursable general conditions costs based upon what would be reasonable for a project of this type and schedule.
11. Field Inspector and trailer – (Quality Control) – The Quality Control Phase of Exhibit A contains and allocates many elements of anticipated reimbursable general conditions and direct costs. If the CM/GC submitting the proposal feels they will require Field Inspectors as part of their staff for managing the project, the appropriate costs should be reflected in the DPE for staff and reimbursable general condition expenses for transportation, office, and equipment. Please note and include as appropriate the other elements of general conditions cost included in Exhibit A's Quality Control Phase, project photographs, operator on-site training, and prepare operation/maintenance manuals.

Designated Services and Method of Payment

CONSTRUCTION MANAGEMENT SERVICES	REQUIRED OF CM/GC				REQUIRED OF ARCH	REQUIRED OF OWNER
PHASE: PRECONSTRUCTION	**PRE-CONST SVCS FEE**	**CONST SVCS FEE**	**GEN CONDS.**	**DIRECT COST OF WORK**		
ARCHITECTURAL SELECTION						X
STRUCTURAL, MECHANICAL AND ELECTRICAL (CONSULTANT)					1	2
SPECIAL CONSULTANT SELECTION						X
SURVEYOR SELECTION						X
SITE SELECTION RECOMMENDATIONS					2	1
REVIEW DESIGN CONCEPTS	X					
DEVELOP BID PACKAGES/SUB-CONTRACTING STRATEGY	1				2	
SITE USE RECOMMENDATIONS	2				1	
MATERIAL SELECTION RECOMMENDATIONS	2				1	
BUILDINGS SYSTEMS RECOMMENDATONS	2				1	
BUILDING EQUIPMENT RECOMMENDATIONS (MOVEABLE)	2				2	1
BUILDING EQUIPMENT RECOMMENDATIONS (FIXED)	2	2			1	
CONSTRUCTION FEASIBILITY RECOMMENDATIONS	X					
PROJECT MASTER SCHEDULING	X					
BID PACKAGE RECOMMENDATIONS	1				2	
LIFE CYCLE COSTING ANALYSIS	2				1	
INFORMAL AND FORMAL VALUE ENGINEERING	X					
ENERGY USE ANALYSIS AND RECOMMENDATIONS	2				1	
PRELIMINARY TOTAL COST FEASIBILITY REVIEW	X					
LABOR AVAILABILITY REVIEW (SUBCONTRACTORS)	X					
MATERIAL EQUIPMENT AND CONTRACTOR AVAILABILITY	X					

Responsibility: x = Total 1 = Primary 2 = Secondary

Designated Services and Method of Payment

CONSTRUCTION MANAGEMENT SERVICES	REQUIRED OF CM/GC				REQUIRED OF ARCH	REQUIRED OF OWNER
PHASE: PROJECT BUDGETING AND COST CONTROL	**PRE-CONST SVCS FEE**	**CONST SVCS FEE**	**GEN CONDS.**	**DIRECT COST OF WORK**		
TOTAL PROJECT COST BUDGET						X
CONSTRUCTION COST BUDGET	X					
CONSTRUCTION COST BUDGET ESTIMATES	X					
PRELIMINARY COST MODEL	X					
SCHEMATIC DESIGN PHASE ESTIMATES	X					
DESIGN DEVELOPMENT PHASE ESTIMATES	X					
BID PACKAGE/SUBCONTRACT ESTIMATES	X					
CASH FLOW PROJECTIONS	X					
PHASE FUNDING MODELING	X					
MATERIAL SURVEYS	X					
TRADE CONTRACTOR ESTIMATES	X					
CHANGE ORDER ESTIMATES			X			
SET-UP COST ACCOUNTING			X			
SET-UP REPORTING METHODS			X			
SET-UP PAYMENT PROCEDURES			2			1
SET-UP CHANGE ORDER PROCEDURES			1		2	1
CONTINUAL PROJECT COST MONITORING			1		2	1

Responsibility: x = Total 1 = Primary 2 = Secondary

Designated Services and Method of Payment

CONSTRUCTION MANAGEMENT SERVICES	REQUIRED OF CM/GC				REQUIRED OF ARCH	REQUIRED OF OWNER
PHASE: SUB-CONTRACTING SELECTION AND PURCHASING	**PRE-CONST SVCS FEE**	**CONST SVCS FEE**	**GEN CONDS.**	**DIRECT COST OF WORK**		
SET PRE-QUALIFICATION CRITERIA	X					
RECOMMEND CONTRACTOR SELECTION METHODS	X					
RECOMMEND CONTRACTOR AWARD SELECTION METHODS	X					
DEVELOP CONTRACTOR INTEREST	X					
PREPARE BIDDING SCHEDULES	X					
CONDUCT PRE-BID CONFERENCE AND ISSUE PLANS	X					
RECEIVE BIDS	X					
ANALYZE BIDS	X					
RECOMMEND AWARD	1				2	
VERIFY UNIT COSTS	X					
NEGOTIATE UNION RATES AND MANPOWER COSTS REQUIRED		X				
CONDUCT PRE-AWARD CONFERENCE			X			
PREPARE CONTRACTS	X					
SUPPLIER AND SUBCONTRACTOR REVIEW	X					
ORIGINATE RFI'S AFTER SCREENING			X			
PREPARE CHANGE ORDERS			2		1	
VERIFY CORRECTNESS OF QUANTITIES AND PRICES OF CHANGE ORDERS			1		2	
COORDINATE OWNER-SUPPLIED FIXED EQUIPMENT			2		1	1

Responsibility: x = Total 1 = Primary 2 = Secondary

Designated Services and Method of Payment

CONSTRUCTION MANAGEMENT SERVICES	REQUIRED OF CM/GC				REQUIRED OF ARCH	REQUIRED OF OWNER
PHASE: CONTRACT DOCUMENTS COORDINATION	**PRE-CONST SVCS FEE**	**CONST SVCS FEE**	**GEN CONDS.**	**DIRECT COST OF WORK**		
FEASIBILITY REVIEW AND RECOMMENDATIONS	X					
CONSTRUCTIBILITY REVIEW AND RECOMMENDATIONS	X					
SUBCONTRACTOR WORK SCOPING	X					
RESPONSIBILITY FOR: SAFETY PRECAUTIONS			X			
SAFETY PROGRAMS			X			
TEMPORARY FACILITIES			X			
COMMON USE EQUIPMENT			X			
COMMON USE SERVICES			X			
REVIEW FOR: JURISDICTIONAL OVERLAP	X					
INCLUSION OF ALL WORK	X					
PHASE CONSTRUCTION COORD.	X					
IDENTIFY LONG LEAD ITEMS	X					
OBTAIN AGENCY APPROVALS					2	1
ASSIST IN OBTAINING PERMITS (AS NEEDED)			X			

Responsibility: x = Total 1 = Primary 2 = Secondary

Designated Services and Method of Payment

CONSTRUCTION MANAGEMENT SERVICES	REQUIRED OF CM/GC				REQUIRED OF ARCH	REQUIRED OF OWNER
PHASE: CONSTRUCTION PHASE STAFF	PRE-CONST SVCS FEE	CONST SVCS FEE	GEN CONDS.	DIRECT COST OF WORK		
PROJECT MANAGER (AS REQUIRED)			X			
PROJECT SUPERINTENDENT (AS REQUIRED)			X			
ASSISTANT PROJECT SUPERINTENDENT			X			
MECHANICAL COORDINATOR (AS REQUIRED)			X			
ELECTRICAL COORDINATOR (AS REQUIRED)			X			
OFFICE ENGINEER (AS REQUIRED)			X			
ENGINEERING AND LAYOUT (AS REQUIRED)				X		
FIELD ENGINEER-LINE AND GRADE (AS REQUIRED)				X		
DRAWING CHECKER (AS REQUIRED)			X			
TIME KEEPER/CHECKER (AS REQUIRED)			X			
SCHEDULING ENGINEER (AS REQUIRED)			X			
PROJECT COORDINATOR			X			
COST ENGINEER (AS REQUIRED)			X			
CLERK-TYPIST (AS REQUIRED)			X			
RODMAN AND HELPERS (AS REQUIRED)				X		
SAFETY ENGINEER (AS REQUIRED)			X			

Responsibility: x = Total 1 = Primary 2 = Secondary

Designated Services and Method of Payment

CONSTRUCTION MANAGEMENT SERVICES	REQUIRED OF CM/GC				REQUIRED OF ARCH	REQUIRED OF OWNER
PHASE: TRAVEL AND LODGING	**PRE-CONST SVCS FEE**	**CONST SVCS FEE**	**GEN CONDS.**	**DIRECT COST OF WORK**		
STAFF TRAVEL COST		X				
STAFF TRANSPORTATION		X				
PROJECT STAFF MOVING EXPENSES		X				
PROJECT STAFF SUBSISTENCE COSTS			X			
PHASE: TEMPORARY FACILITIES						
SAFETY EQUIPMENT AND FIRST AID SUPPLIES			X			
HANDRAILS AND TOE BOARDS			X			
OPENING PROTECTION			X			
FIRE EXTINGUISHERS			X			
WATCHMAN SERVICE				X		
OFFICE OR TRAILER RENTAL			X			
WATERBOY CUPS			X			
TEMPORARY STAIRS			X			
PROJECT SIGNS			X			
BULLETIN BOARDS			X			
CONSTRUCTION FENCING			X			
BARRICADES AND COVERED WALKWAYS (AS REQUIRED)				X		
SAFETY NETS (AS REQUIRED)				X		
A/E TEMPORARY OFFICE			X			
TEMPORARY TOILETS			X			

Responsibility: x = Total 1 = Primary 2 = Secondary

Designated Services and Method of Payment

CONSTRUCTION MANAGEMENT SERVICES	REQUIRED OF CM/GC				REQUIRED OF ARCH	REQUIRED OF OWNER
PHASE: ON-SITE UTILITIES AND SERVICES	PRE-CONST SVCS FEE	CONST SVCS FEE	GEN CONDS.	DIRECT COST OF WORK		
TEMPORARY TELEPHONE INSTALLATION AND EXPENSE (INCLUDING LOCAL A/E)			X			
TEMPORARY POWER SERVICE			X			
POWER SERVICE			X			
TEMPORARY WATER AND HEATING			X			
HEATING ENERGY CHARGES				X		
TEMPORARY WIRING				X		
LIGHT BULBS				X		
DAILY CLEAN-UP			1	2		
WEEKLY TRASH-REMOVAL			1	2		
FINAL CLEAN-UP			1	2		
DUMP PERMITS AND FEES				X		
DEBRIS HAULING/REMOVAL				X		
FLAGMAN/TRAFFIC CONTROL (AS REQUIRED)				X		
FUELS FOR INITIAL TANK FILLING				X		
TEMPORARY ROADS				X		
ROADWAY MAINTENANCE				X		
DUST CONTROLS				X		
TEMPORARY EROSION CONTROL				X		
TEMP. WATER /SEWER EXPENSE & WATER EXPENSES - SITE GRADING & COMPACTION				X		
TWO-WAY RADIO EQUIPMENT (AS REQUIRED)			X			
TRASH CHUTE AND HOPPERS (AS REQUIRED)				X		

Responsibility: x = Total 1 = Primary 2 = Secondary

Designated Services and Method of Payment

CONSTRUCTION MANAGEMENT SERVICES	REQUIRED OF CM/GC				REQUIRED OF ARCH	REQUIRED OF OWNER
PHASE: ON-SITE EQUIPMENT	**PRE-CONST SVCS FEE**	**CONST SVCS FEE**	**GEN CONDS.**	**DIRECT COST OF WORK**		
AUTOMOBILE AND FUEL (AS REQUIRED)			X			
PICK-UP TRUCK AND FUEL (AS REQUIRED)			X			
FLATBED TRUCK AND FUEL (AS REQUIRED)			X			
WATER TRUCK (AS REQUIRED)				X		
AIR COMPRESSOR AND FUEL (AS REQUIRED)				X		
DEWATERING EQUIPMENT AND FUEL (AS REQUIRED)				X		
TEMPORARY GENERATOR AND FUEL (AS REQUIRED)			X			
DEBRIS REMOVAL/HAULING EQUIPMENT (AS REQUIRED)				X		
SNOW REMOVAL (AS REQUIRED)			X			
TIRES AND MAINTENANCE COST (AS REQUIRED)			X			
FORKLIFT OPERATOR				X		
MATERIAL HOIST OPERATOR			X			
PERSONNEL OPERATOR			X			
FIXED CRANE OPERATOR				X		
TRAVEL CRANE OPERATOR				X		

Responsibility: x = Total 1 = Primary 2 = Secondary

Designated Services and Method of Payment

CONSTRUCTION MANAGEMENT SERVICES	REQUIRED OF CM/GC				REQUIRED OF ARCH	REQUIRED OF OWNER
PHASE: TEMPORARY HEATING	PRE-CONST SVCS FEE	CONST SVCS FEE	GEN CONDS.	DIRECT COST OF WORK		
REMOVE SNOW AND ICE (AS REQUIRED)			X			
TEMPORARY ENCLOSURES (AS REQUIRED)				X		
PIPING COST IN BUILDING (AS REQUIRED)			X			
FUEL COST FOR HEATING (AS REQUIRED)				X		
POWER COST FOR HEATING (AS REQUIRED)			X			
FURNACE RENTAL (AS REQUIRED)			X			
HEATER RENTAL (AS REQUIRED)			X			
BOILER RENTAL (AS REQUIRED)			X			
OPERATOR - TEMPORARY SYSTEMS (AS REQUIRED)			X			
OPERATION FIRE WATCH (AS REQUIRED)				X		
CLEANING COST (AS REQUIRED)				X		
MAINTENANCE COST (AS REQUIRED)				X		
EXTENDED WARRANTY COST (AS REQUIRED)				X		
FILTER CHANGE (AS REQUIRED)				X		
TEMPORARY OFFICE HEATING (AS REQUIRED)			X			
TEMP WEATHER PROECTION & HEATING FOR SUBCONTRACTORS (AS REQ'D)				X		

Responsibility: x = Total 1 = Primary 2 = Secondary

Designated Services and Method of Payment

CONSTRUCTION MANAGEMENT SERVICES	REQUIRED OF CM/GC				REQUIRED OF ARCH	REQUIRED OF OWNER
PHASE: REPRODUCTION/PRINTING AND DATA PROCESSING	**PRE-CONST SVCS FEE**	**CONST SVCS FEE**	**GEN CONDS.**	**DIRECT COST OF WORK**		
COST STUDY DOCUMENTS					X	
SYSTEMS STUDY DOCUMENTS					X	
BID PACKAGE SETS (SEE PARAGRAPH 5.1.4)				2		1
BIDDING INSTRUCTIONS	X					
CONSTRUCTION DOCUMENTS ORIGINAL					X	
POSTAGE AND EXPRESS COSTS (CM/GC ISSUES PLANS)			X			
AS-BUILT SUB-DOCUMENTS				X		
AS-BUILT DOCUMENTS			X			
ACCOUNTING FORMS		X				
FIELD REPORTING FORMS			X			
SUBCONTRACT AGREEMENT FORMS	X					
SCHEDULE REPORT FORMS			X			
ESTIMATING FORMS	X					
COST REPORTING FORMS	X					
VALUE ANALYSIS STUDIES PRINTING	X					
DATA PROCESSING (MAIN OFFICE)		X				
REFERENCE MATERIALS			X			
SHOP DRAWING PRINTING				X		
ON-SITE FAX AND COPIER			X			
DATA PROCESSING (ON-SITE)			X			
MAINTENANCE MANUALS (FROM SUBS) AND OPERATIONS MANUALS (FROM SUBS)				X		

Responsibility: x = Total 1 = Primary 2 = Secondary

Designated Services and Method of Payment

CONSTRUCTION MANAGEMENT SERVICES	REQUIRED OF CM/GC				REQUIRED OF ARCH	REQUIRED OF OWNER
PHASE: QUALITY CONTROL	**PRE-CONST SVCS FEE**	**CONST SVCS FEE**	**GEN CONDS.**	**DIRECT COST OF WORK**		
FIELD INSPECTOR (AS REQUIRED)			X			
INSPECTORS' OFFICE (AS REQUIRED)			X			
INSPECTORS' TRANSPORTATION (AS REQUIRED)			X			
INSPECTORS' EQUIPMENT (AS REQUIRED)			X			
SPECIAL INSPECTION CONSULTANTS						X
SPECIAL TESTING CONSULTANTS						X
CONCRETE SUBSTRUCTURE-OBSERVATIONS						X
CONCRETE TESTING						X
MASONRY TESTING						X
COMPACTION TESTING						X
WELDING TESTING						X
PIER INSPECTION/TESTING						X
SOILS INVESTIGATION						X
SPECIAL TESTING SERVICES (EXCEPT AS NOTED)						X
PROJECT PHOTOGRAPHS			X			
WARRANTY INSPECTIONS		1			2	
AIR AND WATER BALANCING				X		
OPERATOR ON-SITE TRAINING			X			
PREPARE OPERATION/MAINTENANCE MANUALS			2	1		

Responsibility: x = Total 1 = Primary 2 = Secondary

Designated Services and Method of Payment

CONSTRUCTION MANAGEMENT SERVICES	REQUIRED OF CM/GC				REQUIRED OF ARCH	REQUIRED OF OWNER
PHASE: PERMITS AND SPECIAL FEES	**PRE-CONST SVCS FEE**	**CONST SVCS FEE**	**GEN CONDS.**	**DIRECT COST OF WORK**		
STORAGE YARD RENTAL				X		
PARKING LOT RENTALS AND SHUTTLE EXPENSES (AS REQUIRED)				2		1
FIELD OFFICE STAFF PARKING FEES			X			
SIGN PERMITS			X			
STREET/CURB PERMIT				X		
BUILDING PERMITS						X
PLAN CHECK FEES						X
WATER SYSTEM DEV. FEE						X
SEWER USE & DRAINAGE PERMIT/DEV. FEE						X
STORM CONNECTION FEE						X
GAS AND POWER SERVICE CHARGE (PERMANENT)						X
GAS AND POWER SERVICE CHARGE (TEMPORARY)				X		
STEAM SERVICE CHARGE						X
CHILLER WATER SERVICE CHARGE						X
SPECIAL TAP FEES						X
CONTRACTORS LICENSES		X				
CONSTRUCTION EQUIPMENT LICENSES		X				
CONSTRUCTION EQUIPMENT PERMITS				X		

Responsibility: x = Total 1 = Primary 2 = Secondary

Designated Services and Method of Payment

CONSTRUCTION MANAGEMENT SERVICES	REQUIRED OF CM/GC				REQUIRED OF ARCH	REQUIRED OF OWNER
PHASE: INSURANCE AND BONDS	**PRE-CONST SVCS FEE**	**CONST SVCS FEE**	**GEN CONDS.**	**DIRECT COST OF WORK**		
BUILDERS RISK INSURANCE			X			
GENERAL LIABILITY, INCLUDING AUTOMOBILE			X			
PRODUCT LIABILITY			X			
EXCESS LIABILITY COVERAGE			X			
WORKERS COMPENSATION (FIELD OFFICE STAFF)			X			
FICA INSURANCE (FIELD OFFICE STAFF)			X			
FEDERAL UNEMPLOYMENT (FIELD OFFICE STAFF)			X			
STATE UNEMPLOYMENT (FIELD OFFICE STAFF)			X			
CONSTRUCTION MANAGER'S PAYMENT BOND			X			
CONSTRUCTION MANAGER'S PERFORMANCE BOND			X			
STATE/LOCAL BONDS				X		
* SUBCONTRACTOR BONDS				X		

Responsibility: x = Total 1 = Primary 2 = Secondary

* ONLY AS MUTUALLY AGREED UPON BETWEEN THE PRINCIPAL REPRESENTATIVE AND THE CM.

Designated Services and Method of Payment

CONSTRUCTION MANAGEMENT SERVICES	REQUIRED OF CM/GC				REQUIRED OF ARCH	REQUIRED OF OWNER
PHASE: OTHER COSTS	PRE-CONST SVCS FEE	CONST SVCS FEE	GEN CONDS.	DIRECT COST OF WORK		
CONSTRUCTION EQUIPMENT				X		
CONSTRUCTION SERVICES LABOR				X		
CONSTRUCTION MATERIALS				X		
COST OF DESIGN AND ENGINEERING						X
A/E FAST TRACK COST EXTRAS						X
PRELIMINARY SOILS INVESTIGATION						X
TITLE/DEVELOPMENT COST						X
BUILDING OPERATION AFTER MOVE-IN						X
BUILDING MAINTENANCE AFTER MOVE-IN						X
MOVING COORDINATION						X
MOVING COSTS						X
COSTS OF EMERGENCY WORK				X		
CM GENERAL OVERHEAD COST		X				
CM PROFIT MARGIN		X				
GMP FINANCIAL RESPONSIBILITIES		X				
STATE REQUIRED INSPECTIONS						X

Responsibility: x = Total 1 = Primary 2 = Secondary

Designated Services and Method of Payment

CONSTRUCTION MANAGEMENT SERVICES	REQUIRED OF CM/GC				REQUIRED OF ARCH	REQUIRED OF OWNER
PHASE: OFF-SITE SERVICES	**PRE-CONST SVCS FEE**	**CONST SVCS FEE**	**GEN CONDS.**	**DIRECT COST OF WORK**		
CORPORATE EXECUTIVES (AS REQUIRED)	X	X				
PRINCIPAL IN CHARGE (AS REQUIRED)	X	X				
PROJECT EXECUTIVE (AS REQUIRED)	X	X				
LEGAL - BASIC SERVICES (AS REQUIRED)	X	X				
ACCOUNTING (AS REQUIRED)		X				
PURCHASING (AS REQUIRED)	X					
SAFETY OFFICER (AS REQUIRED)		X				
EEO OFFICER (AS REQUIRED)	X	X				
SECRETARIAL AND CLERK-TYPIST (AS REQUIRED)	X	X				
BENEFITS AND VACATIONS FOR ABOVE	X	X				

Responsibility: x = Total 1 = Primary 2 = Secondary

Appendix I

UNIVERSITY SUPPLEMENTAL GENERAL CONDITIONS

STATE OF COLORADO
OFFICE OF THE STATE ARCHITECT
STATE BUILDINGS PROGRAM

CONSTRUCTION MANAGER/GENERAL CONTRACTOR (CM/GC) AGREEMENT
(STATE FORM SC-6.4)

EXHIBIT P

UNIVERSITY OF COLORADO DENVER | ANSCHUTZ MEDICAL CAMPUS CONSTRUCTION MANAGER/GENERAL CONTRACTOR – SUPPLEMENTARY GENERAL CONDITIONS

The Construction Manager/General Contractor Agreement shall be amended as follows:

Article 3.4.2.2 Change language to: The construction contingency for the Work shall be equal to three percent (3.0%) of the initial Guaranteed Maximum Price.

The terms University, University of Colorado, University of Colorado Denver, University of Colorado Anschutz Medical Campus, CU Denver, CU Anschutz, Principal Representative, are the interchangeable for this replacement of Article 11.

ARTICLE 11 INSURANCE - Replace Article 11 as follows:

For purposes of this supplement "Contractor" as used herein shall mean, as appropriate to the State Contract form being used, Contractor, Standing Order Contractor, Construction Manager/General Contractor, or Design/Build Entity.

The Contractor shall obtain and maintain, at its own expense and for the duration of the contract including any warranty periods under the Contract are satisfied, the insurance coverages set forth below.

By requiring such insurance, the Principal Representative shall not be deemed or construed to have assessed the risk that may be applicable to the Contractor its agents, representatives, employees or subcontractors under this contract. The insurance requirements herein for this Contract in no way limit the indemnity covenants contained in the Contract. The Principal Representative in no way warrants that the limits contained herein are sufficient to protect the Contractor from liabilities that might arise out of the performance of the work under this Contract by the Contractor, its agents, representatives, employees, or subcontractors. The Contractor shall assess its own risks and if it deems appropriate and/or prudent, maintain higher limits and/or broader coverages. The Contractor is not relieved of any liability or other obligations assumed or pursuant to the Contract by reason of its failure to obtain or maintain insurance in sufficient amounts, duration, or types.

COVERAGES AND LIMITS OF INSURANCE - - Contractor shall provide coverage with limits of liability not less than those stated below.

1. Commercial General Liability – ISO CG 0001 or equivalent. Coverage to include:

- Premises and Operations
- Explosions, Collapse and Underground Hazards
- Personal / Advertising Injury

- Products / Completed Operations
- Liability assumed under an Insured Contract (including defense costs assumed under contract)
- Independent Contractors
- Designated Construction Projects(s) General Aggregate Limit, ISO CG 2503 (1997 Edition)
- Additional Insured—Owners, Lessees or Contractors Endorsement, ISO Form 2010 (2004 Edition or equivalent)
- Additional Insured—Owners, Lessees or Contractors Endorsement (Completed Operations), ISO CG 2037 (7/2004 Edition or equivalent)
- **The policy shall be endorsed to include the following additional insured language on the Additional Insured Endorsements specified above: "The Regents of the University of Colorado, a Body Corporate, named as an additional insured with respect to liability and defense of suits arising out of the activities performed by, or on behalf of the Contractor, including completed operations".**
- Commercial General Liability Completed Operations policies must be kept in effect for up to three (3) years after completion of the project. For buildings with a construction cost greater than $99 million, the Commercial General Liability Completed Operations policies must be kept in effect for up to eight (8) years after the completion of the project.
- **An umbrella and/or excess liability policy may be used to meet the minimum liability requirements provided that the coverage is written on a "following form" basis.**

Liability Limits	General Aggregate	Products/Completed Operation Aggregate	Each Occurrence	Personal/Advertising Injury
Primary General Liability	$2,000,000	$2,000,000	$1,000,0000	$1,000,000
Umbrella or Excess Liability*	$5,000,000	$5,000,000	$5,000,000	$5,000,000

***Umbrella or Excess Liability does not apply to projects totaling $500,000 or under.**

The following exclusionary endorsements are prohibited in the CGL policy:

1. Damage to work performed by subcontract/vendor (CG 22-94 or similar);
2. Contractual liability coverage exclusion modifying or deleting the definition of an "insured contract";
3. If applicable to the work to be performed: Residential or multi-family;
4. If applicable to the work to be performed: Exterior insulation finish systems;
5. If applicable to the work to be performed: Subsidence or earth movement.

2. Automobile Liability

Bodily Injury and Property Damage for any owned, hired, and non-owned vehicles used in the performance of this contract

(This Professional Liability requirement applies only to Design/Build Entity SC-8.0 and 9.0.)

- The Contractor shall maintain Errors and Omissions Liability covering negligent acts, errors and/or omissions, including design errors of the Contractor for damage sustained by reason of or in the course of operations under this Contract. The policy/coverages shall be amended to include the following:

  Amendment of any Contractual Liability Exclusion to state: "This exclusion does not apply to any liability of others which you assume under a written contract provided such liability is caused by your negligent acts."

- In the event that any professional liability insurance required by this Contract is written on a claims-made basis, Contractor warrants that any retroactive date under the policy shall precede the effective date of this Contract; and that either continuous coverage will be maintained or an extended discovery period will be exercised for a period of three (3) years beginning at the time work under this Contract is completed.
- Policy shall contain a waiver of subrogation against The Regents of the University of Colorado, a Body Corporate.

Wrongful Act	$2,000,000
General Aggregate	$2,000,000

6. Builder's Risk/ Installation Floater

Unless otherwise provided or instructed by the Principal Representative, the Contractor shall purchase and maintain, in a company or companies lawfully authorized to do business in the jurisdiction in which the project is located, Builder's Risk Insurance in the amount of the initial contract amount as well as subsequent modifications for the entire project at the site on a replacement cost basis without optional deductibles. This coverage is required for new buildings or additions to existing buildings and for materials and equipment to be installed in existing structures.

- Covered Cause of Loss: Special Form
- Include Theft and Vandalism
- Labor costs to repair damaged work
- Shall be written for 100% of the completed value (replacement cost basis)
- Deductible maximum is $50,000.00
- Waiver of Subrogation is to apply
- The Regents of the University of Colorado, a body corporate, shall be added as **Additional Named Insured on Builders Risk**.

1. Policy must provide coverage from the time any covered property becomes the responsibility of the Contractor, and continue without interruption during construction, renovation, or installation, including any time during which the covered property is being transported to the construction installation site, or awaiting installation, whether on or off site.
2. The Policy shall be maintained, unless otherwise provided in the contract documents or otherwise agreed in writing by all persons and entities who are beneficiaries of such insurance, until final payment has been made or until no person or entity other than the Principal Representative has insurable interest in the property to be covered, whichever is later.
3. The Builder's Risk insurance shall include interests of the Principal Representative, and if applicable, affiliated or associated entities, the General Contractor,

Minimum Limits:

Bodily Injury/Property Damage (Each Accident)	$	1,000,000

3. Workers Compensation

- Statutory Benefits (Coverage A)
- Employers Liability (Coverage B)

a. Policy shall contain a waiver of subrogation in favor of the Principal Representative.

b. This requirement shall not apply when a contractor or subcontractor is exempt under Colorado Workers' Compensation Act., **AND** when such contractor or subcontractor executes the appropriate sole proprietor waiver form.

Minimum Limits:

Coverage A (Workers' Compensation)	Statutory	
Coverage B (Employers Liability)		
Each accident	$	100,000
Disease each employee	$	100,000
Disease policy limit	$	500,000

4. Contractors Pollution Liability

- Coverage shall apply to sudden and gradual pollution conditions resulting from the escape of release of smoke, vapors, fumes, acids, alkalis, toxic chemicals, liquids, or gases, natural gas, waste materials, or other irritants, contaminants, or pollutants (including asbestos). Policy shall cover the Contractor's completed operations.
- If the coverage is written on a claims-made basis, the Contractor warrants that any retroactive date applicable to coverage under the policy precedes the effective date of this Contract; and that continuous coverage will be maintained or an extended discovery period will be exercised for a period of three (3) years beginning from the time that work under this contract is completed.
- **The policy shall be endorsed to include the following as Additional Insureds: The Regents of the University of Colorado, a Body Corporate, named as an additional insured with respect to liability and defense of suits arising out of the activities performed by, or on behalf of the Construction Manager, including completed operations.**
- Endorsements CA9948 and MCS-90 are required on the Automobile Liability Coverage if the Contractor is transporting any type of hazardous materials.
- **Contractors Pollution Liability policies must be kept in effect for up to three (3) years after completion of the project.**

Minimum Limits (Projects at or under $500,000):

Per Loss	$	1,000,000
Aggregate	$	1,000,000

Minimum Limits (Projects over $500,000):

Per Loss	$	2,000,000
Aggregate	$	2,000,000

5. Professional Liability (Errors and Omissions)

subcontractors and sub-tier contractors in the project.

4. Builders' Risk Coverage shall be on a **Special** Covered Cause of Loss Form and shall include theft, vandalism, malicious mischief, collapse, false-work, temporary buildings and debris removal including demolition, increased cost of construction, architect's fees and expenses, flood (including water damage), earthquake, and if applicable, all below and above ground structures, piping, foundations including underground water and sewer mains, piling including the ground on which the structure rests and excavation, backfilling, filling, and grading. Equipment Breakdown Coverage (a.k.a. Boiler & Machinery) shall be included as required by the Contract Documents or by law, which shall specifically cover insured equipment during installation and testing (including hot testing, where applicable). Other coverages may be required if provided in contract documents.
5. The Builders' Risk shall be written for 100% of the completed value (replacement cost basis) of the work being performed. The Builders' Risk shall include the following provisions:
    a. Replacement Cost Basis - including modification of the valuation clause to cover all costs needed to repair the structure or work (including overhead and profits) and will pay based on the values figured at the time of rebuilding or repairing, not at the time of loss
    b. Modify or delete exclusion pertaining to damage to interior of building caused by an perils insured against are covered; also provide coverage for water damage

    Note, if the addition, or renovation is to an existing building, The Principal Representative requires that the Contractor provide as an option to include the existing building into the Builders' Risk Policy. The Principal Representative shall provide the replacement cost value of the existing building
6. At the option of the Principal Representative, the Principal Representative may include Soft Costs (including Loss of Use)/Delay in Opening Endorsement under the builder's risk policy. The Principal Representative agrees to provide the necessary exposure base information for quotation by the Builder's Risk carrier. The Principal Representative agrees to pay the premium associated with the Soft Costs coverage, the Principal Representative decides to purchase this coverage.
7. The Builders' Risk Policy shall specifically permit occupancy of the building during construction. Partial occupancy or use of the work shall not commence until the insurance company or companies providing insurance have consented to such partial occupancy or use. The Principal Representative and Contractor shall take reasonable steps to obtain consent of the insurance company or companies and delete any provisions with regard to restrictions within any Occupancy Clauses within the Builders' Risk Policy. The Builders' Risk Policy shall remain in force until acceptance of the project by the Principal Representative.
8. The deductible shall not exceed $50,000 and shall be the responsibility of the Contractor except for losses such as flood (not water damage), earthquake, windstorm, tsunami, volcano, etc. Losses in excess of $50,000 insured shall be adjusted in conjunction with the Principal Representative. Any insurance payments/proceeds shall be made payable to the Principal Representative subject to requirements of any applicable mortgagee clause.

    The Contractor shall pay subcontractors their just shares of insurance proceeds received by the Contractor, and by appropriate agreements, written where legally required for validity, shall require subcontractors to make payments to their sub-subcontractors in similar manner.

The Principal Representative shall have the authority to adjust and settle any losses in excess of $50,000 with insurers unless one of the parties in interest shall object in writing within five days after occurrence of loss to the Principal Representative exercise of this power. It is expressly agreed that nothing in this section shall be subject to arbitration and any references to arbitration are expressly deleted.

9. The Contractor is responsible for providing 45 days' notice of cancellation to the Principal Representative. The policy shall contain all generally applicable conditions, definitions, exclusions and endorsements related to the Project.

If the Contractor does not intend to purchase such Builder's Risk Insurance required by the Contract and with all of the coverages in the amount described above, the Contractor shall so inform the Principal Representative as stated in writing prior to commencement of the work. The Principal Representative may then affect insurance that will protect the interests of the Principal Representative, the General Contractor, Subcontractors and sub-tier contractors in the project. Coverages applying shall be the same as stated above including other coverages that may be required by the Principal Representative. The cost shall be charged to the Contractor. Coverage shall be written for 100% of the completed value of the work being performed, with a deductible not to exceed $50,000 per occurrence for most projects.

All deductibles will be assumed by the Contractor. Waiver of Subrogation is to apply against all parties named as insureds, but only to the extent the loss is covered, and Beneficial Occupancy Endorsements are to apply.

If the Principal Representative is damaged by the failure or neglect of the Contractor to purchase or maintain insurance as described above, without so notifying the Principal Representative, then the Contractor shall bear all reasonable costs properly attributable thereto.

ADDITIONAL INSURANCE REQUIREMENTS

1. All insurers must be licensed or approved to do business within the State of Colorado, and unless otherwise specified, all policies must be written on a per occurrence basis.
2. Contractor's insurance carrier should possess a minimum A.M. Best's Insurance Guide rating of A- VI.
3. On insurance policies where the Principal Representative are named as additional insureds, the Principal Representative shall be additional insureds to the full limits of liability purchased by the Contractor even if those limits of liability are in excess of those required by this Contract.
4. Contractor shall furnish the Principal Representative with certificates of insurance (ACORD form or equivalent approved by the Principal Representative) as required by this Contract. The certificates for each insurance policy are to be signed by a person authorized by that insurer to bind coverage on its behalf.

   All certificates and any required endorsements are to be received and approved by the Principal Representative before work commences.

   Each insurance policy required by this Contract must be in effect at or prior to commencement of work under this Contract and remain in effect for the duration of the project. Failure to maintain the insurance policies as required by this Contract or to provide evidence of renewal is a material breach of contract.
5. Upon request by the Principal Representative, Contractor must provide a copy of the actual insurance policy effecting coverage(s) required by the contract.
6. The Contractor's insurance coverage shall be primary insurance and non-contributory with respect to all other available resources.

.2 Statement of Policy: It is the policy of the university to maintain the community as a place of work, study, and residence free of sexual harassment or exploitation of students, faculty, staff, and administrators. Sexual harassment is prohibited on campus and in the university programs. The university is committed to taking appropriate action against any of its officials, employees or students who violate the policy prohibiting sexual harassment.

.3 Definition of Sexual Harassment: For purposes of this Policy, sexual harassment is defined as conduct which is unwelcome and consists of:

1. sexual advances; 2. requests for sexual favors; or 3. other verbal or physical conduct of a sexual nature when submission to such conduct is made either explicitly or implicitly a term or condition of an individual's employment or academic decisions affecting the individual; or when such conduct has the purpose or effect, of unreasonably interfering with an individual's work or academic performance by creating an intimidating, hostile, or offensive working or educational environment.

Conduct prohibited under this policy may occur between persons of the same sex or of different sexes and may manifest itself in different ways. For example, sexual harassment may be as undisguised as a direct solicitation of sexual favors, or arise from behavior which has the effect of creating an intimidating, hostile, or offensive educational or working environment. In this regard, the following types of acts, if pervasive and continuous, are more likely than not to be considered sexual harassment: unwelcome physical contact, sexual remarks about a person's clothing, body, or sexual relations, conversation of a sexual nature or similar jokes and stories, and the display of sexually explicit materials in the workplace or their use in the classroom without defensible educational purpose.

.4 Consequence of Sexual Offenses: The university may require the Architect/Engineer to remove from the university property any individual or individuals who violate the policy prohibiting sexual harassment.

.5 Contractor acknowledges that all Contractor employees, agents and representatives providing services to the University of Colorado Denver | Anschutz Medical Campus are responsible for complying with University policies and procedures. This includes, without limitation, policies related to professional conduct, sexual misconduct (including non-consensual sexual intercourse, non-consensual sexual contact, sexual exploitation, sexual harassment, intimate partner abuse, and stalking), and discrimination and harassment based on protected characteristic identity (including race, color, national origin, pregnancy, sex, age, disability, creed, religion, sexual orientation, gender identity, gender expression, veteran status, political affiliation, or political philosophy). Please see http://equity.ucdenver.edu/policies-procedures/.

.6 Contractor agrees that its employees, agents and representatives who engage in conduct prohibited by University policies, including related retaliation or failure to report, as determined in the University's sole discretion, will be subject to

7. The Contractor shall advise the Principal Representative in the event any general aggregate or other aggregate limits are reduced below the required per occurrence limit. At their own expense, the Contractor will reinstate the aggregate limits to comply with the minimum requirements and shall furnish to the Principal Representative a new certificate of insurance showing such coverage is in force.
8. Provide a minimum of thirty (30) days advance written notice to the Principal Representative for cancellation, non-renewal, or material changes to policies required under the Contract (45 days for builders' risk coverage.
9. Certificate Holder: The Regents of the University of Colorado, Project Management, 1945 North Wheeling Street, Campus Mail stop F-418, Aurora, CO 80045.

Failure of the Contractor to fully comply with these requirements during the term of the Contract may be considered a material breach of contract and may be cause for immediate termination of the Contract at the option of the Principal Representative. The Principal Representative reserves the right to negotiate additional specific insurance requirements at the time of the contract award.

Subcontractors
Contractor's certificate(s) shall include all subcontractors as additional insureds under its policies **or** subcontractors shall maintain separate insurance as determined by the Contractor, however, subcontractor's limits of liability shall not be less than $1,000,000 per occurrence / $2,000,000 aggregate.

Non-Waiver
The parties hereto understand and agree that The Principal Representative is relying on, and does not waive or intend to waive by any provision of this Contract, the monetary limitations or any other rights, immunities, and protections provided by the Colorado Governmental Immunity Act, et seq., as from time to time amended, or otherwise available to the Principal Representative or its officers, employees, agents, and volunteers.

Mutual Cooperation
The Principal Representative and Contractor shall cooperate with each other in the collection of any insurance proceeds which may be payable in the event of any loss, including the execution and delivery of any proof of loss or other actions required to effect recovery.

(Revised 12/09/2019)

ARTICLE 21. MISCELLANEOUS. PROVISIONS

Delete the following section except for Projects that are ARRA funded:

21.22 STATEWIDE CONTRACT MANAGEMENT SYSTEM

Add the following:

21.24 UNIVERSITY OF COLORADO DENVER | ANSCHUTZ MEDICAL CAMPUS POLICY ON SEXUAL HARASSMENT

.1 The Contractor shall vigorously pursue to the greatest extent possible, adherence to the university Policy on Sexual Harassment and also require all employees, and employees of all professional consultants of any kind, working on this project to adhere to this Policy.

disciplinary action, up to and including termination by Contractor consistent with Contractor's policies and procedures

.7 Further, as Contractor recognizes and agrees that its selection and hiring of individuals who possess expertise and professional skills to carry out Contractor's obligations in an appropriate and non-discriminatory manner that reflects positively on the University's goodwill and reputation is an essential condition to inducing the University to enter into the Agreement, Contractor agrees to remove or replace any individual whose work or performance under this Agreement is considered by the University as acting inappropriately, unprofessionally, or violating any University policy, in the University's sole discretion, including, without limitation, the aforementioned policies.

.8 Contractor acknowledges that Contractor's activities involve heightened risks as a result of access or exposure by Contractor's employees or agents to one or more security sensitive environments. Contractor expressly acknowledges that Contractor shall take all commercially reasonable measures to mitigate any such risks, which measures shall include but are not limited to conducting criminal history checks, financial background checks when appropriate, and reference checks on all employees or agents who will be performing work at the University. Upon University request, Contractor shall certify in writing that it has complied with this provision and that all employees, agents, and subcontractors performing work hereunder have satisfactorily completed Contractor's background check.

21.25 UNIVERSITY OF COLORADO DENVER | ANSCHUTZ MEDICAL CAMPUS POLICY ON SECURITY BADGING

1) All costs and time associated with obtaining a University security badge for Contractor employees working on campus shall be borne by the Contractor.

Appendix J

COVID POLICIES AND PROCEDURES

NOTICE TO STATE CONTRACTOR

VACCINATION REQUIREMENTS

NOTICE LETTER TO CONTRACTORS TEMPLATE

October 06, 2021

All Contractors Working within CU Denver/Anschutz Medical Campus Facilities

Subject: Vaccination Requirements

Dear Contractor:

On August 31, 2021, pursuant to the Sixth Amended Public Health Order 20-38, Limited COVID Restrictions, all State Contractors and State Contractor Workers who physically enter a State Facility shall comply with the Vaccination Requirements included in Section III of the Order. All State Contractors and State Contractor Workers, including individuals who have been infected with and recovered from COVID-19, shall have received their first dose in a two dose COVID-19 series no later than September 30, 2021 and be Fully Vaccinated by October 31, 2021.

On September 30, 2021 the Seventh Amended Public Health Order 20-38 (PHO or Order), allowed for State Contractor Workers to participate in twice weekly COVID-19 testing if they have an employer approved medical or religious exemption or are unvaccinated.

You are receiving this letter because your company has a contract with University of Colorado Denver/Anschutz Medical Campus and, as part of the performance of that contract, certain of your company's personnel (including any subcontractor personnel) are required to or likely will provide contracted goods or services in person and on-site. Therefore, as a contractor, your company is subject to the vaccination or testing requirements set forth in the Order.

As permitted by the Order, University of Colorado Denver/Anschutz Medical Campus State Contractors shall assume responsibility for verification of full COVID-19 vaccination, approving all exemptions for medical or religious beliefs and determining any accommodations needed for such exemptions.

State Contractors shall verify that each of the identified State Contractor Workers is Fully Vaccinated, or that each of the identified State Contractor Works that is unvaccinated or has a medical or religious exemption is participating in twice weekly COVID-19 testing.

Please be aware that the University of Colorado Denver/Anschutz Medical Campus retains the right to inquire into compliance with the Order's requirements at any time, to include requesting a State Contractor to provide proof of vaccination or a recent negative COVID-19 test.

The State of Colorado values your firm as a contract partner to deliver needed goods or services. Accordingly, we are hopeful that your company will comply with the Order and help the state reduce the spread of the virus. In the meantime, please see COVID-19 Vaccination Requirements for State Contractors FAQs.(https://dhr.colorado.gov/covid-19-vaccination- requirements-for-state-contractors)

University of Colorado Denver/Anschutz Medical Campus

SECTION 00 31 26

EXISTING HAZARDOUS MATERIAL INFORMATION

1.1 EXISTING HAZARDOUS MATERIAL INFORMATION

A. This Document with its referenced attachments is part of the Procurement and Contracting Requirements for Project. They provide Owner's information for Bidders' convenience and are intended to supplement rather than serve in lieu of Bidders' own investigations. They are made available for Bidders' convenience and information, but are not a warranty of existing conditions. This Document and its attachments are not part of the Contract Documents.

B. Report titled "Asbestos Inspection & Sampling" for CU Anschutz Medical Campus, Building 500 5th & 6th Floors Renovations; 13001 E 17th Pl. Aurora, CO; prepared by DS Environmental Consulting; inspection dated October 12, 2021; (digital file name = 23084 - Anshutz B500 5th & 6th Floors - 13001 E 17th Pl. Aurora, CO 10-12-2021 [Ai].pdf); as appended to this document.

C. Report titled "Lead-Based Paint Inspection & Testing Report" for CU Anschutz Medical Campus, Building 500 5th & 6th Floors Renovations; 13001 E 17th Pl. Aurora, CO; prepared by DS Environmental Consulting; inspection dated October 12, 2021; (digital file name = 23084 - Anshutz B500 5th & 6th Floors - 13001 E 17th Pl. Aurora, CO 10-12-2021 [Li].pdf); as appended to this document.

D. Report titled "Asbestos Survey Report" for Gitzsimons Army Medical Center, Building 500; for survey conducted May 7-30, 1996; (digital file name = B500 Abestos Survey.pdf); is available from Owner's Project Manager upon request.

E. The following report set is available from Owner's Project Manager upon request:

1. Report titled "Closeout Report For F500 Building Remodel Asbestos Abatement - Book I;" prepared by RLH Engineering Inc.; dated November 6, 2006; (digital file name = RLH F500 Remodel Closeout Report Book 1 Final.pdf).

    a. Book I includes Work Summary.

2. Report titled "Closeout Report For F500 Building Remodel Asbestos Abatement - Book III;" prepared by RLH Engineering Inc.; dated November 6, 2006; (digital file name = RLH F500 Remodel Closeout Report Book 3 Final.pdf).

    a. Book III includes Air Monitoring Data.

F. The following report set is available from Owner's Project Manager upon request:

1. Report titled"Asbestos And Lead Paint Inspection, Bldg. 500 - Hospital, Vol. I - Reports;" prepared by U.S. Army Corps of Engineers; dated March 1997; (digital file name = US Army Garrison Fitzsimons-March 97 Volume 1.pdf).
2. Report titled"Asbestos And Lead Paint Inspection, Bldg. 500 - Hospital, Vol. II - Appendix A, Lab Results, Chain Of Custody;" prepared by U.S. Army Corps of Engineers; dated March 1997; (digital file name = US Army Garrison Fitzsimons-March 97 Volume 2.pdf).
3. Report titled"Asbestos And Lead Paint Inspection, Bldg. 500 - Hospital, Vol. III - Appendix B Drawings;" prepared by U.S. Army Corps of Engineers; dated March 1997; (digital file name = US Army Garrison Fitz-March 97 Volume 3.pdf).

G. Related Requirements:

1. Document 002113 "Information to Bidders" for the Bidder's responsibilities for examination of Project site and existing conditions.
2. Section 02 41 19 "Selective Structure Demolition" for notification requirements if materials suspected of containing hazardous materials are encountered.

END OF SECTION 00 31 26

DS Environmental CONSULTING

"The trusted choice for your environmental & industrial hygiene needs."

ASBESTOS INSPECTION & SAMPLING REPORT

CU Anschutz Medical Campus, Building 500 5th & 6th Floors Renovations

13001 E 17th Pl. Aurora, CO

PRESENTED TO:	INSPECTED BY:	PROJECT DETAILS:
Chad Jelenik CU Anschutz (720) 728-9577 Chad.Jelenik@cuanschutz.edu	Mr. Andrew Fredericks DS Environmental Cell: (720) 878-1741 andrew@dsconsultinginc.com	DS Job Number: 23084 Date of Inspection: October 12, 2021

Front Range 7555 W 10th Ave
Suite A, Lakewood, CO 80214

Mountains PO Box 6864
Avon, CO 81620

Western Slope PO Box 3793
Aspen, CO 81612

Web dsconsultinginc.com

Direct (303) 286-9094

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APPENDIX A CERTIFICATIONS

APPENDIX B SAMPLE LOCATIONS & ACM HOMOGENEOUS AREAS

APPENDIX C LABORATORY REPORT

1.0 Introduction

Mr. Andrew Fredericks with DS Environmental Consulting (DS) conducted an asbestos inspection and collected bulk-samples of suspect asbestos-containing building materials from the Cancer Center areas on the 5th and 6th floors of the commercial building detailed on the cover page of this report. The purpose of the inspection was to determine if any of the materials that may be impacted by the renovation activities contain asbestos.

2.0 Limitations of Inspection

This inspection was limited in its scope and only included specific areas and materials as defined by the client. The inspection did not constitute a full-building inspection and does not fulfill the asbestos inspection requirements for structures that are to be demolished.

The table below, (*Table 1.0*), lists the suspect asbestos-containing materials included in the scope of the inspection. It identifies the specific areas that were included in the inspection as well descriptions of the suspect asbestos-containing materials in those areas that were sampled; or materials that were assumed to contain asbestos.

The suspect asbestos-containing materials listed below may be found in other areas of the building that were outside of the scope of work for this inspection and sampling. Additionally, there may be other materials in other parts of the building that contain asbestos, which were not included in the scope of this inspection and sampling.

Table 1.0	Sampled or Assumed Suspect ACM within Scope of Work

Materials in **RED** are materials that contain greater than 1% asbestos.
Materials in **BLUE** are assumed to contain >1% asbestos
Materials in **GREEN** contain 1% asbestos or less.
Materials in **BLACK** are none-detected for asbestos.

Suspect Asbestos-Containing Materials Sampled		Material Locations **See Appendix B for Sample Location Map
Homogeneous Area 1 (6-SM1)	Smooth textured drywall	· 6th floor walls
Homogeneous Area 2 (6-JC1)	Joint compound associated with 6-SM1	· 6th Floor walls
Homogeneous Area 3 (5-VCB1)	Grey 4" vinyl cove base and adhesive	· 5th floor walls
Homogeneous Area 4 (6-VCB1)	Brown 4" vinyl cove base and adhesive	· 6th floor walls
Homogeneous Area 5 (5-CT1)	2'x4' lay-in ceiling panels	· 5th floor ceiling grid
Homogeneous Area 6 (6-CT1)	2'x4' lay-in ceiling panels	· 6th floor ceiling grid

Homogeneous Area 7 (5-SUC1)	Sink undercoating	· 5th floor sinks
Homogeneous Area 8 (5-CA1)	Carpet adhesive	· 5th floor beneath carpeting
Homogeneous Area 9 (5-DS1)	Duct sealant	· 5th floor plenum ducts
Homogeneous Area 10 (5-PK1)	Duct putty	· 5th floor plenum ducts

3.0 Conclusions & Summary of Findings

	ACRONYMS	**ACM ASSESSMENT CATEGORIES**
SUMMARY OF FINDINGS	CHRY – Chrysotile ACT – Actinolite TR – Trace; Assumed >1% Asbestos ND – None-detected ACM – Asbestos Containing Material (>1% asbestos) BRL – Below Reporting Limit; Assumed >1% Asbestos	1 – damaged/significantly damaged thermal system insulation ACM 2 – damaged friable surfacing material ACM 3 – significantly damaged friable surfacing material ACM 4 – damaged or significantly damaged friable miscellaneous material ACM 5 – ACM with the potential for damage 6 – ACM with the potential for significant damage 7 – any remaining friable ACM or friable suspected ACM

Materials in **RED** are materials that contain greater than 1% asbestos.
Materials in **BLUE** are assumed to contain >1% asbestos
Materials in **GREEN** contain 1% asbestos or less.
Materials in **BLACK** are none-detected for asbestos.

Sample Information ****See Appendix B for Sample Location Map**		**Material Information**	**Asbestos Content**
HOMOGENEOUS AREA 1	Sample ID: 6-SM1-1 Sample Location: 6th Floor Conference Room Sample ID: 6-SM1-2 Sample Location: 6th Floor Office Sample ID: 6-SM1-3 Sample Location: 6th Floor Hallway Sample ID: 6-SM1-4 Sample Location: 6th Floor Hallway Sample ID: 6-SM1-5 Sample Location: 6th Floor Hallway	Description: **Smooth Textured Drywall** Classification: Surfacing Material Condition: Good Quantity: ~2,140 ft² Friability: Friable Assessment Category: No Category (Non-ACM)	ND

HOMOGENEOUS AREA 2	Sample ID: JC1-1 Sample Location: 6th Floor Conference Room Sample ID: JC1-2 Sample Location: 6th Floor Office	Description: **Joint Compound Associated w/ SM1** Classification: Miscellaneous Material Condition: Good Quantity: ~2,140 ft^2 Friability: Friable Assessment Category: No Category (Non-ACM)	ND
HOMOGENEOUS AREA 3	Sample ID: 5-VCB1-1 Sample Location: 5th Floor Corridor Sample ID: 5-VCB1-2 Sample Location: 5th Floor Corridor	Description: **Grey Vinyl Cove Base with yellow adhesive** Classification: Miscellaneous Material Condition: Good Quantity: ~500 ft^2 Friability: Non-Friable Assessment Category: No Category (Non-ACM)	ND
HOMOGENEOUS AREA 4	Sample ID: 6-VCB1-1 Sample Location: 6th Floor Conference Room Sample ID: 6-VCB1-2 Sample Location: 6th Floor Office	Description: **Brown Vinyl Cove Base with white adhesive** Classification: Miscellaneous Material Condition: Good Quantity: ~500 ft^2 Friability: Non-Friable Assessment Category: No Category (Non-ACM)	ND
HOMOGENEOUS AREA 5	Sample ID: 5-CT1-1 Sample Location: 5th Floor Corridor Ceiling Sample ID: 5-CT1-2 Sample Location: 5th Corridor Ceiling	Description: **2'x4' Lay-in Panels** Classification: Miscellaneous Material Condition: Good Quantity: ~3,250 ft^2 Friability: Friable Assessment Category: 6 Reason for Assessment: Potential for Contact: High Potential for Vibration: Low Potential for Air Erosion: Low	<0.25% ACT after point-counting

HOMOGENEOUS AREA 6	Sample ID: 6-CT1-1 Sample Location: 6th Floor Conference Room Ceiling Sample ID: 6-CT1-2 Sample Location: 6th Floor Office Ceiling	Description: **2'x4' Lay-in Panels** Classification: Miscellaneous Material Condition: Good Quantity: ~3,250 ft^2 Friability: Friable Assessment Category: No Category (Non-ACM)	ND
HOMOGENEOUS AREA 7	Sample ID: 5-SUC1-1 Sample Location: 5th Floor Corridor, sink Room Sample ID: 5-SUC1-2 Sample Location: 5th Floor Corridor, sink	Description: **Sink Undercoating** Classification: Miscellaneous Material Condition: Good Quantity: ~12 ft^2 Friability: Friable Assessment Category: No Category (Non-ACM)	ND
HOMOGENEOUS AREA 8	Sample ID: 5-CA1-1 Sample Location: 5th Floor Corridor Sample ID: 5-CA1-2 Sample Location: 6th Floor Office	Description: **Carpet Adhesive** Classification: Miscellaneous Material Condition: Good Quantity: ~3,250 ft^2 Friability: Non-Friable Assessment Category: No Category (Non-ACM)	ND
HOMOGENEOUS AREA 9	Sample ID: 5-DS1-1 Sample Location: 5th Floor Plenum, exam room Sample ID: 5-DS1-2 Sample Location: 5th Floor Plenum, exam room	Description: **Duct Sealant** Classification: Miscellaneous Material Condition: Good Quantity: ~20 ft^2 Friability: Non-Friable Assessment Category: No Category (Non-ACM)	ND
HOMOGENEOUS AREA 10	Sample ID: 5-PK1-1 Sample Location: 5th Floor Plenum, break room Sample ID: 5-PK1-2 Sample Location: 5th Floor Plenum, break room	Description: **Duct Putty** Classification: Miscellaneous Material Condition: Good Quantity: ~18 ft^2 Friability: Non-Friable Assessment Category: No Category (Non-ACM)	ND

4.0 Material Information

A *Homogeneous Area (HA)* means an area of surfacing material, thermal system insulation material, or miscellaneous material that is uniform in color and texture. The asbestos content of the bulk-samples collected within a homogeneous area can be applied to the entire homogenous area, if they conform to the above characteristics and the regulated minimum sample quantities of each type of material have been collected and analyzed. An *Asbestos Containing Material (ACM)* is a material that contains more than 1% asbestos. Any material can be assumed to be an ACM, but not the contrary.

4.1 Material Friability

A material can either be *friable* or *non-friable.* A friable material is one that, when dry, can be pulverized, or reduced to powder by hand pressure, a non-friable material cannot. A non-friable material may become friable if its condition had deteriorated or has been impacted by forces that have rendered it friable.

4.2 Material Classifications

Sampled materials are divided into one of the following three categories:

- *Surfacing Material*: sprayed or troweled onto structural building members
- *Thermal System Insulation (TSI)*: any type of pipe, boiler, tank, or duct insulation
- *Miscellaneous Material*: all other materials not classified in the above two categories

4.3 Material Conditions

Sampled materials are placed into one of the following three categories of conditions:

- *Good*: none to very little visible damage or deterioration
- *Damaged*: the surface is crumbling, blistered, water-stained, gouged, marred, or otherwise abraded over less than one-tenth of the surface if the damage is evenly distributed, or one-quarter if the damage is localized
- *Significantly Damaged*: the surface is crumbling, blistered, water-stained, gouged, marred, or otherwise abraded over greater than one-tenth of the surface if the damage is evenly distributed, or one-quarter if the damage is localized

4.4 Sample Quantities

DS collected at least the minimum number of samples from each homogeneous area necessary to meet all regulatory requirements for the quantity of material to be disturbed in the scope of work as defined by the client. The quantities listed in this report are approximate and on-site verification of the exact quantity of each material is required for permitting, estimating, and billing purposes. The following outlines the minimum sample quantities required per homogeneous area for a regulatory compliant inspection; however, in the event of a due diligence inspection, these sample minimums may not have been met:

- *Surfacing Materials*: up to 1,000 ft^2 of material requires a minimum of three (3) samples; between 1,000 ft^2 and 5,000 ft^2 of material requires a minimum of five (5) samples; over 5,000 ft^2 of material requires a minimum of seven (7) samples; one (1) sample of each patch
- *Thermal System Insulation (TSI)*: each homogeneous area requires a minimum of three (3) samples; at least one (1) sample must be collected from each patch; and collect enough samples sufficient to adequately assess the material and determine the asbestos content for TSI fittings such as pipe elbows or T's, which a minimum of two (2) samples of each

- *Miscellaneous Materials*: collect enough samples sufficient to determine the asbestos content with a minimum of two (2) samples of each

4.5 Materials Reporting "TRACE" Results

Any sample reporting a "TRACE" amount of asbestos shall be considered to contain greater than 1% asbestos unless it is further analyzed utilizing the point-count method and verified to be less than or equal to 1% asbestos content, and therefore not an ACM. TRACE does not mean it contains less than or equal to 1%.

4.6 Materials Containing 1% Asbestos or Less

Materials containing less than or equal to 1% asbestos are not regulated by the Colorado Department of Public Health and Environment (CDPHE) Regulation 8, Part B – Asbestos. However, all demolition/abatement activities should be performed following the applicable Occupational Safety and Health Administration (OSHA) regulations. This includes, but is not limited to, the appropriate asbestos training for the type of material being removed/disturbed as well as having a properly trained supervisor onsite, using wet removal methods, wearing adequate personal protective equipment (HEPA-filtered particulate respirators), medical surveillance of workers, personal-exposure air monitoring, area air monitoring in occupied buildings, etc. There may also be landfill disposal requirements for these materials, depending on the facility. DS recommends that all demolition/renovation projects involving the disturbance of any amount of asbestos be subjected to post-work visual inspections and a final clearance air testing by a CDPHE-certified Asbestos Air Monitoring Specialist (AMS) after the work has been completed, but before any containments are dismantled, the contractor demobilizes, and the area is reoccupied.

4.7 Overspray

Any surfacing material indicated in this report also includes any associated overspray of that material, e.g., under carpet, above suspended ceilings, on studs and structural members, etc.

5.0 Inspector & Firm Certifications

The inspection detailed within this report was conducted by Mr. Andrew Fredericks with DS. DS is a CDPHE certified Asbestos Consulting Firm, Registration No. 14912. Mr. Fredericks is a CDPHE certified Building Inspector; having certification number 25963 (*see Appendix A for certificates*).

6.0 Inspection, Sampling & Analytical Procedures

6.1 Inspection Procedures

The asbestos inspection detailed in this report was conducted by an Environmental Protection Agency (EPA) and CDPHE certified asbestos Building Inspector. The inspection procedures included identifying and sampling suspect ACM within the pre-defined areas that were within the scope of work, submitting samples to an accredited laboratory for analysis, classifying the materials and assessing their condition, and compiling a final report detailing the inspection and the analytical results of the bulk-samples.

6.2 Sampling Procedures

Statistically random bulk-samples representative of the suspect ACM of each homogeneous area were collected according to the guidelines published in the Environmental Protection Agency's October 1985 publication, "Asbestos in Building: Simplified Sampling Scheme for Friable Surfacing Materials", commonly known as the "Pink Book."

DS has collected the appropriate number of bulk-samples to meet all regulatory requirements for the classification and quantity of each homogeneous area. All reasonable efforts were made to identify homogeneous areas and to sample or assume suspect materials. Destructive investigation was conducted whenever feasible, and every effort was made to locate and quantify suspect ACM within the scope of work. Any material not identified and sampled in this report shall be assumed to be an ACM or shall be sampled by an EPA-trained and CDPHE-certified inspector and submitted for analysis.

6.3 Analytical Procedures

All asbestos bulk-samples were analyzed by a third party, National Voluntary Laboratory Accreditation Program (NVLAP) accredited laboratory via Polarized Light Microscopy (PLM) for asbestos content per CDPHE Regulation 8 (*see Appendix C for laboratory report*).

7.0 Recommendations

The asbestos inspection detailed in this report did identify ACM(s); therefore, professional abatement activities are required to remove or disturb the above-referenced asbestos-containing materials.

The lay-in ceiling panels comprising the 5th floor ceiling tested positive for Actinolite at trace levels (<0.25). This material is not regulated, however OSHA protections for worker safety must be followed when removing or disturbing these ceiling panels.

8.0 Asbestos Abatement & Demolition Requirements

If ACM is to be removed or disturbed in a single-family residence, and the total quantity exceeds any of the regulatory trigger levels of 50 linear ft. on pipes, 32 ft^2 on other surfaces, or the volume equivalent of a 55-gallon drum, a CDPHE-certified General Abatement Contractor (GAC) is required to perform the work. The regulatory trigger levels within a commercial building are 260 linear ft. on pipes, 160 ft^2 on other surfaces, or the volume equivalent of a 55-gallon drum. In addition, formal notification to CDPHE prior to the abatement of ACM as well as air monitoring, visual inspections, and final air clearances by a CDPHE-certified Asbestos AMS is required. DS can provide the client or building owner with a proposal for project design, abatement oversight and air monitoring upon request.

CDPHE regulations allow for the demolition of a building that contains certain non-friable asbestos-containing materials, such as caulking, tars, and mastics; however, demolition must be completed without causing the non-friable ACM to be rendered friable. Certain other non-friable materials, such as cementitious siding (Transite) and resilient floor tiles must be abated prior to demolition. DS recommends abating all ACM prior to abatement, regardless of friability. Burning a building with any ACM is prohibited. Operations such as sanding, cutting, crushing, grinding, pneumatic jacking, etc. of ACM are not permitted. Recycling of building materials such as concrete, metal, or wood that are bonded or contaminated with ACM, e.g., glue, caulking, or mastic is also prohibited. If any of the non-friable asbestos containing materials are to be recycled and rendered friable after demolition (i.e., crushing mastic-coated concrete), these materials must be abated of all ACM prior to shipping offsite for recycling.

OSHA regulations regarding occupational exposure during demolition activities is still mandatory. OSHA 29 CFR 1926.1101 requires that workers performing construction-related activities be protected from asbestos fibers more than the permissible exposure limit of 0.1 f/cc of air. Contractors must comply with applicable provisions of OSHA 29 CFR 1926.1101 during demolition and renovation activities. These OSHA provisions include, but are

not limited to, PPE and respirators, personnel training, personal-exposure air monitoring, employee medical surveillance, wet removal methods, signage for regulated areas, etc.

9.0 Major Asbestos Spills

If ACM is significantly damaged and the total quantity exceeds the regulatory trigger levels, the area is deemed a "Major Asbestos Spill." The area is consequently subject to the requirements in Reg. 8, Section III.T. –*Asbestos Spills*. Unless the entire facility is to be treated as a major asbestos spill, a Colorado-certified Air Monitoring Specialist (AMS) must determine the extent of the spill area. This may be done using visual examination, air samples, micro-vacuum dust samples, wipe samples or a combination thereof. If visible dust or debris is observed, directly related to or resulting from the known or assumed ACM which created the major asbestos spill, areas where it is observed must be included in the abatement of the spill. Samples must be collected and analyzed quantitatively by Transmission Electron Microscopy (TEM.) The General Abatement Contractor (GAC) selected to perform the cleanup of the spill must:

- Submit notification in accordance with subsection III.E. (Notifications) or subsection III.G. (Permits), whichever is applicable to the Division for approval.
- Using certified Workers and Supervisors, in accordance with Section II. (Certification Requirements), construct a containment in accordance with the requirements of the regulation.
- HEPA vacuum then steam clean all carpets, drapes upholstery and other non-clothing fabrics in the contaminated area or discard these materials in accordance with subsection III.R. (Waste Handling)
- Launder or discard all contaminated clothing in accordance with subsection III.R. (Waste Handling)
- HEPA vacuum or wet wipe with clean amended water all hard surfaces in the contaminated area.
- Discard all waste in accordance with subsection III.R. (Waste Handling)

All persons must comply with any other measures, provided in writing by the Division, which are deemed necessary to protect public health. Following completion of Sections III.T.2.d.(i) through III.T.2.e., the AMS must comply with air monitoring requirements as described in Section III.P. (Clearing Abatement Projects); air samples must be collected aggressively as described in 40 C.F.R. Part 763, Appendix A to Subpart E (EPA 2010), except that the air stream of the leaf blower must not be directed at any friable ACM that remains in the area. Gross removal of additional ACM may not be conducted under Section III.T.2. Any remaining gross removal of ACM must be abated in accordance with Section III.H. (Abatement Sequence). If additional ACM is to be removed, the final air sampling required in Section III.T.2.f. is not required to be conducted until after the additional removal is completed.

10.0 Project Design & Project Manager Requirements

DS can provide an Asbestos Abatement Project Design as well as fulfill the Colorado Asbestos Abatement Project Manager requirements for any asbestos abatement project, as applicable below.

Project Design

An abatement *Project Design* is an accurate and detailed scope of work, which includes project specifications and procedures, containment design/equipment placement, and descriptions of engineering controls and work practices for an asbestos abatement project or response action that is required by CDPHE Regulation Number 8, Part B - Asbestos (Reg. 8) on large asbestos abatement projects. Prior to the start of any asbestos abatement project in a non-school building, where the amount of asbestos-containing material (ACM) to be removed or disturbed exceeds 1,000 linear feet on pipes, or 3,000 square feet on surfaces, or in a school building in which

the amount of friable ACM to be abated exceeds 3 linear feet on pipes, or 3 square feet on surfaces, a written Project Design must be developed by a State of Colorado certified Project Designer in accordance with subsection IV.G.7 of Regulation 8. A signed copy shall be posted on-site prior to commencing any abatement activities, shall be always available on-site, and shall remain onsite until final air clearances have been completed by a State of Colorado-certified Air Monitoring Specialist (AMS).

Project Manager

A *Project Manager* shall be used on all asbestos abatement projects in which the amount of friable asbestos-containing material to be abated exceeds 1,000 linear feet on pipes, or 3,000 square feet on other surfaces per CDPHE Regulation Number 8, Part B – Section III.B.6. An asbestos Project Manager on an abatement project shall be responsible for assessing that the project is conducted in accordance with Regulation 8, assessing that the Project Design is followed, assessing that the abatement project is cleared in accordance with Regulation 8, assessing that the asbestos waste generated on the project is properly manifested and disposed of in accordance with Regulation 8, and communicating these assessments to the building owner or GAC.

The GAC shall notify the building owner during the bid process as to whether a Project Manager is required. Project Managers shall be independent of the asbestos abatement contractor and work strictly on behalf of the building owner to the extent feasible unless the abatement is being performed in-house. Project Managers must sign the original copy of the abatement permit for the permit to be valid, and before any abatement can take place.

11.0 Disclaimer & Limitations

The activities outlined in this report were conducted in a manner consistent with a level of care and expertise exercised by members of the environmental consulting and industrial hygiene profession. All activities were performed in accordance with all applicable federal, state, and local regulations as well as generally accepted standards and professional practice. No warranty is either expressed or implied. DS assumes no responsibility or liability for error in public information utilized, statements from sources other than DS, or developments resulting from situations outside the scope of work for this project.

The details provided within this report outline the inspection activities on the date(s) indicated and should not be relied upon to represent conditions later. The laboratory results contained in this report apply specifically to the materials in which bulk-samples were collected. The results do not include or apply to any other materials within the structure that were not sampled but may contain asbestos; including materials that may be hidden or inaccessible. Additional inspection and bulk-sampling activities by a certified inspector would be required to determine whether any other materials contain asbestos.

This report has been prepared on behalf of and exclusively for use by the DS's client, with specific application to their project as discussed in the scope of work. The information contained in this report is intended as supplementary material for abatement design and is not to be used as the sole means to develop the scope of abatement activities, bidding, or billing purposes. Contractors or consultants reviewing this report must draw their own conclusions regarding further investigation or remediation deemed necessary. DS can provide a full scope of work for abatement upon request. DS does not warrant the work of regulatory agencies, laboratories or other third parties supplying information which may have been used in the preparation of this report.

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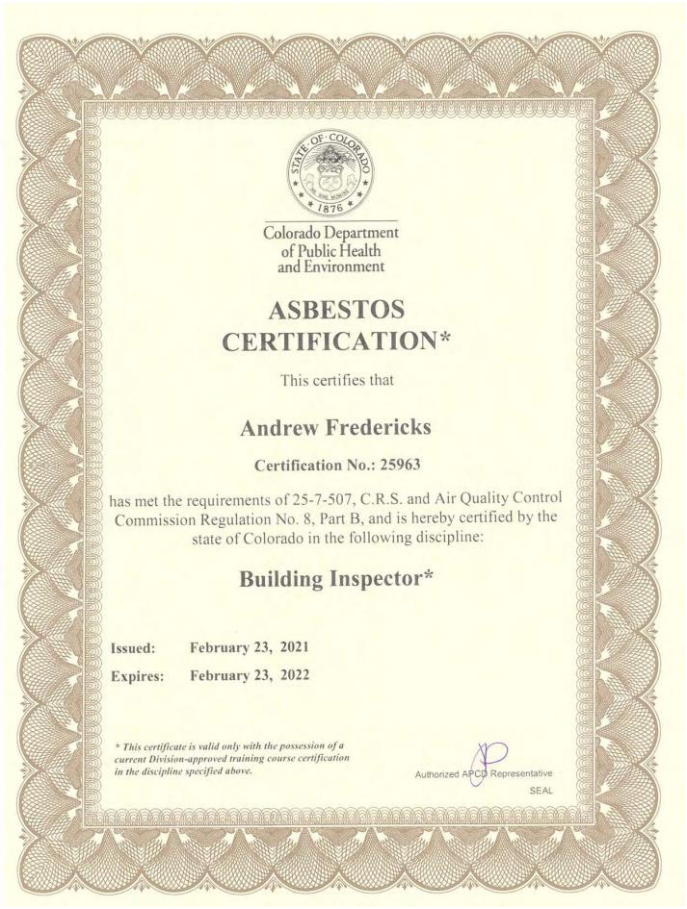
APPENDIX A: CERTIFICATIONS



Colorado Department
of Public Health
and Environment

ASBESTOS CERTIFICATION*

This certifies that

Andrew Fredericks

Certification No.: 25963

has met the requirements of 25-7-507, C.R.S. and Air Quality Control Commission Regulation No. 8, Part B, and is hereby certified by the state of Colorado in the following discipline:

Building Inspector*

Issued: **February 23, 2021**

Expires: **February 23, 2022**

** This certificate is valid only with the possession of a current Division-approved training course certification in the discipline specified above.*

Authorized APCD Representative

SEAL

Inspector Certification: 25963

Colorado Department
of Public Health
and Environment

ASBESTOS CONSULTING FIRM

This certifies that

DS Environmental Consulting, Inc.

Registration No.: ACF - 14912

has met the registration requirements of 25-7-507, C.R.S. and the Air Quality Control Commission Regulation No. 8, Part B, and is hereby authorized to perform asbestos consulting activities as required under Regulation No 8, Part B, in the state of Colorado.

Issued: January 07, 2021

Expires: January 30, 2022

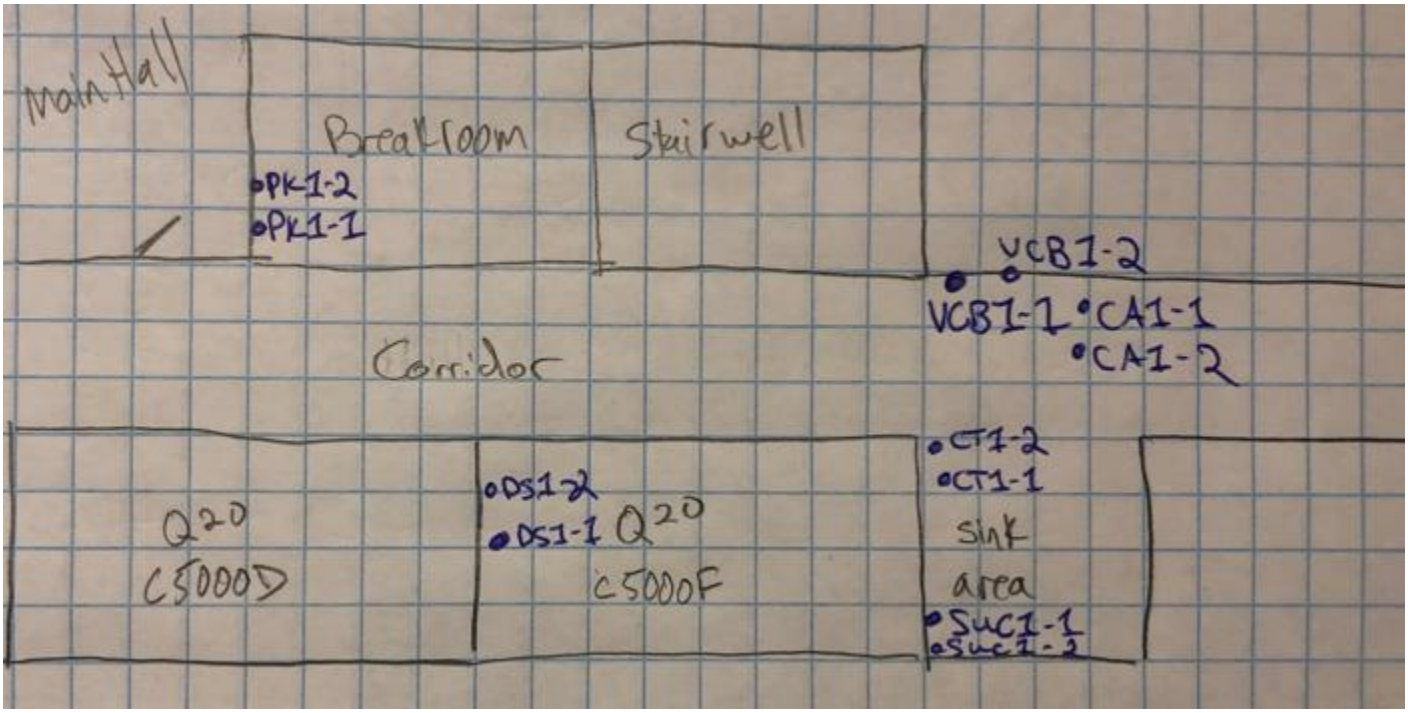
Authorized APCD Representative

SEAL

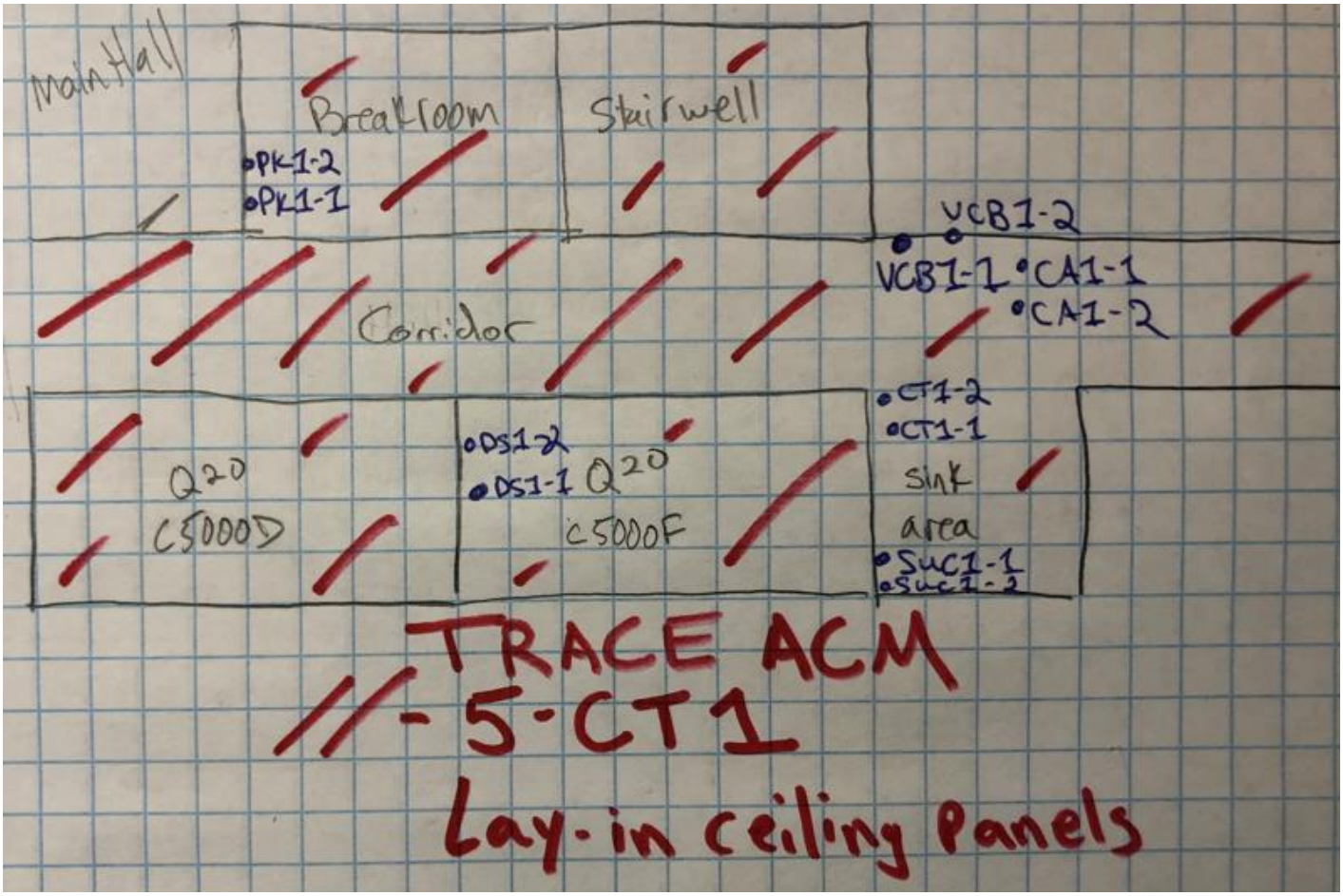
Firm Certification: 14912

APPENDIX B: SAMPLE LOCATIONS & ACM HOMOGENEOUS AREAS

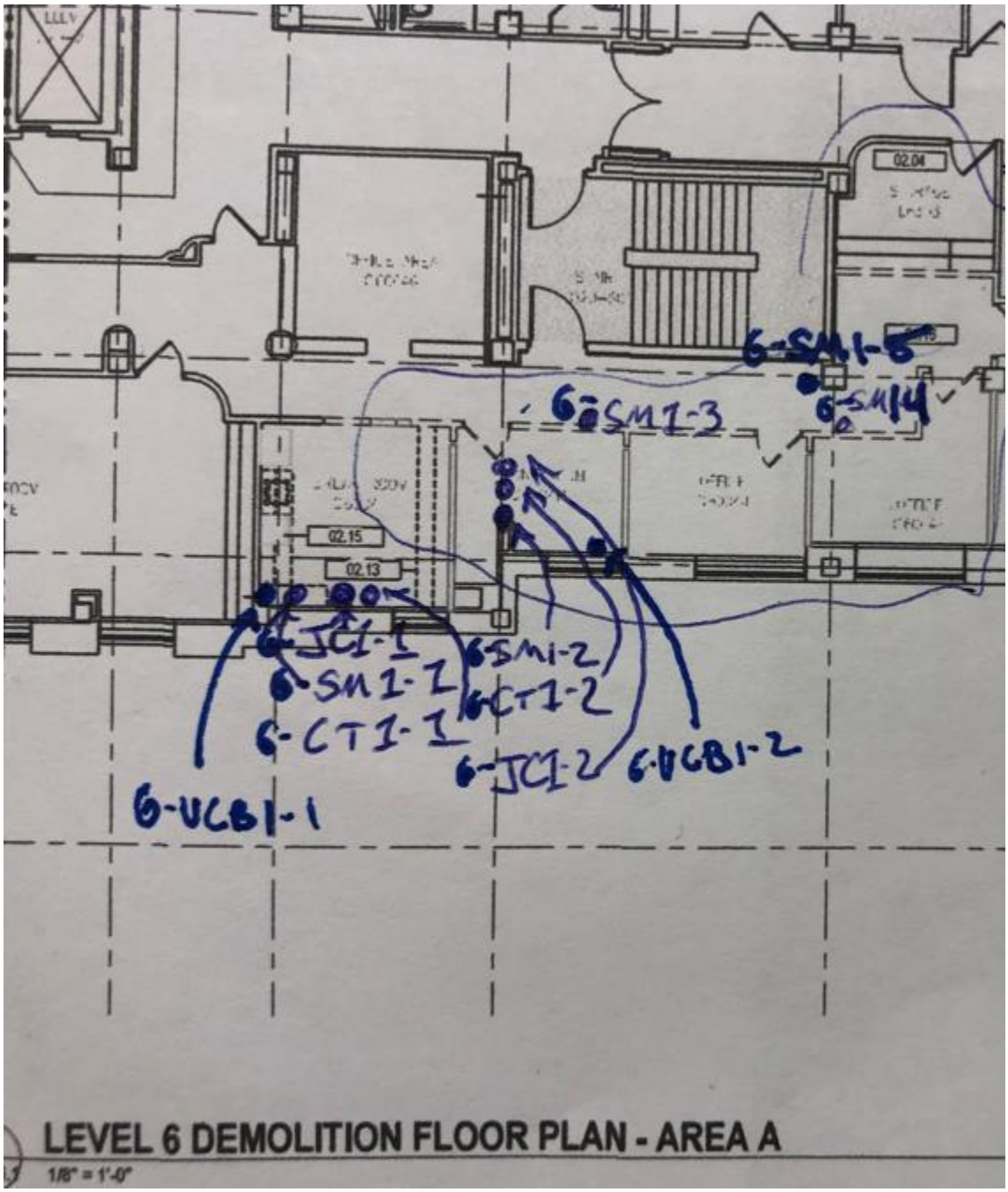
5th Floor Renovation Area Sample Locations



5th Floor ACMs (lay-in ceiling panels are assumed to contain <0.25%)



6th Floor Renovation Area Sample Locations



6th Floor ACMs

NONE

APPENDIX C: LABORATORY REPORT

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780 Simms Street
Suite 104
Golden, CO, 80401
303.232.3746
www.aerobiology.net

Certificate of Analysis

Client Name	DS Environmental Consulting		Date Collected: 10/12/2021
Street Address	7555 W. 10th Ave, Suite A	NVLAP® TESTING	Date Received: 10/12/2021
City, State ZIP	Lakewood, CO 80214	NVLAP Lab Code 200860-0	Date Analyzed: 10/19/2021
Attn:	Andrew Fredericks		Date Reported: 10/19/2021
Client Project Name:	Anshutz Bldg 500		Project ID: 21045825

Test Requested: 3002, Asbestos in Bulk Samples
Method: EPA 600/R-93/116: Method for Asbestos in Bulk Building Materials, EPA -- 40 CFR Appendix E to Subpart E of Part 763, Interim Method for Asbestos in Bulk Insulation Samples

Sample Identification		Physical Description of Sample/Layer	Homo-geneous (Y/N)	Layer Percentage	Asbestos Detected	Asbestos Percentage	Non-Asbestos Fiber Percentage	Non-Fibrous Material Percentage	Matrix Material Composition
Client	Lab Sample Number								
6-SM1-1	21045825-1	Pink/Brown Drywall with Light Gray/White Paint	N	100	ND		15 CELL,FG	85	G
6-SM1-2	21045825-2A	Light Gray/White Paint with White Texture	N	45	ND			100	C
	21045825-2B	Pink/Brown Drywall	N	55	ND		50 CELL,FG	50	G
6-SM1-3	21045825-3	Pink/Brown Drywall with Light Gray/White Paint	N	100	ND		50 CELL,FG	50	G
6-SM1-4	21045825-4A	Light Gray/White Paint with White Texture	N	20	ND			100	C
	21045825-4B	Pink/Brown Drywall	N	80	ND		40 CELL,FG	60	G
6-SM1-5	21045825-5A	Light Gray/White Paint with White Texture	N	2	ND			100	C
	21045825-5B	Pink/Brown Drywall	N	98	ND		15 CELL,FG	85	G
6-JC1-1	21045825-6	Light Gray/White Paint with White Texture	N	100	ND			100	C
6-JC1-2	21045825-7A	Light Gray/White Paint with White Texture	N	85	ND			100	C

Anita Grigg
Laboratory Analyst

Shannon Whitmore
Asbestos Lab Supervisor

AC = Actinolite
AM = Amosite
AN = Anthophyllite
CHRY = Chrysotile
CR = Crocidolite
TRM = Tremolite
Tr = Trace
ND = None Detected

AH = Animal Hair
CELL = Cellulose
FG = Fibrous Glass
MW = Mineral Wool
OT = Other
SYN = Synthetic
TL = Talc
W = Wollastonite

B = Binder
C = Calcite
D = Diatoms
G = Gypsum
M = Mica
OR = Organic
OP = Opaques
P = Perlite

Q = Quartz
T = Tar
V = Vermiculite

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Certificate of Analysis

NVLAP TESTING
NVLAP Lab Code 200860-0

Client Name	DS Environmental Consulting	Date Collected:	10/12/2021
Street Address	7555 W. 10th Ave, Suite A	Date Received:	10/12/2021
City, State ZIP	Lakewood, CO 80214	Date Analyzed:	10/19/2021
Attn:	Andrew Fredericks	Date Reported:	10/19/2021
Client Project Name:	Anshutz Bldg 500	Project ID:	21045825

Test Requested: 3002, Asbestos in Bulk Samples
Method: EPA 600/R-93/116: Method for Asbestos in Bulk Building Materials, EPA -- 40 CFR Appendix E to Subpart E of Part 763, Interim Method for Asbestos in Bulk Insulation Samples

Sample Identification		Physical Description of Sample/Layer	Homo-geneous (Y/N)	Layer Percentage	Asbestos Detected	Asbestos Percentage	Non-Asbestos Fiber Percentage	Non-Fibrous Material Percentage	Matrix Material Composition
Client	Lab Sample Number								
6-JC1-2	21045825-7B	Off-White Paper	Y	15	ND		95 CELL	5	
5-VCB1-1	21045825-8A	Gray Covebase	Y	98	ND			100	
	21045825-8B	Yellow Mastic	Y	2	ND			100	
	21045825-8C	Gray Resinous Material	Y	Tr	ND			100	
5-VCB1-2	21045825-9A	Gray Covebase	Y	98	ND			100	
	21045825-9B	Yellow Mastic	Y	2	ND			100	
	21045825-9C	Gray Resinous Material	Y	Tr	ND			100	
6-VCB1-1	21045825-10A	Brown Covebase	Y	98	ND			100	
	21045825-10B	White Mastic	Y	2	ND			100	
6-VCB1-2	21045825-11A	Brown Covebase	N	98	ND			100	

Anita Grigg
Laboratory Analyst

Shannon Whitmore
Asbestos Lab Supervisor

AC = Actinolite
AM = Amosite
AN = Anthophyllite
CHRY = Chrysotile
CR = Crocidolite
TRM = Tremolite
Tr = Trace
ND = None Detected
AH = Animal Hair
CELL = Cellulose
FG = Fibrous Glass
MW = Mineral Wool
OT = Other
SYN = Synthetic
TL = Talc
W = Wollastonite
B = Binder
C = Calcite
D = Diatoms
G = Gypsum
M = Mica
OR = Organic
OP = Opaques
P = Perlite
Q = Quartz
T = Tar
V = Vermiculite

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Certificate of Analysis

NVLAP TESTING
NVLAP Lab Code 200860-0

Client Name	DS Environmental Consulting	Date Collected:	10/12/2021
Street Address	7555 W. 10th Ave, Suite A	Date Received:	10/12/2021
City, State ZIP	Lakewood, CO 80214	Date Analyzed:	10/19/2021
Attn:	Andrew Fredericks	Date Reported:	10/19/2021
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Sample Identification		Physical Description of Sample/Layer	Homo-geneous (Y/N)	Layer Percentage	Asbestos Detected	Asbestos Percentage	Non-Asbestos Fiber Percentage	Non-Fibrous Material Percentage	Matrix Material Composition
Client	Lab Sample Number								
6-VCB1-2	21045825-11B	White Mastic	N	2	ND			100	
5-CT1-1	21045825-12A	White/Brown Drywall Ceiling Tile with White Resinous Texture	N	100	ND		40 CELL,FG	60	G,M
5-CT1-2	**21045825-13**	**White/Brown Drywall Ceiling Tile with White Resinous Texture**	**N**	**100**	**AC**	**Tr**	**40 CELL,FG**	**60**	**G,M**
6-CT1-1	21045825-14	White/Gray Perlitic Ceiling Tile	N	100	ND		75 CELL,MW	25	P
6-CT1-2	21045825-15	Gray Perlitic Ceiling Tile	N	100	ND		75 CELL,MW	25	P
5-SUC1-1	21045825-16	Gray Sink Undercoating	N	100	ND		15 CELL	85	
5-SUC1-2	21045825-17A	Gray Sink Undercoating	N	60	ND		15 CELL	85	
	21045825-17B	Dark Gray Fibrous Material with Off-White Resinous Material	N	40	ND		90 SYN	5	
5-CA1-1	21045825-18	Off-White Resinous Material with Multicolored Debris	N	100	ND		1 SYN	99	
5-CA1-2	21045825-19	Off-White Resinous Material with Multicolored Debris	N	100	ND		5 SYN	95	

Anita Grigg
Laboratory Analyst

Shannon Whitmore
Asbestos Lab Supervisor

AC = Actinolite
AM = Amosite
AN = Anthophyllite
CHRY = Chrysotile
CR = Crocidolite
TRM = Tremolite
Tr = Trace
ND = None Detected
AH = Animal Hair
CELL = Cellulose
FG = Fibrous Glass
MW = Mineral Wool
OT = Other
SYN = Synthetic
TL = Talc
W = Wollastonite
B = Binder
C = Calcite
D = Diatoms
G = Gypsum
M = Mica
OR = Organic
OP = Opaques
P = Perlite
Q = Quartz
T = Tar
V = Vermiculite

Aerobiology Laboratory Associates, Incorporated
Expertise Since 1997

780 Simms Street
Suite 104
Golden, CO, 80401
303.232.3746
www.aerobiology.net

Certificate of Analysis

NVLAP TESTING
NVLAP Lab Code 200860-0

Client Name	DS Environmental Consulting	Date Collected:	10/12/2021
Street Address	7555 W. 10th Ave, Suite A	Date Received:	10/12/2021
City, State ZIP	Lakewood, CO 80214	Date Analyzed:	10/19/2021
Attn:	Andrew Fredericks	Date Reported:	10/19/2021
Client Project Name:	Anshutz Bldg 500	Project ID:	21045825

Test Requested: 3002, Asbestos in Bulk Samples
Method: EPA 600/R-93/116: Method for Asbestos in Bulk Building Materials, EPA -- 40 CFR Appendix E to Subpart E of Part 763, Interim Method for Asbestos in Bulk Insulation Samples

Sample Identification		Physical Description of Sample/Layer	Homo-geneous (Y/N)	Layer Percentage	Asbestos Detected	Asbestos Percentage	Non-Asbestos Fiber Percentage	Non-Fibrous Material Percentage	Matrix Material Composition
Client	Lab Sample Number								
5-DS1-1	21045825-20	Gray Resinous Material	N	100	ND			100	
5-DS1-2	21045825-21	Gray Resinous Material	N	100	ND			100	
5-PK1-1	21045825-22A	White Resinous Coating	Y	65	ND			100	
	21045825-22B	White Resinous Material	Y	10	ND			100	
	21045825-22C	Tan/Silver Wrap	N	10	ND		50 CELL	50	
	21045825-22D	Gray Insulation	Y	15	ND		95 MW	5	
5-PK1-2	21045825-23A	White Resinous Coating	Y	60	ND		2 W	98	
	21045825-23B	Tan Insulation	Y	40	ND		95 MW	5	

Anita Grigg
Laboratory Analyst

Shannon Whitmore
Asbestos Lab Supervisor

AC = Actinolite	AH = Animal Hair	B = Binder	Q = Quartz
AM = Amosite	CELL = Cellulose	C = Calcite	T = Tar
AN = Anthophyllite	FG = Fibrous Glass	D = Diatoms	V = Vermiculite
CHRY = Chrysotile	MW = Mineral Wool	G = Gypsum	
CR = Crocidolite	OT = Other	M = Mica	
TRM = Tremolite	SYN = Synthetic	OR = Organic	
Tr = Trace	TL = Talc	OP = Opaques	
ND = None Detected	W = Wollastonite	P = Perlite	

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Certificate of Analysis

Client Name	DS Environmental Consulting		Date Collected: 10/12/2021
Street Address	7555 W. 10th Ave, Suite A	NVLAP® TESTING	Date Received: 10/12/2021
City, State ZIP	Lakewood, CO 80214	NVLAP Lab Code 200860-0	Date Analyzed: 10/19/2021
Attn:	Andrew Fredericks		Date Reported: 10/19/2021
Client Project Name:	Anshutz Bldg 500		Project ID: 21045825

Test Requested: **3002, Asbestos in Bulk Samples**
Method: EPA 600/R-93/116: Method for Asbestos in Bulk Building Materials, EPA -- 40 CFR Appendix E to Subpart E of Part 763, Interim Method for Asbestos in Bulk Insulation Samples

General Notes

- **ND** indicates no asbestos was detected; the method detection limit is 1 %.
- **Trace** or "< 1" indicates asbestos was identified in the sample, but the concentration is less than 1% and cannot be quantified without point counting.
- Samples identified as inhomogeneous (more than one layer) are separated into individual layers, and each layer is analyzed and reported separately.
- All regulated asbestos minerals (i.e. chrysotile, amosite, crocidolite, anthophyllite, tremolite, and actinolite) were sought in every layer of each sample, but only those asbestos minerals detected are listed. Amosite is the common name for the asbestiform variety of the minerals grunerite. Crocidolite is the common name used for the asbestiform variety of the mineral riebeckite.
- Tile, vinyl, foam, plastic, and fine powder samples may contain asbestos fibers of such small diameter (< 0.25 microns in diameter) that these fibers cannot be detected by PLM. For such samples, more sensitive analytical methods (e.g. TEM, SEM, and XRD) are recommended if greater certainty about asbestos content is required. Semi-quantitative bulk TEM floor tile analysis is accepted under NESHAP regulations.
- These results are submitted pursuant to Aerobiology Laboratory Associates, Inc.'s current terms and conditions of sale, including the company's standard warranty and limitation of liability provisions. No responsibility or liability is assumed for the manner in which the results are used or interpreted.
- Unless notified in writing to return the samples covered by this report, Aerobiology Laboratory Associates, Inc. will store the samples for a minimum period of thirty (30) days before discarding. A shipping and handling charge will be assessed for the return of any samples.
- Aerobiology does not guarantee the results of tape lifts, microvacs, wipe, and/or debris samples. Accurate analysis cannot be performed due to particle size, media used, and/or amount of material given. Analysis of these materials should be preformed by a TEM. ***A result of ND does not indicate that the sample area does not contain asbestos. It means the analyst could not identify asbestos in the specific sample for the reasons listed above.***

Notes Required by NVLAP

- This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.
- This test report relates only to the items tested or calibrated.
- This report is not valid unless it bears the name of a NVLAP-approved signatory.
- Any reproduction of this document must include the entire document in order for the report to be valid.

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Certificate of Analysis

NVLAP TESTING
NVLAP Lab Code 200860-0

Client Name	DS Environmental Consulting	Date Collected:	10/12/2021
Street Address	7555 W. 10th Ave, Suite A	Date Received:	10/12/2021
City, State ZIP	Lakewood, CO 80214	Date Analyzed:	10/27/2021
Attn:	Andrew Fredericks	Date Reported:	10/27/2021
Client Project Name:	Anshutz Bldg 500	Project ID:	21045825

Test Requested: **3001, Asbestos Point Count in Bulk Samples (400/1000)**
Method: EPA/600/R-93/116: Method for the Determination of Asbestos in Bulk Building Materials; EPA-600/M4-82-020: Interim Method for the Determination of Asbestos in Bulk Insulation Samples

Sample Identification		Physical Description of Sample/Layer	Asbestos Detected	Asbestos Percentage	Point Count Method (400/1000)
Client	Lab Sample Number				
5-CT1-2	**21045825-13**	**White/Brown Drywall Ceiling Tile with White Resinous Texture**	**AC**	**<0.25**	**400**

Anita Grigg
Laboratory Analyst

Shannon Whitmore
Asbestos Laboratory Supervisor

AC = Actinolite
AM = Amosite
AN = Anthophyllite
CHRY = Chrysotile
CR = Crocidolite
TRM = Tremolite

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Certificate of Analysis

Client Name	DS Environmental Consulting		Date Collected: 10/12/2021
Street Address	7555 W. 10th Ave, Suite A	NVLAP® TESTING	Date Received: 10/12/2021
City, State ZIP	Lakewood, CO 80214	NVLAP Lab Code 200860-0	Date Analyzed: 10/27/2021
Attn:	Andrew Fredericks		Date Reported: 10/27/2021
Client Project Name:	Anshutz Bldg 500		Project ID: 21045825

Test Requested: **3001, Asbestos Point Count in Bulk Samples (400/1000)**
Method: EPA/600/R-93/116: Method for the Determination of Asbestos in Bulk Building Materials; EPA-600/M4-82-020: Interim Method for the Determination of Asbestos in Bulk Insulation Samples

General Notes

- **ND** indicates no asbestos was detected; the method detection limit is 1 %.
- **Trace** or "< 1" indicates asbestos was identified in the sample, but the concentration is less than 1% and cannot be quantified without point counting.
- Samples identified as inhomogeneous (more than one layer) are separated into individual layers, and each layer is analyzed and reported separately.
- All regulated asbestos minerals (i.e. chrysotile, amosite, crocidolite, anthophyllite, tremolite, and actinolite) were sought in every layer of each sample, but only those asbestos minerals detected are listed. Amosite is the common name for the asbestiform variety of the mineral grunerite. Crocidolite is the common name used for the asbestiform variety of the mineral riebeckite.
- Tile, vinyl, foam, plastic, and fine powder samples may contain asbestos fibers of such small diameter (< 0.25 microns in diameter) that these fibers cannot be detected by PLM. For such samples, more sensitive analytical methods (e.g. TEM, SEM, and XRD) are recommended if greater certainty about asbestos content is required. Semi-quantitative bulk TEM floor tile analysis is accepted under NESHAP regulations.
- These results are submitted pursuant to Aerobiology Laboratory Associates, Inc.'s current terms and conditions of sale, including the company's standard warranty and limitation of liability provisions. No responsibility or liability is assumed for the manner in which the results are used or interpreted.
- Unless notified in writing to return the samples covered by this report, Aerobiology Laboratory Associates, Inc. will store the samples for a minimum period of thirty (30) days before discarding. A shipping and handling charge will be assessed for the return of any samples.
- Aerobiology does not guarantee the results of tape lifts, microvacs, wipe, and/or debris samples. Accurate analysis cannot be performed due to particle size, media used, and/or amount of material given. Analysis of these materials should be preformed by a TEM. ***A result of ND does not indicate that the sample area does not contain asbestos. It means the analyst could not identify asbestos in the specific sample for the reasons listed above.***

Notes Required by NVLAP

- This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.
- This test report relates only to the items tested or calibrated.
- This report is not valid unless it bears the name of a NVLAP-approved signatory.
- Any reproduction of this document must include the entire document in order for the report to be valid.

DS Environmental CONSULTING

"The trusted choice for your environmental & industrial hygiene needs."

LEAD-BASED PAINT INSPECTION & TESTING REPORT

CU Anschutz Medical Campus, Building 500 5th & 6th Floors Renovations

13001 E 17th Pl. Aurora, CO

PRESENTED TO:	INSPECTED BY:	PROJECT DETAILS:
Mr. Chad Jelenik Project Manager University of Colorado at Anschutz (720) 728-9577 Chad.Jelenik@cuanschutz.edu	Mr. Brandon Sinkbeil DS Environmental Consulting Phone: 303-286-9094 brandon@dsconsultinginc.com www.dsconsultinginc.com	DS Job Number: 23084 Date of Testing: October 12, 2021

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3.0 Scope of Work

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10.0 Disclaimer & Limitations

11.0 Copyright Notice

APPENDIX A Inspector & Firm Certificates

APPENDIX B Figure Showing LBP Locations

1.0 Introduction

Mr. Brandon Sinkbeil with DS Environmental Consulting (DS) performed a limited-scope, lead-based paint (LBP) inspection and performed in situ X-Ray Florescence (XRF) testing to determine the presence of LBP on select painted building components within the Cancer Center areas on the 5th and 6th floors of the commercial building detailed on the cover page of this report.

The purpose of the limited-scope inspection was to identify any LBP present on the building components planned to be disturbed during planned renovations, as defined by the client. XRF testing was conducted on accessible interior painted components of the building. LBP was not found on any of the tested components.

Table 1 and Table 2 in *Section 6.0* further details the materials that contain LBP and those that do not.

2.0 Definitions

Room Equivalent is an identifiable part of a building, such as a room, a house exterior, a foyer, staircase, hallway or an exterior area.

Lead-based Paint (LBP) is any paint having concentrations of lead greater than 1.0 mg/cm^2, which is also Colorado's action level.

Limited-scope means the extent of the inspection and XRF testing included in this report was limited to a subset of the entire building, was not a lead hazard assessment, and was not a full-building inspection. No water, air, dust or soil samples were collected or analyzed to determine the respective lead concentrations.

Paint is any liquid mixture, usually of solid pigment in a liquid form, used as a decorative or protective coating. This includes, but is not limited to, primer, lacquer, polyurethane, wood stain, etc.

X-Ray Florescence (XRF) is a non-destructive analytical technique used to determine the elemental composition of materials. XRF analyzers determine the chemistry of a sample by measuring the fluorescent (or secondary) X-ray emitted from a sample when it is excited by a primary X-ray source.

3.0 Scope of Work

The scope of the limited LBP inspection was limited to accessible painted areas of the building, as defined by the client. The remaining inaccessible areas of the building or any out-building on the property were not included in the scope of the inspection. The limited LBP inspection did not constitute a full building inspection or hazard assessment. Additionally, there may be other components in other parts of the building that contain LBP, which were not included in the scope of this inspection and testing. No water, dust or soil samples were tested for lead content.

4.0 Certifications

Mr. Brandon Sinkbeil is a Colorado State Certified LBP Inspector/Risk Assessor; having EPA Accreditation #15128. DS Environmental Consulting is a Colorado State Certified Lead Evaluation Firm, license #16918. Mr. Sinkbeil is certified to operate the RMD LPA-1 and Heuresis Pb200i XRF Lead Paint Spectrum Analyzers by the manufacturers (see Appendix A for certificates).

5.0 Data Interpretation

When evaluating the information included in this report, Wall "A" in each room is the wall where the main front entrance door to the building is located (or aligned with the street). While facing Wall "A" and going clockwise, Wall "B" will always be to the right, Wall "C" directly to the rear and Wall "D" to the left. Ceilings and floors are designated with an asterisk.

If a component, i.e. baseboard, window sill, or door jamb, contains LBP in any room equivalent, then all other components that are similar in color, substrate and painting history can be assumed to be positive as well with no additional testing, regardless of their location in the structure; however, this extrapolation cannot be made the same with negative components. If a component is negative for LBP, only the components in that room equivalent can be assumed negative, additional testing must be done to similar components in each room equivalent.

All walls shall be tested in room equivalents with four or less walls and a minimum of four different walls in room equivalents with more than four walls for all walls to be determined negative; however, the scope of work for a limited-scope inspection may dictate that not all walls are to be impacted; therefore, not all walls are required to be tested.

**Please note that due to the limited nature of this inspection, only the materials included in this report, in the locations identified, have been tested and no assumptions have been made to the lead-content of similar components in other areas. All inaccessible areas are assumed to be positive, even though they were not able to be tested. These areas may not be listed in this report.

6.0 Inspection, Sampling & Analytical Procedures

Table 1: Components that Contain LBP

No tested components were found to contain LBP.

Table 2: Components that **Do Not** Contain LBP

5th and 6th floor walls, ceilings, doors, window components, casework, trim, shelving, ceiling tiles, cove base, and counter tops.

7.0 Equipment Information

LBP concentrations were obtained using an RMD Model LPA-1 or a Heuresis Pb200i XRF Lead Paint Spectrum Analyzer, which are approved by the U.S. Environmental Protection Agency (EPA) and the U.S. Department of Housing and Urban Development (HUD) to determine the concentration of lead in paint.

The XRF was calibrated according to the manufacturer's Performance Characteristic Sheet (PCS). The XRF was calibrated using the calibration standard block of known 1.0 mg/cm^2 lead content as well as a standard block of

known 0.0 mg/cm^2 lead content. Calibration reading of each block were taken before the inspection began as well as after the inspection was completed, every four hours of continuous use or following a battery change.

8.0 Inspection & Testing Procedures

The LBP inspection and XRF testing were conducted by a State of Colorado accredited LBP Inspector qualified by experience, education, and training in approved LBP testing techniques. These procedures call for the visual inspection of the areas of concern and the collection of XRF readings for lead concentrations.

This inspection was performed in accordance with the U.S. Environmental Protection Agency (EPA) and the U.S. Department of Housing and Urban Development (HUD) guidelines for lead-hazard inspections, as well as the State of Colorado Air Quality Control Commission Regulation No. 19 for the Control of Lead Hazards. The EPA's 40 CFR Part 745 Final Rule (January 5, 2001) set standards for the identification of dangerous levels of lead. The standards identify when lead-based paint, lead-contaminated dust, and lead-contaminated soil are hazards. It also establishes residential dust clean-up levels (post-abatement clearance levels) and set dust and soil sampling requirements. The lead-based paint readings were collected by XRF analyzation for the purpose of determining lead concentrations as mg/cm^2.

9.0 Conclusions & Recommendations

Concentrations of lead in paint higher than the State of Colorado regulatory levels were not identified; therefore, no further "lead safe" work practices are required when disturbing, removing or impacting the tested components. Additional testing is required if new materials are discovered or the scope of work changes.

10.0 Disclaimer & Limitations

This limited-scope inspection does not constitute a comprehensive lead-based paint inspection or full lead-hazard assessment. Other areas not tested and conditions existing outside this scope of work may contain lead concentrations above the regulatory action levels. Consequently, to determine whether or not lead-based paint exists within other areas of the building, a full lead-based paint inspection or risk assessment must occur. No water, dust or soil samples were collected and analyzed for lead concentrations.

11.0 Copyright Notice

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APPENDIX A: INSPECTOR & FIRM CERTIFICATES

Colorado Department
of Public Health
and Environment

LEAD-BASED PAINT CERTIFICATION*

This certifies that

Brandon Sinkbeil

Certification No.: 15128

has met the requirements of 25-7-1104, C.R.S. and Air Quality Control Commission Regulation No. 19, and is hereby certified by the state of Colorado in the following discipline:

Inspector*

Issued: May 06, 2021

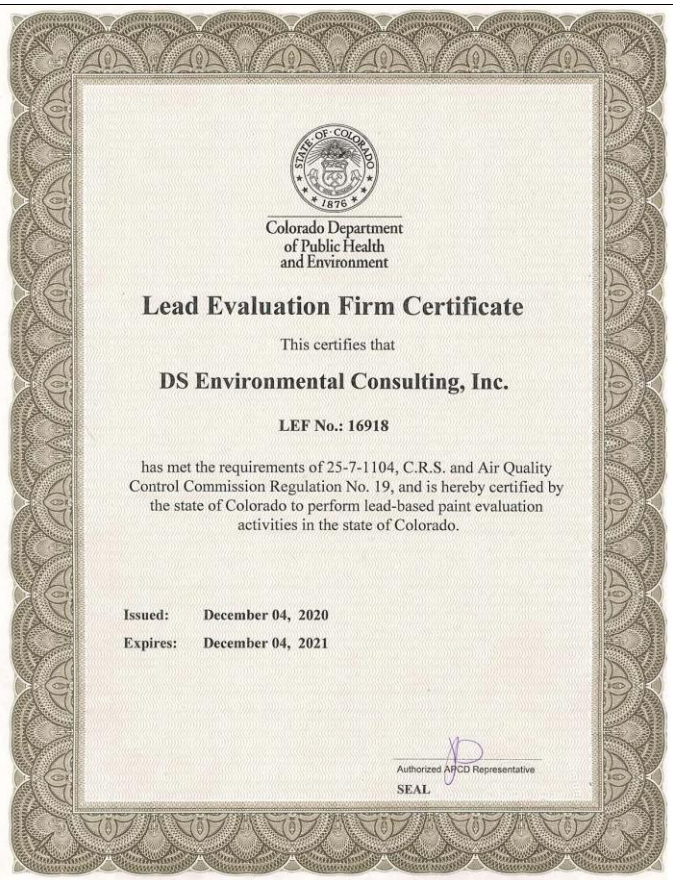
Expires: May 06, 2024

* This certificate is valid only with the possession of a valid lead-based paint training certificate in the discipline specified above, issued by either a Colorado approved training provider, an EPA approved training provider, or a training provider approved by another EPA authorized program.

Authorized APCD Representative

SEAL

Inspector Certification: 15128



Colorado Department
of Public Health
and Environment

Lead Evaluation Firm Certificate

This certifies that

DS Environmental Consulting, Inc.

LEF No.: 16918

has met the requirements of 25-7-1104, C.R.S. and Air Quality Control Commission Regulation No. 19, and is hereby certified by the state of Colorado to perform lead-based paint evaluation activities in the state of Colorado.

Issued: December 04, 2020

Expires: December 04, 2021

Authorized APCD Representative

SEAL

Firm Certification: 16918

Certificate of Achievement

This is to certify that

Brandon Sinkbeil

DS Consulting, Inc.

on the 26th day of May, 2010 successfully completed the factory training for

RMD's LPA-1 Lead Paint Inspection System

including, but not limited to the topics of Radiation Safety, DOT Regulations, and the Proper Use of the Instrument.

Sia Afshari Product Manager RMD
44 Hunt St, Watertown, Massachusetts

RMD LPA-1 XRF Certification

Certificate of Training

Brandon Sinkbeil

Has completed the Heuresis Corp. training materials presented on the topic of Instrument Operator Training, Pb200i, with regards to the materials licensed by the Commonwealth of Massachusetts and the Nuclear Regulatory Commission.

HEURESIS CORPORATION

Instrument Operator Training
Heuresis Corporation, Pb200i

I confirm that the above named individual has received the training listed on this certificate.

Name: Dillyn Pattle — Date: September 6th, 2018

Title: XRF Sales, Rentals, Training and Consulting

I certify that I have received the stated training and understand the content presented. I understand that I can follow up this training with questions from Heuresis Corporation.

Name — Date: 9/6/18

Heuresis Pb200i XRF Certification

APPENDIX B: FIGURE SHOWING LBP LOCATIONS

- *NONE* -

SECTION 00 43 23

BID ALTERNATES FORM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. 00 41 53 - Bid Form (SPB-6.13)

1.2 SUMMARY (Not Applicable)

1.3 DEFINITIONS (Not Applicable)

1.4 BID FORM

A. FORM: State of Colorado form "Bid Alternates Form" (SBP-6.131).

B. A copy of the above noted form is attached to the end of this section.

C. Additional State and University of Colorado forms to be attached to the submitted bid are listed in the Articles below.

1.5 PROCEDURES

A. Fill out each alternate as shown in project documents with associated cost.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 00 43 23

(See "Bid Alternates Form" (SBP-6.131) form on next pages)

(See "Bid Alternates Form" (SBP-6.131) form on next pages)

STATE OF COLORADO
OFFICE OF THE STATE ARCHITECT
STATE BUILDINGS PROGRAM

BID ALTERNATES FORM

Institution/Agency: University of Colorado Denver | Anschutz Medical Campus
Project No./Name: PN 21_155291 / Fitz Bldg 5th 6th Cancer Center Paint Patch Code Reno

Additive alternates will not be used if deductible alternates are used and deductible alternates will not be used if additive alternates are used.

Additive Alternates (If Applicable)
Refer to specification section 01 23 00 for descriptions of add alternates. If the add alternates are accepted, the base bid would be modified by the amount entered by the bidder.

A.A. No. 1	Carpet Recycling	Add $
A.A. No. 2	Roller Window Shades	Add $
A.A. No. 3		Add $
A.A. No. 4		Add $
A.A. No. 5		Add $
A.A. No. 6		Add $
A.A. No. 7		Add $
A.A. No. 8		Add $
A.A. No. 9		Add $
A.A. No. 10		Add $

Deductive Alternates (If Applicable)

Refer to specification section _____ for descriptions of the deductive alternates. If the deductive alternates are accepted, the base bid would be modified by the amount entered by the bidder.

D.A. No. 1		Deduct $
D.A. No. 2		Deduct $
D.A. No. 3		Deduct $
D.A. No. 4		Deduct $
D.A. No. 5		Deduct $
D.A. No. 6		Deduct $
D.A. No. 7		Deduct $
D.A. No. 8		Deduct $
D.A. No. 9		Deduct $
D.A. No. 10		Deduct $

THE BIDDER:

_____
Company Name

_____
Signature Date

SECTION 00 43 40

CERTIFICATE AND AFFIDAVIT REGARDING UNAUTHORIZED IMMIGRANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS (Not Applicable)

1.2 SUMMARY

A. The form UI-1 shall be provided by all contractors, architect, engineers and consultants directly engaged with the University of Colorado Denver | Anschutz Medical Campus.

1.3 DEFINITIONS (Not Applicable)

1.4 CERTIFICATE AND AFFIDAVIT REGARDING UNAUTHROIZED IMMIGRANTS

A. FORM: State of Colorado form "CERTIFICATE AND AFFIDAVIT REGARDING UNAUTHORIZED IMMIGRANTS" (UI-1).

B. A copy of the above noted form is available using hyperlink on page "Appendix C" under Section 00 11 00 - ADVERTISEMENT - REQUEST FOR PROPOSALS.

1.5 PROCEDURE (Not Applicable)

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 00 43 40

SECTION 00 51 01

NOTICE OF AWARD (CM/GC)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS (Not Applicable)

1.2 SUMMARY (Not Applicable)

1.3 DEFINITIONS (Not Applicable)

1.4 NOTICE OF AWARD

A. FORM: State of Colorado form "Notice of Award" (SBP-6.16) for CM/GC Agreements.

B. Copies of the above noted forms are attached to the end of this section.

1.5 PROCEDURE (Not Applicable)

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 00 51 00

(see "Notice of Award" (SBP-6.16) for CM/GC Agreements form on next pages)

(see "Notice of Award" (SBP-6.16) for CM/GC Agreements form on next pages)

STATE OF COLORADO
OFFICE OF THE STATE ARCHITECT
STATE BUILDINGS PROGRAMS

NOTICE OF AWARD

(Construction Manager/General Contractor and Design /Build GMP Agreements)

Date of Notice: _____
Date to be inserted by the Principal Representative

Institution/Agency: University of Colorado Denver | Anschutz Medical Campus

Project No./Name: PN 21_155291 / Fitz Bldg 5th 6th Cancer Center Paint Patch Code Reno

TO:

The State of Colorado, represented by the undersigned, has considered the Proposals submitted for the above described work.

Your Proposal, deemed to be in the best interest of the State of Colorado, in the amount of _____ DOLLARS AND NO/100* ($_____*) is hereby accepted, pending final execution of the Agreement.

You **are** required to execute the approved Agreement and to furnish the Performance Bond, Labor and Material Payment Bond, Insurance Policy, Certificates of Insurance, Certification and Affidavit Regarding Unauthorized Immigrants and Labor Overhead (Direct Labor Burdens) for Work performed by Contractor within ten (10) days from the date of this Notice. Labor overhead (Direct Labor Burdens) for major Subcontractors are required to be submitted for each bid package along with other documentation as required by Agreement.

If you fail to execute said Agreement and to furnish said Performance Bond, Labor and Material Payment Bond, Insurance Policy and Certificates of Insurance, and Certification and Affidavit Regarding Unauthorized Immigrants, and Labor Overhead (Direct Labor Burdens) as described above within ten (10) days from the date of this Notice, the State Controller is entitled to retain the amount of the Proposal Guaranty submitted with your Proposal as Liquidated Damages. In this event, the right is reserved to consider all of your rights arising out of the acceptance of your Proposal as abandoned and to award the work covered by your Proposal to another, or to re-advertise the Project, or otherwise dispose thereof.

By _____
State Buildings Programs (of Authorized Delegate) Date

By _____
Principal Representative (Institution or Agency) Date

When completely executed, this form is to be sent by **certified mail** to the Contractor by the Principal Representative or delivered by any other means to which the parties agree.

SECTION 00 52 53.10

CONSTRUCTION MANAGER/GENERAL CONTRACTOR (CM/GC) AGREEMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS (Not Applicable)

1.2 SUMMARY (Not Applicable)

1.3 DEFINITIONS (Not Applicable)

1.4 CONTRACTOR'S CONSTRUCTION MANAGER-GENERAL CONTRACTOR AGREEMENT

A. FORM: State of Colorado form "Construction Manager/General Contractor Agreement (CM/GC)" SC-6.51.

B. A copy of the above noted document is available using hyperlink on page "Appendix B" under Section 00 11 00 - ADVERTISEMENT - REQUEST FOR PROPOSALS.

1.5 PROCEDURE (Not Applicable)

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 00 52 53.10

SECTION 00 55 01

NOTICE TO PROCEED TO COMMENCE CONSTRUCTION PHASE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS (Not Applicable)

1.2 SUMMARY (Not Applicable)

1.3 DEFINITIONS (Not Applicable)

1.4 NOTICE TO PROCEED

A. FORM: State of Colorado form "Notice To Proceed To Commence Construction Phase (CM/GC Contract)" (SBP-7.26).

B. A copy of the above noted form is attached to the end of this section.

1.5 PROCEDURE (Not Applicable)

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 00 55 01

(see "Notice To Proceed To Commence Construction Phase (CM/GC Contract)" (SBP-7.26) on next pages)

(see "Notice To Proceed To Commence Construction Phase (CM/GC Contract)" (SBP-7.26) on next pages)

STATE OF COLORADO
OFFICE OF THE STATE ARCHITECT
STATE BUILDINGS PROGRAM

NOTICE TO PROCEED TO COMMENCE CONSTRUCTION PHASE (CM/GC CONTRACT)

Date of Notice: _____
Date to be inserted by the Principal Representative

Amendment No./Date: _____

Bid Package(s) No.: _____

Institution/Agency: University of Colorado Denver | Anschutz Medical Campus

Project No./Name: PN 21_155291 / Fitz Bldg 5th 6th Cancer Center Paint Patch Code Reno

Attach Notice of Code Compliance from Code Review Agent/Building Official for Documents Listed Above

To:

This is to advise you that your Performance Bond, Labor and Material Payment Bond, Insurance Policy and Certificates of Insurance, and Affidavit Regarding Unauthorized Immigrants have been received. Our issuance of this Notice does not relieve you of responsibility to assure that the bond and insurance requirements of the Contract Documents are met for the duration of the Agreement. The Amendment # _____ for the above described work has been fully executed.

You are hereby authorized and directed to proceed within ten (10) days from date of this Authorization as required in the Agreement. Any liquidated damages for failure to achieve Substantial Completion by the date agreed that may be applicable to this contract will be calculated using the date of this Notice for the date of the commencement of the Work.

By _____
State Buildings Program (or Authorized Delegate) Date

By _____
Principal Representative (Institution or Agency) Date

When completely executed, this form is to be sent by certified mail to the Construction Manager by the Principal Representative; or delivered by any other means to which the parties agree.

SECTION 00 61 13.13

PERFORMANCE BOND

PART 1 - GENERAL

1.1 RELATED DOCUMENTS (Not Applicable)

1.2 SUMMARY (Not Applicable)

1.3 DEFINITIONS (Not Applicable)

1.4 PERFORMANCE BOND

A. FORM: State of Colorado form "Performance Bond" (SC-6.22).

B. A copy of the above noted form is attached to the end of this section.

1.5 PROCEDURE

A. Performance Bond is required for construction values of $150,000 or more.

B. This bond must be accompanied by Power of Attorney.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 00 61 13.13

(see "Performance Bond" (SC-6.22) on next pages)

(see "Performance Bond" (SC-6.22) on next page)

STATE OF COLORADO
OFFICE OF THE STATE ARCHITECT
STATE BUILDINGS PROGRAM

PERFORMANCE BOND

Institution/Agency: University of Colorado Denver | Anschutz Medical Campus
Project No./Name: PN 21_155291 / Fitz Bldg 5th 6th Cancer Center Paint Patch Code Reno

BONDING COMPANY: DO NOT MAKE ANY CHANGES TO THE LANGUAGE IN THIS BOND.

KNOW ALL PERSONS BY THESE PRESENTS:

That the Contractor

as Principal and hereinafter called "Principal,"

and

as Surety and hereinafter called "Surety," a corporation organized and existing under the laws of _____ are held and firmly bound unto **the STATE OF COLORADO** acting by and through Board of Regents of the University of Colorado, a body corporate, for and on behalf of the University of Colorado Denver, hereinafter called the "Principal Representative", in the sum of _____ _____ Dollars ($_____)

for the payment whereof the Principal and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly, by these presents.

WHEREAS, the Principal and the State of Colorado acting by and through the Principal Representative have entered into a certain Contract, hereinafter called "Contract," dated _____ _____, 20___, for the construction of a PROJECT described as

which Contract is hereby by reference made a part hereof;

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION, is such that, if the Principal shall promptly, fully and faithfully perform all the undertakings, covenants, terms, conditions and agreements of said Contract during the original term of said Contract any extensions thereof that may be granted by the Principal Representative with or without notice to the Surety, and during the life of any guaranty required under the Contract, and shall also well and truly perform and fulfill all undertakings, covenants, terms, conditions and agreements of any and all duly authorized modifications of said Contract that may hereafter be made, notice of which modifications to the Surety being hereby waived, then this obligation shall be null and void; otherwise it shall remain in full force and effect.

AND THE SAID SURETY, for value received hereby stipulates and agrees that whenever the Principal shall be, and declared by the Principal Representative to be in default under said Contract, the State of Colorado having performed its obligations thereunder, the Surety may promptly remedy the default or shall promptly (1) Complete the Contract in accordance with its terms and conditions, or (2) Obtain a bid or bids for submittal to the Principal Representative for completing the Contract in accordance with its terms and conditions, and upon determination by the Principal Representative and Surety of the lowest responsible bidder, arrange for a contract between such bidder and the State of Colorado acting by and through the Principal Representative and make available as work progresses (even though there should be a default or a succession of defaults under the contract or contracts of completion arranged under this paragraph) sufficient funds to pay the cost of completion, less the balance of the contract price but not exceeding, including other costs and damages for which the Surety may be liable hereunder, the amount hereinbefore set forth. The term “balance of the contract price” as herein used shall mean the total amount payable to the Principal under the Contract and any amendments thereto, less the amount properly paid by the State of Colorado to the Contractor.

No right of action shall accrue on this bond to or for the use of any person or corporation other than the State of Colorado.

IN WITNESS WHEREOF said Principal and Surety have executed this Bond, this _____day of , A.D., _____ 20_____

(Corporate Seal)

THE PRINCIPAL

_____

ATTEST:

By: _____

_____ Title: _____

Secretary

(Corporate Seal)

SURETY

_____

By: _____

Attorney-in-fact

THIS BOND MUST BE ACCOMPANIED BY POWER OF ATTORNEY, EFFECTIVELY DATED

Note: This bond is issued simultaneously with another bond conditioned for the full and faithful payment for all labor and material of the contract.

SECTION 00 61 13.16

LABOR AND MATERIAL BOND

PART 1 - GENERAL

1.1 RELATED DOCUMENTS (Not Applicable)

1.2 SUMMARY (Not Applicable)

1.3 DEFINITIONS (Not Applicable)

1.4 LABOR AND MATERIAL BOND

A. FORM: State of Colorado form "Labor and Material Bond" (SC-6.221).

B. A copy of the above noted form is attached to the end of this section.

1.5 PROCEDURES

A. Labor and Material Bond is required for construction values of $150,000 or more.

B. This bond must be accompanied by Power of Attorney.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 00 61 13.16

(see "Labor and Material Bond" (SC-6.221) on next pages)

(see "Labor and Material Bond" (SC-6.221) on next page)

STATE OF COLORADO
OFFICE OF THE STATE ARCHITECT
STATE BUILDINGS PROGRAM

LABOR AND MATERIAL BOND

Institution/Agency: University of Colorado Denver | Anschutz Medical Campus
Project No./Name: PN 21_155291 / Fitz Bldg 5th 6th Cancer Center Paint Patch Code Reno

BONDING COMPANY: DO NOT MAKE ANY CHANGES TO THE LANGUAGE IN THIS BOND.

KNOW ALL PERSONS BY THESE PRESENTS:

That the Contractor

as Principal and hereinafter called "Principal,"

and

as Surety and hereinafter called "Surety," a corporation organized and existing under the laws of _____ are held and firmly bound unto the STATE OF COLORADO acting by and through Board of Regents of the University of Colorado, a body corporate, for and on behalf of the University of Colorado Denver, hereinafter called "Principal Representative," and to all subcontractors and any others who have supplied or furnished or shall supply or furnish materials, rental machinery, tools, or equipment actually used in the performance of the hereinafter identified Contract, or who have performed or shall perform labor in the performance of or in connection with said Contract, hereinafter called "Obligees" in the sum of _____ Dollars ($_____ _____)

together with interest at the rate of eight per cent (8%) per annum on all payments becoming due in accordance with said Contract, from the time such payments shall become due until such payment shall be made, for the payment of which, well and truly made to the Obligees, the Principal and the Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly, by these presents.

WHEREAS, the Principal and the State of Colorado acting by and through the Principal Representative have entered into a certain Contract, hereinafter called "Contract," dated _____, 20___ for the construction of a PROJECT described as

which Contract is hereby by reference made a part hereof;

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION is such that if the Principal and the Surety shall fully indemnify and save harmless the State of Colorado and the Principal Representative from and against any and all costs and damages, including patent infringements, which either may suffer by reason of any failure or failures of the Principal promptly and faithfully to perform all terms and conditions of said Contract and shall fully reimburse and repay the State of Colorado and the Principal Representative all outlay and expense which the State of Colorado and the Principal Representative may incur in making good any such failure or failures, and further, if the Principal and his subcontractors shall duly and promptly pay for any and all labor, materials, team hire, sustenance, provisions, provender, rental machinery, tools, or equipment and other supplies which have been or shall be used or consumed by said Principal or his subcontractors in the performance of the work of said Contract , and it said Principal shall duly and promptly pay all his subcontractors the sums due them for any and all materials, rental machinery, tools, or equipment and labor that have been or shall be furnished, supplied, performed or used in connection with performance of said Contract, and shall also fully indemnify and save harmless the State of Colorado and the Principal Representative to the extent of any and all expenditures which either or both of them may be required to make by reason of any failures or defaults by the Principal or any subcontractor in connection with such payments; then this obligation shall be null and void, otherwise it shall remain in full force and effect.

It is expressly understood and agreed that any alterations which may be made in the terms of said Contract or in the work to be done under said Contract, or any extension(s) of time for the performance of the Contract, or any forebearance on the part of either the State of Colorado or the Principal to any of the others, shall not in any way release the Principal and the Surety, or either of them, their heirs, executors, administrators, successors or assigns from their liability hereunder, notice to the Surety of any such alteration, extension or forbearance being hereby waived.

IN WITNESS WHEREOF, the Principal and the Surety have executed this Bond, this _____ day of _____, A.D., 20_____.

(Corporate Seal)

THE PRINCIPAL

_____

ATTEST:

By: _____

_____ Title: _____

Secretary

(Corporate Seal)

SURETY

_____

By: _____

Attorney-in-fact

THIS BOND MUST BE ACCOMPANIED BY POWER OF ATTORNEY, EFFECTIVELY DATED

Note: This bond is issued simultaneously with another bond conditioned for the full and faithful performance of the contract.

SECTION 00 62 16

CERTIFICATE OF INSURANCE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS (Not Applicable)

1.2 SUMMARY (Not Applicable)

1.3 DEFINITIONS (Not Applicable)

1.4 CERTIFICATE OF INSURANCE

A. Sample Certificate of Liability Insurance and language.

B. Sample Evidence of Property Insurance (Builder's Risk).

C. A copy of the above noted forms are attached to the end of this section.

1.5 PROCEDURE (Not Applicable)

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 00 62 16

(See samples of Certificate of Liability Insurance and Evidence of Property Insurance on next pages)

(See samples of Certificate of Liability Insurance and Evidence of Property Insurance on next pages)

ACORD®

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY)
CURRENT DATE

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER	CONTACT NAME:	
COMPANY ADDRESS CITY, STATE, ZIP CODE	PHONE (A/C, No, Ext):	FAX (A/C, No):
	E-MAIL ADDRESS:	
	INSURER(S) AFFORDING COVERAGE	NAIC #
	INSURER A :	
INSURED INSURED NAME INSURED ADDRESS INSURED CITY, STATE, ZIP CODE	INSURER B :	
	INSURER C :	
	INSURER D :	
	INSURER E :	
	INSURER F :	

COVERAGES **CERTIFICATE NUMBER:** **REVISION NUMBER:**

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
A	[X] COMMERCIAL GENERAL LIABILITY [ ] CLAIMS-MADE [X] OCCUR [X] POLLUTION LIABILITY [ ] GEN'L AGGREGATE LIMIT APPLIES PER: [ ] POLICY [X] PRO-JECT [ ] LOC [ ] OTHER:	Y		POLICY NUMBER	01/01/2019	01/01/2020	EACH OCCURRENCE DAMAGE TO RENTED PREMISES (Ea occurrence) MED EXP (Any one person) PERSONAL & ADV INJURY GENERAL AGGREGATE PRODUCTS - COMP/OP AGG 	$ 1,000,000 $ $ $ 1,000,000 $ 2,000,000 $ 2,000,000 $
B	AUTOMOBILE LIABILITY [ ] ANY AUTO [X] OWNED AUTOS ONLY [ ] SCHEDULED AUTOS [X] HIRED AUTOS ONLY [X] NON-OWNED AUTOS ONLY 	Y	Y	POLICY NUMBER	01/01/2019	01/01/2020	COMBINED SINGLE LIMIT (Ea accident) BODILY INJURY (Per person) BODILY INJURY (Per accident) PROPERTY DAMAGE (Per accident) 	$ 1,000,000 $ $ $ $
	[ ] UMBRELLA LIAB [ ] OCCUR [ ] EXCESS LIAB [ ] CLAIMS-MADE [ ] DED [ ] RETENTION $						EACH OCCURRENCE AGGREGATE 	$ $ $
D	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANYPROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? Y/N [Y] (Mandatory in NH) If yes, describe under DESCRIPTION OF OPERATIONS below	N / A	Y	POLICY NUMBER	01/01/2019	01/01/2020	[X] PER STATUTE [ ] OTH-ER E.L. EACH ACCIDENT E.L. DISEASE - EA EMPLOYEE E.L. DISEASE - POLICY LIMIT	 $ 100,000 $ 100,000 $ 500,000
E	PROFESSIONAL LIABILITY		Y	POLICY NUMBER	01/01/2019	01/01/2020	Each Occurrence Aggregate	2,000,000 2,000,000

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

The Regents of the University of Colorado, a Body Corporate are named as Additional Insured as respects General, Pollution and Automobile Liability policies.

The Automobile, Workers Compensation and Professional Liability policies are endorsed to include a Waiver of Subrogation in favor of The Regents of the University of Colorado, a Body Corporate.

CERTIFICATE HOLDER

The Regents of the University of Colorado
Attn: Project Management
1945 North Wheeling Street, Campus Mail stop F-418
Aurora, CO 80045

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

Authorized Representative Signature

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EVIDENCE OF PROPERTY INSURANCE

DATE (MM/DD/YYYY)
CURRENT TEXT

THIS EVIDENCE OF PROPERTY INSURANCE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE ADDITIONAL INTEREST NAMED BELOW. THIS EVIDENCE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS EVIDENCE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE ADDITIONAL INTEREST.

AGENCY	PHONE (A/C, No, Ext):
COMPANY ADDRESS CITY, STATE, ZIP CODE	
FAX (A/C, No):	E-MAIL ADDRESS:
CODE:	SUB CODE:
AGENCY CUSTOMER ID #:	

COMPANY
INSURANCE COMPANY

INSURED	LOAN NUMBER	POLICY NUMBER
INSURED NAME INSURED ADDRESS INSURED CITY, STATE, ZIP CODE		POLICY NUMBER
	EFFECTIVE DATE: 01/01/2019 — EXPIRATION DATE: 01/01/2020 — ☐ CONTINUED UNTIL TERMINATED IF CHECKED	
	THIS REPLACES PRIOR EVIDENCE DATED:	

PROPERTY INFORMATION

LOCATION/DESCRIPTION

LOCATION OF PROJECT

Builders Risk is required for new buildings or alterations to existing buildings

and for materials and equipment to be installed in existing structures.

THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS EVIDENCE OF PROPERTY INSURANCE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

COVERAGE INFORMATION

PERILS INSURED — ☐ BASIC ☐ BROAD ☒ SPECIAL ☐

COVERAGE / PERILS / FORMS	AMOUNT OF INSURANCE	DEDUCTIBLE
Builders Risk - 100% of Completed Value	100% Project Value	$50,000 or les

REMARKS (Including Special Conditions)

RE: Specific Project

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

ADDITIONAL INTEREST

NAME AND ADDRESS		
The Regents of the University of Colorado Attn: Project Management 1945 North Wheeling Street, Campus Mail stop F-418 Aurora, CO 80045	☒ ADDITIONAL INSURED ☐ LENDER'S LOSS PAYABLE ☐ LOSS PAYEE ☐ MORTGAGEE ☒ Waiver of Subrogation	LOAN #
		AUTHORIZED REPRESENTATIVE AUTHORIZED REPRESENTATIVE SIGNATURE

ACORD 27 (2016/03)

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SECTION 00 62 76

APPLICATION AND CERTIFICATE FOR CONTRACTORS PAYMENT FORM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for managing the contractual requirements of this Project.

B. Related Requirements:

1. Section 01 29 00 "Payment Procedures."

1.3 DEFINITIONS (Not Applicable)

1.4 FORMS

A. Application and Certification for Contractors Payment (SBP-7.2)

1. Download Link: https://drive.google.com/open?id=0ByG39KP3LPlCVHVqenlySGJlMFE .

1.5 PROCEDURE (Not Applicable)

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 00 62 76

SECTION 00 63 46

CHANGE ORDER BULLETIN

PART 1 - GENERAL

1.1 RELATED DOCUMENTS (Not Applicable)

1.2 SUMMARY

A. Section includes administrative and procedural requirements for managing the contractual requirements of this Project.

1.3 DEFINITIONS (Not Applicable)

1.4 CHANGE ORDER BULLETIN

A. State of Colorado form "Change Order Bulletin" (SC-6.311).

B. A copy of the above noted form is attached to the end of this section.

1.5 PROCEDURE (Not Applicable)

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 00 63 46

(See "Change Order Bulletin" (SC-6.311) form on next pages)

(See "Change Order Bulletin" (SC-6.311) form on next page)

STATE OF COLORADO
OFFICE OF THE STATE ARCHITECT
STATE BUILDINGS PROGRAM

CHANGE ORDER BULLETIN

Change Order Bulletin No: _____ Date _____

Contractor: _____

Institution or Agency: University of Colorado Denver | Anschutz Medical Campus

Project No./Name: PN 21_155291 / Fitz Bldg 5th 6th Cancer Center Paint Patch Code Reno

Description of Work: _____

This bulletin is issued to define the scope of revision in drawings and/or specifications for a contemplated change order. The work called for by these revisions shall be in accordance with the requirements of the original contract documents.

Please prepare and submit a proposal for the changes described below. For pricing use State Form SC-6.312. A formal change order State Form SC-6.31 will be issued after approval of your proposal by State Buildings Program and the Architect. Your proposal shall include a statement as to the effect this change will have on the time for completion of the project.

This bulletin is **NOT** an authorization to proceed.

DESCRIPTION OF CHANGE:

SPECIFICATION REVISIONS:

STATUS OF EXISTING WORK:

PREPARED BY: _____
ARCHITECT/ENGINEER OR CONTRACTOR

APPROVED BY: _____
STATE BUILDINGS PROGRAM
(or Authorized Delegate)

SECTION 00 63 53

CHANGE ORDER PROPOSAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS (Not Applicable)

1.2 SUMMARY (Not Applicable)

1.3 DEFINITIONS (Not Applicable)

1.4 CHANGE ORDER PROPOSAL

A. State of Colorado form "Change Order Proposal" (SC-6.312).

1. Download link: https://drive.google.com/file/d/1Uo7i4h3LqpByA8GUYEI5K9qne_8hSwtS/view .

B. A copy of the above noted form is attached to the end of this section.

1.5 PROCEDURE (Not Applicable)

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 00 63 53

(See "Change Order Proposal" (SC-6.312) form on next pages)

(See "Change Order Proposal" (SC-6.312) form on next pages)

STATE OF COLORADO
OFFICE OF THE STATE ARCHITECT
STATE BUILDINGS PROGRAMS

CHANGE ORDER PROPOSAL

(enter information ONLY in YELLOWED cells)

Change Order Proposal No. _____ Date _____

Change Order Bulletin No: _____

Description of Work: (enter into text box) Date _____

Contractor

Institution or Agency
University of Colorado Denver | Anschutz Medical Campus

Project No./Name PN 21_155291 / Fitz Bldg 5th 6th Cancer Center Paint Patch Code Reno

(Before completing this form, read instructions on reverse side.)

PART I -	**WORK PERFORMED BY CONTRACTOR**					
Line 1.	Direct Labor Costs		$			
Line 2.	Labor Overhead (Direct Labor Burdens)	(x Line 1)	$	0.00		
Line 3.	Total Contractor's Labor Costs (Lines 1 and 2)				$ 0.00	
Line 4.	Direct Materials Costs		$			
Line 5.	Materials Overhead (Delivery Costs & Taxes)	(x Line 4)	$	0.00		
Line 6.	Total Materials Costs (Lines 4 and 5)				$ 0.00	
Line 7.	Total Equipment Costs				$	
Line 8.	PART I - TOTAL CONTRACTOR'S L, M & E COSTS (Lines 3, 6 and 7)				**Part I** $	0.00
PART II -	**WORK PERFORMED BY SUBCONTRACTOR**					
Line 9.	Direct Labor Costs		$			
Line 10.	Labor Overhead (Direct Labor Burdens)	(x Line 9)	$	0.00		
Line 11.	Total Subcontractor's Labor Costs (Lines 9 and 10)				$ 0.00	
Line 12.	Direct Materials Costs					
Line 13.	Materials Overhead (Delivery Costs & Taxes)	(x Line 12)	$	0.00		
Line 14.	Total Subcontractor's Materials Costs (Lines 12 and 13)				$ 0.00	
Line 15.	Total Subcontractor's Equipment Costs				$	
Line 16.	Total Subcontractor's L, M & E Costs (Line 11, 14 and 15)				$ 0.00	
Line 17.	Subcontractor's Overhead (Indirect Costs)	(10.0% x Line 16)	$	0.00		
Line 18.	Subcontractor's Profit (on line 16)	Addition or Deduct	$	0.00		
Line 19.	PART II - TOTAL SUBCONTRACTOR'S COSTS (Lines 16, 17 and 18)				**Part II** $	0.00
PART III -	**CONTRACTOR'S OVERHEAD & PROFIT**					
Line 20.	Contractor's Overhead (Indirect Costs)	(10.0% x Part I Total)	$	0.00		
Line 21.	Contractor's Profit	(5.0% x Part I Total)	$	0.00		
Line 22.	PART III - TOTAL CONTRACTOR OVERHEAD & PROFIT (Lines 20 and 21)				**Part III** $	0.00
PART IV -	**CONTRACTOR'S MARKUP ON SUBCONTRACTOR**					
Line 23.	Contractor's Commission on Subcontractor	(5.0% x Part II Total)	$	0.00		
Line 24.	Contractor's Profit (on Line 19)	Addition or Deduct	$	0.00		
Line 25.	PART IV - TOTAL CONTRACTOR MARKUP ON SUBCONTRACTOR (Lines 23 and 24)				**Part IV** $	0.00
PART V -	**SUBTOTAL C.O. PROPOSAL (Parts I and II and III and IV)**				Part V (Subtotal) $	0.00
PART VI -	**CONTRACTOR'S BOND COST**	(x Part V Total)			Part VI $	0.00
PART VII -	**GRAND TOTAL CHANGE ORDER PROPOSAL (Sum of Totals: Parts V and VI)**				**Grand Total** $	**0.00**
PART VIII -	**CONTRACT TIME (CALENDAR DAYS CHANGED)**	☐ EXTENDED ☐ NO CHANGE ☐ REDUCED				Days

THE TIME OF COMPLETION MAY CHANGE BY THE CALENDAR DAYS INDICATED (ABOVE) FROM THE TOTAL NUMBER OF DAYS LISTED IN THE CONTRACTOR'S AGREEMENT TO COMPLETE THE ENTIRE PROJECT.

CONTRACTOR'S CERTIFICATE:
This is to certify that, to the best of my knowledge and belief, the cost/price data submitted in response to the listed C.O. Bulletin, are accurate, complete and current as of _____.

Firm: _____

Name & title: _____

Signature: _____

*Date: _____

ARCHITECT/ENGINEER'S CERTIFICATE:
This is to certify that I have analyzed the proposal and find, to the best of my knowledge and belief, that the proposal represents current, fair, factual and competitive cost/price data.

Firm: _____

Name & title: _____

Signature: _____

Date: _____

* The proposal shall remain in full force and effect for a period of _____ calendar days from date of signature.

STATE BUILDINGS PROGRAMS (or Authorized Delegate)

_____ Date: _____

SC-6.312 (Rev. 7/2018)

INSTRUCTIONS FOR COMPLETING "CHANGE ORDER PROPOSAL" COST/PRICE DATA SUMMARY (STATE FORM SC-6.312)

(enter information only in YELLOWED cells)

Enter Change Order Proposal Number, Date Created, Contractor's Name, Agency/Institution, State Project Number and Name.
REFERENCE: Enter Change Order Bulletin Number, Date Issued, and Description of Changes from Bulletin, noting exceptions which are listed in the Bulletin but are excluded, i.e., not priced on this form.

PART I - WORK PERFORMED BY CONTRACTOR:

Line 1. Direct Labor Costs: Fill in subtotal of direct labor costs which includes base rates plus applicable fringe benefits. On Contractor's (or Sub's) letterhead show costs as follows:

Trade	Rate		Duration		Extended Costs
	$	x		= $	0
	$	x		= $	0
			Direct Labor Cost	= $	0

Line 2. Labor Overhead (Direct Labor Burdens, etc,): Enter percentage (as submitted in Schedule of Values) of Line 1 as applicable. (Spread
Line 3. Total Contractor's Labor Costs: Total of Lines 1 and 2. (Spreadsheet calculates the total)

Line 4. Direct Material Cost: Support with quotes or invoices. Fill in subtotal of direct materials costs.
Include all delivery, handling, insurance costs, etc. On Contractor's letterhead show direct materials costs as follows:

Materials	Rate		Quantity		Extended Costs
	$	x		= $	0
	$	x		= $	0
			Direct Materials Cost	= $	0

Line 5. Materials Overhead (Delivery, taxes, insurance, etc. - as mutually agreed upon at contract signing):
Enter percentage as applicable. (Spreadsheet calculates the value)
Line 6. Total Contractor's Material Costs: Total of Lines 4 and 5. (Spreadsheet calculates the total)

Line 7. Total Contractor's Equipment Costs: Enter total equipment costs including indirect overhead costs in hourly rate - except indirect labor costs. On Contractor's letterhead show total equipment costs as follows:

Equipment	Rate		Duration		Extended Costs
	$	x		= $	0
	$	x		= $	0
			Total Equipment Cost	= $	0

Line 8. TOTAL CONTRACTOR'S Labor, Materials & Equipment (L, M & E) Costs: Add Lines 3, 6 and 7 of Part I.
(Spreadsheet form calculates totals)

PART II - WORK PERFORMED BY SUBCONTRACTOR:

Line 9. Direct Labor Costs: See Line 1 instructions.
Line 10. Labor Overhead (Direct Labor Burdens, etc,): Enter percentage (as submitted in Schedule of Values) of Line 9 as applicable. (Spreadsheet calculates the value)
Line 11. Total Contractor's Labor Costs: Total of Lines 9 and 10. (Spreadsheet calculates the total)
Line 12. Direct Material Cost: See Line 4 instructions.
Line 13. Materials Overhead (Delivery, taxes, insurance, etc.) Enter percentage as applicable. (Spreadsheet calculates the value)
Line 14. Total Subcontractor's Material Costs: Total of Lines 12 and 13. (Spreadsheet calculates the total)
Line 15. Total Subcontractor's Equipment Costs: See Line 7 instructions.
Line 16. TOTAL SUBCONTRACTOR'S Labor, Materials & Equipment (L, M & E) Costs: Add Lines 11, 14 and 15 of Part II.
Line 17. Subcontractor's Overhead (Indirect costs). Edit percentage of Line 16 if applicable - See Article 35 of General Conditions.
Line 18. Subcontractor's Profit: Enter a "1" in appropriate cell. For an addition, Edit E37, a deduct, Edit I37, See Article 35 General Conditions
Line 19. TOTAL SUBCONTRACTOR'S Labor, Materials & Equipment (L, M & E) Costs: Add Lines 16, 17 and 18 of Part II.

PARTS III THROUGH VIII - CERTIFICATIONS - Self Explanatory.

Part 3. Edit percentages for Line 20 or 21 if applicable. See Article 35 of General Conditions.
Part 4. Line 23, Edit percentages applicable to Line 18. See Article 35 of General Conditions.
Part 4. Line 24, Enter a "1" in appropriate cell. For an addition, edit E45, a deduct edit I45. See Article 35 of General Conditions.
Part 5. SUBTOTAL OF CHANGE ORDER PROPOSAL (sum of lines 8, 19, 22, and 25 - applicable)
Part 6. Contractor's Bond Cost: Enter percentage value of Part 5 as applicable. (spreadsheet calculates the value)
Part 7. GRAND TOTAL OF THE CHANGE ORDER PROPOSAL. (spreadsheet calculates the sum of parts 5 and 6)
Part 8. Contract time change. Place an "X" in appropriate cell and edit the cell to indicate the number of days changed.

A. The Contractor, who prepares this proposal form, certifies the cost/price data by signing, dating, and forwarding same to the Architect/Engineer (or Consultant) for further action.

B. The Architect/Engineer (or Consultant) reviews and analyzes the cost/price data for the requirements that these are: 1) currently prevalent, 2) reasonably fair, 3) factually applicable, and 4) equivalently competitive market selling prices. The Architect/Engineer (or Consultant) may negotiate - after receipt of the cost proposal - any or all of the cost elements of the proposal to support a recommendation of acceptance to the Principal Representative. Certification by the A/E (or Consultant) of the above requirements is made upon his signature. The Architect/Engineer (or Consultant) forwards the proposal with the supporting back-up to the Agency.

C. Authority for the Institution or Agency (usually the Principal Representative) reviews the proposal, signs, dates, and forwards to Office of the State Architect for final action.

D. State Buildings Division reviews the cost proposal, with all supporting back-up, for technical and procedural requirements and, if in order, signs and dates the proposal.

SC-6.312 (Rev 7/2018)

SECTION 00 63 58.02

CHANGE ORDER LOG (CM/GC)

PART 1 - GENERAL

1.1 RELATED ITEMS (Not Applicable)

1.2 SUMMARY (Not Applicable)

1.3 DEFINITIONS (Not Applicable)

1.4 CHANGE ORDER LOG

A. State of Colorado form "Change Order Log (CM/GC)."

B. A copy of the above noted form is attached to the end of this section.

1.5 PROCEDURE (Not Applicable)

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 00 63 58.02

(See "Change Order Log (CM/GC)" form on next pages)

(See "Change Order Log (CM/GC)" form on next pages)

STATE BUILDINGS AND REAL ESTATE PROGRAMS
CHANGE ORDER MANAGEMENT
CHANGE ORDER LOG (CM/GC)

Project #: PN 21_155291
Project Title: Fitz Bldg 5th 6th Cancer Center Paint Patch Code Reno
Contractor:

Amend or CO NO.	COP NO.	COB NO.	INITIATION DATE	INITIATOR O	A	C	DESCRIPTION	VALUE ADDED	CONT CODE	PENDING COST	IMPACT COST (OC)	COST (CC)	TIME	STATUS	REASON FOR CHANGE	RESOLUTION / COMMENTS

SECTION 00 63 63

CHANGE ORDER

PART 1 - GENERAL

1.1 RELATED DOCUMENTS (Not Applicable)

1.2 SUMMARY (Not Applicable)

1.3 DEFINITIONS (Not Applicable)

1.4 CHANGE ORDER

A. State of Colorado form "Change Order" (SC-6.31).

B. A copy of the above noted form is attached to the end of this section.

1.5 PROCEDURE (Not Applicable)

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 00 63 63

(See "Change Order" (SC-6.31) form on next pages)

(See "Change Order" (SC-6.31) form on next pages)

STATE OF COLORADO
OFFICE OF THE STATE ARCHITECT
STATE BUILDINGS PROGRAM

CHANGE ORDER

Change Order No: _____ Contract ID No. _____ Date _____

Contractor: _____

Institution or Agency: University of Colorado Denver | Anschutz Medical Campus

Project No./Name: PN 21_155291 / Fitz Bldg 5th 6th Cancer Center Paint Patch Code Reno

Your Change Order Proposal(s), dated _____ is hereby being designated for approval of the following work:

(Note: If more space is needed for description of work, attach additional 8-1/2" x 11" sheets hereto.)

This change order was originated by the Contractor ☐, Architect/Engineer ☐, State ☐, and I/We do hereby recommend acceptance and approval of the change to the Contractor's Agreement Dated _____ which is by this reference, made a part hereof, and identified as Exhibit _____ with an increase ☐, a decrease ☐, no change ☐, of $_____.

The Time of Completion is extended _____ calendar days ☐, is unchanged ☐, is reduced ☐ calendar days, from the total number of days listed in the Contractor's Agreement to complete the entire Project. The revised total number of days to complete the entire Project aggregating this Change Order and previously approved Change Order(s) per the Summary of Changes chart below, is _____ calendar days. If the completion date was extended or reduced, the new completion date of the Project is _____ (M/D/YYYY).

SUMMARY OF CHANGES			
	Description of Work/Date	Time of Completion/ Calendar Days Extended/Reduced	Dollar Amounts
Original Contract			
Change Order #1			
Change Order #2			
Current Totals			

*Persons signing for Architect/Engineer/Contractor hereby swear and affirm that they are authorized to act on Architect/Engineer/Contractor's behalf and acknowledge that the State is relying on their representations to that effect. **Principal is not a recognized title and will not be accepted.**

Architect/Engineer Firm	Name and Title (print) Signature		Date
Contractor (Name of Firm)	Name and Title (print) Signature		Date
Institution or Agency	Name and Title (print)	Principal Representative (Signature)	Date

CONTRACT STATUS

Original Contract Value	
Previous increases by CO/Amend	
Previous decreases by CO/Amend	
Value After Prior CO's/Amend	
This CO/Amend Increases ☐ Decreases ☐	
CURRENT CONTRACT VALUE	

STATE BUILDINGS PROGRAM (or Authorized Delegate)	DATE
STATE CONTROLLER (or Authorized Delegate)	DATE

(Verification)

SECTION 00 63 64.06

CONTRACT AMENDMENT (CM/GC)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS (Not Applicable)

1.2 SUMMARY (Not Applicable)

A. Section includes administrative and procedural requirements for managing the contractual requirements of this Project.

1.3 DEFINITIONS (Not Applicable)

1.4 CHANGE ORDER BULLETIN

A. State of Colorado form "Contract Amendment (CM/GC)" (SC-6.0B).

B. A copy of the above noted form is attached to the end of this section.

1.5 PROCEDURE (Not Applicable)

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 00 63 64.06

(See Contract Amendment (CM/GC)" (SC-6.0B) form on next pages)

(See Contract Amendment (CM/GC)" (SC-6.0B) form on next pages)

STATE OF COLORADO
OFFICE OF THE STATE ARCHITECT
STATE BUILDINGS PROGRAM

CONTRACT AMENDMENT (Construction Manager/General Contractor)

Amendment No: _____ Contract ID No.: _____

Contractor: _____

Institution or Agency: University of Colorado Denver | Anschutz Medical Campus

Project No./Name: PN 21_155291 / Fitz Bldg 5th 6th Cancer Center Paint Patch Code Reno

PARTIES. THIS AMENDMENT is entered into by and between the STATE OF COLORADO, acting by and through the _____, Principal Representative, hereinafter referred to as the State, and _____ having its offices at _____ hereinafter referred to as the Contractor.

EFFECTIVE DATE AND NOTICE OF NONLIABILITY. This Amendment shall not be effective or enforceable until it is approved and signed by the State Controller or its designee (hereinafter called the "Effective Date"), but shall be effective and enforceable thereafter in accordance with its provisions. The State shall not be liable to pay or reimburse Contractor for any performance hereunder or be bound by any provision hereof prior to the Effective Date.

FACTUAL RECITALS

Authority exists in the Law and Funds have been budgeted, appropriated, and otherwise made available and a sufficient unencumbered balance thereof remains available for payment.

Required approval, clearance, and coordination has been accomplished from and with appropriate agencies; and

[Statement of facts/reasons for the Amendment]

NOW THEREFORE, it is hereby agreed that

1. Consideration for this Amendment consists of the payments, which shall be made pursuant to this Amendment and the promises, and agreements herein set forth.

2. It is expressly agreed by the parties that this Amendment is supplemental to the original contract, as amended (_____), *collectively** referred to as the original contract, which is, by this reference incorporated herein, that all terms, conditions, and provisions thereof, unless specifically modified herein, are to apply to this Amendment as though they were expressly re-written, incorporated, and included herein. *(*Note: only use this language if creating Amendment #2 or higher)*

3. It is agreed the original contract is and shall be modified, altered, and changed in the following respects only:

   a.
   b.
   c.

SUMMARY OF CHANGES					
	Pre-Const. Services Fee	Construction Services Fee	General Conditions Fee	Direct Cost of Work	Dollar Amount
Original Contract/Date					
Amendment #1/Date					
Amendment #2/Date					
Contract Sum (To Date):					

Guaranteed Maximum Price (To Date):	
Fixed Limit of Construction Cost (To Date):	

4. Except with respect to the "Special Provisions," in the event of any conflict, inconsistency, variance, or contradiction between the provisions of this Amendment and any of the provisions of the original contract, the provisions of this Amendment shall in all respects supersede, govern, and control. The "Special Provisions" shall always be controlling over other provisions in the contract or Amendments. The factual representations in the "Special Provisions" concerning the absence of bribery or corrupt influences and personal interest of State employees are presently reaffirmed.

PART 1 - 5. FINANCIAL OBLIGATIONS OF THE STATE PAYABLE AFTER THE CURRENT FISCAL YEAR ARE CONTINGENT UPON FUNDS FOR THAT PURPOSE BEING APPROPRIATED, BUDGETED, AND OTHERWISE MADE AVAILABLE.

6. THIS AMENDMENT SHALL NOT BE DEEMED VALID UNTIL IT SHALL HAVE BEEN APPROVED BY THE CONTROLLER OF THE STATE OF COLORADO OR SUCH ASSISTANT AS SHE OR HE MAY DESIGNATE.

THE PARTIES HERETO HAVE EXECUTED THIS CONTRACT

Persons signing for Contractor/Consultant hereby swear and affirm that they are authorized to act on Contractor's behalf and acknowledge that the State is relying on their representations to that effect. **Principal is not a recognized title and will not be accepted.**

Project Name/Number: PN 21_155291 / Fitz Bldg 5th 6th Cancer Center Paint Patch Code Reno
Contract ID No.: _____

THE CONTRACTOR/CONSULTANT:

_____
Legal Name of Contracting Entity

_____
*Signature

By _____
Name (print) Title

Date: _____

STATE OF COLORADO, acting by and through:
(Insert Name of Agency or IHE)

By: _____
(Insert Name & Title of Principal Representative for Agency or IHE)

Date: _____

APPROVED
DEPARTMENT OF PERSONNEL & ADMINISTRATION
STATE BUILDINGS PROGRAM
State Architect (or authorized Delegate)

By: _____
(Insert Name of Authorized Individual)

Date: _____

APPROVED
DEPARTMENT OF LAW
ATTORNEY GENERAL (or authorized Delegate)

By: _____
Insert Name of Authorized Individual)

Date: _____

ALL CONTRACTS MUST BE APPROVED BY THE STATE CONTROLLER:

CRS §24-30-202 requires the State Controller to approve all State Contracts. This Contract is not valid until signed and dated below by the State Controller or delegate. Contractor is not authorized to begin performance until such time. If Contractor begins performing prior thereto, the State of Colorado is not obligated to pay Contactor for such performance or for any goods and/or services provided hereunder.

APPROVED:
STATE OF COLORADO
STATE CONTROLLER'S OFFICE
State Controller (or authorized Delegate)

By: _____
(Insert Name & Title of Authorized Individual)

Date: _____

SECTION 00 65 15

NOTICE OF PARTIAL SUBSTANTIAL COMPLETION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS (Not Applicable)

1.2 SUMMARY

A. Section includes administrative and procedural requirements for managing the contractual requirements of this Project.

1.3 DEFINITIONS (Not Applicable)

1.4 NOTICE OF PARTIAL SUBSTANTIAL COMPLETION

A. State of Colorado form "Notice of Partial Substantial Completion" (SPB-071).

B. A copy of the above noted form is attached to the end of this section.

1.5 PROCEDURE (Not Applicable)

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 00 65 15

(See "Notice of Partial Substantial Completion" (SPB-071) form on next pages)

(See "Notice of Partial Substantial Completion" (SPB-071) form on next pages)

STATE OF COLORADO
OFFICE OF THE STATE ARCHITECT
STATE BUILDINGS PROGRAM

NOTICE OF PARTIAL SUBSTANTIAL COMPLETION

Date of Partial Substantial Completion: _____
Date to be inserted by the Principal Representative

Institution/Agency: University of Colorado Denver | Anschutz Medical Campus

Project No./Name: PN 21_155291 / Fitz Bldg 5th 6th Cancer Center Paint Patch Code Reno

TO:

Principal Representative

and

Contractor

This is to advise you that the Work has been reviewed, inspected and determined, to the best knowledge, information and belief of the Architect/Engineer, to be substantially complete as of the date noted above in accordance with the criteria outlined in Article 41 of The General Conditions of the Contract in SC-6.23 and SC-8.1 or Article 17.3 in SC-6.4 and the Specifications, including without limitation a) suitable for occupancy, b) inspected for code compliance with Building Inspection Records signed by code officials for the State, c) determined to be fully and comfortably usable, and d) fully cleaned and appropriate for presentation to the public.

A punch list of work to be completed, work not in compliance with the Drawings or Specifications, and unsatisfactory work is attached hereto, along with the Contractor's schedule for the completion of each and every item identified on the punch list specifying the Subcontractor or trade responsible for the work, and the dates the completion or correction will be commenced and finished within any period indicated in the Agreement for punch list completion prior to Final Acceptance.

Except as stated on the reverse side of this Notice of Partial Substantial Completion, all manufacturers' warranties, other special warranties and the Contractor's one-year obligation to perform remedial work, shall commence on the Date of Substantial Completion noted above.

This Notice of Partial Substantial Completion shall be effective and establish the Date of Substantial Completion only when fully executed on the reverse by the Contractor and the Principal Representative. The Principal Representative accepts the Work as substantially complete as of the Date of Substantial Completion herein noted. The Contractor agrees to complete or correct the Work identified on the attached punch list and to do so in accordance with attached punch list completion schedule

Architect/Engineer	Date	Contractor	Date
State Buildings Program (or Authorized Delegate)	Date	Principal Representative (Institution or Agency)	Date

The responsibilities of the Principal Representative and the Contractor for security, maintenance, heat, utilities, and insurance shall be as specified in the Contract Documents or as otherwise hereafter noted:

Exceptions, if any, to the commencement of warranties shall be:

The attached final punch list consists of ____ pages, and the attached Contractor's schedule showing the dates of commencement and completion of each punch list item consists of ____ pages.

When completely executed, this form shall be sent to the Contractor and the Principal Representative with a copy to State Buildings Program.

SECTION 00 65 16

NOTICE OF SUBSTANTIAL COMPLETION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS (Not Applicable)

1.2 SUMMARY

A. Section includes administrative and procedural requirements for managing the contractual requirements of this Project.

1.3 DEFINITIONS (Not Applicable)

1.4 CHANGE ORDER BULLETIN

A. State of Colorado form "Notice of Substantial Completion" (SPB-07).

B. A copy of the above noted form is attached to the end of this section.

1.5 PROCEDURE (Not Applicable)

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 00 65 16

(See "Notice of Substantial Completion" (SPB-07) form on next pages)

(See "Notice of Substantial Completion" (SPB-07) form on next pages)

STATE OF COLORADO
OFFICE OF THE STATE ARCHITECT
STATE BUILDINGS PROGRAM

NOTICE OF SUBSTANTIAL COMPLETION

Date of Substantial Completion: _____
Date to be inserted by the Principal Representative

Institution/Agency: University of Colorado Denver | Anschutz Medical Campus

Project No./Name: PN 21_155291 / Fitz Bldg 5th 6th Cancer Center Paint Patch Code Reno

TO:

Principal Representative

and

Contractor

This is to advise you that the Work has been reviewed, inspected and determined, to the best knowledge, information and belief of the Architect/Engineer, to be substantially complete as of the date noted above in accordance with the criteria outlined in Article 41 of The General Conditions of the Contract in SC-6.23 and SC-8.1 or Article 17.3 in SC-6.4 and the Specifications, including without limitation a) suitable for occupancy, b) inspected for code compliance with Building Inspection Records signed by code officials for the State, c) determined to be fully and comfortably usable, and d) fully cleaned and appropriate for presentation to the public.

A punch list of work to be completed, work not in compliance with the Drawings or Specifications, and unsatisfactory work is attached hereto, along with the Contractor's schedule for the completion of each and every item identified on the punch list specifying the Subcontractor or trade responsible for the work, and the dates the completion or correction will be commenced and finished within any period indicated in the Agreement for punch list completion prior to Final Acceptance.

Except as stated on the reverse side of this Notice of Substantial Completion, all manufacturers' warranties, other special warranties and the Contractor's one-year obligation to perform remedial work, shall commence on the Date of Substantial Completion noted above.

This Notice of Substantial Completion shall be effective and establish the Date of Substantial Completion only when fully executed by the Contractor and the Principal Representative. The Principal Representative accepts the Work as substantially complete as of the Date of Substantial Completion herein noted. The Contractor agrees to complete or correct the Work identified on the attached punch list and to do so in accordance with attached punch list completion schedule

Architect/Engineer	Date	Contractor	Date
State Buildings Program (or Authorized Delegate)	Date	Principal Representative (Institution or Agency)	Date

The responsibilities of the Principal Representative and the Contractor for security, maintenance, heat, utilities, and insurance shall be as specified in the Contract Documents or as otherwise hereafter noted:

Exceptions, if any, to the commencement of warranties shall be:

The attached final punch list consists of ____ pages, and the attached Contractor's schedule showing the dates of commencement and completion of each punch list item consists of ____ pages.

When completely executed, this form shall be sent to the Contractor and the Principal Representative with a copy to State Buildings Program.

SECTION 00 65 19.01

BUILDING INSPECTION RECORD

PART 1 - GENERAL

1.1 RELATED DOCUMENTS (Not Applicable)

1.2 SUMMARY (Not Applicable)

1.3 DEFINITIONS (Not Applicable)

1.4 BUILDING INSPECTION RECORD

A. State of Colorado form "Notice of Substantial Completion" (SBP-BIR).

B. A copy of the above noted form is attached to the end of this section.

1.5 PROCEDURE

A. The University Project Manager will request building permits and provide to Contractor.

B. Permits issued outside of the University jurisdiction are the responsibility of the contractor.

C. Paper copy of the Building Inspection Record (BIR) is required to be kept at the construction site at all times. After final signoff by Building Inspector, return paper copy to University Project Manager. Project Manager is responsible for final signoff on the BIR before the Building Department can close the permit.

D. Contractor is responsible for requesting all University Building Inspector requests through the University's MyCityInspector website platform.

E. Use the following login page for requesting inspections: https://ucdenver.mycityinspector.com .

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 00 65 19.01

(See "Notice of Substantial Completion" (SBP-BIR) form on next pages)

(See "Notice of Substantial Completion" (SBP-BIR) form on next pages)

STATE OF COLORADO
OFFICE OF THE STATE ARCHITECT
STATE BUILDINGS PROGRAM

BUILDING INSPECTION RECORD

Institution or Agency: University of Colorado Denver | Anschutz Medical Campus
Project No./Name: PN 21_155291 / Fitz Bldg 5th 6th Cancer Center Paint Patch Code Reno

Building Official/Code Review Agent: _____
Architect/Engineer: _____
Contractors:
General: _____
Electrical: _____
Mechanical: _____
Plumbing: _____
Notice to Proceed Date: _____

Type of Construction: _____
Occupancy Classifications: _____
Project Manager: _____
Project Manager Signature At Completion: _____
Inspector of Record Signature at Completion: _____
BIR Completion Date: _____

Provide If Checked

*** No work shall be concealed or covered until the appropriate inspector has inspected and approved.**

	Building (Consultant)	**Date**	**Inspector/ICC#**	**Comments or Corrections**
☐	Footings/Foundations			
☐	Concrete Slab / Under-Floor			
☐	Framing (after rough elec/mech/plumb)			
☐	Lath and Gypsum Board			
☐	Fire-Resistant Penetrations			
☐	Mechanical/Energy Efficiency			
☐	Roofing			
☐	Other			
☐	Final			
	Special (Consultant)	**Date**	**Inspector**	**Comments or Corrections**
☐	Steel			
☐	Concrete			
☐	Masonry			
☐	Wood			
☐	Soils/Foundations			
☐	Spray-Applied Fireproofing			
☐	Smoke Control Systems			
☐	Other			
	Elevator Inspection (State)	**Date**	**Inspector**	**Comments or Corrections**
☐	Final			
	Electrical (Co. St. Electrical Bd.)	**Date**	**Inspector**	**Comments or Corrections**
☐	Underground			
☐	Rough Walls			
☐	Rough Ceilings			
☐	Final			

	Plumbing (Co. Ex. Bd. of Plumbers)	**Date**	**Inspector**	**Comments or Corrections**
☐	Underground			
☐	Gas			
☐	Inside Water			
☐	Final			
	Fire Department Inspection (Local)	**Date**	**Inspector**	**Comments or Corrections**
☐	Fire Sprinkler System			
☐	Fire Alarm System			
☐	Other			
☐	Final			
	Health Dept. Inspection (Local)	**Date**	**Inspector**	**Comments or Corrections**
☐	Final			
	Boiler Inspection (State)	**Date**	**Inspector**	**Comments or Corrections**
☐	New Installation			
☐	Repair or Alteration			
☐	Final			

Place this card in an obvious, protected location, along with all related inspection reports and documents.

615-92-53-7997

SECTION 00 65 19.03

NOTICE OF APPROVAL OF OCCUPANCY/USE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS (Not Applicable)

1.2 SUMMARY (Not Applicable)

1.3 DEFINITIONS (Not Applicable)

1.4 NOTICE OF APPROVAL OF OCCUPANCY/USE

A. State of Colorado form "Notice of Approval of Occupancy/Use" (SBP-01).

B. A copy of the above noted form is attached to the end of this section.

1.5 PROCEDURE

PART 2 - PRODUCTS (Not (Not Applicable)Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 00 65 19.03

(See "Notice of Approval of Occupancy/Use" (SBP-01) form on next pages)

(See "Notice of Approval of Occupancy/Use" (SBP-01) form on next pages)

STATE OF COLORADO
OFFICE OF THE STATE ARCHITECT
STATE BUILDINGS PROGRAM

NOTICE OF APPROVAL OF OCCUPANCY/USE

Date of Occupancy: _____
Date to be inserted by the Architect/Engineer after consulation with Principal Representative

Institution/Agency: University of Colorado Denver | Anschutz Medical Campus

Project No./Name: PN 21_155291 / Fitz Bldg 5th 6th Cancer Center Paint Patch Code Reno

Portion(s) of project for which occupancy is approved:

Type of Occupancy: ☐ Total or ☐ Partial

The items identified below if applicable must be completed with before Occupancy is approved.

Date Completed	A/E Signoff	
		1. The Notice of Substantial Completion has been issued and the Building Inspection Record is completely signed-off and attached.
		2a. Notification has been made to the local Fire Department concerning which portion(s) of the building will be occupied and the date(s).
		2b. Fire alarms, smoke detection systems and building fire sprinkler systems have been fully checked and are operable.
		2c. The building's fire connections must be installed and operable, if applicable.
		3. Coordination for final utility and service connections and meters (water, gas, sewer, electricity and telecommunication) has been made and systems are in full operating order.
		4. Sterilization of plumbing systems has been performed.
		5. Operational test of systems and equipment has been performed as required.
		6. Systems adjustments such as balancing, equipment operations, etc., have been performed. Reports have been submitted to the Architect/Engineer for approval.
		7. Principal Representative furnished equipment and furnishings are coordinated and placed.
		8. All elements left unfinished must be in such condition that there would be no hazard to the health or safety of the occupants.
		9. All restroom facilities must be fully functional and operable.
		10. All light fixtures must be installed and operable.

		11. All exit lights and emergency lighting systems have been checked and are operable.
		12. All windows have been glazed and hardware is available for ventilation purposes.
		13. All routes of egress must be clear of construction materials and debris at all times.
		14. There must be a means of pedestrian access to each building. Contractor must have sidewalks installed before occupancy and pedestrian barricades and other means of public protection as required.

Occupancy does not constitute acceptance of the project as being complete. It simply provides the Principal Representative the opportunity to occupy/use the project or the applicable portion thereof prior to final completion and acceptance. Occupants can expect to be impacted by the Contractor's efforts to complete the project. The Contractor would not repair any damage caused by the occupants.

Architect/Engineer	Date	Principal Representative (Institution or Agency)	Date
State Buildings Program (or Authorized Delegate)	Date	Contractor	Date

SECTION 00 65 19.23

PRE-ACCEPTANCE CHECKLIST

PART 1 - GENERAL

1.1 RELATED DOCUMENTS (Not Applicable)

1.2 SUMMARY (Not Applicable)

1.3 DEFINITIONS (Not Applicable)

1.4 PRE-ACCEPTANCE CHECKLIST

A. State of Colorado form "Pre-Acceptance Checklist" (SBP-05).

B. A copy of the above noted form is attached to the end of this section.

1.5 PROCEDURE (Not Applicable)

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 00 65 19.23

(See "Pre-Acceptance Checklist" (SBP-05) form on next pages)

(See "Pre-Acceptance Checklist" (SBP-05) form on next page)

STATE OF COLORADO
OFFICE OF THE STATE ARCHITECT
STATE BUILDINGS PROGRAMS

PRE-ACCEPTANCE CHECKLIST*

Institution or Agency: University of Colorado Denver | Anschutz Medical Campus Final Punch List Date _____
Architect/Engineer: _____
Contractor: _____
Project No./Name: PN 21_155291 / Fitz Bldg 5th 6th Cancer Center Paint Patch Code Reno

After Contractor is satisfied that work is complete as per Notice of Substantial Completion Punch List, a date for final review is established. Architect/Engineer inspection is made with Contractor(s) and Principal Representative and State Buildings Programs (SBP) present. Forms are processed as required.

	DATE COMPLETED	A/E SIGNOFF	REMARKS
1. The Notice of Approval of Occupancy/Use has been fully executed.			
2. Schedule for corrections, deficiencies, and items to be supplied are established by Contractor.			
3. Final Change Orders are processed (work must be completed prior to Notice of Acceptance).			
4. Punch list work is completed and accepted			
5. Permanent keying, keys and keying instructions have been performed.			
6. Extra materials as per specifications are delivered to Principal Representative.			
7. As-built drawings have been submitted to Architect/Engineer.			
8. Guarantee/Warranty documentation requirements are met.			
9. Five Most Costly Goods form is completed by Contractor and received			
10. Removal of Contractor's temporary work including cleanup and debris removal.			
11. State personnel are instructed in system and equipment operations as required by contract.			
12. All Instructions, manuals, guides, and charts have been transmitted to Principal Representative.			

Architect/Engineer _____ Date _____

Contractor _____ Date _____

State Buildings Programs (or Authorized Delegate) _____ Date _____

Principal Representative (Institution or Agency) _____ Date _____

SECTION 00 65 19.25

NOTICE OF PARTIAL FINAL ACCEPTANCE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

1.2 SUMMARY

1.3 DEFINITIONS

1.4 NOTICE OF PARTIAL FINAL ACCEPTANCE

A. State of Colorado form "Notice of Partial Final Acceptance" (SC-6.271).

B. A copy of the above noted form is attached to the end of this section.

1.5 PROCEDURE (Not Applicable)

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 00 65 19.25

(See "Notice of Partial Final Acceptance" (SC-6.271) form on next pages)

(See "Notice of Partial Final Acceptance" (SC-6.271) form on next pages)

STATE OF COLORADO
OFFICE OF THE STATE ARCHITECT
STATE BUILDINGS PROGRAM

NOTICE OF PARTIAL FINAL ACCEPTANCE

Date of Notice of Partial Acceptance: _____

Date to be inserted by A/E after consultation with the Principal Representative

Institution/Agency: University of Colorado Denver | Anschutz Medical Campus

Project No./Name: PN 21_155291 / Fitz Bldg 5th 6th Cancer Center Paint Patch Code Reno

Portion(s) of Project for which final acceptance is approved:

TO:

Notice is hereby given that the State of Colorado, acting by and through the _____, accepts as complete* the above numbered project.

State Buildings Program (or Authorized Delegate)	Date	Principal Representative (Institution or Agency)	Date

*When completely executed, this form is to be sent by certified mail to the Contractor by the Principal Representative.

SECTION 00 65 19.26

NOTICE OF FINAL ACCEPTANCE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS (Not Applicable)

1.2 SUMMARY (Not Applicable)

1.3 DEFINITIONS (Not Applicable)

1.4 NOTICE OF FINAL ACCEPTANCE

A. State of Colorado form "Notice of Final Acceptance" (SBP-6.27).

B. A copy of the above noted form is attached to the end of this section.

1.5 PROCEDURE (Not Applicable)

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 00 65 19.26

(See "Notice of Final Acceptance" (SBP-6.27) form on next pages)

(See "Notice of Final Acceptance" (SBP-6.27) form on next page)

STATE OF COLORADO
OFFICE OF THE STATE ARCHITECT
STATE BUILDINGS PROGRAM

NOTICE OF FINAL ACCEPTANCE

Date of Notice of Acceptance: _____
Date to be inserted by A/E after consultation with the Principal Representative

Institution/Agency: University of Colorado Denver | Anschutz Medical Campus

Project No./Name: PN 21_155291 / Fitz Bldg 5th 6th Cancer Center Paint Patch Code Reno

TO:

Notice is hereby given that the State of Colorado, acting by and through the _____, accepts as complete* the above numbered project.

State Buildings Program (or Authorized Delegate)	Date	Principal Representative (Institution or Agency)	Date

*When completely executed, this form is to be sent by **certified mail** to the Contractor by the Principal Representative or delivered by any other means to which the parties agree.

SECTION 00 65 19.30

NOTICE OF CONTRACTOR'S SETTLEMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

1.2 SUMMARY

1.3 DEFINITIONS

1.4 NOTICE OF CONTRACTOR' S SETTLEMENT

A. State of Colorado form "Notice of Contractor' s Settlement" (SBP-7.3).

B. A copy of the above noted form is attached to the end of this section.

1.5 PROCEDURE

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 00 65 19.30

(See "Notice of Contractor' s Settlement" (SBP-7.3) form on next pages)

(See "Notice of Contractor' s Settlement" (SBP-7.3) form on next pages)

STATE OF COLORADO
OFFICE OF THE STATE ARCHITECT
STATE BUILDINGS PROGRAM

NOTICE OF CONTRACTOR'S SETTLEMENT

Institution/Agency: University of Colorado Denver | Anschutz Medical Campus
Notice Number:
Project No./Title: PN 21_155291 / Fitz Bldg 5th 6th Cancer Center Paint Patch Code Reno

Notice is hereby given that on *date* at *address* Colorado, final settlement will be made by the STATE OF COLORADO with *vendor name*, hereinafter called the "CONTRACTOR", for and on account of the contract for the construction of a PROJECT as referenced above.

1. Any person, co-partnership, association or corporation who has an unpaid claim against the said project, for or on account of the furnishing of labor, materials, team hire, sustenance, provisions, provender, rental machinery, tools. or equipment and other supplies used or consumed by such Contractor or any of his subcontractors In or about the performance of said work, may at any time up to and including said time of such final settlement, file a verified statement of the amount due and unpaid on account of such claim

2. All such claims shall be filed with the Authority for College, Institution, Department or Agency.

3. Failure on the part of a creditor to file such statement prior to such final settlement will relieve the State of Colorado from any and all liability for such claim

Authorized Facility Manager or Authorized Individual

Name: _____
Approval Date: _____
Agency: _____
Phone: _____
Fax: _____
Email: _____

MEDIA OF PUBLICATION:

PUBLICATION DATES:
First:

Second: (At least ten (10) days prior to above settlement date)

NOTES TO EDITOR:

Transmit two (2) copies of the Affidavit of Publication, and invoice, to:

SECTION 00 72 54

CONTRACT GENERAL CONDITIONS (CM/GC)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS (Not Applicable)

1.2 SUMMARY

A. Section includes administrative and procedural requirements for managing the contractual requirements of this Project.

1.3 DEFINITIONS (Not Applicable)

1.4 CONTRACT GENERAL CONDITIONS FOR CM/GC AGREEMENT

A. State of Colorado form "The General Conditions of the Construction Manager/General Contractor (CM/GC) Agreement" (SC-6.51) dated 7/2021.

B. A copy of the above noted document is attached to the end of this section.

1.5 PROCEDURE (Not Applicable)

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 00 72 54

(See "The General Conditions of the Construction Manager/General Contractor (CM/GC) Agreement" (SC-6.51) form on next pages)

(See "The General Conditions of the Construction Manager/General Contractor (CM/GC) Agreement" (SC-6.51) form on next pages)

STATE OF COLORADO
OFFICE OF THE STATE ARCHITECT
STATE BUILDINGS PROGRAM

THE GENERAL CONDITIONS OF THE CONSTRUCTION MANAGER/GENERAL CONTRACTOR (CM/GC) AGREEMENT

(STATE FORM SC 6.51)

STATE OF COLORADO
OFFICE OF THE STATE ARCHITECT
STATE BUILDINGS PROGRAM

THE GENERAL CONDITIONS OF THE CONSTRUCTION MANAGER/GENERAL CONTRACTOR (CM/GC) AGREEMENT

(STATE FORM SC-6.51)

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STATE OF COLORADO
OFFICE OF THE STATE ARCHITECT
STATE BUILDINGS PROGRAM

THE GENERAL CONDITIONS OF THE CONSTRUCTION MANAGER/GENERAL CONTRACTOR (CM/GC) AGREEMENT

(STATE FORM SC-6.51)

ARTICLE 1. DEFINITIONS

A. CONTRACT DOCUMENTS

The Contract Documents consist of the following some of which are procedural documents used in the administration and performance of the Agreement:

1. Construction Manager/General Contractor (CM/GC) Agreement; (SC-6.5.);
   - 1.1 Construction Manager's Fee Proposal, All Appendices, Addenda and Clarifications
   - 1.2 The Request for Proposals, All Appendices, Addenda and Clarifications;
2. Performance Bond (SC-6.22) and Labor and Material Payment Bond (SC-6.221);
3. These General Conditions of the Construction Manager/General Contractor (CM/GC) Agreement (SC- 6.5.1) and if applicable, Supplementary General Conditions;
4. Drawings, including all addenda issued prior to the Notice to Proceed to Commence Construction Phase (SBP-8.261);
5. Change Orders (SC-6.31) and Amendments (SC-6.0B), if any, when properly executed;
6. Notice of Award (SBP-6.15);
7. Builder's Risk insurance certificates of insurance (ACORD 25-S);
8. Liability and Workers' compensation certificates of insurance;
9. Notice to Proceed to Commence Construction Phase (SBP-6.261);
10. Notice of Approval of Occupancy/Use (SBP-01);
11. Notice of Partial Substantial Completion (SBP-071);
12. Notice of Substantial Completion (SBP-07);
13. Notice of Partial Final Acceptance (SC-6.27);
14. Notice of Final Acceptance (SBP-6.271);
15. Notice of Partial Contractor's Settlement (SC-7.3);
16. Notice of Contractor's Settlement (SBP-7.31);
17. Application and Certificate for Contractor's Payment (SBP-7.2);
18. Other procedural and reporting documents or forms referred to in the General Conditions, the Supplementary General Conditions, and the Specifications or required by the State Buildings Program or the Principal Representative, including but not necessarily limited to Pre-Acceptance Check List (SBP-05) and the Building Inspection Record (SBP-BIR). A list of the current standard State Buildings Program forms applicable to this Contract may be obtained from the Principal Representative on request.

B. DEFINITIONS OF WORDS AND TERMS USED

1. AGREEMENT. The term "Agreement" shall mean the written agreement entered into by the State of Colorado acting by and through the Principal Representative and the Construction Manager for the performance of the Work and payment therefore, on State Form SC-6.5. The term Agreement when used without reference to State Form SC-6.5 may also refer to the entirety of the parties' agreement to perform the Work described in the Contract Documents or reasonably inferable there from. The term "Contract" shall be interchangeable with this latter meaning of the term Agreement
2. AMENDMENT: The term "Amendment" shall be defined as provided in Article 3.8 of the Agreement, Amendments and Change Orders.

3. ARCHITECT/ENGINEER. The term “Architect/Engineer” shall mean either the architect of record or the engineer of record under contract to the State of Colorado for the Project identified in the Contract Documents.
4. BID PACKAGE. Bid Package describes all documents that relate to a specific scope of work, including the drawings, specifications, documents, estimates, bid forms and bid bonds relevant to a discrete portion of or a complete construction Project.
5. CHANGE ORDER. The term “Change Order” means a written order directing the Construction Manager to make changes in the Work, in accordance with Article 35A, The Value of Changed Work and Article 3.8 of the Agreement (SC-6.5), Amendments and Change Orders.
6. COLORADO LABOR. The term “Colorado labor”, as provided in C.R.S. § 8-17-101(2) (a), as amended, means any person who is a resident of the state of Colorado, at the time of the public Works project, without discrimination as to race, color, creed, sex, sexual orientation, marital status, national origin, ancestry, age, or religion except when sex or age is a bona fide occupational qualification. A resident of the state of Colorado is a person who can provide a valid Colorado driver’s license, a valid Colorado state-issued photo identification, or documentation that he or she has resided in Colorado for the last thirty days.
7. CONSTRUCTION MANAGER/GENERAL CONTRACTOR. The words “Construction Manager/General Contractor” shall mean the person, company, firm, corporation or other legal entity entering into a contract with the State of Colorado acting by and through the Principal Representative. The Construction Manager/General Contractor may also be referred to as the “Construction Manager” or “Contractor” in this agreement or in related exhibits, attachments, contract modification or procedural documents.
8. CONSTRUCTION MANAGER/GENERAL CONTRACTOR’S SCOPE NARRATIVE. Shall be defined as the bilateral agreement concerning final scope, which is developed cumulatively and simultaneously with each of the Bid Packages and is agreed upon during review of the final scope as it pertains to each Bid Package.
9. CONSULTANT. The term “Consultant” shall mean a person, firm or corporation supplying design/consulting services for the Project. Design professionals and consultants are directly contracted to the Architect/Engineer or the Principal Representative.
10. DAYS. The term “days” whether singular or plural shall mean calendar days unless expressly stated otherwise. Where the term “business days” is used it shall mean business days of the State of Colorado.
11. DRAWINGS. The term “Drawings” shall mean all drawings approved by appropriate State officials which have been prepared by the Architect/Engineer showing the Work to be done, except that where a list of drawings is specifically enumerated in the Supplementary General Conditions or division 1 of the Specifications, the term shall mean the drawings so enumerated, including all addenda drawings.
12. EMERGENCY FIELD CHANGE ORDER. The term “Emergency Field Change Order” shall mean a written change order for extra Work or a change in the Work necessitated by an emergency as defined in Article 35D executed on State form SC 6.31 and identified as an Emergency Field Change Order. The use of such orders is limited to emergencies and to the amounts shown in Article 35D.
13. FAST TRACK CONSTRUCTION. The term “Fast Track Construction” is a methodology where portions of the Work could have their design completed as separate Construction Phase(s) and may be under construction before other portions of the Work are fully designed.
14. FINAL ACCEPTANCE. The terms “final acceptance” or “finally complete” mean the stage in the progress of the Work, after substantial completion, when all remaining items of Work have been completed, all requirements of the Contract Documents are satisfied and the Notice of Acceptance can be issued. Discrete physical portions of the Project may be separately and partially deemed finally complete at the discretion of the Principal Representative when that portion of the Project reaches such stage of completion and a partial Notice of Acceptance can be issued.
15. FIXED LIMIT OF CONSTRUCTION COST. The term “Fixed Limit of Construction Cost” shall set forth a dollar amount available for the total Construction Cost of all elements of the Work as specified by the Principal Representative.

16. GUARANTEED MAXIMUM PRICE. The term "Guaranteed Maximum Price" shall mean the maximum amount for which the Work shall be accomplished and it shall be computed by the Construction Manager in accordance with the provisions of paragraph 5.4 of the Agreement and as approved by the Principal Representative.
17. NOTICE. The term “Notice” shall mean any communication in writing from either contracting party to the other by such means of delivery that receipt cannot properly be denied. Notice shall be provided to the person identified to receive it in Article 8 of the Agreement. Notice Identification, or to such other person as either party identifies in writing to receive Notice. Notice by facsimile transmission where proper transmission is evidence shall be adequate where facsimile numbers are included in Article 7 of the Agreement, or to such other person as either party identifies in writing to receive Notice or in the absence of the identified party, a principal of the Construction Manager. Notice by facsimile transmission where proper transmission is evidenced shall be adequate where facsimile numbers are included in Article 7 of the Agreement. Notwithstanding an email delivery or return receipt, email Notice shall not be adequate. Acknowledgment of receipt of a voice message shall not be deemed to waive the requirement that Notice, where required, shall be in writing.
18. OCCUPANCY. The term “Occupancy” means occupancy taken by the State as Owner after the Date of Substantial Completion at a time when a building or other discrete physical portion of the Project is used for the purpose intended. The Date of Occupancy shall be the date of such first use, but shall not be prior to the date of execution of the Notice of Approval of Occupancy/Use. Prior to the date of execution of a Notice of Approval of Occupancy/Use, the state shall have no right to occupy and the project may not be considered safe for occupancy for the intended use.
19. OWNER. The term “Owner” shall mean the Principal Representative.
20. PRECONSTRUCTION. The term “Preconstruction” shall mean the Work done by the Construction Manager in the management and definition of the project prior to the awarding of construction contracts for any bid package.
21. PRINCIPAL REPRESENTATIVE. The term “Principal Representative” shall be defined, as provided in C.R.S. § 24-30-1301(14), as the governing board of a state department, institution, or agency; or if there is no governing board, then the executive head of a state department, institution, or agency, as designated by the governor or the general assembly and as specifically identified in the Contract Documents, or shall have such other meaning as the term may otherwise be given in C.R.S. § 24-30-1301(14), as amended. The Principal Representative may delegate authority. The Construction Manager shall have the right to inquire regarding the delegated authority of any of the Principal Representative’s representatives on the project and shall be provided with a response in writing when requested.
22. PRODUCT DATA. The term “Product Data” shall mean all submittals in the form of printed manufacturer’s literature, manufacturer’s specifications, and catalog cuts.
23. PROJECT. The "Project" is the total construction of which the Work performed under the Contract Documents is a part, and may include construction by the Principal Representative or by separate contractors.
24. REASONABLY INFERABLE. The phrase “reasonably inferable” means that if an item or system is either shown or specified, all material and equipment normally furnished with such items or systems and needed to make a complete installation shall be provided whether mentioned or not, omitting only such parts as are specifically excepted, and shall include only components which the Construction Manager could reasonably anticipate based on his or her skill and knowledge using an objective, industry standard, not a subjective standard. This term takes into consideration the normal understanding that not every detail is to be given on the Drawings and Specifications If there is a difference of opinion, the Principal Representative shall make the determination as to the standards of what reasonably inferable.
25. SAMPLES. The term “Samples” shall mean examples of materials or Work provided to establish the standard by which the Work will be judged.
26. SBP. The term "SBP" means "State Buildings", which is used in connection with labeling applicable State form documents (e.g., "SBP-01" is the form number for Notice of Approval of Occupancy/Use).

27. SC. The term "SC" means "State Contract" which is used in connection with labeling applicable State form documents (e.g. "SC 6.23" is the State form number for these General Conditions of the Construction Manager/General Contractor's (CM/GC) Agreement).
28. SCHEDULE OF VALUES. The term "Schedule of Values" is defined as the itemized listing of description of the Work by Division and Section of the Specifications. The format shall be the same as Form SC-7.2. Included shall be the material costs, and the labor and other costs plus the sum of both.
29. SHOP DRAWINGS. The term "Shop Drawings" shall mean any and all detailed drawings prepared and submitted by Construction Manager, Subcontractor at any tier, vendors or manufacturers providing the products and equipment specified on the Drawings or called for in the Specifications.
30. SPECIFICATIONS. The term "Specifications" shall mean the requirements of the CSI divisions of the project manual prepared by the Architect/Engineer describing the Work to be accomplished.
31. STATE BUILDINGS PROGRAM. Shall refer to the Office of the State Architect within the Department of Personnel & Administration of Colorado State government responsible for project administration, review, approval and coordination of plans, construction procurement policy, contractual procedures, and code compliance and inspection of all buildings, public Works and improvements erected for state purposes; except public roads and highways and projects under the supervision of the division of wildlife and the division of parks and outdoor recreation as provided in C.R.S. § 24-30-1301, *et seq*. The term State Buildings Program shall also mean that individual within a State Department agency or institution, including institutions of higher education, who has signed an agreement accepting delegation to perform all or part of the responsibilities and functions of State Buildings Program.
32. SUBCONSULTANT. The term "Subconsultant" shall mean a person, firm or corporation supplying design/consulting services for the Project. Design and other professionals directly contracted to the Architect/Engineers are considered subconsultants.
33. SUBCONTRACTOR. The term "Subcontractor" shall mean a person, firm or corporation supplying labor, materials, equipment and/or Services for Work at the site of the Project for, and under separate contract or agreement with the Construction Manager.
34. SUBMITTALS. The term "submittals" means drawings, lists, tables, documents and samples prepared by the Construction Manager to facilitate the progress of the Work as required by these General Conditions or the Drawings and Specifications. They consist of Shop Drawings, Product Data, Samples, and various administrative support documents including but not limited to lists of subcontractors, construction progress schedules, schedules of values, applications for payment, inspection and test results, requests for information, various document logs, and as-built drawings. Submittals are re*quired* by the Contract Documents, but except to the extent expressly specified otherwise are not themselves a part of the Contract Documents.
35. SUBSTANTIAL COMPLETION. The terms "substantial completion" or "substantially complete" mean the stage in the progress of the Work when the construction is sufficiently complete, in accordance with the Contract Documents as modified by any Change Orders, so that the Work, or at the discretion of the Principal Representative, any designated portion thereof, is available for its intended use by the Principal Representative and a Notice of Substantial Completion can be issued. Portions of the Project may, at the discretion of the Principal Representative, be designated as substantially complete.
36. SUPPLIER. The term "Supplier" shall mean any manufacturer, fabricator, distributor, material man or vendor.
37. SURETY. The term "Surety" shall mean the company providing the labor and material payment and performance bonds for the Construction Manager as obligor.
38. VALUE ENGINEERING. "Value Engineering" or "VE" is defined as an analysis and comparison of cost versus value of building materials, equipment, and systems. VE considers the initial cost of construction, coupled with the estimated cost of maintenance, energy use, life expectancy and replacement cost. VE related to this Project shall include the analysis and comparison of building elements in an effort to reduce overall Project costs, while maintaining or enhancing the quality of the design intent, whenever possible.

39. WORK. The term “Work” shall mean all or part of the labor, materials, equipment, and other services required by the Contract Documents or otherwise required to be provided by the Construction Manager to meet the Construction Manager’s obligations under the Contract.

ARTICLE 2. EXECUTION, CORRELATION, INTENT OF DOCUMENTS, COMMUNICATION AND COOPERATION

A. EXECUTION

The Construction Manager, within ten (10) days from the date of Notice of Award, will be required to:

1. Execute the Agreement, State Form SC-6.5.
2. Furnish fully executed Performance and Labor and Material Payment Bonds on State Forms SC-6.22 and SC-6.221; and
3. Furnish certificates of insurance evidencing all required insurance on standard Acord forms designed for such purpose.
4. Furnish certified copies of any insurance policies requested by the Principal Representative.
5. If Article 6.1 of the Construction Manager/General Contractor Agreement (SC-6.5) applies, furnish documentation that identifies the subcontractors that will be used for all mechanical, sheet metal, fire suppression, sprinkler fitting, electrical, and plumbing work required on the project and certify that that all firms identified participate in apprenticeship programs registered with the United States Department of Labor’s Employment and Training Administration or state apprenticeship councils recognized by the United States Department of Labor and have a proven record of graduating a minimum of fifteen percent of its apprentices for at least three of the past five years.

B. CORRELATION

By execution of the Agreement the Construction Manager represents that the Construction Manager has visited the site, has become familiar with local conditions and local requirements under which the Work is to be performed, including the building code programs of the State Buildings Program as implemented by the Principal Representative, and has correlated personal observations with the requirements of the Contract Documents.

C. INTENT OF DOCUMENTS

The Contract Documents are complementary, and what is called for by any one document shall be as binding as if called for by all. The intention of the documents is to include all labor, materials, equipment and transportation necessary for the proper execution of the Work. Words describing materials or Work which have a well-known technical or trade meaning shall be held to refer to such recognized standards.

In any event, if any error exists, or appears to exist, in the requirements of the Drawings or Specifications, or if any disagreement exists as to such requirements, the Construction Manager shall have the same explained or adjusted by the Architect/Engineer before proceeding with the Work in question. In the event of the Construction Manager’s failure to give prior written Notice of any such errors or disagreements of which the Construction Manager or the Subcontractors at any tier are aware, the Construction Manager shall, at no additional cost to the Principal Representative, make good any damage to, or defect in, Work which is caused by such omission.

Where a conflict occurs between or within standards, Specifications or Drawings, which is not resolved by reference to the precedence between the Contract Documents, the more stringent or higher quality requirements shall apply so long as such more stringent or higher quality requirements are reasonably inferable. The Principal Representative, or the Architect/Engineer with consent of the Principal Representative, shall decide which requirements will provide the best installation.

With the exception noted in the following paragraph, the precedence of the Contract Documents is in the following sequence:

1. The Minimum Requirements of the Request for Proposals;
2. The Construction Manager's Fee Proposals;
3. The Agreement (SC-6.5);
4. The Supplementary General Conditions, if any;
5. The General Conditions (SC-6.51); and
6. Drawings and Specifications, all as modified by any addenda.

Change Orders and Amendments, if any, to the Contract Documents take precedence over the original Contract Documents.

Notwithstanding the foregoing order of precedence, the Special Provisions of Article 52 of the General Conditions, Special Provisions, shall take precedence, rule and control over all other provisions of the Contract Documents.

Unless the context otherwise requires, form numbers in this document are for convenience only. In the event of any conflict between the form required by name or context and the form required by number, the form required by name or context shall control. The Construction Manager may obtain State forms from the Principal Representative upon request.

D. PARTNERING, COMMUNICATIONS AND COOPERATION

In recognition of the fact that conflicts, disagreements and disputes often arise during the performance of construction contracts, the Construction Manager and the Principal Representative aspire to encourage a relationship of open communication and cooperation between the employees and personnel of both, in which the objectives of the Contract may be better achieved and issues resolved in a more fully informed atmosphere.

The Construction Manager and the Principal Representative each agree to assign an individual who shall be fully authorized to negotiate and implement a voluntary partnering plan for the purpose of facilitating open communications between them. Within thirty days (30) of the Notice to Proceed, the assigned individuals shall meet to discuss development of an informal agreement to accomplish these goals.

The assigned individuals shall endeavor to reach an informal agreement, but shall have no such obligation. Any plans these parties voluntarily agree to implement shall result in no change to the contract amount, and no costs associated with such plan or its development shall be recoverable under any contract clause. In addition, no plan developed to facilitate open communication and cooperation shall alter, amend or waive any of the rights or duties of either party under the Contract unless and except by written Amendment to the Contract, nor shall anything in this clause or any subsequently developed partnering plan be deemed to create fiduciary duties between the parties unless expressly agreed in a written Amendment to the Contract. It is also recognized that projects with relatively low contract values may not justify the expense or special efforts required. In the case of small projects with an initial Contract value under $500,000, the requirements of the preceding paragraph shall not apply.

ARTICLE 3. COPIES FURNISHED

The Construction Manager will be furnished, free of charge, the number of copies of Drawings and Specifications as specified in the Contract Documents, or if no number is specified, all copies reasonably necessary for the execution of the Work.

ARTICLE 4. OWNERSHIP OF DRAWINGS

Drawings or Specifications, or copies of either, furnished by the Architect/Engineer, are not to be used on any other Work. At the completion of the Work, at the written request of the Architect/Engineer, the Construction Manager shall endeavor to return all Drawings and Specifications.

The Construction Manager may retain the Construction Manager's Contract Document set, copies of Drawings and Specifications used to contract with others for any portion of the Work and a marked up set of as-built drawings.

ARTICLE 5. ARCHITECT/ENGINEER'S STATUS

The Architect/Engineer is the representative of the Principal Representative for purposes of administration of the Contract, as provided in the Contract Documents and the Agreement. In case of termination of employment or the death of the Architect/Engineer, the Principal Representative will appoint a capable Architect/Engineer against whom the Construction Manager makes no reasonable objection, whose status under the Contract shall be the same as that of the former Architect/Engineer.

ARTICLE 6. ARCHITECT/ENGINEER DECISIONS AND JUDGMENTS, ACCESS TO WORK AND INSPECTION

A DECISIONS

The Architect/Engineer shall, within a reasonable time, make decisions on all matters relating to the execution and progress of the Work or the interpretation of the Contract Documents, and in the exercise of due diligence shall be reasonably available to the Construction Manager to timely interpret and make decisions with respect to questions relating to the design or concerning the Contract Documents. The Principal Representative may consent with such decision by the Design Build Entity's Architect/Engineer or amend/revise such decision at the discretion of the Principal Representative.

B JUDGMENTS

The Architect/Engineer is, in the first instance, the judge of the performance required by the Contract Documents as it relates to compliance with the Drawings and Specifications and quality of Workmanship and materials.

The Architect/Engineer shall make judgments regarding whether directed Work is extra or outside the scope of Work required by the Contract Documents at the time such direction is first given. If, in the Construction Manager's judgment, any performance directed by the Architect/Engineer is not required by the Contract Documents or if the Architect/Engineer does not make the judgment required, it shall be a condition precedent to the filing of any claim for additional cost related to such directed Work that the Construction Manager, before performing such Work, shall first obtain in writing, the Architect/Engineer's written decision that such directed Work is included in the performance required by the Contract Documents. If the Architect/Engineer's direction to perform the Work does not state that the Work is within the performance required by the Contract Documents, the Construction Manager shall, in writing, request the Architect/Engineer to advise in writing whether the directed Work will be considered extra Work or Work included in the performance required by the Contract Documents.

The Architect/Engineer shall respond to any such written request for such a decision within three (3) business days and if no response is provided, or if the Architect/Engineer's written decision is to the effect that the Work is included in the performance required by the Contract Documents, the Construction Manager may file with the Principal Representative and the Architect/Engineer a Notice of claim in accordance with Article 36, Claims. Whether or not a Notice of claim is filed, the Construction Manager shall proceed with the ordered Work. Disagreement with the decision of the Architect/Engineer shall not be grounds for the Construction Manager to refuse to perform the Work directed or to suspend or terminate performance.

C ACCESS TO WORK

The Architect/Engineer, the Principal Representative and representatives of State Buildings Program shall at all times have access to the Work. The Construction Manager shall provide proper facilities for such access and for their observations or inspection of the Work.

D INSPECTION

The Architect/Engineer has agreed to make, or that structural, mechanical, electrical engineers or other consultants will make, periodic visits to the site to generally observe the progress and quality of the Work to determine in general if the Work is proceeding in accordance with the Contract Documents. Observation may extend to all or any part of the Work and to the preparation, fabrication or manufacture of materials.

Without in any way meaning to be exclusive or to limit the responsibilities of the Architect/Engineer or the Construction Manager, the Architect/Engineer has agreed to observe, among other aspects of the Work, the following for compliance with the Contract Documents:

1. Compaction testing reports based upon the findings and recommendations of the Principal Representative's testing consultant;
2. Bearing surfaces of excavations before concrete is placed based upon the findings and recommendations of the Principal Representative's soils engineering consultant;
3. Reinforcing steel after installation and before concrete is poured;
4. Structural concrete;
5. Laboratory reports on all concrete testing based upon the findings and recommendations of the Principal Representative's testing consultant;
6. Structural steel during and after erection and prior to its being covered or enclosed;
7. Steel welding; Principal Representative will furnish steel welding inspection consultant/agency if required or necessary for the project;
8. Mechanical and plumbing Work following its installation and prior to its being covered or enclosed;
9. Electrical Work following its installation and prior to its being covered or enclosed; and
10. Any special or quality control testing required in the Contract Documents provided by the Principal Representative's testing consultant.

If the Specifications, the Architect/Engineer's instructions, laws, ordinances of any public authority require any Work to be specifically tested or approved, the Construction Manager shall give the Principal Representative, Architect/Engineer and appropriate testing agency (if necessary) timely notice of its readiness for observation by the Architect/Engineer or inspection by another authority, and if the inspection is by another authority, of the date fixed for such inspection, required certificates of inspection being secured by the Construction Manager. The Construction Manager shall give all required Notices to the Principal Representative or his or her designee for inspections required for the building inspection program. It shall be the responsibility of the Construction Manager to determine the Notice required by the State pursuant to Building Inspection Record for the Project, according to State form SBP-B.I.R., or the equivalent form required by the Principal Representative as approved by the State Buildings Program. If any portion of the Work should be covered contrary to the reasonable request of the Architect/Engineer, or to requirements specifically expressed in the Contract Documents, it must, if required in writing by the Architect/Engineer, be uncovered for its observation and shall be replaced at the Construction Manager's expense.

If any other portion of the Work has been covered which the Architect/Engineer has not specifically requested to observe prior to it's being covered, it may request to see such work and it shall be uncovered by the Construction Manager. If such work is found in accordance with the Contract Documents, the cost of uncovering and replacement shall, by appropriate Amendment or Change Order, be charged to the Principal Representative. If such work is found not in accordance with the Contract Documents, the Construction Manager shall pay such costs unless it is found that this condition was caused by the Principal Representative or a separate Construction Manager as provided in Article 18, in which event, the Principal Representative shall be responsible for the payment of such costs.

ARTICLE 7. CONSTRUCTION MANAGER'S SUPERINTENDENCE AND SUPERVISION

The Construction Manager shall employ, and keep present (as applicable) on the Project during its progress, a competent project manager as satisfactory to the Principal Representative. The project manager shall not

be changed except with the consent of the Principal Representative, unless the project manager proves to be unsatisfactory to the Construction Manager and ceases to be in his or her employ. The project manager shall represent the Construction Manager for the Project, and in the absence of the Construction Manager, all directions given to the project manager shall be as binding as if given to the Construction Manager. Directions received by the project manager shall be documented by the project manager and communicated in writing with the Construction Manager.

The Construction Manager shall employ, and keep present on the Project during its progress, a competent superintendent and any necessary assistants, all satisfactory to the Architect/Engineer and the Principal Representative. The superintendent shall not be changed except with the consent of the Architect/Engineer and the Principal Representative, unless the superintendent proves to be unsatisfactory to the Project Manager/Construction Manager and ceases to be in his or her employ. The superintendent shall represent the Project Manager/Construction Manager in his or her absence and all directions given to the superintendent shall be as binding as if given to the Project Manager/Construction Manager. Directions received by the superintendent shall be documented by the superintendent and confirmed in writing with the Project Manager/Construction Manager.

The Construction Manager shall give efficient supervision to the Work, using his or her best skill and attention. He or she shall carefully study and compare all Drawings, Specifications and other written instructions and shall without delay report any error, inconsistency or omission which he or she may discover in writing to the Architect/Engineer. The Construction Manager shall not be liable to the Principal Representative for damage to the extent it results from errors or deficiencies in the Contract Documents or other instructions by the Architect/Engineer, unless the Construction Manager knew or had reason to know, that damage would result by proceeding and the Construction Manager fails to so advise the Architect/Engineer.

The superintendent shall see that the Work is carried out in accordance with the Contract Documents and in a uniform, thorough and first-class manner in every respect. The **Construction Manager**'s superintendent shall establish all lines, levels, and marks necessary to facilitate the operations of all concerned in the **Construction Manager**'s Work. The **Construction Manager** shall lay out all Work in a manner satisfactory to the Architect/Engineer, making permanent records of all lines and levels required for excavation, grading, foundations, and for all other parts of the Work.

ARTICLE 8. MATERIALS AND EMPLOYEES

Unless otherwise stipulated, the Construction Manager shall provide and pay for all materials, labor, water, tools, equipment, light, power, transportation and other facilities necessary for the execution and completion of the Work.

Unless otherwise specified, all materials shall be new and both workmanship and materials shall be first class and of uniform quality. The Construction Manager shall, if required, furnish satisfactory evidence as to the kind and quality of materials.

The **Construction Manager** is fully responsible for all acts and omissions of the **Construction Manager**'s employees and shall at all times enforce strict discipline and good order among employees on the site. The **Construction Manager** shall not employ on the Work any person reasonably deemed unfit by the Principal Representative or anyone not skilled in the Work assigned to him.

ARTICLE 9. SURVEYS, PERMITS, LAWS, TAXES AND REGULATIONS

A SURVEYS

The Principal Representative shall furnish all surveys, property lines and bench marks deemed necessary by the Architect/Engineer, unless otherwise specified.

B PERMITS AND LICENSES

Permits and licenses necessary for the prosecution of the Work shall be secured and paid for by the Construction Manager. Unless otherwise specified in the Specifications, no local municipal or

county building permit shall be required. However, State Buildings Program requires each Principal Representative to administer a building code inspection program, the implementation of which may vary at each agency or institution of the State. The Construction Manager s' employees shall become personally familiar with these local conditions and requirements and shall fully comply with such requirements. State electrical and plumbing permits are required, unless the requirement to obtain such permits is altered by State Building's Programs. The Construction Manager shall obtain and pay for such permits.

Easements for permanent structures or permanent changes in existing facilities shall be secured and paid for by the Principal Representative, unless otherwise specified.

C TAXES

1. Refund of Sales and Use Taxes
   The Construction Manager shall pay all local taxes required to be paid, including but not necessarily limited to all sales and use taxes. If requested by the Principal Representative prior to issuance of the Notice to Proceed or directed in the Supplementary General Conditions or the Specifications, the Construction Manager shall maintain records of such payments in respect to the Work, which shall be separate and distinct from all other records maintained by the Construction Manager, and the Construction Manager shall furnish such data as may be necessary to enable the State of Colorado, acting by and through the Principal Representative, to obtain any refunds of such taxes which may be available under the laws, ordinances, rules or regulations applicable to such taxes. When so requested or directed, the Construction Manager shall require Subcontractors at all tiers to pay all local sales and use taxes required to be paid and to maintain records and furnish the Construction Manager with such data as may be necessary to obtain refunds of the taxes paid by such Subcontractors. No State sales and use taxes are to be paid on material to be used in this Project. On application by the purchaser or seller, the Department of Revenue shall issue to a Construction Manager or to a Subcontractor at any tier, a certificate or certificates of exemption per C.R.S. § 39-26-703(2)(b), and C.R.S. § 39-26-708.

2. Federal Taxes
   The Construction Manager shall exclude the amount of any applicable federal excise or manufacturers' taxes from the proposal. The Principal Representative will furnish the Construction Manager, on request exemption certificates.

D LAWS AND REGULATIONS

The Construction Manager shall give all notices and comply with all laws, ordinances, rules and regulations bearing on the conduct of the Work as drawn or specified. If the Construction Manager observes that the Drawings or Specifications require Work which is at variance therewith, the Construction Manager shall without delay notify the Architect/Engineer in writing and any necessary changes shall be adjusted as provided in Article 35, Changes in the Work.

The Construction Manager shall bear all costs arising from the performance of Work required by the Drawings or Specifications that the Construction Manager knows to be contrary to such laws, ordinances, rules or regulations, if such Work is performed without giving Notice to the Architect/Engineer.

ARTICLE 10. PROTECTION OF WORK AND PROPERTY

A GENERAL PROVISIONS

The Construction Manager shall continuously maintain adequate protection of all Work and materials, protect the property from injury or loss arising in connection with this Contract and adequately protect adjacent property as provided by law and the Contract Documents. The Construction Manager shall make good any damage, injury or loss, except to the extent:

1. Directly due to errors in the Contract Documents;
2. Caused by agents or employees of the Principal Representative; and,
3. Due to causes beyond the Construction Manager's control and not to fault or negligence; provided such damage, injury or loss would not be covered by the insurance required to be carried by the Construction Manager;

B. SAFETY PRECAUTIONS

The Construction Manager shall take all necessary precautions for the safety of employees on the Project, and shall comply with all applicable provisions of federal, State and municipal safety laws and building codes to prevent accidents or injury to persons on, about or adjacent to the premises where the Work is being performed. He or she shall erect and properly maintain at all times, as required by the conditions and progress of the Work, all necessary safeguards for the protection of Workers and the public and shall post danger signs warning against the hazards created by such features of construction as protruding nails, hoists, well holes, elevator hatchways, scaffolding, window openings, stairways and falling materials; and he or she shall designate a responsible member of his or her organization on the Project, whose duty shall be the prevention of accidents. The name and position of any person so designated shall be reported to the Architect/Engineer by the Construction Manager.

The Construction Manager shall provide all necessary bracing, shoring and tying of all structures, decks and framing to prevent any structural failure of any material which could result in damage to property or the injury or death of persons; take all precautions to insure that no part of any structure of any description is loaded beyond its carrying capacity with anything that will endanger its safety at any time during the execution of this Contract; and provide for the adequacy and safety of all scaffolding and hoisting equipment. The Construction Manager shall not permit open fires within the building enclosure. The Construction Manager shall construct and maintain all necessary temporary drainage and do all pumping necessary to keep excavations and floors, pits and trenches free of water. The Construction Manager shall be solely responsible for all construction means, methods, techniques, sequences and procedures, and for coordinating all portions of the Work, except as otherwise noted.

The Construction Manager shall take due precautions when obstructing sidewalks, streets or other public ways in any manner, and shall provide, erect and maintain barricades, temporary walkways, roadways, trench covers, colored lights or danger signals and any other devices necessary or required to assure the safe passage of pedestrians and automobiles.

C. EMERGENCIES

In an emergency affecting the safety of life or of the Work or of adjoining property, the **Construction Manager** without special instruction or authorization from the Architect/Engineer or Principal Representative, is hereby permitted to act, at his or her discretion, to prevent such threatened loss or injury; and he or she shall so act, without appeal, if so authorized or instructed. Provided the **Construction Manager** has no responsibilities for the emergency, if the **Construction Manager** incurs additional cost not otherwise recoverable from insurance or others on account of any such emergency Work, the Contract sum shall be equitably adjusted in accordance with Article 35, Changes in the Work.

ARTICLE 11. DRAWINGS AND SPECIFICATIONS ON THE WORK

The Construction Manager shall keep on the job site one copy of the Contract Documents in good order, including current copies of all Drawings and Specifications for the Work, and any approved Shop Drawings, Product Data or Samples, and as-built drawings. As-built drawings shall be updated weekly by the Construction Manager and Subcontractors to reflect actual constructed conditions including dimensioned locations of underground Work and the Construction Manager 's failure to maintain such updates may be grounds to withhold portions of payments otherwise due in accordance with Article 33, Payments Withheld. All such documents shall be available to the Architect/Engineer and representatives of the State. In addition, the Construction Manager shall keep on the job site one copy of all approved addenda, Change Orders and requests for information issued for the Work.

The **Construction Manager** shall develop procedures to insure the currency and accuracy of as-built drawings and shall maintain on a current basis a log of requests for information and responses thereto, a Shop Drawing and Product Data submittal log, and a Sample submittal log to record the status of all necessary and required submittals.

ARTICLE 12. REQUESTS FOR INFORMATION AND SCHEDULES

A DETAIL DRAWINGS AND INSTRUCTIONS

The Architect/Engineer shall furnish additional instructions with reasonable promptness, by means of drawings or otherwise, necessary for the proper execution of the Work. All such drawings and instructions shall be consistent with the Contract Documents and reasonably inferable there from. The Architect/Engineer shall determine what additional instructions or drawings are necessary for the proper execution of the Work.

The Work shall be executed in conformity with such instructions and the Construction Manager shall do no Work without proper drawings, specifications or instructions. If the Construction Manager believes additional instructions, specifications or drawings are needed for the performance of any portion of the Work, the Construction Manager shall give Notice of such need in writing through a request for information furnished to the Architect/Engineer sufficiently in advance of the need for such additional instructions, specifications or drawings to avoid delay and to allow the Architect/Engineer a reasonable time to respond. The Construction Manager shall maintain a log of the requests for information and the responses provided.

The Construction Manager, the Architect/Engineer, and the Principal Representative shall jointly prepare a schedule, subject to change from time to time in accordance with the progress of the Work, fixing the dates at which the various detail drawings will be required, and the Architect/Engineer shall furnish them in accordance with that schedule. Under like conditions, a schedule shall be prepared, fixing the dates for the submission of shop drawings, for the beginning of manufacture and installation of materials and for the completion of the various parts of the Work.

The Principal Representative may consent with such instructions by the Architect/Engineer or amend/revise such instructions at the discretion of the Principal Representative.

B SCHEDULES

1. Submittal Schedules

Prior to the Notice to Proceed to Commence Construction for the first construction phase, a schedule shall be prepared which may be preliminary to the extent required, fixing the dates for the submission and initial review of required Shop Drawings, Product Data and Samples for the beginning of manufacture and installation of materials, and for the completion of the various parts of the Work. It shall be prepared so as to cause no delay in the Work or in the Work of any other contractor engaged by the Principal Representative. The schedule shall be subject to change from time to time in accordance with the progress of the Work, and it shall be subject to the review and approval by the Architect/Engineer. It shall fix the dates at which the various Shop Drawings Product Data and Samples will be required from the Architect/Engineer. The Architect/Engineer, after review and agreement as to the time provided for initial review, shall review and comment on the Shop Drawings, Product Data and Samples in accordance with that schedule. The schedule shall be finalized, prepared and submitted with respect to each of the elements of the Work in time to avoid delay, considering reasonable periods for review, manufacture or installation.

At the time the schedule is prepared, the Construction Manager, the Architect/Engineer and Principal Representative shall jointly identify the Shop Drawing, Product Data and Samples, if any, which the Principal Representative shall receive simultaneously with the Architect/Engineer for the purposes of owner coordination with existing facility standards and systems. The

Construction Manager shall furnish a copy for the Principal Representative when so requested. Transmittal of Shop Drawings and Product Data copies to the Principal Representative shall be solely for the convenience of the Principal Representative and shall neither create nor imply responsibility or duty of review by the Principal Representative.

The Construction Manager may also, or at the direction of the Principal Representative at any time shall, prepare and maintain a schedule, which may also be preliminary and subject to change to the extent required, fixing the dates for the initial responses to requests for information or for detail drawings which will be required from the Architect/Engineer to allow the beginning of manufacture, installation of materials and for the completion of the various parts of the Work. The schedule shall be subject to review and approval by the Architect/Engineer. The Architect/Engineer shall, after review and agreement, furnish responses and detail drawings in accordance with that schedule. Any such schedule shall be prepared and approved in time to avoid delay, considering reasonable periods for review, manufacture or installation, but so long as the request for information schedule is being maintained, it shall not be deemed to transfer responsibility to the Construction Manager for errors or omissions in the Contract Documents where circumstances make timely review and performance impossible.

The Architect/Engineer shall not unreasonably withhold approval of the Construction Manager's schedules and shall inform the Construction Manager and the Principal Representative of the basis of any refusal to agree to the Construction Manager's schedules. The Principal Representative shall attempt to resolve any disagreements.

2. Schedule of Values

Prior to the Notice to Proceed to Commence Construction for the first construction phase, the Construction Manager shall submit to the Architect/Engineer and Principal Representative, for approval, and to the State Buildings Program when specifically requested, a complete itemized schedule of the values of the various parts of the Work, as estimated by the Construction Manager, aggregating the total price. The schedule of values shall be in such detail as the Architect/Engineer or the Principal Representative shall require, prepared on forms acceptable to the Principal Representative. It shall, at a minimum, identify on a separate line each division of the Specifications including the general conditions costs to be charged to the Project. The Construction Manager shall revise and resubmit the schedule of values for approval when, in the opinion of the Architect/Engineer or the Principal Representative, such resubmittal is required due to changes or modifications to the Contract Documents or the Contract sum.

The total cost of each line item so separately identified shall, when requested by the Architect/Engineer or the Principal Representative, be broken down into reasonable estimates of the value as indicated in Article 3.4.6 of the Construction Manager/General Contractor (CMGC) Agreement (SC-6.5).

The cost of subcontracts shall be incorporated in the Construction Manager's schedule of values, and when requested by the Architect/Engineer or the Principal Representative, shall be separately shown as line items.

The Architect/Engineer shall review the proposed schedules and approve it after consultation with the Principal Representative, or advise the Construction Manager of any required revisions within ten (10) days of its receipt. In the event no action is taken on the submittal within ten days, the Construction Manager may utilize the schedule of values as its submittal for payment until it is approved or until revisions are requested.

When the Architect/Engineer deems it appropriate to facilitate certification of the amounts due to the Construction Manager, further breakdown of subcontracts, including breakdown by labor and materials, may be directed.

This schedule of values, when approved, will be used in preparing Construction Manager's applications for payment on State Form SC-7.2, Application for Payment.

3. Construction Schedules
Prior to the Notice to Proceed to Commence Construction for the first construction phase, the Construction Manager shall submit to the Architect/Engineer and the Principal Representative, and to the State Buildings Program when specifically requested, on a form acceptable to them, an overall timetable of the construction schedule for the Project. Unless the Supplementary General Conditions or the Specifications allow scheduling with bar charts or other less sophisticated scheduling tools, the Construction Manager's schedule shall be a critical-path method (CPM) construction schedule. The CPM schedule shall start with the date of the Notice to Proceed to Commence Construction for the first construction phase and include submittals activities, the various construction activities, change order Work (when applicable), close-out, testing, demonstration of equipment operation when called for in the Specifications, and acceptance. The CPM schedule shall at a minimum correlate to the schedule of values line items and shall be cost loaded if requested by the Architect/Engineer or Principal Representative. The completion time shall be the time specified in the Agreement and all Project scheduling shall allocate float utilizing the full period available for construction as specified in the Agreement on State Form SC 6.13, without indication of early completion, unless such earlier completion is approved in writing by the Principal Representative and State Building Programs.

The time shown between the starting and completion dates of the various elements within the construction schedule shall represent one hundred per cent (100%) completion of each element.

All other elements of the CPM schedule shall be as required by the Specifications. In addition, the Construction Manager shall submit monthly updates or more frequently, if required by the Principal Representative, updates of the construction schedule. These updates shall reflect the Construction Manager's "Work in place" progress.

When requested by the Architect/Engineer, the Principal Representative or the State Buildings Program, the Construction Manager shall revise the construction schedule to reflect changes in the schedule of values.

When the testing of materials is required by the Specifications, the Construction Manager shall also prepare and submit to the Architect/Engineer and the Principal Representative a schedule for testing in accordance with Article 14, Samples and Testing.

ARTICLE 13. SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

A. SUBMITTAL PROCESS
The Construction Manager shall check and field verify all dimensions. The Construction Manager shall check, approve and submit to the Architect/Engineer in accordance with the schedule described in Article 12, Requests for Information and Schedules, all Shop Drawings, Product Data and Samples required by the specifications or required by the Construction Manager for the Work of the various trades. All Drawings and Product Data shall contain identifying nomenclature and each submittal shall be accompanied by a letter of transmittal identifying in detail all enclosures. The number of copies of Shop Drawings and Product Data to be submitted shall be as specified in the Specifications and if no number is specified then three copies shall be submitted.

The Architect/Engineer shall review and comment on the Shop Drawings and Product Data within the time provided in the agreed upon schedule for conformance with information given and the design concept expressed in, or reasonably inferred from, the Contract Documents. The nature of all corrections to be made to the Shop Drawings and Product Data, if any, shall be clearly noted, and the submittals shall be returned to the Construction Manager for such corrections. If a change

in the scope of the Work is intended by revisions requested to any Shop Drawings and Product Data, the Construction Manager shall be requested to prepare a change proposal in accordance with Article 35, Changes in the Work. On resubmitted Shop Drawings, Product Data or Samples, the Construction Manager shall direct specific attention in writing on the transmittal cover to revisions other than those corrections requested by the Architect/Engineer on any previously checked submittal. The Architect/Engineer shall promptly review and comment on, and return, the resubmitted items.

The Construction Manager shall thereafter furnish such other copies in the form approved by the Architect/Engineer as may be needed for the prosecution of the Work.

B. FABRICATION AND ORDERING
Fabrication shall be started by the Construction Manager only after receiving approved Shop Drawings from the Architect/Engineer. Materials shall be ordered in accordance with approved Product Data. Work which is improperly fabricated, whether through incorrect Shop Drawings, faulty workmanship or materials, will not be acceptable.

C. DEVIATIONS FROM DRAWINGS OR SPECIFICATIONS
The review and comments of the Architect/Engineer of Shop Drawings, Product Data or Samples shall not relieve the Construction Manager from responsibility for deviations from the Drawings or Specifications, unless he or she has in writing called the attention of the Architect/Engineer to such deviations at the time of submission, nor shall it relieve the Construction Manager from responsibility for errors of any sort in Shop Drawings or Product Data. Review and comments on Shop Drawings or Product Data containing identified deviations from the Contract Documents shall not be the basis for a Change Order or a claim based on a change in the scope of the Work unless Notice is given to the Architect/Engineer and Principal Representative of all additional costs, time and other impacts of the identified deviation by bring it to their attention in writing at the time the submittals are made, and any subsequent change in the Contract sum or the Contract time shall be limited to cost, time and impacts so identified.

D. CONSTRUCTION MANAGER REPRESENTATIONS
By preparing, approving, and/or submitting Shop Drawings, Product Data and Samples, the Construction Manager represents that the Construction Manager has determined and verified all materials, field measurements, and field construction criteria related thereto, and has checked and coordinated the information contained within each submittal with the requirements of the Work, the Project and the Contract Documents and prior reviews and approvals.

ARTICLE 14. SAMPLES AND TESTING

A. SAMPLES
The Construction Manager shall furnish for approval, with such promptness as to cause no delay in his or her Work or in that of any other Construction Manager, all Samples as directed by the Architect/Engineer. The Architect/Engineer shall check and approve such Samples, with reasonable promptness, but only for conformance with the design intent of the Contract Documents and the Project, and for compliance with any submission requirements given in the Contract Documents.

B. TESTING - GENERAL
The Construction Manager shall provide such equipment and facilities as the Architect/Engineer may require for conducting field tests and for collecting and forwarding samples to be tested. Samples themselves shall not be incorporated into the Work after approval without the permission of the Architect/Engineer.

All materials or equipment proposed to be used may be tested at any time during their preparation or use. The Construction Manager shall furnish the required samples without charge and shall give

sufficient Notice of the placing of orders to permit the testing thereof. Products may be sampled either prior to shipment or after being received at the site of the Work.

Tests shall be made by an accredited testing laboratory. Except as otherwise provided in the Specifications, sampling and testing of all materials, and the laboratory methods and testing equipment, shall be in accordance with the latest standards and tentative methods of the American Society of Testing Materials (ASTM). The cost of testing which is in addition to the requirements of the Specifications shall be paid by the Construction Manager if so directed by the Architect/Engineer, and the Contract sum shall be adjusted accordingly by Change Order; provided however, that whenever testing shows portions of the Work to be deficient, all costs of testing including that required to verify the adequacy of repair or replacement Work shall be the responsibility of the Construction Manager.

C. TESTING - CONCRETE AND SOILS

Unless otherwise specified or provided elsewhere in the Contract Documents, the Principal Representative will contract for and pay for the testing of concrete and for soils compaction testing through an independent laboratory or laboratories selected and approved by the Principal Representative. The Construction Manager shall assume the responsibility of arranging, scheduling and coordinating the concrete sample collection efforts and soils compaction efforts in an efficient and cost effective manner. Testing shall be performed in accordance with the requirements of the Specifications, and if no requirements are specified, the Construction Manager shall request instructions and testing shall be as directed by the Architect/Engineer or the soils engineer, as applicable, and in accordance with standard industry practices.

The Principal Representative and the Architect/Engineer shall be given reasonable advance notice of each concrete pour and reserve the right to either increase or decrease the number of cylinders or the frequency of tests.

Soil compaction testing shall be at random locations selected by the soils engineer. In general, soils compaction testing shall be as directed by the soils engineer and shall include all substrate prior to backfill or construction.

D. TESTING - OTHER

Additional testing required by the Specifications will be accomplished and paid for by the Principal Representative in a manner similar to that for concrete and soils unless noted otherwise in the Specifications. In any case, the Construction Manager will be responsible for arranging, scheduling and coordinating additional tests. Where the additional testing will be contracted and paid for by the Principal Representative the Construction Manager shall give the Principal Representative not less than one-month advance written Notice of the date the first such test will be required.

ARTICLE 15. SUBCONTRACTS

A. CONTRACT PERFORMANCE OUTSIDE OF THE UNITED STATES OR COLORADO

After the contract is awarded, Construction Manager is required to provide written notice to the Principal Representative no later than twenty (20) days after deciding to perform services under this contract outside the United States or Colorado or to subcontract services under this contract to a subcontractor that will perform such services outside the United States or Colorado. The written notification must include, but need not be limited to, a statement of the type of services that will be performed at a location outside the United States or Colorado and the reason why it is necessary or advantageous to go outside the United States or Colorado to perform the services. All notices received by the State pursuant to outsourced services shall be posted on the Colorado Department of Personnel & Administration's website. *If Construction Manager knowingly fails to notify the Principal Representative of any outsourced services as specified herein, the Principal Representative, at its discretion, may terminate this contract* as provided in the Colorado Procurement Code or the applicable procurement code for institutions of higher education (Does not apply to any project that receives federal moneys)

B. SUBCONTRACTOR PREQUALIFICATION
Prior to the Notice to Proceed to Commence Construction for the first and subsequent construction phases, the Construction Manager shall submit to the Principal Representative and State Buildings Program a complete list of all known Subcontractors, planned for the Work. The list shall be supplemented as other Subcontractors are determined by the Construction Manager and any such supplemental list shall be submitted to the Principal Representative and State Buildings Program not less than ten (10) days before the Subcontractors commence Work.

C. SUBCONTRACTOR PROPOSALS
If Construction Manager utilizes any Subcontractor on this Project, Construction Manager shall request and receive proposals from the Subcontractors and subcontracts will be awarded after the proposals are tabulated in a pre-approved format which compares to the Fixed Limit of Construction Cost budgeted by line item, as indicated in the finalized Construction Manager's Fee Proposal, and, reviewed by the Construction Manager, and Principal Representative.

Should the construction Manager submit a proposal for subcontract Work, the proposal conditions used shall be the same as for all subcontractor proposals. These Construction Manager proposals for subcontract Work shall be submitted to the Principal Representative twenty-four (24) hours prior to receipt of other subcontractor proposals and be opened with the other proposals.

D. SUBCONTRACT FORMS
All subcontracts will be between Construction Manager and the Subcontractors. The form of subcontracts shall be furnished to the Principal Representative for review and consent as to form, which consent shall not be unreasonably withheld.

E. SUBCONTRACTOR SUBSTITUTION
The substitution of any Subcontractor listed in the Construction Manager's bid shall be justified in writing not less than ten (10) days after the date of the Notice to Proceed to commence construction for the first and subsequent construction phases, and shall be subject to the approval of the Principal Representative. For reasons such as the Subcontractor's refusal to perform as agreed, subsequent unavailability or later discovered bid errors, or other similar reasons, but not including the availability of a lower Subcontract price, such substitution may be approved. The Construction Manager shall bear any additional cost incurred by such substitutions.

F. CONSTRUCTION MANAGER RESPONSIBLE FOR SUBCONTRACTORS
The Construction Manager shall not employ any Subcontractor that the Architect/Engineer, within ten (10) days after the date of receipt of the Construction Manager's list of Subcontractors or any supplemental list, objects to in writing as being unacceptable to either the Architect/Engineer, the Principal Representative or State Buildings Program. If a Subcontractor is deemed unacceptable, the Construction Manager shall propose a substitute Subcontractor and the Contract sum shall be adjusted by any demonstrated difference between the Subcontractor's bids, except where the Subcontractor has been debarred by the State or fails to meet qualifications of the Contract Documents to perform the Work proposed.

The Construction Manager shall be fully responsible to the Principal Representative for the acts and omissions of Subcontractors and of persons either directly or indirectly employed by them. All instructions or orders in respect to Work to be done by Subcontractors shall be given to the Construction Manager.

ARTICLE 16. RELATIONS OF CONSTRUCTION MANAGER AND SUBCONTRACTOR

The Construction Manager agrees to bind each Subcontractor to the terms of these General Conditions and to the requirements of the Drawings and Specifications, and any Addenda thereto, and also all the other Contract Documents, so far as applicable to the Work of such Subcontractor. The Construction Manager

further agrees to bind each Subcontractor to those terms of the General Conditions which expressly require that Subcontractors also be bound, including without limitation, requirements that Subcontractors waive all rights of subrogation, provide adequate general commercial liability and property insurance, automobile insurance and workers' compensation insurance as provided in Article 25, Insurance.

Nothing contained in the Contract Documents shall be deemed to create any contractual relationship whatsoever between any Subcontractor and the State of Colorado acting by and through its Principal Representative.

ARTICLE 17. MUTUAL RESPONSIBILITY OF CONTRACTORS

Should the Construction Manager cause damage to any separate contractor on the Work, the Construction Manager agrees, upon due Notice, to settle with such contractor by agreement, if he or she will so settle. If such separate contractor sues the Principal Representative on account of any damage alleged to have been so sustained, the Principal Representative shall notify the Construction Manager, who shall defend such proceedings if requested to do so by Principal Representative. If any judgment against the Principal Representative arises there from, the Construction Manager shall pay or satisfy it and pay all costs and reasonable attorney fees incurred by the Principal Representative, in accordance with Article 53H, Indemnification, provided the Construction Manager was given due Notice of an opportunity to settle.

ARTICLE 18. SEPARATE CONTRACTS

The Principal Representative reserves the right to enter into other contracts in connection with the Project or the Contract. The Construction Manager shall afford other contractors reasonable opportunity for the introduction and storage of their materials and the execution of their Work, and shall properly connect and coordinate his or her Work with theirs. If any part of the Construction Manager's Work depends, for proper execution or results, upon the Work of any other contractor, the Construction Manager shall inspect and promptly report to the Architect/Engineer any defects in such Work that render it unsuitable for such proper execution and results. Failure of the Construction Manager to so inspect and report shall constitute an acceptance of the other contractor's Work as fit and proper for the reception of Work, except as to defects which may develop in the other Construction Manager's Work after the execution of the Construction Manager's Work.

To insure the proper execution of subsequent Work, the Construction Manager shall measure Work already in place and shall at once report to the Architect/Engineer any discrepancy between the executed Work and the Drawings.

ARTICLE 19. USE OF PREMISES

The Construction Manager shall confine apparatus, the storage of materials and the operations of workmen to limits indicated by law, ordinances, permits and any limits lines shown on the Drawings. The Construction Manager shall not unreasonably encumber the premises with materials.

The Construction Manager shall enforce all of the Architect/Engineer's instructions and prohibitions regarding, without limitation, such matters as signs, advertisements, fires, smoking and security.

ARTICLE 20. CUTTING, FITTING OR PATCHING

The Construction Manager shall do all cutting, fitting or patching of Work that may be required to make its several parts come together properly and fit it to receive or be received by Work of other contractors shown upon, or reasonably inferred from, the Drawings and Specifications for the complete structure, and shall provide for such finishes to patched or fitted Work as the Architect/Engineer may direct. The Construction Manager shall not endanger any Work by cutting, excavating or otherwise altering the Work and shall not cut or alter the Work of any other contractor save with the consent of the Architect/Engineer.

ARTICLE 21. UTILITIES

A. TEMPORARY UTILITIES
Unless otherwise specifically stated in the Specifications or on the Drawings, the Principal Representative shall be responsible for the locations of all utilities as shown on the Drawings or

indicated elsewhere in the Specifications, subject to the Construction Manager's compliance with all statutory or regulatory requirements to call for utility locates. When actual conditions deviate from those shown the Construction Manager shall comply with the requirements of Article 37, Differing Site Conditions. The Construction Manager shall provide and pay for the installation of all temporary utilities required to supply all the power, light and water needed by him and other contractors for their Work and shall install and maintain all such utilities in such manner as to protect the public and Workmen and conform with any applicable laws and regulations. Upon completion of the Work, he or she shall remove all such temporary utilities from the site. The Construction Manager shall pay for all consumption of power, light and water used by him or her and the other contractors, without regard to whether such items are metered by temporary or permanent meters. The Superintendent shall have full authority over all trades and Subcontractors at any tier to prevent waste. The cut-off date on permanent meters shall be either the agreed date of the date of the Notice of Substantial Completion or the Notice of Approval of Occupancy/Use of the Project.

B. PROTECTION OF EXISTING UTILITIES
Where existing utilities, such as water mains, sanitary sewers, storm sewers and electrical conduits, are shown on the Drawings, the Construction Manager shall be responsible for the protection thereof, without regard to whether any such utilities are to be relocated or removed as a part of the Work. If any utilities are to be moved, the moving must be conducted in such manner as not to cause undue interruption or delay in the operation of the same.

C. CROSSING OF UTILITIES
When new construction crosses highways, railroads, streets, or utilities under the jurisdiction of State, city or other public agency, public utility or private entity, the Construction Manager shall secure proper written permission before executing such new construction. The Construction Manager will be required to furnish a proper release before final acceptance of the Work.

ARTICLE 22. UNSUITABLE CONDITIONS

The Construction Manager shall not Work at any time, or permit any Work to be done, under any conditions contrary to those recommended by manufacturers or industry standards which are otherwise proper, unsuited for proper execution, safety and performance. Any cost caused by ill-timed Work shall be borne by the Construction Manager unless the timing of such Work shall have been directed by the Architect/Engineer or the Principal Representative, after the award of the Contract, and the Construction Manager provided Notice of any additional cost.

ARTICLE 23. TEMPORARY FACILITIES

A. OFFICE FACILITIES
The Construction Manager shall provide and maintain without additional expense for the duration of the Project temporary office facilities, as required and as specified, for its own use and the use of the Architect/Engineer, representatives of the Principal Representative and State Buildings Program.

B. TEMPORARY HEAT
The Construction Manager shall furnish and pay for all the labor, facilities, equipment, fuel and power necessary to supply temporary heating, ventilating and air conditioning, except to the extent otherwise specified, and shall be responsible for the installation, operation, maintenance and removal of such facilities and equipment. Unless otherwise specified, the permanent HVAC system shall not be used for temporary heat in whole or in part. If the Construction Manager desires to put the permanent system into use, in whole or in part, the Construction Manager shall set it into operation and furnish the necessary fuel and manpower to safely operate, protect and maintain that HVAC system. Any operation of all or any part of the permanent HVAC system including operation for testing purposes shall not constitute acceptance of the system, nor shall it relieve the Construction Manager of his or her one-year guarantee of the system from the date of the Notice of Substantial Completion of the entire Project, and if necessary due to prior operation, the

Construction Manager shall provide manufacturers' extended warranties from the date of the Construction Manager's use prior to the date of the Notice of Substantial Completion.

C. WEATHER PROTECTION
The Construction Manager shall, at all times, provide protection against weather, so as to maintain all Work, materials, apparatus and fixtures free from injury or damages. The Construction Manager shall provide weather-tight storage on substantial floors at least six (6) inches off the ground for all materials requiring protection from the weather.

D. DUST PARTITIONS
If the Work involves Work in an occupied existing building, the Construction Manager shall erect and maintain during the progress of the Work, suitable dust-proof temporary partitions, or more permanent partitions as specified, to protect such building and the occupants thereof.

E. BENCH MARKS
The Construction Manager shall maintain any site bench marks provided by the Principal Representative and shall establish any additional benchmarks specified by the Architect/Engineer as necessary for the Construction Manager to layout the Work and ascertain all grades and levels as needed.

F. SIGN
The Construction Manager shall erect and permit one 4' x 8' sign only at the site to identify the Project as specified or directed by the Architect/Engineer which shall be maintained in good condition during the life of the Project.

G. SANITARY PROVISION
The Construction Manager shall provide and maintain suitable, clean, temporary sanitary toilet facilities for any and all workmen engaged on the Work, for the entire construction period, in strict compliance with the requirement of all applicable codes, regulations, laws and ordinances, and no other facilities, new or existing, may be used by any person on the Project. When the Project is complete the Construction Manager shall promptly remove them from the site, disinfect, and clean or treat the areas as required. If any new construction surfaces in the Project other than the toilet facilities provided for herein are soiled at any time, the entire areas so soiled shall be completely removed from the Project and rebuilt. In no event may present toilet facilities of any existing building at the site of the Work be used by employees of the Construction Manager or any subcontractors.

ARTICLE 24. CLEANING UP

The Construction Manager shall keep the building and premises free from all surplus material, waste material, dirt and rubbish caused by employees or Work, and at the completion of the Work shall remove all such surplus material, waste material, dirt, and rubbish, as well as all tools, equipment and scaffolding, and shall wash and clean all window glass and plumbing fixtures, perform cleanup and cleaning required by the Specifications and leave all of the Work clean unless more exact requirements are specified.

ARTICLE 25. INSURANCE

A. GENERAL
The Construction Manager shall procure and maintain all insurance requirements and limits as set forth below, at his or her own expense, for the length of time set forth in Contract requirements. The Construction Manager shall continue to provide evidence of such coverage to State of Colorado on an annual basis during the aforementioned period including all of the terms of the insurance and indemnification requirements of this agreement. All below insurance policies shall include a provision preventing cancellation without thirty (30) days' prior notice by certified mail. A completed Certificate of Insurance shall be filed with the Principal Representative and State Buildings Program

within ten (10) days after the date of the Notice of Award, said Certificate to specifically state the inclusion of the coverages and provisions set forth herein and shall state whether the coverage is "claims made" or "per occurrence".

B. COMMERCIAL GENERAL LIABILITY INSURANCE (CGL)
This insurance must protect the Construction Manager from all claims for bodily injury, including death and all claims for destruction of or damage to property (other than the Work itself), arising out of or in connection with any operations under this Contract, whether such operations be by the Construction Manager or by any Subcontractor under him or anyone directly or indirectly employed by the Construction Manager or by a Subcontractor. All such insurance shall be written with limits and coverages as specified below and shall be written on an occurrence form.

General Aggregate	$2,000,000
Products – Completed Operations Aggregate	$2,000,000
Each Occurrence	$1,000,000
Personal Injury	$1,000,000

The following coverages shall be included in the CGL:

1. Per project general aggregate (CG 25 03 or similar)
2. Additional Insured status in favor of the State of Colorado and any other parties as outlined in The Contract and must include both ONGOING Operations AND COMPLETED Operations per CG2010 10/01 and CG 2037 10/01 or equivalent as permitted by law.
3. The policy shall be endorsed to be **primary and non-contributory** with any insurance maintained by Additional Insureds.
4. A waiver of Subrogation in favor of all Additional Insured parties.
5. Personal Injury Liability
6. Contractual Liability coverage to support indemnification obligation per Article 53.I
7. Explosion, collapse and underground (xcu)

The following exclusionary endorsements are prohibited in the CGL policy:

1. Damage to Work performed by Subcontract/Vendor (CG 22-94 or similar)
2. Contractual Liability Coverage Exclusion modifying or deleting the definition of an "insured contract" from the unaltered SO CG 0001 1001 policy from (CG 24 26 or similar)
3. If applicable to the Work to be performed: Residential or multi-family
4. If applicable to the Work to be performed: Exterior insulation finish systems
5. If applicable to the Work to be performed: Subsidence or Earth Movement

The Construction Manager shall maintain general liability coverage including Products and Completed Operations insurance, and the Additional Insured with primary and non-contributory coverage as specified in this Contract for three (3) years after completion of the project.

C. AUTOMOBILE LIABILITY INSURANCE and business auto liability covering liability arising out of any auto (including owned, hired and non-owned autos).

Combined Bodily Injury and Property Damage Liability
(Combined Single Limit): $1,000,000 each accident

Coverages:
Specific waiver of subrogation

D. WORKERS' COMPENSATION INSURANCE

The Construction Manager shall procure and maintain Workers' Compensation Insurance at his or her own expense during the life of this Contract, including occupational disease provisions for all employees per statutory requirements. Policy shall contain a waiver of subrogation in favor of the State of Colorado.

The Construction Manager shall also require each Subcontractor to furnish Workers' Compensation Insurance, including occupational disease provisions for all of the latter's employees, and to the extent not furnished, the Construction Manager accepts full liability and responsibility for Subcontractor's employees.

In cases where any class of employees engaged in hazardous Work under this Contract at the site of the Project is not protected under the Workers' Compensation statute, the Construction Manager shall provide, and shall cause each Subcontractor to provide, adequate and suitable insurance for the protection of employees not otherwise protected.

E. UMBRELLA LIABILITY INSURANCE (for construction projects exceeding $10,000,000, provide the following coverage):

The Construction Manager shall maintain umbrella/excess liability insurance on an occurrence basis in excess of the underlying insurance described in Section B-D above. Coverage shall follow the terms of the underlying insurance, included the additional insured and waiver of subrogation provisions. The amounts of insurance required in Sections above may be satisfied by the Construction Manager purchasing coverage for the limits specified or by any combination of underlying and umbrella limits, so long as the total amount of insurance is not less than the limits specified in each section previously mentioned.

Each occurrence	$5,000,000
Aggregate	$5,000,000

F. BUILDER'S RISK INSURANCE

Unless otherwise expressly stated in the Supplementary General Conditions (e.g. where the State elects to provide for projects with a completed value of less than $1,000,000), the Construction Manager shall purchase and maintain, in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located, property insurance written on a builder's risk "all-risk" or equivalent policy form in the amount of the initial Contract Sum, plus value of subsequent Contract Modifications and cost of materials supplied or installed by others, comprising total value for the entire Project at the site on a replacement cost basis without optional deductibles. Such property insurance shall be maintained, unless otherwise provided in the Contract Documents or otherwise agreed in writing by all persons and entities who are beneficiaries of such insurance, until final payment has been made or until no person or entity other than the Owner has an insurable interest in the property, or the Date of Notice specified on the Notice of Acceptance, State Form SBP-6.27 or whichever is later.

This insurance shall include interests of the Owner, the Construction Manager, Subcontractors and Sub-subcontractors in the Project as named insureds.

All associated deductibles shall be the responsibility of the Construction Manager. Such policy may have a deductible clause but not to exceed ten thousand dollars ($10,000.00).

Property insurance shall be on an "all risk" or equivalent policy form and shall include, without limitation, insurance against the perils of fire (with extended coverage) and physical loss or damage including, without duplication of coverage, theft, vandalism, malicious mischief, collapse, earthquake, flood, windstorm, false Work, testing and startup, temporary buildings and debris removal including demolition occasioned by enforcement of any applicable legal requirements, and

shall cover reasonable compensation for Architect's and Construction Manager's services and expenses required as a result of such insured loss.

Construction Manager shall maintain Builders Risk coverage including partial use by Owner.
The Construction Manager shall waive all rights of subrogation as regards the State of Colorado and the Principal Representative, its officials, its officers, its agents and its employees, all while acting within the scope and course of their employment for damages caused by fire or other causes of loss to the extent covered by property insurance obtained pursuant to this Section or other property insurance applicable to the Work. The Construction Manager shall require all Subcontractors at any tier to similarly waive all such rights of subrogation and shall expressly include such a waiver in all subcontracts.

Upon request, the amount of such insurance shall be increased to include the cost of any additional Work to be done on the Project, or materials or equipment to be incorporated in the Project, under other independent contracts let or to be let. In such event, the Construction Manager shall be reimbursed for this cost as his or her share of the insurance in the same ratio as the ratio of the insurance represented by such independent contracts let or to be let to the total insurance carried.

The Principal Representative, with approval of the State Controller, shall have the power to adjust and settle any loss. Unless it is agreed otherwise, all monies received shall be applied first on rebuilding or repairing the destroyed or injured Work.

G. POLLUTION LIABILITY INSURANCE
If Construction Manager is providing directly or indirectly Work with pollution/environmental hazards, the Construction Manager must provide or cause those conducting the Work to provide Pollution Liability Insurance coverage. Pollution Liability policy must include contractual liability coverage. State of Colorado must be included as additional insureds on the policy. The policy limits shall be in the amount of $1,000,000 with maximum deductible of $25,000 to be paid by the Subcontractor/Vendor.

H. ADDITIONAL MISCELLANEOUS INSURANCE PROVISIONS
Certificates of Insurance and/or insurance policies required under this Contract shall be subject to the following stipulations and additional requirements:

1. Any and all deductibles or self-insured retentions contained in any Insurance policy shall be assumed by and at the sole risk of the Construction Manager;
2. If any of the said policies shall fail at any time to meet the requirements of the Contract Documents as to form or substance, or if a company issuing any such policy shall be or at any time cease to be approved by the Division of Insurance of the State of Colorado, or be or cease to be in compliance with any stricter requirements of the Contract Documents, the Construction Manager shall promptly obtain a new policy, submit the same to the Principal Representative and State Building Programs for approval if requested, and submit a Certificate of Insurance as hereinbefore provided. Upon failure of the Construction Manager to furnish, deliver and maintain such insurance as provided herein, this Contract, in the sole discretion of the State of Colorado, may be immediately declared suspended, discontinued, or terminated. Failure of the Construction Manager in obtaining and/or maintaining any required insurance shall not relieve the Construction Manager from any liability under the Contract, nor shall the insurance requirements be construed to conflict with the obligations of the Construction Manager concerning indemnification;
3. All requisite insurance shall be obtained from financially responsible insurance companies, authorized to do business in the State of Colorado and acceptable to the Principal Representative;
4. Receipt, review or acceptance by the Principal Representative of any insurance policies or certificates of insurance required by this Contract shall not be construed as a waiver or relieve

the Construction Manager from its obligation to meet the insurance requirements contained in these General Conditions.

ARTICLE 26. CONSTRUCTION MANAGER'S PERFORMANCE AND PAYMENT BONDS

The Construction Manager shall furnish a Performance Bond and a Labor and Material Payment Bond on State Forms SC-6.22, Performance Bond, and SC-6.221, Labor and Material Payment Bond, or such other forms as State Buildings Program may approve for the Project, executed by a corporate Surety authorized to do business in the State of Colorado and in the full amount of the Contract sum. The expense of these bonds shall be borne by the Contractor and the bonds shall be filed with State Buildings Program.

If, at any time, a Surety on such a bond is found to be, or ceases to be in strict compliance with any qualification requirements of the Contract Documents or the bid documents, or loses its right to do business in the State of Colorado, another Surety will be required, which the Construction Manager shall furnish to State Buildings Program within ten (10) days after receipt of Notice from the State or after the Construction Manager otherwise becomes aware of such conditions.

ARTICLE 27. LABOR AND WAGES

A. In accordance with laws of Colorado, C.R.S. § 8-17-101(1), as amended, Colorado labor shall be employed to perform at least eighty percent of the Work. If the Federal Davis-Bacon Act shall be applicable to the Project, as indicated in Article 6.2 (Construction Manager/General Contractor Agreement SC-6.5), Modification of Article 27, the minimum wage rates to be paid on the Project will be specified in the Contract Documents.

B. In accordance with laws of Colorado, C.R.S. § 24-92 Part 2, if prevailing wage rates are applicable to this project:

1. The contractor shall in conspicuous places on the project post an owner provided poster with the current prevailing rate of payments as provided in the project solicitation.

    a. A contractor who fails to comply shall be deemed guilty of a class 3 misdemeanor and shall pay the State one hundred dollars ($100) for each calendar day of noncompliance as determined by the State.

2. The contractor and any subcontractors shall pay all the employees employed directly on the site of the work, unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account, the full amounts accrued at time of payment computed at wage rates not less than those stated in the competitive solicitation, regardless of any contractual relationships that may be alleged to exist between the contractor or subcontractor and the employees.

3. The contractor and any subcontractors shall prepare and submit payroll reports to the State on a monthly basis that disclose all relevant payroll information, including the name and address of any entities to which fringe benefits are paid.

4. The contractor and any subcontractors shall maintain on the site where public projects are being constructed a daily log of employees employed each day on the public project. The log shall include, at a minimum, for each employee his or her name, primary job title, and employer, and shall be kept on a form prescribed by the director. The log shall be available for inspection on the site at all times by the State.

5. If the contractor or any subcontractor fails to pay wages as are required by the contract, the State shall not approve a warrant or demand for payment to the contractor until the contractor furnishes the State evidence satisfactory to such agency of government that such wages have been paid; except that the State shall approve and pay any portion of a warrant or demand for payment to the contractor to the extent the State has been furnished satisfactory evidence that the contractor or one or more subcontractors has paid such wages required by the contract,

The contractor or subcontractor may use the following procedure in order to satisfy the requirements of this section:

a. The contractor or subcontractor may submit to the State, for each employee to whom such wages are due, a check payable to that employee or to the State so it is negotiable by either party. Each such check shall be in an amount representing the difference between the accrued wages required to be paid to that employee by the contract and the wages actually paid by the contractor or subcontractor.

b. If any check submitted cannot be delivered to the employee within a reasonable period, then it shall be negotiated by the State and the proceeds deposited in the unclaimed property trust fund created in section 38-13-116.6. Nothing in this subsection (1) shall be construed to lessen the responsibility of the contractor or subcontractor to attempt to locate and pay any employee to whom wages are due.

ARTICLE 28. ROYALTIES AND PATENTS

The Construction Manager shall be responsible for assuring that all rights to use of products and systems have been properly arranged and shall take such action as may be necessary to avoid delay, at no additional charge to the Principal Representative, where such right is challenged during the course of the Work. The Construction Manager shall pay all royalties and license fees required to be paid and shall defend all suits or claims for infringement of any patent rights and shall save the State of Colorado harmless from loss on account thereof, in accordance with Article 53H, Indemnification; provided, however, the Construction Manager shall not be responsible for such loss or defense for any copyright violations contained in the Contract Documents prepared by the Architect/Engineer or the Principal Representative of which the Construction Manager is unaware, or for any patent violations based on specified processes that the **Construction Manager** is unaware are patented or that the **Construction Manager** should not have had reason to believe were patented.

ARTICLE 29. ASSIGNMENT

Except as otherwise provided hereafter the Construction Manager shall not assign the whole or any part of this Contract without the written consent of the Principal Representative. This provision shall not be construed to prohibit assignments of the right to payment to the extent permitted by C.R.S. § 4-9-406, et. seq., as amended, provided that written Notice of assignment adequate to identify the rights assigned is received by the Principal Representative and the controller for the agency, department, or institution executing this Contract (as distinguished from the State Controller). Such assignment of the right to payment shall not be deemed valid until receipt by the Principal Representative and such controller and the Construction Manager assumes the risk that such written Notice of assignment is received by the Principal Representative and the controller for the agency, department, or institution involved. In case the Construction Manager assigns all or part of any moneys due or to become due under this Contract, the instrument of assignment shall contain a clause substantially to the effect that it is agreed that the right of the assignee in and to any moneys due or to become due to the Construction Manager shall be subject to all claims of all persons, firms, and corporations for services rendered or materials supplied for the performance of the Work called for in this Contract, whether said service or materials were supplied prior to or after the assignment. Nothing in this Article shall be deemed a waiver of any other defenses available to the State against the Construction Manager or the assignee.

ARTICLE 30. CORRECTION OF WORK BEFORE ACCEPTANCE

The Construction Manager shall promptly remove from the premises all Work or materials condemned or declared irreparably defective as failing to conform to the Contract Documents on receipt of written Notice from the Architect/Engineer or the Principal Representative, whether incorporated in the Work or not. If such materials shall have been incorporated in the Work, or if any unsatisfactory Work is discovered, the Construction Manager shall promptly replace and re-execute his or her Work in accordance with the requirements of the Contract Documents without expense to the Principal Representative, and shall also bear the expense of making good all Work of other contractors destroyed or damaged by the removal or replacement of such defective material or Work.

Should any defective Work or material be discovered during the process of construction, or should reasonable doubt arise as to whether certain material or Work is in accordance with the Contract Documents, the value of such defective or questionable material or Work shall not be included in any application for payment, or if previously included, shall be deducted by the Architect/Engineer from the next application submitted by the Construction Manager r.

If the Construction Manager does not perform repair, correction and replacement of defective Work, in lieu of proceeding by issuance of a Notice of intent to remove condemned Work as outlined above, the Principal Representative may, not less than seven (7) days after giving the original written Notice of the need to repair, correct, or replace defective Work, deduct all costs and expenses of replacement or correction as instructed by the Architect/Engineer from the Construction Manager's next application for payment in addition to the value of the defective Work or material. The Principal Representative may also make an equitable deduction from the Contract sum by unilateral Change Order, in accordance with Article 33, Payments Withheld and Article 35, Changes in the Work.

If the Construction Manager does not remove such condemned or irreparably defective Work or material within a reasonable time, the Principal Representative may, after giving a second seven (7) day advance Notice to the Construction Manager and the Surety, remove them and may store the material at the Construction Manager's expense. The Principal Representative may accomplish the removal and replacement with its own forces or with another contractor. If the Construction Manager does not pay the expense of such removal and pay all storage charges within ten (10) days thereafter, the Principal Representative may, upon ten (10) days' written Notice, sell such material at auction or at private sale and account for the net proceeds thereof, after deducting all costs and expenses which should have been borne by the Construction Manager. If the Construction Manager shall commence and diligently pursue such removal and replacement before the expiration of the seven-day period, or if the Construction Manager shall show good cause in conjunction with submittal of a revised CPM schedule showing when the Work will be performed and why such removal of condemned Work should be scheduled for a later date, the Principal Representative shall not proceed to remove or replace the condemned Work.

If the Construction Manager disagrees with the Notice to remove Work or materials condemned or declared irreparably defective, the Construction Manager may request facilitated negotiation of the issue and the Principal Representative's right to proceed with removal and to deduct costs and expenses of repair shall be suspended and tolled until such time as the parties meet and negotiate the issue

During construction, whenever the Architect/Engineer has advised the Construction Manager in writing, in the Specifications, by reference to Article 6, Architect/Engineer Decisions And Judgments, of these General Conditions or elsewhere in the Contract Documents of a need to observe materials in place prior to their being permanently covered up, it shall be the Construction Manager's responsibility to notify the Architect/Engineer at least forty-eight (48) hours in advance of such covering operation. If the Construction Manager fails to provide such notification, Construction Manager shall, at his or her expense, uncover such portions of the Work as required by the Architect/Engineer for observation, and reinstall such covering after observation. When a covering operation is continued from day to day, notification of the commencement of a single continuing covering operation shall suffice for the activity specified so long as it proceeds regularly and without interruption from day to day, in which event the Construction Manager shall coordinate with the Architect/Engineer regarding the continuing covering operation.

ARTICLE 31. APPLICATIONS FOR PAYMENTS

A. CONSTRUCTION MANAGER'S SUBMITTALS
On or before the first day of each month and no more than five days prior thereto, the Construction Manager may submit applications for payment for the Work performed during such month covering the portion of the Work completed as of the date indicated, and payments on account of this Contract shall be due per C.R.S. § 24-30-202(24) (correct notice of amount due), within forty-five (45) days of receipt by the Principal Representative of application for payments that have been certified by the Architect/Engineer. The Construction Manager shall submit the application for

payment to the Architect/Engineer on State forms SBP-7.2, Application and Certificate for Contractor's Payment, or such other format as the State Buildings Program shall approve, in an itemized format in accordance with the schedule of values or a cost loaded CPM schedule when required, supported to the extent reasonably required by the Architect/Engineer or the Principal Representative by receipts or other vouchers, showing payments for materials and labor, prior payments and payments to be made to Subcontractors and such other evidence of the Construction Manager's right to payments as the Architect/Engineer or Principal Representative may direct.

If payments are made on account of materials not incorporated in the Work but delivered and suitably stored at the site, or at some other location agreed upon in writing, such payments shall be conditioned upon submission by the Construction Manager of bills of sale or such other procedure as will establish the Principal Representative's title to such material or otherwise adequately protect the Principal Representative's interests, and shall provide proof of insurance whenever requested by the Principal Representative or the Architect/Engineer, and shall be subject to the right to inspect the materials at the request of either the Architect/Engineer or the Principal Representative.

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.

B. ARCHITECT/ENGINEER CERTIFICATION

In accordance with the Architect/Engineer's agreement with the Principal Representative, the Architect/Engineer after appropriate observation of the progress of the Work shall certify to the Principal Representative the amount that the Construction Manager is entitled to, and forward the application to the Principal Representative. If the Architect/Engineer certifies an amount different from the amount requested or otherwise alters the Construction Manager's application for payment, a copy shall be forwarded to the Construction Manager.

If the Architect/Engineer is unable to certify all or portions of the amount requested due to the absence or lack of required supporting evidence, the Architect/Engineer shall advise the Construction Manager of the deficiency. If the deficiency is not corrected at the end of ten (10) days, the Architect/Engineer may either certify the remaining amounts properly supported to which the Construction Manager is entitled, or return the application for payment to the Construction Manager for revision with a written explanation as to why it could not be certified.

C. RETAINAGE WITHHELD

Unless otherwise provided in the Supplementary General Conditions, an amount equivalent to five percent (5%) of the amount shown to be due the Construction Manager on each application for payment shall be withheld until the Work required by the Contract has been performed. The withheld percentage of the contract price of any such Work, improvement, or construction shall be administered according to C.R. S. § 24-91-103, as amended, and C.R.S. § 38-26-107, as amended, and Article 31D, shall be retained until the Work or discrete portions of the Work, have been completed satisfactorily, finally or partially accepted, and advertised for final settlement as further provided in Article 41.

D. RELEASE OF RETAINAGE

The Construction Manager may, for satisfactory and substantial reasons shown to the Principal Representative's satisfaction, make a written request to the Principal Representative and the Architect/Engineer for release of part or all of the withheld percentage applicable to the Work of a Subcontractor which has completed the subcontracted Work in a manner finally acceptable to the Architect/Engineer, the Construction Manager, and the Principal Representative. Any such request shall be supported by a written approval from the Surety furnishing the Construction Manager's bonds and any surety that has provided a bond for the Subcontractor. The release of any such withheld percentage shall be further supported by such other evidence as the Architect/Engineer or the Principal Representative may require, including but not limited to, evidence of prior payments

made to the Subcontractor, copies of the Subcontractor's contract with the Construction Manager, any applicable warranties, as-built information, maintenance manuals and other customary close-out documentation. Neither the Principal Representative nor the Architect Engineer shall be obligated to review such documentation nor shall they be deemed to assume any obligations to third parties by any review undertaken.

The Construction Manager's obligation under these General Conditions to guarantee Work for one year from the date of the Notice of Substantial Completion or the date of any Notice of Partial Substantial Completion of the applicable portion or phase of the Project, shall be unaffected by such partial release; unless a Notice of Partial Substantial Completion is issued for the Work subject to the release of retainage.

Any rights of the Principal Representative which might be terminated by or from the date of any final acceptance of the Work, whether at common law or by the terms of this Contract, shall not be affected by such partial release of retainage prior to any final acceptance of the entire Project.

The Construction Manager remains fully responsible for the Subcontractor's Work and assumes any risk that might arise by virtue of the partial release to the Subcontractor of the withheld percentage, including the risk that the Subcontractor may not have fully paid for all materials, labor and equipment furnished to the Project.

If the Principal Representative considers the Construction Manager's request for such release satisfactory and supported by substantial reasons, the Architect/Engineer shall make a "final inspection" of the applicable portion of the Project to determine whether the Subcontractor's Work has been completed in accordance with the Contract Documents. A final punch list shall be made for the Subcontractor's Work and the procedures of Article 41, Completion, Final Inspection, Acceptance and Settlement, shall be followed for that portion of the Work, except that advertisement of the intent to make final payment to the Subcontractor shall be required only if the Principal Representative has reason to believe that a supplier or Subcontractor to the Subcontractor for which the request is made, may not have been fully paid for all labor and materials furnished to the Project.

ARTICLE 32. CERTIFICATES FOR PAYMENTS

State Form SBP-7.2, Certificate For Contractor's Payment, and its continuation detail sheets, when submitted, shall constitute the ~~Certificate of~~ Construction Manager 's Application for Payment, and shall be a representation by the Construction Manager to the Principal Representative that the Work has progressed to the point indicated, the quality of the Work is in accordance with the Contract Documents, and materials for which payment is requested have been incorporated into the Project except as noted in the application. If requested by the Principal Representative the Certificate of Contractor's Application for Payment shall be sworn under oath and notarized.

ARTICLE 33. PAYMENTS WITHHELD

The Architect/Engineer, the Principal Representative or State Buildings Program may withhold, or on account of subsequently discovered evidence nullify, the whole or any part of any application on account of, but not limited to any of the following:

1. Defective Work not remedied;
2. Claims filed or reasonable evidence indicating probable filing of claims;
3. Failure of the Construction Manager to make payments to Subcontractors for material or labor;
4. A reasonable doubt that the Contract can be completed for the balance of the contract price then unpaid;
5. Damage or injury to another contractor or any other person, persons or property except to the extent of coverage by a policy of insurance;
6. Failure to obtain necessary permits or licenses or to comply with applicable laws, ordinances, codes, rules or regulations or the directions of the Architect/Engineer;
7. Failure to submit a monthly construction schedule;

8. Failure of the Construction Manager to keep Work progressing in accordance with the time schedule;
9. Failure to keep a superintendent on the Work;
10. Failure to maintain as built drawings of the Work in progress;
11. Unauthorized deviations by the Construction Manager from the Contract Documents; or
12. On account of liquidated damages.

In addition, the Architect Engineer, Principal Representative or State Buildings Program may withhold or nullify the whole or any part of any application for any reason noted elsewhere in these General Conditions of the Construction Manager/General Contractor (CM/GC) Agreement. Nullification shall mean reduction of amounts shown as previously paid on the application. The amount withheld or nullified may be in such amount as the Architect/Engineer or the Principal Representative estimates to be required to allow the State to accomplish the Work, cure the failure and cover any damages or injuries, including an allowance for attorneys' fees and costs where appropriate. When the grounds for such withholding or nullifying are removed, payment shall be made for the amounts thus withheld or nullified on such grounds.

ARTICLE 34. DEDUCTIONS FOR UNCORRECTED WORK

If the Architect/Engineer and the Principal Representative deem it inexpedient to correct Work damaged or not performed in accordance with the Contract Documents, the Principal Representative may, after consultation with the Architect/Engineer and ten (10) days' Notice to the Construction Manager of intent to do so, make reasonable reductions from the amounts otherwise due the Construction Manager on the next application for payment. Notice shall specify the amount or terms of any contemplated reduction. The Construction Manager may during this period correct or perform the Work. If the Construction Manager does not correct or perform the Work, an equitable deduction from the Contract sum shall be made by Change Order, in accordance with Article 35, Changes in the Work, unilaterally if necessary. If either party elects' facilitation of this issue after Notice is given, the ten-day (10) notice period shall be extended and tolled until facilitation has occurred.

ARTICLE 35. CHANGES IN THE WORK

The Principal Representative may designate, without invalidating the Agreement, and with the approval of State Buildings Program and the State Controller, may order extra Work or make changes with or without the consent of the Construction Manager as hereafter provided, by altering, adding to or deducting from the Work, the Contract sum being adjusted accordingly. All such changes in the Work shall be within the general scope of and be executed under the conditions of the Contract, except that any claim for extension of time made necessary due to the change or any claim of other delay or other impacts caused by or resulting from the change in the Work shall be presented by the Construction Manager and adjusted by Change Order to the extent known at the time such change is ordered and before proceeding with the extra or changed Work. Any claims for extension of time or of delay or other impacts, and any costs associated with extension of time, delay or other impacts, which are not presented before proceeding with the change in the Work, and which are not adjusted by Change Order to the extent known, shall be waived.

The Architect/Engineer shall have authority to make minor changes in the Work, not involving extra cost, and not inconsistent with the intent of the Contract Documents, but otherwise, except in an emergency endangering life or property, no extra Work or change in the Contract Documents shall be made unless by 1) a written Change Order, approved by the Principal Representative, State Buildings Program, and the State Controller prior to proceeding with the changed Work; or 2) by an Emergency Field Change Order approved by the Principal Representative and State Buildings Program as hereafter provided in Article 35D, Emergency Field Ordered Changed Work; or 3) by an allocation in writing of any allowance already provided in the encumbered contract amount, the Contract sum being later adjusted to decrease the Contract sum by any unallocated or unexpended amounts remaining in such allowance. No change to the Contract sum shall be valid unless so ordered.

A. THE VALUE OF CHANGED WORK
   1. The value of any extra Work or changes in the Work shall be determined by agreement in one or more of the following ways:

a. by estimate and acceptance of a lump-sum amount;

b. By unit prices specified in the Agreement, or subsequently agreed upon, that are extended by specific quantities;

c. By actual cost plus a fixed fee in a lump sum amount for profit, overhead and all indirect and off-site home office costs, the latter amount agreed upon in writing prior to starting the extra or changed Work.

2. Where the Construction Manager and the Principal Representative cannot agree on the value of extra Work, the Principal Representative may order the Construction Manager to perform the changes in the Work and a Change Order may be unilaterally issued based on an estimate of the change in the Work prepared by the Architect/Engineer. The value of the change in the Work shall be the Principal Representative's determination of the amount of equitable adjustment attributable to the extra Work or change. The Principal Representative's determination shall be subject to appeal by the Construction Manager pursuant to the claims process in Article 36, Claims.

3. Except as otherwise provided in Article 35B, Detailed Breakdown, below, the Cost Principles of the Colorado Procurement Code or the applicable procurement code for institutions of higher education, shall govern all Contract changes.

B. DETAILED BREAKDOWN

In all cases where the value of the extra or changed Work is not known based on unit prices in the Construction Manager's bid or the Agreement, a detailed change proposal shall be submitted by the Construction Manager on a Change Order Proposal (SC-6.312), or in such other format as the State Buildings Program approves, with which the Principal Representative may require an itemized list of materials, equipment and labor, indicating quantities, time and cost for completion of the changed Work.

Such detailed change proposals shall be stated in lump sum amounts and shall be supported by a separate breakdown, which shall include estimates of all or part of the following when requested by the Architect/Engineer or the Principal Representative:

1. Materials, indicating quantities and unit prices including taxes and delivery costs if any (separated where appropriate into general, mechanical and electrical and/or other Subcontractors' Work; and the Principal Representative may require in its discretion any significant subcontract costs to be similarly and separately broken down).
2. Labor costs, indicating hourly rates and time and labor burden to include Social Security and other payroll taxes such as unemployment, benefits and other customary burdens.
3. Costs of project management time and superintendence time of personnel stationed at the site, and other field supervision time, but only where a time extension, other than a weather delay, is approved as part of the Change Order, and only where such project management time and superintendence time is directly attributable to and required by the change; provided however that additional cost of on-site superintendence shall be allowable whenever in the opinion of the Architect/Engineer the impact of multiple change requests to be concurrently performed will result in inadequate levels of supervision to assure a proper result unless additional superintendence is provided.
4. Construction equipment (including small tools). Expenses for equipment and fuel shall be based on customary commercially reasonable rental rates and schedules. Equipment and hand tool costs shall not include the cost of items customarily owned by workers.
5. Workers' compensation costs, if not included in labor burden.
6. The cost of commercial general liability and property damage insurance premiums but only to the extent charged the Construction Manager as a result of the changed Work.
7. Overhead and profit, as hereafter specified.
8. Builder's risk insurance premium costs.
9. Bond premium costs.

10. Testing costs not otherwise excluded by these General Conditions.
11. Subcontract costs.

Unless modified in the Supplementary General Conditions, overhead and profit shall not exceed the percentages set forth in the table below.

	OVERHEAD	PROFIT	COMMISSION
To the Construction Manager or to Subcontractors for the portion of Work performed with their own forces:	10%	5%	0%
To the Construction Manager or to Subcontractors for Work performed by others at a tier immediately below either of them:	5%	0%	5%

Overhead shall include: a) insurance premium for policies not purchased for the Project and itemized above, b) home office costs for office management, administrative and supervisory personnel and assistants, c) estimating and change order preparation costs, d) incidental job burdens, e) legal costs, f) data processing costs, g) interest costs on capital, h) general office expenses except those attributable to increased rental expenses for temporary facilities, and all other indirect costs, but shall not include the Social Security tax and other direct labor burdens. The term “Work” as used in the proceeding table shall include labor, materials and equipment and the "Commission" shall include all costs and profit for carrying the subcontracted Work at the tiers below except direct costs as listed in items 1 through 11 above if any.

On proposals for Work involving both additions and credits in the amount of the Contract sum, the overhead and profit will be allowed on the net increase only. On proposals resulting in a net deduct to the amount of the Contract sum, profit on the deducted amount shall be returned to the Principal Representative at fifty percent (50%) of the rate specified. The inadequacy of the profit specified shall not be a basis for refusal to submit a proposal.

Except in the case of Change Orders or Emergency Field Change Orders agreed to on the basis of a lump sum amount or unit prices as described in paragraphs 35A1 and 35A2 above, The Value of Changed Work, the Construction Manager shall keep and present a correct and fully auditable account of the several items of cost, together with vouchers, receipts, time cards and other proof of costs incurred, summarized on a Change Order form (SC-6.31) using such format for supporting documentation as the Principal Representative and State Buildings Program approve. This requirement applies equally to Work done by Subcontractors. Only auditable costs shall be reimbursable on Change Orders where the value is determined on the basis of actual cost plus a fixed fee pursuant to paragraph 35A3 above, or where unilaterally determined by the Principal Representative on the basis of an equitable adjustment in accordance with the Procurement Rules, as described above in Article 35A, The Value Of Changed Work.

Except for proposals for Work involving both additions and credits, changed Work shall be adjusted and considered separately for Work either added or omitted. The amount of adjustment for Work omitted shall be estimated at the time it is directed to be omitted, and when reasonable to do so, the agreed adjustment shall be reflected on the schedule of values used for the next Construction Manager’s application for payment.

The Principal Representative reserves the right to contract with any person or firm other than the Construction Manager for any or all extra Work; however, unless specifically required in the Contract Documents, the Construction Manager shall have no responsibility without additional compensation to supervise or coordinate the Work of persons or firms separately contracted by the Principal Representative.

C. HAZARDOUS MATERIALS

The Principal Representative represents that it has undertaken an examination of the site of the Work and has determined that there are no hazardous substances, as defined below, which the Construction Manager could reasonably encounter in its performance of the Work. In the event the Principal Representative so discovers hazardous substances, the Principal Representative shall render harmless such hazards before the Construction Manager commences the Work.

In the event the Construction Manager encounters any materials reasonably believed to be hazardous substances which have not been rendered harmless, the Construction Manager shall immediately stop Work in the area affected and report the condition to the Principal Representative, in writing. For purposes of this Agreement, "hazardous substances" shall include asbestos, lead, polychlorinated biphenyl (PCB) and any or all of those substances defined as "hazardous substance", "hazardous waste", or "dangerous or extremely hazardous wastes" as those terms are used in the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and the Resource Conservation and Recovery Act (RCRA), and shall also include materials regulated by the Toxic Substances Control Act (TSCA), the Clean Air Act, the Air Quality Act, the Clean Water Act, and the Occupational Safety and Health Act. The Work in the affected area shall not therefore be resumed except by written agreement of the Principal Representative and the Construction Manager, if in fact materials that are hazardous substances have not been rendered harmless. The Work in the affected area shall be resumed only in the absence of the hazardous substances or when it has been rendered harmless or by written agreement of the Principal Representative and the Construction Manager.

The Construction Manager **shall not be required to perform Work without consent in any areas where it reasonably believes hazardous substances that have not been rendered harmless are present.**

D. EMERGENCY FIELD CHANGE ORDERED WORK

The Principal Representative, without invalidating the Agreement, and with the approval of State Buildings Program and without the approval of the State Controller, may order extra Work or make changes in the case of an emergency that is a threat to life or property or where the likelihood of delays in processing a normal Change Order will result in substantial delays and or significant cost increases for the Project. Emergency Field Orders are not to be used solely to expedite normal Change Order processing absent a clear showing of a high potential for significant and substantial cost or delay. Such changes in the Work may be directed through issuance of an Emergency Field Change Order signed by the Construction Manager, the Principal Representative (or by a designee specifically appointed to do so in writing), and approved by the Director of State Buildings Program or his or her delegate. The change shall be directed using an Emergency Field Change Order form (SC-6.31E).

If the amount of the adjustment of the Contract price and time for completion can be determined at the time of issuance of the Emergency Field Change Order, those adjustments shall be reflected on the face of the Emergency Field Change Order. Otherwise, the Emergency Field Change Order shall reflect a not to exceed (NTE) amount for any schedule adjustment (increasing or decreasing the time for completion) and an NTE amount for any adjustment to Contract sum, which NTE amount shall represent the maximum amount of adjustment to which the Construction Manager will be entitled, including direct and indirect costs of changed Work, as well as any direct or indirect costs attributable to delays, inefficiencies or other impacts arising out of the change. Emergency Field Change Orders directed in accordance with this provision need not bear the approval signatures of the State Controller.

On Emergency Field Change Orders where the price and schedule have not been finally determined, the Construction Manager shall submit final costs for adjustment as soon as practicable. No later than seven (7) days after issuance, except as otherwise permitted, and every seven days thereafter, the Construction Manager shall report all costs to the Principal

Representative and the Architect/Engineer. The final adjustment of the Emergency Field Change Order amount and the adjustment to the Project time for completion shall be prepared on a normal Change Order from (SC-6.31) in accordance with the procedures described in Article 35A, The Value of Changed Work, and B, Detailed Breakdown, above. Unless otherwise provided in writing signed by the Director of State Buildings Program to the Principal Representative and the Construction Manager, describing the extent and limits of any greater authority, individual Emergency Field Change Orders shall not be issued for more than $25,000, nor shall the cumulative value of Emergency Field Change Orders exceed an amount of $100,000.

E. APPROPRIATION LIMITATIONS - C.R.S. § 24-91-103.6, as amended
The amount of money appropriated, as shown on the Construction Manager/General Contractor (CM/GC) Agreement (SC-6.5), is equal to or in excess of the Contract amount. No Change Order, Emergency Field Change Order, or other type of order or directive shall be issued by the Principal Representative, or any agent acting on his or her behalf, which directs additional compensable Work to be performed, which Work causes the aggregate amount payable under the Contract to exceed the amount appropriated for the original Contract, as shown on the Agreement (SC-6.5), unless one of the following occurs: (1) the Construction Manager is provided written assurance from the Principal Representative that sufficient additional lawful appropriations exist to cover the cost of the additional Work; or (2) the Work is covered by a Construction Manager remedy provision under the Contract, such as a claim for extra cost. By way of example only, no assurance is required for any order, directive or instruction by the Architect/Engineer or the Principal Representative to perform Work which is determined to be within the performance required by the Contract Documents; the Construction Manager's remedy shall be as described elsewhere in these General Conditions.

Written assurance shall be in the form of an Amendment to the Contract reciting the source and amount of such appropriation available for the Project. No remedy granting provision of this Contract shall obligate the Principal Representative to seek appropriations to cover costs in excess of the amounts recited as available to pay for the Work to be performed.

ARTICLE 36. CLAIMS

It is the intent of these General Conditions to provide procedures for speedy and timely resolution of disagreements and disputes at the lowest level possible. In the spirit of on the job resolution of job site issues, the parties are encouraged to use the partnering processes of Article 2D, Partnering, Communications and Cooperation, before turning to the more formal claims processes described in this Article 36, Claims. The use of non-binding dispute resolution, whether through the formal processes described in Article 39, Non-Binding Dispute Resolution – Facilitated Negotiations, or through less formal alternative processes developed as part of a partnering plan, are also encouraged. Where such process cannot resolve the issues in dispute, the claims process that follows is intended to cause the issues to be presented, decided and where necessary, documented in close proximity to the events from which the issues arise. To that end, and in summary of the remedy granting process that follows commencing with the next paragraph of this Article 36, Claims, the Construction Manager shall 1) first, seek a decision by the Architect/Engineer, and 2) shall second, informally present the claim to Principal Representative as described hereafter, and 3) failing resolution in the field, give Notice of intent to exercise statutory rights of review of a formal contract controversy, and 4) seek resolution outside the Contract as provided by the Colorado Procurement Code or the applicable procurement code for institutions of higher education.

If the Construction Manager claims that any instructions, by detailed drawings, or otherwise, or any other act or omission of the Architect/Engineer or Principal Representative affecting the scope of the Construction Manager's Work, involve extra cost, extra time or changes in the scope of the Work under this Contract, the Construction Manager shall have the right to assert a claim for such costs or time, provided that before either proceeding to execute such Work (except in an emergency endangering life or property), or filing a Notice of claim, the Construction Manager shall have obtained or requested a written decision of the Architect/Engineer following the procedures as provided in Article 6A and B, Architect/Engineer Decisions and Judgments, respectively; provided, however, that in the case of a directed change in the Work pursuant to Article 35, no written judgment or decision of the Architect/Engineer is required. If the Construction

Manager is delayed by the lack of a response to a request for a decision by the Architect/Engineer, the Construction Manager shall give Notice in accordance with Article 38, Delays and Extensions of Time.

Unless it is the Architect/Engineer's judgment and determination that the Work is not included in the performance required by the Contract Documents, the Construction Manager shall proceed with the Work as originally directed. Where the Construction Manager's claim involves a dispute concerning the value of Work unilaterally directed pursuant to Article 35A2 the Construction Manager shall also proceed with the Work as originally directed while his or her claim is being considered.

The Construction Manager shall give the Principal Representative and the Architect/Engineer Notice of any claim promptly after the receipt of the Architect/Engineer's decision, but in no case later than three (3) business days after receipt of the Architect/Engineer's decision (or no later than ten (10) days from the date of the Construction Manager's request for a decision when the Architect/Engineer fails to decide as provided in Article 6). The Notice of claim shall state the grounds for the claim and the amount of the claim to the extent known in accordance with the procedures of Article 35, Changes in the Work. The period in which Notice must be given may be extended by the Principal Representative if requested in writing by the Construction Manager with good cause shown, but any such extension to be effective shall be in writing.

The Principal Representative shall respond in writing, with a copy to the Architect/Engineer, within a reasonable time, and except where a request for facilitation of negotiation has been made as hereafter provided, in no case later than seven (7) business days (or at such other time as the Construction Manager and Principal Representative agree) after receipt of the Construction Manager's Notice of claim regarding such instructions or alleged act or omission. If no response to the Construction Manager's claim is received within seven (7) business days of Construction Manager's Notice (or at such other time as the Construction Manager and Principal Representative agree) and the instructions have not been retracted, it shall be deemed that the Principal Representative has denied the claim.

The Principal Representative may grant or deny the claim in whole or in part, and a Change Order shall be issued if the claim is granted. To the extent any portion of claim is granted where costs are not clearly shown, the Principal Representative may direct that the value of that portion of the Work be determined by any method allowed in Article 35A, The Value of Changed Work. Except in the case of a deemed denial, the Principal Representative shall provide a written explanation regarding any portion of the Construction Manager's claim that is denied.

If the Construction Manager disagrees with the Principal Representative's judgment and determination on the claim and seeks an equitable adjustment of the Contract sum or time for performance, he or she shall give Notice of intent to exercise his or her statutory right to seek a decision on the contract controversy within ten (10) days of receipt of the Principal Representative's decision denying the claim. A "contract controversy," as such term is used in the Colorado Procurement Code or the applicable procurement code for institutions of higher education, shall not arise until the initial claim process described above in this Article 36 has been properly exhausted by the Construction Manager. The Construction Manager's failure to proceed with Work directed by the Architect/Engineer or to exhaust the claim process provided above in this Article 36, shall constitute an abandonment of the claim by the Construction Manager and a waiver of the right to contest the decision in any forum.

At the time of filing the Notice of intent to exercise his or her statutory right to seek a decision on the contract controversy, the Construction Manager may request that the Principal Representative defer a decision on the contract controversy until a later date or until the end of the Project. If the Principal Representative agrees, he or she shall so advise the Construction Manager in writing. If no such request is made, or if the Principal Representative does not agree to such a request, the Principal Representative shall render a written decision within twenty (20) business days and advise the Construction Manager of the reasons for any denial. Unless the claim has been decided by the Principal Representative (as opposed to delegates of the Principal Representative), the person who renders the decision on this statutory contract controversy shall not be the same person who decided the claim. To the extent any portion of the contract controversy is granted where costs are not clearly shown, the Principal Representative may direct that the value of that portion of the Work be determined by any method allowed in Article 35A, The Value of Changed Work. In

the event of a denial the Principal Representative shall give Notice to the Construction Manager of his or her right to administrative and judicial reviews as provided in the Colorado Procurement Code or the applicable procurement code for institutions of higher education. If no decision regarding the contract controversy is issued within twenty (20) business days of the Construction Manager's giving Notice (or such other date as the Construction Manager and Principal Representative have agreed), and the instructions have not been retracted or the alleged act or omission have not been corrected, it shall be deemed that the Principal Representative has ruled by denial on the contract controversy. Except in the case of a deemed denial, the Principal Representative shall provide an explanation regarding any portion of the contract controversy that involves denial of the Construction Manager's claim.

Either the Construction Manager or the Principal Representative may request facilitation of negotiations concerning the claim or the contract controversy, and if requested, the parties shall consult and negotiate before the Principal Representative decides the issue. Any request for facilitation by the Construction Manager shall be made at the time of the giving of Notice of the claim or Notice of the contract controversy. Facilitation shall extend the time for the Principal Representative to respond by commencing the applicable period at the completion of the facilitated negotiation, which shall be the last day of the parties' meeting, unless otherwise agreed in writing.

Disagreement with the decision of the Architect Engineer, or the decision of the Principal Representative to deny any claim or denying the contract controversy, shall not be grounds for the Construction Manager to refuse to perform the Work directed or to suspend or terminate performance. During the period that any claim or contract controversy decision is pending under this Article 36, Claims, the Construction Manager shall proceed diligently with the Work directed.

In all cases where the Construction Manager proceeds with the Work and seeks equitable adjustment by filing a claim and or statutory appeal, the Construction Manager shall keep a correct account of the extra cost, in accordance with Article 35B, Detailed Breakdown supported by receipts. The Principal Representative shall be entitled to reject any claim or contract controversy whenever the foregoing procedures are not followed and such accounts and receipts are not presented.

The payments to the Construction Manager in respect of such extra costs shall be limited to reimbursement for the current additional expenditure by the Construction Manager made necessary by the change in the Work, plus a reasonable amount for overhead and profit, determined in accordance with Article 35B, Detailed Breakdown, determined solely with reference to the additional Work, if any, required by the change.

ARTICLE 37. DIFFERING SITE CONDITIONS

A. NOTICE IN WRITING

The Construction Manager shall promptly, and where possible before conditions are disturbed, give the Architect/Engineer and the Principal Representative Notice in writing of:

1. subsurface or latent physical conditions at the site differing materially from those indicated in or reasonably assumed from the information provided in the Contract Documents; and,
2. unknown physical conditions at the site, of an unusual nature, differing materially from those ordinarily encountered and generally recognized as inherent in Work of the character provided for in the Contract Documents.

The Architect/Engineer shall promptly investigate the conditions, and if it is found that such conditions do materially so differ and cause an increase or decrease in the Construction Manager's costs of performance of any part of the Work required by the Contract Documents, whether or not such Work is changed as a result of such conditions, an equitable adjustment shall be made and the Contract sum shall be modified in accordance with Article 35, Changes In The Work.

If the time required for completion of the Work affected by such materially differing conditions will extend the Work on the critical path as indicated on the CPM schedule, the time for completion shall also be equitably adjusted.

B. LIMITATIONS

No claim of the Construction Manager under this clause shall be allowed unless the Construction Manager has given the Notice required in Article 37A, Notice in Writing, above. The time prescribed for presentation and adjustment in Articles 36, Claims and 38, Delays And Extensions Of Time, shall be reasonably extended by the State to the extent required by the nature of the differing conditions; provided, however, that even when so extended no claim by the Construction Manager for an equitable adjustment hereunder shall be allowed if not quantified and presented prior to the date the Construction Manager requests a final inspection pursuant to Article 41A, Notice Of Completion.

ARTICLE 38. DELAYS AND EXTENSIONS OF TIME

If the Construction Manager is delayed at any time in the progress of the Work by any act or neglect of the State of Colorado or the Architect/Engineer, or of any employee or agent of either, or by any separately employed Construction Manager or by strikes, lockouts, fire, unusual delay in transportation, unavoidable casualties or any other causes beyond the Construction Manager's control, including weather delays as defined below, the time of Completion of the Work shall be extended for a period equal to such portion of the period of delays directly affecting the completion of the Work as the Construction Manager shall be able to show he or she could not have avoided by the exercise of due diligence.

The Construction Manager shall provide Notice in writing to the Architect/Engineer, the Principal Representative and State Buildings Program within three (3) business days from the beginning of such delay and shall file a written claim for an extension of time within seven (7) business days after the period of such delay has ceased, otherwise, any claim for an extension of time is waived.

Provided that the Construction Manager has submitted reasonable schedules for approval when required by Article 12, Requests for Information and Schedules, if no schedule is agreed to fixing the dates on which the responses to requests for information or detail drawings will be needed, or Shop Drawings, Product Data or Samples are to be reviewed as required or allowed by Article 12B, Schedules, no extension of time will be allowed for the Architect/ Engineer's failure to furnish such detail drawings as needed, or for the failure to initially review Shop Drawings, Product Data or Samples, except in respect of that part of any delay in furnishing detail drawings or instructions extending beyond a reasonable period after written demand for such detailed drawings or instructions is received by the Architect/Engineer. In any event, any claim for an extension of time for such cause will be recognized only to the extent of delay directly caused by failure to furnish detail drawings or instructions or to review Shop Drawings, Product Data or Samples pursuant to schedule, after such demand.

All claims for extension of time due to a delay claimed to arise or result from ordered changes in the scope of the Work, or due to instructions claimed to increase the scope of the Work, shall be presented to the Architect/Engineer, the Principal Representative and State Buildings Program as part of a claim for extra cost, if any, in accordance with Article 36, Claims, and in accordance with the Change Order procedures required by Article 35, Changes In The Work.

Except as otherwise provided in this paragraph, no extension of time shall be granted when the Construction Manager has failed to utilize a CPM schedule or otherwise identify the Project's critical path as specified in Article 12, Requests for Information and Schedules, or has elected not to do so when allowed by the Supplementary General Conditions or the Specifications to use less sophisticated scheduling tools, or has failed to maintain such a schedule. Delay directly affecting the completion of the Work shall result in an extension of time only to the extent that completion of the Work was affected by impacts to the critical path shown on Construction Manager's CPM schedule. Where the circumstances make it indisputable in the opinion of the Architect/Engineer that the delay affected the completion of the Work so directly that the additional notice of the schedule impact by reference to a CPM schedule was unnecessary, a reasonable extension of time may be granted.

Extension of the time for completion of the Work will be granted for delays due to weather conditions only when the Construction Manager demonstrates that such conditions were more severe and extended than

those reflected by the ten-year average for the month, as evidenced by the Climatological Data, U. S. Department of Commerce, for the Project area.

Extensions of the time for completion of the Work due to weather will be granted on the basis of one and three tenths (1.3) calendar days for every day that the Construction Manager would have Worked but was unable to Work, with each separate extension figured to the nearest whole calendar day.

For weather delays and delays caused by events, acts or omissions not within the control of the Principal Representative or any person acting on the Principal Representative's behalf, the Construction Manager shall be entitled to an extension of time only and shall not be entitled to recovery of additional cost due to or resulting from such delays. This Article does not, however, preclude the recovery of damages for delay by either party under other provisions in the Contract Documents.

ARTICLE 39. NON-BINDING DISPUTE RESOLUTION – FACILITATED NEGOTIATIONS

The Construction Manager and Principal Representative agree to designate one or more mutually acceptable persons willing and able to facilitate negotiations and communications for the resolution of conflicts, disagreements or disputes between them at the specific request of either party with regard to any Project decision of either of them or any decision of the Architect/Engineer. The designation of such person(s) shall not carry any obligation to use their services except that each party agrees that if the other party requests the intervention of such person(s) with respect to any such conflict, dispute or disagreement, the non-requesting party shall participate in good faith attempts to negotiate a resolution of the issue in dispute. If the parties cannot agree on a mutually acceptable person to serve in this capacity one shall be so appointed; provided, however, that either party may request the director of State Buildings Program to appoint such a person, who, if appointed, shall be accepted for this purpose by both the Construction Manager and the Principal Representative.

The cost, if any, of the facilitative services of the person(s) so designated shall be shared if the parties so agree in any partnering plan; or in the absence of agreement the cost shall be borne by the party requesting the facilitation of negotiation.

Any dispute, claim, question or disagreement arising from or relating to the Contract or an alleged breach of the Contract may be subject to a request by either party for facilitated negotiation subject to the limitations hereafter listed, and the parties shall participate by consultation and negotiation with each other, as guided by the facilitator and with recognition of their mutual interests, in an attempt to reach an equitable solution satisfactory to both parties.

The obligation to participate in facilitated negotiations shall be as described above and elsewhere in these General Conditions, as by way of example in Article 36, Claims, or Article 34, Deductions for Uncorrected Work and to the extent not more particularly described or limited elsewhere, each party's obligations shall be as follows:

1. a party shall not initiate communication with the facilitator regarding the issues in dispute; except that any request for facilitation shall be made in writing with copies sent, faxed or delivered to the other party;
2. a party shall prepare a brief written description of its position if so requested by the facilitator (who may elect to first discuss the parties' positions with each party separately in the interest of time and expense);
3. a party shall respond to any reasonable request for copies of documents requested by the facilitator, but such requests, if voluminous, may consist of an offer to allow the facilitator access to the parties' documents;
4. a party shall review any meeting agenda proposed by a facilitator and endeavor to be informed on the subjects to be discussed;
5. a party shall meet with the other party and the facilitator at a mutually acceptable place and time, or, if none can be agreed to, at the time and place designated by the facilitator for a period not to exceed four hours unless the parties agree to a longer period;

6. a party shall endeavor to assure that any facilitation meeting shall be attended by any other persons in their employ that the facilitator requests be present, if reasonably available, including the Architect/Engineer;
7. each party shall participate in such facilitated face-to-face negotiations of the issues in dispute through persons fully authorized to resolve the issue in dispute;
8. each party shall be obligated to participate in negotiations requested by the other party and to perform the specific obligations described in paragraphs (1) through (10) this Article 39, Facilitated Negotiation, no more than three times during the course of the Project;
9. neither party shall be under any obligation to resolve any issue by facilitated negotiation, but each agrees to participate in good faith and the Principal Representative shall direct the Architect/Engineer to appropriately document any resolution or agreement reached and to execute any Amendment or Change Order to the Contract necessary to implement their agreement; and,
10. any discussions and documents prepared exclusively for use in the negotiations shall be deemed to be matters pertaining to settlement negotiations and shall not be subsequently available in further proceedings except to the extent of any documented agreement.

In accordance with State Fiscal Rules and Article 52G, Prohibited Terms, nothing in this Article 39 shall be deemed to call for arbitration or otherwise obligate the State to participate in any form of binding alternative dispute resolution.

A partnering plan developed as described in Article 2D, Partnering, Communications and Cooperation, may modify or expand the requirements of this Article but may not reduce the obligation to participate in facilitated negotiations when applicable. In the case of small projects estimated to be valued under $500,000, the requirements of this Article may be deleted from this Contract by modification in Article 6.3, Construction Manager/General Contractor (CM/GC) Agreement (SC-6.5), Optional Provisions and Elections. When so modified, the references to the parties' right to elect facilitated negotiation elsewhere in these General Conditions shall be deleted.

ARTICLE 40. RIGHT OF OCCUPANCY

The Principal Representative shall have the right to take possession of and to use any completed or partially completed portions of the Work, even if the time for completing the entire Work or portions of the Work has not expired and even if the Work has not been finally accepted, and the Construction Manager shall fully cooperate with the Principal Representative to allow such possession and use. Such possession and use shall not constitute an acceptance of such portions of the Work.

Prior to any occupancy of the Project, an inspection shall be made by the Principal Representative, the Architect/Engineer, State Buildings Program and the Construction Manager. Such inspection shall be made for the purpose of ensuring that the building is secure, protected by operation safety systems as designed, operable exits, power, lighting and HVAC systems, and otherwise ready for the occupancy intended and the Notice of Substantial Completion has been issued for the occupancy intended. The inspection shall also document existing finish conditions to allow assessment of any damage by occupants. The Construction Manager shall assist the Principal Representative in completing and executing State Form SBP-01, Approval of Occupancy/Use, prior to the Principal Representative's possession and use. Any and all areas so occupied will be subject to a final inspection when the Construction Manager complies with Article 41, Completion, Final Inspection, Acceptance and Settlement.

ARTICLE 41. COMPLETION, FINAL INSPECTION, ACCEPTANCE AND SETTLEMENT

A. NOTICE OF COMPLETION
When the Work, or a discrete physical portion of the Work (as hereafter described) which the Principal Representative has agreed to accept separately, is substantially complete and ready for final inspection, the Construction Manager shall file a written Notice with the Architect/Engineer that the Work, or such discrete physical portion, in the opinion of the Construction Manager, is substantially complete under the terms of the Contract. The Construction Manager shall prepare and submit with such Notice a comprehensive list of items to be completed or corrected prior to final

payment, which shall be subject to review and additions as the Architect/Engineer or the Principal Representative shall determine after inspection. If the Architect/Engineer or the Principal Representative believe that any of the items on the list of items submitted, or any other item of Work to be corrected or completed, or the cumulative number of items of Work to be corrected or completed, will prevent a determination that the Work is substantially complete, those items shall be completed by the Construction Manager and the Notice shall then be resubmitted.

B. FINAL INSPECTION

Within ten (10) days after the Construction Manager files written Notice that the Work is substantially complete, the Architect/Engineer, the Principal Representative, and the Construction Manager shall make a “final inspection” of the Project to determine whether the Work is substantially complete and has been completed in accordance with the Contract Documents. State Buildings Program shall be notified of the inspection not less than three (3) business days in advance of the inspection. The Construction Manager shall provide the Principal Representative and the Architect/Engineer an updated punch list in sufficient detail to fully outline the following:

1. Work to be completed, if any; and
2. Work not in compliance with the Drawings or Specifications, if any.

A final punch list shall be made by the Architect/Engineer in sufficient detail to fully outline to the Construction Manager:

1. Work to be completed, if any;
2. Work not in compliance with the Drawings or Specifications, if any; and
3. unsatisfactory Work for any reason, if any.

The required number of copies of the final punch list will be countersigned by the authorized representative of the Principal Representative and will then be transmitted by the Architect/Engineer to the Construction Manager, the Principal Representative, and State Buildings Program. The Architect/Engineer's final punch list shall control over the Construction Manager’s preliminary punch list.

C. NOTICE OF SUBSTANTIAL COMPLETION

Notice of Substantial Completion shall establish the date of substantial completion of the Project. The Construction Manager acknowledges and agrees that because the departments, agencies and institutions of the State of Colorado are generally involved with the business of the public at large, greater care must be taken in establishing the date of substantial completion than might otherwise be the case to ensure that a project or building or discrete physical portion of the Work is fully usable and safe for public use, and that such care necessarily raises the standard by which the concept of substantial completion is applied for a public building.

The Notice of Substantial Completion shall not be issued until the following have been fully established:

1. All required building code inspections have been called for and the appropriate code officials have affixed their signatures to the Building Inspection Record indicating successful completion of all required code inspections;
2. All required corrections noted on the Building Inspection Record shall have been completed unless the Architect/Engineer, the Principal Representative and State Buildings Program, in their complete and absolute discretion, all concur that the condition requiring the remaining correction is not in any way life threatening, does not otherwise endanger persons or property, and does not result in any undue inconvenience or hardship to the Principal Representative or the public;
3. The building, structure or Project can be fully and comfortably used by the Principal Representative and the public without undue interference by the Construction Manager’s

employees and Workers during the completion of the final punch list taking into consideration the nature of the public uses intended and taking into consideration any stage or level of completion of HVAC system commissioning or other system testing required by the Specifications to be completed prior to issuance of the Notice of Substantial Completion;

4. The Project has been fully cleaned as required by these General Conditions, and as required by any stricter requirements of the Specifications, and the overall state of completion is appropriate for presentation to the public; and
5. The Construction Manager has provided a schedule for the completion of each and every item identified on the punch list which specifies the Subcontractor or trade responsible for the Work, and the dates the completion or correction of the item will be commenced and finished; such schedule will show completion of all remaining final punch list items within the period indicated in the Contract for final punch list completion prior to Final Acceptance, with the exception of only those items which are beyond the control of the Construction Manager despite due diligence. The schedule shall provide for a reasonable punch list inspection process. Unless liquidated damages have been specified in Article 7.4 of the Construction Manager's Design/Bid/Build Agreement SC-6.21), the cost to the Principal Representative, if any, for re-inspections due to failure to adhere to the Construction Manager's proposed punch-list completion schedule shall be the responsibility of the Construction Manager and may be deducted by the Principal Representative from final amounts due to the Construction Manager.

Substantial completion of the entire Project shall not be conclusively established by a decision by the Principal Representative to take possession and use of a portion, or all of the Project, where portions of the Project cannot meet all the criteria noted above. Notice of Substantial Completion for the entire Project shall, however, only be withheld for substantial reasons when the Principal Representative has taken possession and uses all of the Project in accordance with the terms of Article 40, Right of Occupancy. Failure to furnish the required completion schedule shall constitute a substantial reason for withholding the issuance of any Notice of Substantial Completion.

The Construction Manager shall have the right to request a final inspection of any discrete physical portion of the Project when in the opinion of the Principal Representative, The Architect/Engineer and State Buildings Program a final punch list can be reasonably prepared, without confusion as to which portions of the Project are referred to in any subsequent Notice of Partial Final Settlement which might be issued after such portion is finally accepted. Discrete physical portions of the Project may be, but shall not necessarily be limited to, such portions of the Project as separate buildings where a Project consists of multiple buildings. Similarly, an addition to an existing building where the Project also calls for renovation or remodeling of the existing building may constitute a discrete physical portion of the Project. In such circumstances, when in the opinion of the Principal Representative, the Architect/Engineer and State Buildings Program, the requirements for issuance of a Notice of Substantial Completion can be satisfied with respect to the discrete portion of the Project, a partial Notice of Substantial Completion may be issued for such discrete physical portion of the Project.

D. NOTICE OF ACCEPTANCE

The Notice of Acceptance shall establish the completion date of the Project. It shall not be authorized until the Construction Manager shall have performed all of the Work to allow completion and approval of the Pre-Acceptance Checklist (SBP-05).

Where partial Notices of Substantial Completion have been issued, partial Notices of Final Acceptance may be similarly issued when appropriate for that portion of the Work. Partial Notice of Final Acceptance may also be issued to exclude the Work described in Change Orders executed during late stages of the Project where a later completion date for the Change Ordered Work is expressly provided for in the Contract as amended by the Change Order, provided the Work can be adequately described to allow partial advertisement of any Notice of Partial Final Settlement to be issued without confusion as to the Work included for which final payment will be made.

E. SETTLEMENT

Final payment and settlement shall be made on the date fixed and published for such payment except as hereafter provided. The Principal Representative shall not authorize final payment until all items on the Pre-Acceptance check list (SBP-05) have been completed, the Notice of Acceptance issued, and the Notice of Contractors Settlement published. If the Work shall be substantially completed, but Final Acceptance and completion thereof shall be prevented through delay in correction of minor defects, or unavailability of materials or other causes beyond the control of the Construction Manager, the Principal Representative in his or her discretion may release all amounts due to the Construction Manager except such amounts as may be in excess of three times the cost of completing the unfinished Work or the cost of correcting the defective Work, as estimated by the Architect/Engineer and approved by State Buildings Program. Before the Principal Representative may issue the Notice of Contractor's Settlement and advertise the Project for final payment, the Construction Manager shall have corrected all items on the punch list except those items for which delayed performance is expressly permitted, subject to withholding for the cost thereof, and shall have:

1. Delivered to the Principal Representative:

    a. All guarantees and warranties;
    b. All statements to support local sales tax refunds, if any;
    c. Required operating maintenance instructions as per the Principal Representative; and,
    d. One (1) set of hard copy as-built Contract Documents, and one (1) electronic copy showing all job changes.

2. Demonstrated to the operating personnel of the Principal Representative the proper operation and maintenance of all equipment.

3. Delivered to the State of Colorado Department of Personnel & Administration in accordance with the Colorado Procurement Code or the applicable procurement code for institutions of higher education:

    a. A written disclosure of the five most costly goods incorporated into the project, including iron, steel, or related manufactured goods and the total cost and country of origin of those five goods and whether the project was subject to any existing domestic content preferences.

Upon completion of the foregoing the Project shall be advertised in accordance with the Notice of Contractor's Settlement by two publications of Notice, the last publication appearing at least ten (10) days prior to the time of final settlement. Publication and final settlement should not be postponed or delayed solely by virtue of unresolved claims against the Project or the from Subcontractors, suppliers or materialmen based on good faith disputes; the resolution of the question of payment in such cases being directed by statute.

Except as hereafter provided, on the date of final settlement thus advertised, provided the Construction Manager has submitted a written Notice to the Architect/Engineer that no claims have been filed, and further provided the Principal Representative shall have received no claims, final payments and settlement shall be made in full. If any unpaid claim for labor, materials, rental machinery, tools, supplies or equipment is filed before payment in full of all sums due the Construction Manager, the Principal Representative and the State Controller shall withhold from the Construction Manager on the date established for final settlement, sufficient funds to insure the payment of such claim, until the same shall have been paid or withdrawn, such payment or withdrawal to be evidenced by filing a receipt in full or an order for withdrawal signed by the claimant or his or her duly authorized agent or assignee. The amount so withheld may be in the amount of 125% of the claims or such other amount as the Principal Representative reasonably deems necessary to cover expected legal expenses. Such withheld amounts shall be in addition to any amount withheld based on the cost to compete unfinished Work or the cost to repair defective Work.

However, as provided by statute, such funds shall not be withheld longer than ninety (90) days following the date fixed for final settlement with the Construction Manager, as set forth in the published Notice of Contractor's Settlement, unless an action at law shall be commenced within that time to enforce such unpaid claim and a Notice of such action at law shall have been filed with the Principal Representative and the State Controller. At the expiration of the ninety (90) day period, the Principal Representative shall authorize the State Controller to release to the Construction Manager all other money not the subject of such action at law or withheld based on the cost to compete unfinished Work or the cost to repair defective Work.

Notices of Partial Final Settlement may be similarly advertised, provided all conditions precedent have been satisfied as though that portion of the Work affected stood alone, a Notice of Partial Acceptance has been issued, and the consent of surety to the partial final settlement has been obtained in writing. Thereafter, partial final payments may be made to the Construction Manager subject to the same conditions regarding unpaid claims.

ARTICLE 42. GENERAL WARRANTY AND CORRECTION OF WORK AFTER ACCEPTANCE

The Construction Manager warrants that the materials used and the equipment furnished shall be new and of good quality unless specified to the contrary. The Construction Manager further warrants that the Work shall, in all respects, be free from material defects not permitted by the Specifications and shall be in accordance with the requirements of the Contract Documents. Neither the final certificate for payment nor any provision in the Contract Documents shall relieve the Construction Manager of responsibility for defects or faulty materials or Workmanship. The Construction Manager shall be responsible to the Principal Representative for such warranties for the longest period permitted by any applicable statute of limitations.

In addition to these general warranties, and without limitation of these general warranties, for a period of one year after the date of any Notice of Substantial Completion, or any Notice of Partial Substantial Completion if applicable, the Construction Manager shall remedy defects, and faulty Workmanship or materials, and Work not in accordance with the Contract Documents which was not accepted at the time of the Notice of Final Acceptance, all in accordance with the provisions of Article 44, One-Year Guarantee And Special Guarantees And Warranties.

ARTICLE 43. LIENS

Colorado statutes do not provide for any right of lien against public buildings. In lieu thereof, C.R.S. § 38-26-107, provides adequate relief for any claimant having furnished labor, materials, rental machinery, tools, equipment, or services toward construction of the particular public Work in that final payment may not be made to a Construction Manager until all such creditors have been put on Notice by publication in the public press of such pending payment and given opportunity for a period of up to ninety (90) days to stop payment to the Construction Manager in the amount of such claims.

ARTICLE 44. ONE-YEAR GUARANTEE AND SPECIAL GUARANTEES AND WARRANTIES

A. ONE-YEAR GUARANTEE OF THE WORK

The Construction Manager shall guarantee to remedy defects and repair or replace the Work for a period of one year from the date of the Notice of Substantial Completion or from the dates of any partial Notices of Substantial Completion issued for discrete physical portions of the Work. The Construction Manager shall remedy any defects due to faulty materials or Workmanship and shall pay for, repair and replace any damage to other Work resulting there from, which shall appear within a period of one year from the date of such Notice(s) of Substantial Completion. The Construction Manager shall also remedy any deviation from the requirements of the Contract Documents which shall later be discovered within a period of one year from the date of the Notice of Substantial Completion; provided, however, that the Construction Manager shall not be required to remedy deviations from the requirements of the Contract Documents where such deviations were obvious, apparent and accepted by the Architect/Engineer or the Principal Representative at the time of the Notice of Final Acceptance. The Principal Representative shall give Notice of observed defects or other Work requiring correction with reasonable promptness. Such Notice shall be in writing to the Architect/Engineer and the Construction Manager.

The one year guarantee of the Construction Manager's Work may run separately for discrete physical portions of the Work for which partial Notices of Substantial Completion have been issued, however, it shall run from the last Notice of Substantial Completion with respect to all or any systems common to the Work to which more than one Notice of Substantial Completion may apply.

This one-year guarantee shall not be construed to limit the Construction Manager's general warranty described in Article 42, General Warranty and Correction of Work After Acceptance, that all materials and equipment are new and of good quality, unless specified to the contrary, and that the Work shall in all respects be free from material defects not permitted by the Specifications and in accordance with the requirements of the Contract Documents.

B. SPECIAL GUARANTEES AND WARRANTIES
In case of Work performed for which product, manufacturers or other special warranties are required by the Specifications, the Construction Manager shall secure the required warranties and deliver copies thereof to the Principal Representative through the Architect/Engineer upon completion of the Work.

These product, manufacturers or other special warranties, as such, do not in any way lessen the Construction Manager's responsibilities under the Contract. Whenever guarantees or warranties are required by the Specifications for a longer period than one year, such longer period shall govern.

ARTICLE 45. GUARANTEE INSPECTIONS AFTER COMPLETION

The Architect/Engineer, the Principal Representative and the Construction Manager together shall make at least two (2) complete inspections of the Work after the Work has been determined to be substantially complete and accepted. One such inspection, the "Six-Month Guarantee Inspection," shall be made approximately six (6) months after date of the Notice of Substantial Completion, unless in the case of smaller projects valued under $500,000 this inspection is declined in Article 6.1, Construction Manager/General Contractor's (CM/GC) Agreement (SC-6.5), Modification of Article 45, in which case the inspection to occur at six months shall not be required. Another such inspection, the "Eleven-Month Guaranty Inspection" shall be made approximately eleven (11) months after the date of the Notice of Substantial Completion. The Construction Manager shall schedule and so notify all parties concerned, and the Principal Representative shall so notify State Buildings Program, of these inspections. If more than one Notice of Substantial Completion has been issued at the reasonable discretion of the Principal Representative separate eleven month inspections may be required where the one year guarantees do not run reasonably concurrent.

Written punch lists and reports of these inspections shall be made by the Architect/Engineer and forwarded to the Construction Manager, the Principal Representative, State Buildings Program, and all other participants within ten (10) days after the completion of the inspections. The punch list shall itemize all guarantee items, prior punch list items still to be corrected or completed and any other requirements of the Contract Documents to be completed which were not waived by final acceptance because they were not obvious or could not reasonably have been previously observed. The Construction Manager shall immediately initiate such remedial Work as may be necessary to correct any deficiencies or defective Work shown by this report, and shall promptly complete all such remedial Work in a manner satisfactory to the Architect/Engineer, the Principal Representative and State Buildings Program.

If the Construction Manager fails to promptly correct all deficiencies and defects shown by this report, the Principal Representative may do so, after giving the Construction Manager ten (10) days written Notice of intention to do so.

The State of Colorado, acting by and through the Principal Representative, shall be entitled to collect from the Construction Manager all costs and expenses incurred by it in correcting such deficiencies and defects, as well as all damages resulting from such deficiencies and defects.

ARTICLE 46. TIME OF COMPLETION AND LIQUIDATED DAMAGES

It is hereby understood and mutually agreed, by and between the parties hereto, that the date of beginning, rate of progress, and the time for completion of the Work to be done hereunder are ESSENTIAL CONDITIONS of this Agreement, and it is understood and agreed that the Work embraced in this Contract shall be commenced at the time specified in the Notice to Proceed (SC-7.26).

It is further agreed that time is of the essence of each and every portion of this Contract, and of any portion of the Work described on the Drawings or Specifications, wherein a definite and certain length of time is fixed for the performance of any act whatsoever. The parties further agree that where under the Contract additional time is allowed for the completion of the Work or any identified portion of the Work, the new time limit or limits fixed by such extension of the time for completion shall be of the essence of this Agreement.

The Construction Manager acknowledges that subject to any limitations in the Advertisement for Bids, issued for the Project, the Construction Manager's bid is consistent with and considers the number of days to substantially complete the Project and the number of days to finally complete the Project to which the parties may have stipulated in the Agreement, which stipulation was based on the Construction Manager's bid. The Construction Manager agrees that Work shall be prosecuted regularly, diligently and uninterruptedly at such rate of progress as will ensure the Project will be substantially complete, and fully and finally complete, as recognized by the issuance of all required Notices of Substantial Completion and Notices of Final Acceptance, within any times stipulated and specified in the Agreement, as the same may be amended by Change Order or other written modification, and that the Principal Representative will be damaged if the times of completion are delayed.

It is expressly understood and agreed, by and between the parties hereto, that the times for the Substantial Completion of the Work or for the final acceptance of the Work as may be stipulated in the Agreement, and as applied here and in Article 6.1, Construction Manager/General Contractor (CM/GC) Agreement (SC-6.5), Modifications of Article 46, are reasonable times for these stages of completion of the Work, taking into such consideration all factors, including the average climatic range and usual industrial conditions prevailing in the locality of the building operations.

If the Construction Manager shall neglect, fail or refuse to complete the Work within the times specified in the Agreement, such failure shall constitute a breach of the terms of the Contract and the State of Colorado, acting by and through the Principal Representative, shall be entitled to liquidated damages for such neglect, failure or refusal, as specified in Article 6.1, Construction Manager/General Contractor (CM/GC) Agreement (SC-6.5), Modification of Article 46.

The Construction Manager and the Construction Manager's Surety shall be jointly liable for and shall pay the Principal Representative, or the Principal Representative may withhold, the sums hereinafter stipulated as liquidated damages for each calendar day of delay until the entire Project is 1) substantially completed, and the Notice (or all Notices) of Substantial Completion are issued, 2) finally complete and accepted and the Notice (or all Notices) of Acceptance are issued, or 3) both. Delay in substantial completion shall be measured from the Date of the Notice to Proceed and delay in final completion and acceptance shall be measured from the Date of the Notice of Substantial Completion.

In the first instance, specified in Article 6.1 of the Construction Manager/General Contractor (CM/GC) Agreement (SC-6.5), Modification of Article 46, liquidated damages, if any, shall be the amount specified therein, for each calendar day of delay beginning after the stipulated number of days for Substantial Completion from the date of the Notice to Proceed, until the date of the Notice of Substantial Completion. Unless otherwise specified in any Supplementary General Conditions, in the event of any partial Notice of Substantial Completion, liquidated damages shall accrue until all required Notices of Substantial Completion are issued.

In the second instance, specified in Article 6.2 of the Construction Manager/General Contractor (CM/GC) Agreement (SC-6.5), Modification of Article 46, liquidated damages, if any, shall be the amount specified in Article 6.2 of the Construction Manager/General Contractor (CM/GC) Agreement (SC-6.5), Modification of

Article 46, for each calendar day in excess of the number of calendar days specified in the Construction Manager's bid for the Project and stipulated in the Agreement to finally complete the Project (as defined by the issuance of the Notice of Acceptance) after the final Notice of Substantial Completion has been issued.

In the third instance, when so specified in both Articles 6.1 and 6.2 of the Construction Manager/General Contractor (CM/GC) Agreement (SC-6.5), both types of liquidated damages shall be separately assessed where those delays have occurred.

The parties expressly agree that said amounts are a reasonable estimate of the presumed actual damages that would result from any of the breaches listed, and that any liquidated damages that are assessed have been agreed to in light of the difficulty of ascertaining the actual damages that would be caused by any of these breaches at the time this Contract was formed; the liquidated damages in the first instance representing an estimate of damages due to the inability to use the Project; the liquidated damages in the second instance representing an estimate of damages due to the additional administrative, technical, supervisory and professional expenses related to and arising from the extended closeout period including delivery of any or all guarantees and warranties, the submittals of sales and use tax payment forms, the calling for the final inspection and the completion of the final punch list.

The parties also agree and understand that the liquidated damages to be assessed in each instance are separate and distinct, although potentially cumulative, damages for the separate and distinct breaches of delayed substantial completion or final acceptance. Such liquidated damages shall not be avoided by virtue of the fact of concurrent delay caused by the Principal Representative, or anyone acting on behalf of the Principal Representative, but in such event the period of delay for which liquidated damages are assessed shall be equitably adjusted in accordance with Article 38, Delays and Extensions of Time.

ARTICLE 47. DAMAGES

If either party to this Contract shall suffer damage under this Contract in any manner because of any wrongful act or neglect of the other party or of anyone employed by either of them, then the party suffering damage shall be reimbursed by the other party for such damage. Except to the extent of damages liquidated for the Construction Manager s failure to achieve timely completion as set forth in Article 46, Time of Completion and Liquidated Damages, the Principal Representative shall be responsible for, and at his or her option may insure against, loss of use of any existing property not included in the Work, due to fire or otherwise, however caused. Notwithstanding the foregoing, or any other provision of this Contract, to the contrary, no term or condition of this contract shall be construed or interpreted as a waiver, express or implied, of any of the immunities, rights, benefits, protection, or other provisions of the Colorado Governmental Immunity Act, Section 24-10-101, *et seq.*, CRS, as now or hereafter amended. The parties understand and agree that liability for claims for injuries to persons arising out of negligence of the State of Colorado, its departments, institutions, agencies, boards, officials and employees is controlled and limited by the provisions of Section 24-101-101, *et seq.*, CRS, as now or hereafter amended and the risk management statutes, Section 24-30-1501, *et seq.*, CRS, as now or hereafter amended.

Notice of intent to file a claim under this clause shall be made in writing to the party liable within a reasonable time of the first observance of such damage and not later than the time of final payment, except that in the case of claims by the Principal Representative involving warranties against faulty Work or materials Notice shall be required only to the extent stipulated elsewhere in these General Conditions. Claims made to the Principal Representative involving extra cost or extra time arising by virtue of instructions to the Construction Manager to which Article 36, Claims, applies shall be made in accordance with Article 36. Other claims arising under the Contract involving extra cost or extra time which are made to the Principal Representative under this clause shall also be made in accordance with the procedures of Article 36, whether or not arising by virtue of instructions to the Construction Manager; provided however that it shall not be necessary to first obtain or request a written judgment of the Architect/Engineer.

Provided written Notice of intent to file a claim is provided as required in the preceding paragraph, nothing in this Article shall limit or restrict the rights of either party to bring an action at law or to seek other relief to which either party may be entitled, including consequential damages, if any, and shall not be construed to limit the time during which any action might be brought. Nothing in these General Conditions shall be

deemed to limit the period of time during which any action may be brought as a matter of contract, tort, warranty or otherwise, it being the intent of the parties to allow any and all actions at law or in equity for such periods as the law permits. All such rights shall, however be subject to the obligation to assert claims and to appeal denials pursuant to Article 36, Claims, where applicable.

ARTICLE 48. STATE'S RIGHT TO DO THE WORK; TEMPORARY SUSPENSION OF WORK; DELAY DAMAGES

A. STATE'S RIGHT TO DO THE WORK

If after receipt of Notice to do so, the Construction Manager should neglect to prosecute the Work properly or fail to perform any provision of the Contract, the Principal Representative, after a second seven (7) days' advance written Notice to the Construction Manager and the Surety may, without prejudice to any other remedy the Principal Representative may have, take control of all or a portion of the Work, as the Principal Representative deems necessary and make good such deficiencies deducting the cost thereof from the payment then or thereafter due the Construction Manager, as provided in Article 30, Correction Of Work Before Acceptance and Article 33, Payments Withheld, provided, however, that the Architect/Engineer shall approve the amount charged to the Construction Manager by approval of the Change Order.

B. TEMPORARY SUSPENSION OF WORK

The State, acting for itself or by and through the Architect/Engineer, shall have the authority to suspend the Work, either wholly or in part, for such period or periods as may be deemed necessary due to:

1. Unsuitable weather;
2. Faulty Workmanship;
3. Improper superintendence or project management;
4. Construction Manager's failure to carry out orders or to perform any provision of the Contract Documents;
5: Loss of, or restrictions to, appropriations;
6. Conditions, which may be considered unfavorable for the prosecution of the Work.

If it should become necessary to stop Work for an indefinite period, the Construction Manager shall store materials in such manner that they will not become an obstruction or become damaged in any way; and he or she shall take every precaution to prevent damage to or deterioration of the Work, provide suitable drainage and erect temporary structures where necessary.

Notice of suspension of Work shall be provided to the Construction Manager in writing stating the reasons therefore. The Construction Manager shall again proceed with the Work when so notified in writing.

The Construction Manager understands and agrees that the State of Colorado cannot predict with certainty future revenues and could ultimately lack the revenue to fund the appropriations applicable to this Contract. The Construction Manager further acknowledges and agrees that in such event that State may, upon Notice to the Construction Manager, suspend the Work in anticipation of a termination of the Contract for the convenience of the State, pursuant to Article 50, Termination for Convenience of State. If the Contract is not so terminated the Contract sum and the Contract time shall be equitably adjusted at the time the Principal Representative directs the Work to be recommenced and gives Notice that the revenue to fund the appropriation is available.

C. DELAY DAMAGES

The Principal Representative and the State of Colorado shall be liable to the Construction Manager for the payment of any claim for extra costs, extra compensation or damages occasioned by hindrances or delays encountered in the Work only when and to the limited extent that such hindrance or delay is caused by an act or omission within the control of the Principal Representative,

the Architect/Engineer or other persons or entities acting on behalf of the Principal Representative. Further, the Principal Representative and the State of Colorado shall be liable to the Construction Manager for the payment of such a claim only if the Construction Manager has provided required Notice of the delay or impact, or has presented its claim for an extension of time or claim of other delay or other impact due to changes ordered in the Work before proceeding with the changed Work. Except as otherwise provided, claims for extension of time shall be Noticed and filed in accordance with Article 38, Delays and Extensions of Time, within three (3) business days of the beginning of the delay with any claim filed within seven (7) days after the delay has ceased, or such claim is waived. Claims for extension of time or for other delay or other impact resulting from changes ordered in the Work shall be presented and adjusted as provided in Article 35, Changes in the Work.

ARTICLE 49. STATE'S RIGHTS TO TERMINATE CONTRACT

A. GENERAL

If the Construction Manager should be adjudged bankrupt, or if he or she should make a general assignment for the benefit of his or her creditors, or if a receiver should be appointed to take over his affairs, or if he or she should fail to prosecute his or her Work with due diligence and carry the Work forward in accordance with the construction schedule and the time limits set forth in the Contract Documents, or if he or she should fail to subsequently perform one or more of the provisions of the Contract Documents to be performed by him, the Principal Representative may serve written Notice on the Construction Manager and the Surety on performance and payment bonds, stating his or her intention to exercise one of the remedies hereinafter set forth and the grounds upon which the Principal Representative bases his or her right to exercise such remedy.

In such event, unless the matter complained of is satisfactorily cleared within ten (10) days after delivery of such Notice, the Principal Representative may, without prejudice to any other right or remedy, exercise one of such remedies at once, having first obtained the concurrence of the Architect/Engineer in writing that sufficient cause exists to justify such action.

B. CONDITIONS AND PROCEDURES

1. The Principal Representative may terminate the services of the Construction Manager, which termination shall take effect immediately upon service of Notice thereof on the Construction Manager and his or her Surety, whereupon the Surety shall have the right to take over and perform the Contract. If the Surety does not provide Notice to the Principal Representative of its intent to commence performance of the Contract within ten (10) days after delivery of the Notice of termination, the Principal Representative may take over the Work, take possession of and use all materials, tools, equipment and appliances on the premises and prosecute the Work to completion by such means as he or she shall deem best. In the event of such termination of his or her service, the Construction Manager shall not be entitled to any further payment under the Contract until the Work is completed and accepted. If the Principal Representative takes over the Work and if the unpaid balance of the contract price exceeds the cost of completing the Work, including compensation for any damages or expenses incurred by the Principal Representative through the default of the Construction Manager, such excess shall be paid to the Construction Manager. If, however, the cost, expenses and damages as certified by the Architect/Engineer exceed such unpaid balance of the contract price, the Construction Manager and his or her Surety shall pay the difference to the Principal Representative.
2. The Principal Representative may require the Surety on the Construction Manager 's bond to take control of the Work and see to it that all the deficiencies of the Construction Manager are made good, with due diligence within ten (10) days of delivery of Notice to the Surety to do so. As between the Principal Representative and the Surety, the cost of making good such deficiencies shall all be borne by the Surety. If the Surety takes over the Work, either by election upon termination of the services of the Construction Manager pursuant to Section B(1) of this Article 49, State's Right To Terminate Contract, or upon instructions from the Principal Representative to do so, the provisions of the Contract Documents shall govern the Work to be done by the Surety, the Surety being substituted for the Construction Manager as to such

provisions, including provisions as to payment for the Work, the times of completion and provisions of this Article as to the right of the Principal Representative to do the Work or to take control of all or a portion of the Work.

3. The Principal Representative may take control of all or a portion of the Work and make good the deficiencies of the Construction Manager, or the Surety if the Surety has been substituted for the Construction Manager, with or without terminating the Contract, employing such additional help as the Principal Representative deems advisable in accordance with the provisions of Article 48A, State's Right To Do The Work; Temporary Suspension Of Work; Delay Damages. In such event, the Principal Representative shall be entitled to collect from the Construction Manager and his or her Surety, or to deduct from any payment then or thereafter due the Construction Manager, the costs incurred in having such deficiencies made good and any damages or expenses incurred through the default of Construction Manager, provided the Architect/Engineer approves the amount thus charged to the Construction Manager. If the Contract is not terminated, a Change Order to the Contract shall be executed, unilaterally if necessary, in accordance with the procedures of Article 35, Changes in the Work.

C. ADDITIONAL CONDITIONS

If any termination by the Principal Representative for cause is later determined to have been improper, the termination shall be automatically converted to and deemed to be a termination by the Principal Representative for convenience and the Construction Manager shall be limited in recovery to the compensation provided for in Article 50, Termination for Convenience of State. Termination by the Construction Manager shall not be subject to such conversion.

ARTICLE 50. TERMINATION FOR CONVENIENCE OF STATE

A. NOTICE OF TERMINATION

The performance of Work under this Contract may be terminated, in whole or from time to time in part, by the State whenever for any reason the Principal Representative shall determine that such termination is in the best interest of State. Termination of Work hereunder shall be effected by delivery to the Construction Manager of a Notice of such termination specifying the extent to which the performance of Work under the Contract is terminated and the date upon which such termination becomes effective.

B. PROCEDURES

After receipt of the Notice of termination, the Construction Manager shall, to the extent appropriate to the termination, cancel outstanding commitments hereunder covering the procurement of materials, supplies, equipment and miscellaneous items. In addition, the Construction Manager shall exercise all reasonable diligence to accomplish the cancellation or diversion of all applicable outstanding commitments covering personal performance of any Work terminated by the Notice. With respect to such canceled commitments, the Construction Manager agrees to:

1. settle all outstanding liabilities and all claims arising out of such cancellation of commitments, with approval or ratification of the Principal Representative, to the extent he or she may require, which approval or ratification shall be final for all purposes of this clause; and,
2. assign to the State, in the manner, at the time, and to the extent directed by the Principal Representative, all of the right, title, and interest of the Construction Manager under the orders and subcontracts so terminated, in which case the State shall have the right, in its discretion, to settle or pay any or all claims arising out of the termination of such orders and subcontracts.

The Construction Manager shall submit his or her termination claim to the Principal Representative promptly after receipt of a Notice of termination, but in no event later than three (3) months from the effective date thereof, unless one or more extensions in writing are granted by the Principal Representative upon written request of the Construction Manager within such three-month period or authorized extension thereof. Upon failure of the Construction Manager to submit his or her termination claim within the time allowed, the Principal Representative may determine, on the basis

of information available to him, the amount, if any, due to the Construction Manager by reason of the termination and shall thereupon pay to the Construction Manager the amount so determined.

Costs claimed, agreed to, or determined pursuant to the preceding and following paragraph shall be in accor**dance with the provisions of the Colorado Procurement Code or the applicable procurement code** for institutions of higher education.

Subject to the preceding provisions, the Construction Manager and the Principal Representative may agree upon the whole or any part of the amount or amounts to be paid to the Construction Manager by reason of the termination under this clause, which amount or amounts may include any reasonable cancellation charges thereby incurred by the Construction Manager and any reasonable loss upon outstanding commitments for personal services which he or she is unable to cancel; provided, however, that in connection with any outstanding commitments for personal services which the Construction Manager is unable to cancel, the Construction Manager shall have exercised reasonable diligence to divert such commitments to other activities and operations. Any such agreement shall be embodied in an Amendment to this Contract and the Construction Manager shall be paid the agreed amount.

The State may from time to time, under such terms and conditions as it may prescribe, make partial payments against costs incurred by the Construction Manager in connection with the termination portion of this Contract, whenever, in the opinion of the Principal Representative, the aggregate of such payments is within the amount to which the Construction Manager will be entitled hereunder.

The Construction Manager agrees to transfer title and deliver to the State, in the manner, at the time, and to the extent, if any, directed by the Principal Representative, such information and items which, if the Contract had been completed, would have been required to be furnished to the State, including:

a. completed or partially completed plans, Drawings and information; and,
b. materials or equipment produced or in process or acquired in connection with the performance of the Work terminated by the Notice.

Other than the above, any termination inventory resulting from the termination of the Contract may, with written approval of the Principal Representative, be sold or acquired by the Construction Manager under the conditions prescribed by and at a price or prices approved by the Principal Representative. The proceeds of any such disposition shall be applied in reduction of any payments to be made by the State to the Construction Manager under this Contract or shall otherwise be credited to the price or cost of Work covered by this Contract or paid in such other manners as the Principal Representative may direct. Pending final disposition of property arising from the termination, the Construction Manager agrees to take such action as may be necessary, or as the Principal Representative may direct, for the protection and preservation of the property related to this Contract which is in the possession of the Construction Manager and in which the State has or may acquire an interest.

Any disputes as to questions of fact, which may arise hereunder, shall be subject to the Remedies provisions of the Colorado Procurement Code or the applicable procurement code for institutions of higher education.

ARTICLE 51. CONSTRUCTION MANAGER'S RIGHT TO STOP WORK AND/OR TERMINATE CONTRACT

If the Work shall be stopped under an order of any court or other public authority for a period of three (3) months through no act or fault of the Construction Manager or of any one employed by him, then the Construction Manager may on seven (7) days' written Notice to the Principal Representative and the Architect/Engineer stop Work or terminate this Contract and recover from the Principal Representative payment for all Work executed, any losses sustained on any plant or material, and a reasonable profit only for the Work completed. If the Architect/Engineer shall fail to issue or otherwise act in writing upon any

certificate for payment within ten (10) days after it is presented and received by the Architect/Engineer, as provided in Article 31, Applications For Payments, or if the Principal Representative shall fail to pay the Construction Manager any sum certified that is not disputed in whole or in part by the Principal Representative in writing to the Construction Manager and the Architect/Engineer within thirty (30) days after the Architect/Engineer's certification, then the Construction Manager may on ten (10) days' written Notice to the Principal Representative and the Architect/Engineer stop Work and/or give written Notice of intention to terminate this Contract.

If the Principal Representative shall thereafter fail to pay the Construction Manager any amount certified by the Architect/Engineer and not disputed in writing by the Principal Representative within ten (10) days after receipt of such Notice, then the Construction Manager may terminate this Contract and recover from the Principal Representative payment for all Work executed, any losses sustained upon any plant or materials, and a reasonable profit only for the Work completed. The Principal Representative's right to dispute an amount certified by the Architect/Engineer shall not relieve the Principal Representative of the obligation to pay amounts not in dispute as certified by the Architect/Engineer.

ARTICLE 52. SPECIAL PROVISIONS

A. CONTROLLER'S APPROVAL C.R.S. § 24-30-202(1)
This Contract shall not be deemed valid until it has been approved by the Colorado State Controller or designee.

B. FUND AVAILABILITY C.R.S. § 24-30-202(5.5)
Financial obligations of the State payable after the current fiscal year are contingent upon funds for that purpose being appropriated, budgeted, and otherwise made available

C. GOVERNMENTAL IMMUNITY
Liability for claims for injuries to persons or property arising from the negligence of the State, its departments, boards, commissions committees, bureaus, offices, employees and officials shall be controlled and limited by the provisions of the Colorado Governmental Immunity Act, C.R.S. § 24-10-101 et seq.; the Federal Tort Claims Act, 28 U.S.C. Pt. VI, Ch. 171 and 28 U.S.C. 1346(b), and the State's risk management statutes, §§24-30-1501, et seq. C.R.S. No term or condition of this contract shall be construed or interpreted as a waiver, express or implied, of any of the immunities, rights, benefits, protections, or other provisions, contained in these statutes.

D. INDEPENDENT CONTRACTOR
Construction Manager shall perform its duties hereunder as an independent contractor and not as an employee. Neither Construction Manager nor any agent or employee of Construction Manager shall be deemed to be an agent or employee of the State. Construction Manager shall not have authorization, express or implied, to bind the State to any agreement, liability, or understanding, except as expressly set forth herein. **Construction Manager and its employees and agents are not entitled to unemployment insurance or workers compensation benefits through the State and the State shall not pay for or otherwise provide such coverage for Construction Manager or any of its agents or employees. Construction Manager shall pay when due all applicable employment taxes and income taxes and local head taxes incurred pursuant to this contract. Construction Manager shall (a) provide and keep in force workers' compensation and unemployment compensation insurance in the amounts required by law, (b) provide proof thereof when requested by the State, and (c) be solely responsible for its acts and those of its employees and agents.**

E. COMPLIANCE WITH LAW
Construction Manager shall strictly comply with all applicable federal and State laws, rules, and regulations in effect or hereafter established, including, without limitation, laws applicable to discrimination and unfair employment practices.

F. CHOICE OF LAW, JURISDICTION, AND VENUE
Colorado law, and rules and regulations issued pursuant thereto, shall be applied in the interpretation, execution, and enforcement of this contract. Any provision included or incorporated herein by reference which conflicts with said laws, rules, and regulations shall be null and void. All suits or actions related to this Contract shall be filed and proceedings held in the State of Colorado and exclusive venue shall be in the City and County of Denver.

G. PROHIBITED TERMS
Any term included in this Contract that requires the State to indemnify or hold Construction Manager harmless; requires the State to agree to binding arbitration; limits Construction Manager's liability for damages resulting from death, bodily injury, or damage to tangible property; or that conflicts with this provision in any way shall be void ab initio. Nothing in this Contract shall be construed as a waiver of any provision of C.R.S. §24-106-109. Any term included in this Contract that limits Contractor's liability that is not void under this section shall apply only in excess of any insurance to be maintained under this Contract, and no insurance policy shall be interpreted as being subject to any limitations of liability of this Contract.

H. SOFTWARE PIRACY PROHIBITION.
State or other public funds payable under this contract shall not be used for the acquisition, operation, or maintenance of computer software in violation of federal copyright laws or applicable licensing restrictions. Construction Manager hereby certifies and warrants that, during the term of this contract and any extensions, Construction Manager has and shall maintain in place appropriate systems and controls to prevent such improper use of public funds. If the State determines that Construction Manager is in violation of this provision, the State may exercise any remedy available at law or in equity or under this contract, including, without limitation, immediate termination of this contract and any remedy consistent with federal copyright laws or applicable licensing restrictions.

I. EMPLOYEE FINANCIAL INTEREST/CONFLICT OF INTEREST C.R.S. § 24-18-201 & C.R.S. § 24-50-507
The signatories aver that to their knowledge, no employee of the State has any personal or beneficial interest whatsoever in the service or property described in this contract. Construction Manager has no interest and shall not acquire any interest, direct or indirect, that would conflict in any manner or degree with the performance of Construction Manager's services and Construction Manager shall not employ any person having such known interests.

J. VENDOR OFFSET AND ERRONEOUS PAYMENTS C.R.S. § 24-30-202(1) & C.R.S. § 24-30-202.4
Subject to C.R.S. § 24-30-202.4 (3.5), the State Controller may withhold payment under the State's vendor offset intercept system for debts owed to State agencies for: **(a)** unpaid child support debts or child support arrearages; **(b)** unpaid balances of tax, accrued interest, or other charges specified in C.R.S. § 39-21-101, et seq.; **(c)** unpaid loans due to the Student Loan Division of the Department of Higher Education; **(d)** amounts required to be paid to the Unemployment Compensation Fund; and **(e)** other unpaid debts owing to the State as a result of final agency determination or judicial action. The State may also recover, at the State's discretion, payments made to Construction Manager in error for any reason, including, but not limited to, overpayments or improper payments, and unexpended or excess funds received by Construction Manager by deduction from subsequent payments under this Contract, deduction from any payment due under any other contracts, grants or agreements between the State and Construction Manager, or by any other appropriate method for collecting debts owed to the State.

K. PUBLIC CONTRACTS FOR SERVICES. C.R.S. § 8-17.5-101.
Construction Manager certifies, warrants, and agrees that it does not knowingly employ or contract with an illegal alien who will perform Work under this contract and will confirm the employment eligibility of all employees who are newly hired for employment in the United States to perform Work under this contract, through participation in the E-Verify Program or the Department program established pursuant to C.R.S. § 8-17.5-102(5)(c), Construction Manager shall not knowingly employ or contract with an illegal alien to perform Work under this contract or enter into a contract with a subcontractor that fails to certify to Construction Manager that the subcontractor shall not knowingly employ or contract with an illegal alien to perform Work under this contract. Construction Manager **(a)** shall not use E-Verify Program or Department program procedures to undertake pre-employment screening of job applicants while this contract is being performed, **(b)** shall notify the subcontractor and the contracting State agency within three days if Construction Manager has actual knowledge that a subcontractor is employing or contracting with an illegal alien for Work under this contract, **(c)** shall terminate the subcontract if a subcontractor does not stop employing or contracting with the illegal alien within three days of receiving the notice, and **(d)** shall comply with reasonable requests made in the course of an investigation, undertaken pursuant to C.R.S. § 8-17.5-102(5), by the Colorado Department of Labor and Employment. If Construction Manager participates in the Department program, Construction Manager shall deliver to the contracting State agency, Institution of Higher Education or political subdivision a written, notarized affirmation, affirming that Construction Manager has examined the legal Work status of such employee, and shall comply with all of the other requirements of the Department program. If Construction Manager fails to comply with any requirement of this provision or C.R.S. § 8-17.5-101 et seq., the contracting State agency, institution of higher education or political subdivision may terminate this contract for breach and, if so terminated, Construction Manager shall be liable for damages.

L. PUBLIC CONTRACTS WITH NATURAL PERSONS. C.R.S. § 24-76.5-101.
Construction Manager, if a natural person eighteen (18) years of age or older, hereby swears and affirms under penalty of perjury that he or she (a) is a citizen or otherwise lawfully present in the United States pursuant to federal law, (b) shall comply with the provisions of C.R.S. § 24-76.5-101 et seq., and (c) has produced one form of identification required by C.R.S. § 24-76.5-103 prior to the effective date of this contract.

ARTICLE 53. MISCELLANEOUS PROVISIONS

A. CONSTRUCTION OF LANGUAGE
The language used in these General Conditions shall be construed as a whole according to its plain meaning, and not strictly for or against any party. Such construction shall, however, construe language to interpret the intent of the parties giving due consideration to the order of precedence noted in Article 2C, Intent of Documents.

B. SEVERABILITY
Provided this Agreement can be executed and performance of the obligations of the Parties accomplished within its intent, the provisions hereof are severable and any provision that is declared invalid or becomes inoperable for any reason shall not affect the validity of any other provision hereof, provided that the Parties can continue to perform their obligations under this Agreement in accordance with its intent.

C. SECTION HEADINGS
The captions and headings in this Agreement are for convenience of reference only, and shall not be used to interpret, define, or limit its provisions.

D. AUTHORITY
Each person executing the Agreement and its Exhibits in a representative capacity expressly represents and warrants that he or she has been duly authorized by one of the parties to execute the Agreement and has authority to bind said party to the terms and conditions hereof.

E. INTEGRATION OF UNDERSTANDING
This Contract is intended as the complete integration of all understandings between the parties and supersedes all prior negotiations, representations, or agreements, whether written or oral. No prior or contemporaneous addition, deletion, or other amendment hereto shall have any force or affect whatsoever, unless embodied herein in writing. No subsequent novation, renewal, addition, deletion, or other amendment hereto shall have any force or effect unless embodied in a written Change Order or Amendment to this Contract.

F. NO THIRD PARTY BENEFICIARIES
Enforcement of this Agreement and all rights and obligations hereunder are reserved solely to the Parties. Any services or benefits which third parties receive as a result of this Contract are incidental to the Contract, and do not create any rights for such third parties.

G. WAIVER
Waiver of any breach under a term, provision, or requirement of this Agreement, or any right or remedy hereunder, whether explicitly or by lack of enforcement, shall not be construed or deemed as a waiver of any subsequent breach of such term, provision or requirement, or of any other term, provision, or requirement.

H. INDEMNIFICATION
Construction Manager shall indemnify, save, and hold harmless the State, its employees and agents, against any and all claims, damages, liability and court awards including costs, expenses, and attorney fees , to the extent such claims are caused by any negligent act or omission of the Construction Manager, its employees, agents, subcontractors or assignees pursuant to the terms of this Contract, but not to the extent such claims are caused by any negligent act or omission of, or breach of contract by, the State, its employees, agents, other contractors or assignees, or other parties not under control of or responsible to the Construction Manager.

I. STATEWIDE CONTRACT MANAGEMENT SYSTEM
If the maximum amount payable to Construction Manager under this Contract is $100,000 or greater, either on the Effective Date or at any time thereafter, this shall apply. Construction Manager agrees to be governed by and comply with the Colorado Procurement Code or the applicable procurement code for institutions of higher education, regarding the monitoring of vendor performance and the reporting of contract performance information in the State's contract management system ("Contract Management System" or "CMS"). Construction Manager performance shall be subject to evaluation and review in accordance with the terms and conditions of this Contract, Colorado statutes governing CMS, and State Fiscal Rules and State Controller policies.

J. CORA DISCLOSURE
To the extent not prohibited by federal law, this Agreement and the performance measures and standards under the Colorado Procurement Code or the applicable procurement code for institutions of higher education, if any, are subject to public release through the Colorado Open Records Act, C.R.S. § 24-72-201, et seq.

SECTION 00 73 02

SUPPLEMENTARY GENERAL CONDITIONS (CM/GC)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS (Not Applicable)

1.2 SUMMARY

A. Section includes administrative and procedural requirements for managing the contractual requirements of this Project.

1.3 DEFINITIONS (Not Applicable)

1.4 SUPPLEMENTARY GENERAL CONDITIONS

A. The University of Colorado Denver | Anschutz Medical Campus Supplementary General Conditions apply to Construction Manager/General Contractor Agreement (CM/GC) (SC-6.4).

B. A copy of the above noted document is available using hyperlink on page "Appendix I" under Section 00 11 00 - ADVERTISEMENT - REQUEST FOR PROPOSALS.

1.5 PROCEDURE (Not applicable)

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 00 73 02

SECTION 00 73 46

WAGE DETERMINATION SCHEDULE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS (Not Applicable)

1.2 SUMMARY (Not Applicable)

1.3 DEFINITIONS (Not Applicable)

1.4 PROCEDURE

A. DAVIS-BACON WAGE DETERMINATIONS

1. Comply with the laws of Colorado, C.R.S. § 24-92 Part 2. See Contract General Conditions (CM/GC) Article 27 - Labor And Wages.

B. OTHER WAGE DETERMINATIONS

1. See "Appendix E ~ APPLICABLE PREVAILING WAGE RATES" under Section 00 11 00 - ADVERTISEMENT - REQUEST FOR PROPOSALS.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 00 73 46

SECTION 00 73 47

APPRENTICESHIP PARTICIPATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS (Not Applicable)

1.2 SUMMARY (Not Applicable)

1.3 DEFINITIONS (Not Applicable)

1.4 PROCEDURE

A. APPRENTICESHIP PARTICIPATION

1. Comply with Colorado SENATE BILL 19-196 Concerning The Modification Of Procurement Requirements For State Contracts For Public Projects, Colorado Revised Statues, Section 24-92-115 regarding Apprenticeship utilization requirements - mechanical, electrical, and plumbing contracts - public projects.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 00 73 47

SECTION 00 73 80

SALES TAX

PART 1 - GENERAL

1.1 RELATED DOCUMENTS (Not Applicable)

1.2 SUMMARY

A. This Section includes administrative documents related to sales tax exemption for construction material purchases.

1.3 DEFINITIONS (Not Applicable)

1.4 DOCUMENTS

A. Tax Exempt Status of University of Colorado, dated August 25, 2017.

B. City of Aurora Sales and Use Tax Exemption, dated March 12, 2001.

C. City of County of Denver Tax Confirming Exemption Status, dated November 5, 1999.

D. State of Colorado Letter Confirming Adams County, RTD, Stadium, and Cultural Tax Exemptions, dated April 7, 2006.

E. Colorado Department of Revenue - Contractor Application for Exemption Certification.

F. Copies of the above noted documents are attached to the end of this section.

1.5 PROCEDURE

A. General Contractor must apply for a sales tax exemption certificate through the Colorado Department of Revenue using the "Contractor Application For Exemption Certificate."

1. Form can be downloaded from the Colorado Department of Revenue website: https://www.colorado.gov/pacific/sites/default/files/DR0172.pdf .

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 00 73 80

(See DOCUMENTS, specified on previous page, on next pages)

DR 0160 (02/16/11)
COLORADO DEPARTMENT OF REVENUE
DENVER CO 80261-0013

CERTIFICATE OF EXEMPTION FOR STATE SALES/USE TAX ONLY

USE ACCOUNT NUMBER for all references	LIABILITY INFORMATION	ISSUE DATE
09802565	G 010180	Aug 25 2017

THIS LICENSE IS NOT TRANSFERABLE

STATE OF COLORADO/ OFFICE OF STATE CONTROLLER
ATTN: OFFICE OF UNIVERSITY CONTROLLER
1800 N GRANT ST STE 600
DENVER CO 80203-1148

Executive Director
Department of Revenue

DR 0563 (08/30/13)
COLORADO DEPARTMENT OF REVENUE
Denver CO 80261-0013

130563 19999

Sales Tax Exemption Certificate
Multi - Jurisdiction

See page 2 for instructions

Last Name or Business Name	First Name	Middle Initial

Address		

City	State	ZIP

I Certify That

Name of Firm (Buyer)
The Regents of University of Colorado

Address
1800 Grant Street, Suite 600

City	State	ZIP
Denver	CO	80203

Qualifies As (Check each applicable item)

☐ Wholesaler ☐ Retailer ☐ Manufacturer ☐ Charitable or Religious

☒ Political Subdivision or Governmental Agency ☐ Other (Specify)

If Other, specify here

1) and is registered with the below listed states and cities within which your firm would deliver purchases to us which are for resale or lease by us in the normal course of our business which is Institution of Higher Education or

2) that such purchases are exempt from payment of sales or use tax in such states and cities because our buyer is:

☒ Political Subdivision or Governmental Agency ☐ Charitable or Religious ☐ Otherwise Exempt By Statute (Specify)

If Otherwise Exempt By Statue, specify here

City or State	State Registration or ID Number	City or State	State Registration or ID Number
City of Aurora	98-00799-0000	Colorado (Boulder campus)	98-02915-0000
Colorado	98-02565-0000	Texas	32002730391

If the list of states and cities is more than six(6), attach a list to this certificate.
I further certify that if any property so purchased tax free is used or consumed by the firm as to make it subject to a Sale or Use Tax we will pay the tax due direct to proper taxing authority when state law so provides or inform the seller for added tax billing. This certificate shall be part of each order which we may hereafter give to you, unless otherwise specified, and shall be called until canceled by us in writing or revoked by the city or state.

General Description of products to be purchased from seller

Under penalties of perjury, I swear or affirm that the information on this form is true and correct as to every material matter.

Authorized Signature *(owner, Partner or Corporate Officer)*	Title	Date (MM/DD/YY)
Robert C Kuck	Associate Vice President/University Controller	9/4/18

FINANCE DEPARTMENT

Administration
1470 South Havana Street
Aurora, Colorado 80012
303-739-7055
FAX: 303-739-7068

March 12, 2001

Wayne F. Henderson
Vice Chancellor for Administration and Finance
University of Colorado Health Sciences Center
Fitzsimons, Building 500, Room C1003
P.O. Box 6508
Aurora, Colorado 80045-0508

RE: Letter of Commitment

Dear Mr. Henderson:

I am in receipt of your letter dated February 27, 2001, requesting that I issue a letter of commitment to the University of Colorado Health Sciences Center ("UCHSC") pursuant to *City Code Section 130-63(c)*. It is my understanding that UCHSC is part and parcel of the University of Colorado, a public institution of higher education of the State of Colorado. *§ 23-20-101, et seq., C.R.S.* You have asked for some assurance that UCHSC is exempt from the payment of City sales and use tax, as well as the employer portion of the City occupational privilege tax.

City Code Section 130-157(1) exempts all sales of tangible personal property and taxable services to the various political subdivisions of this state from imposition of City sales tax. Identical exemptions exist in both the City Use Tax ordinance (*City Code § 130-198(5)*) and the City Employer Occupational Privilege Tax ordinance (*City Code § 130-405(1)*). Accordingly, UCHSC falls squarely within each of these three exemptions.

It should be noted, however, that these exemptions do not extend to the collection of City tax. For instance, UCHSC must collect, report, and remit City sales tax on any retail sale of tangible personal property or taxable services it makes to a non-exempt third party. *City Code § 130-160.* Likewise, UCHSC

must also collect, report, and remit the employee portion of the City occupational privilege tax for each person it employs within the City for any period of time within a calendar month sufficient to receive no less than $250.00 as compensation for such employment. *City Code § 130-464.*

With respect to the deposit and ultimate payment of City use tax on construction materials, it is the longstanding policy of the City that the party who contracts for and directs and controls the construction of building improvements is liable for such tax. *See Fifteenth Street Investment Co. v. People, 102 Colo. 571, 81 P.2d 764 (1938).* Under the circumstances described in your request, it is UCHSC, and not its contractors, upon whom sole liability for the payment of City use tax would rest. Because UCHSC is an exempt entity, no use tax is due and owing on the purchase and subsequent use of construction materials for the development of UCHSC's property at the Fitzsimons site.

With regard to your additional requests, the City has no objection if UCHSC's contractors wish to use this letter to present to City building officials and third-party retailers as evidence of UCHSC's tax exemption. As for any future revocation of this letter, unless the status of UCHSC as a political subdivision changes, the various City tax exemptions which UCHSC is entitled to claim cannot be lawfully repealed without the prior approval of the City's voters. *See Colo. Const. Art. X, § 20(4)(a).* Therefore, the City believes UCHSC will be adequately informed in the event that the City decides to seek approval for any change in its tax laws that would impact UCHSC's tax-exempt status.

Very truly yours,

John Gross
Director of Finance

Department of Finance
Treasury Division
Tax Compliance – Audit Unit

201 W Colfax Ave #1009
Denver, CO 80202
fax: 720- 913-9455
www.denvergov.org/treasury

DENVER
THE MILE HIGH CITY

February 19, 2014

University of Colorado
Procurement Service Center
1800 Grant Street, Suite 500
Denver, CO 80203

Ladies/Gentlemen:

The above named entity is exempt from the Denver sales tax per Sec. 53-26(1) of the City Retail Sales Tax Article:

Sec. 53-26 (1) Exemptions

There shall be exempt from taxation under the provisions of this Article the following: (1) All sales to the United States Government, to the State, its departments and institutions and the political subdivisions thereof, only when purchased in their governmental capacities.

To qualify for the exemption, purchases must be billed direct to the organization, and payment made from funds of the organization.

The exemption does not extend to construction contractors who may perform contracts for you; they are the consumer of all property purchased and used in the performance or contracts for others. Nor does the exemption apply to purchases by employees or members for their own personal use.

You may reproduce this letter to furnish to suppliers as needed.

Sincerely,

Donald Korte, Audit Manager
Tax Compliance/Audit Section
720-913-9339

FOR CITY SERVICES VISIT DenverGov.org | CALL 311

STATE OF COLORADO

TAXPAYER SERVICE DIVISION
Department of Revenue

1375 Sherman Street
Denver, Colorado 80261

Bill Owens
Governor

M. Michael Cooke
Executive Director

Neil Tillquist
Division Director

Michael J. Barden
University of Colorado at Denver and Health Sciences Center(UCDHSC)
Building 500, Mail Stop F418
P.O. Box 6508
Aurora CO 80045

April 7, 2006

Dear Mr. Barden:

This is in response to your letter of March 1, 2006, to Bruce Nelson of the Department of Revenue regarding sales tax exemption from county and special district sales taxes for UCDHSC construction projects at the Fitzsimons campus. Mr. Nelson has left the Department, so I am responding to your inquiry.

In regards to Adams County sales and use tax, the sales tax is collected by the Department of Revenue, not the city of Aurora. Use tax on building materials is collected by the county when issuing building permits. Under 29-2-105(d), 39-26-708(1)(a) and 39-26-708(2)(a), C.R.S., UCDHSC and its contractors and sub-contractors are exempt from county sales and use tax on construction and building materials for State/UCDHSC owned real property.

In regards to special district sales and use taxes, UCDHSC and its contractors and sub-contractors are exempt from sales and use tax pursuant to the exemptions granted in 39-26-708(1)(a) and 39-26-708(2)(a), C.R.S., for the Regional Transportation District under 32-9-119(2)(c)(II), C.R.S, for the Scientific and Cultural District under 32-13-107(2), C.R.S, and for the Metropolitan Football Stadium District under 32-15-110(2)(a), C.R.S.

Additionally, for construction projects in the City and County of Denver, UCDHSC and its contractors and sub-contractors are exempt from the aforementioned special district sales and use taxes, as well as state sales and use tax.

Should you have additional questions regarding these matters, feel free to contact me.

Respectfully,

Steve Asbell

Steve Asbell
Taxpayer Service Policy Group
Colorado Dept of Revenue
Ph:303.866.3889 email: sasbell@spike.dor.state.co.us

DR 0005 (05/03)

DO NOT SEND

DR 0172 (05/01/18)
COLORADO DEPARTMENT OF REVENUE
Denver CO 80261 - 0009
(303) 238-SERV (7378)

Special Notice

Purpose of this application

The exemption certificate for which you are applying must be used only for the purpose of purchasing construction and building materials for the exempt project described below. This exemption does not include or apply to the purchase or rental of equipment, supplies, and materials which are purchased, rented, or consumed by the contractor and which do not become a part of the structure, highway, road, street, or other public works **owned** and **used** by the exempt organization.

Any unauthorized use of the exemption certificate will result in revocation of your exemption certificate and other penalties provided by law.

A separate certificate is required for each project.

Colorado Withholding Account Number

A Colorado Account Number (CAN) should be provided in this field. Applications that are left blank or list N/A will not be processed and will be returned.

Subsidiary:
This box is marked when a subsidiary is using the parents withholding account number (only when it does not have its own.) Provide the parents CAN.

Subcontractor:
This box is marked when a contractor does not have employees of their own and outsources their employees through a subcontractor. List the subcontractor or subcontractors name and CAN(s).

Staffing Agency:
This box is marked when a contractor does not have employees of their own and outsources their employees through a staffing agency. Provide the Staffing Agency's name and CAN.

No employees/no subcontractors:
For contractors with no employees, no subcontractors/ staffing agencies:

Write no employees in the (CAN) box and provide explanation. For example, I have no employees or subcontractors and perform all of the work myself.

Subcontractors:
Subcontractors will not be issued Certificates of Exemption by the Department of Revenue. Upon receipt of the Certificate, the prime contractor should make a copy for each subcontractor involved in the project and complete it by filling in the subcontractor's name and address and signing it. The original Certificate should always be retained by the prime contractor. Copies of all Certificates that the prime contractor issued to subcontractors should be kept at the prime contractor's place of business for a minimum of three years and be available for inspection in the event of an audit.

See FYI Sales 95 for information about qualifying affordable housing projects.

To avoid a returned application ensure you have done the following:

- ☐ Accurately completed all applicable boxes of the form.
- ☐ Provided a copy of the Contract or agreement page. The Contract or Agreement page lists the type and scope of work.
- ☐ Bid amount on Contract or Agreement page matches the amount listed on the application (to the penny).
- ☐ Contract or Agreement page contains the signatures of the contracting parties.
- ☐ The form DR0172 (application) is signed.
- ☐ The exempt organizations number was provided and is correct.

140172 19999

DR 0172 (05/01/18)
COLORADO DEPARTMENT OF REVENUE
Denver CO 80261 - 0009
(303) 238-SERV (7378)

Contractor Application for Exemption Certificate

This exemption does not include or apply to the purchase or rental of equipment, supplies, and materials which are purchased, rented, or consumed by the contractor and which do not become a part of the structure, highway, road, street, or other public works **owned** and **used** by the exempt organization.

Any unauthorized use of the exemption certificate will result in revocation of your exemption certificate and other penalties provided by law. A separate certificate is required for each contract.

Send completed forms to: Colorado Department of Revenue, Denver, CO 80261-0009
Failure to accurately complete all boxes of the form or provide all supporting documentation will cause the application to be denied.

For Department Use Only. Do not write in this section.

Contractor/Account No.	Period (MM/YY-MM/YY)
89-	

Must be completed by applicant

Contractor Information

Trade name/DBA			
Owner, partner or corporate last name	First Name		Middle Initial
Mailing Address	City	State	Zip
E-Mail Address	FEIN	Bid amount for your contract (Must match to the penny) $	
Fax number	Business Phone number		
Colorado withholding tax account number (See instructions)	☐ Subsidiary ☐ Subcontractors ☐ Staffing Agency ☐ No employees/subcontractors (see below)		
No Employees/Subcontractors. (Provide explanation or attach a letter of explanation).			

Exemption Information

Copies of contract or agreement page, identifying the contracting parties, bid amount, type of work, and signatures of contracting parties **must** be attached

Name of exempt organization (as show on contract)		Exempt organization's number 98	
Address of exempt organization	City	State	Zip
Principal contact at exempt organization-Last Name	First Name		Middle Initial
Housing Authority (if applicable)	Name of Project (if applicable)		
Owner of the Project (if applicable)			
Physical location of project site (give actual address when applicable and Cities and/or County (ies) where project is located)			
City	State	Zip	Principal contact's telephone number
Scheduled construction start date (MM/DD/YY)	Estimated completion date (MM/DD/YY)		

I declare under penalty of perjury in the second degree that the statements made in this application are true and complete to the best of my knowledge.

Signature of the business owner, partner or corporate officer	Title of corporate officer	Date (MM/DD/YY)

SECTION 01 10 00

SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

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

B. Related Requirements:

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

1.3 PROJECT INFORMATION

A. Project Identification: Fitzsimons Building 5th & 6th Floors Cancer Center, Paint Patch Code Renovation; Project No. 21_155291.

1. Project Location: 13001 E. 17th Place; Aurora, Colorado 80045.

B. Principal Representation: University of Colorado Denver.

1. University's Representative: Chad Jelinek; Project Manager (see Section 00 01 04 "Project Directory" for additional contact information).

C. Architect/Engineer: Stantec Architecture Inc. (See Section 00 01 04 "Project Directory" for additional contact information).

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

1. See Section 00 01 04 "Project Directory"

E. Project Web Site: A project Web site administered by Contractor will be used for purposes of managing communication and documents during the construction stage.

1. See Section 01 31 00 "Project Management and Coordination" for requirements for establishing administering and using the Project Web site.

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. Tenant Finish of partial 5th Floor and full 6th Floor at the Fitzsimons Building (Building 500) on the Anschutz Medical Campus. Project Area is approximately 32,000 GSF. The space was previously built out to be used as office space and this project will upgrade finishes & furniture throughout, build new fire rated exit passageways to allow for more occupants on the floor and upgrade millwork at 2 break rooms for ADA compliance. This project will also address the fire rating of abandoned flooring penetrations and expansion joints that are currently not rated. This project is not targeting LEED or WELL certification..

1.5 WORK BY UNIVERSITY

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

1.6 WORK UNDER SEPARATE CONTRACTS

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

1.7 UNIVERSITY-FURNISHED AND INSTALLED PRODUCTS

A. University will furnish certain items of equipment/furnishings as shown on the Drawings. Contractor will be responsible for coordinating their work to accommodate these items including, but not limited to, physical space fit, utility connections and rough-in, power wiring and electrical characteristics.

B. Include in Project scheduling the latest times when information for such items is required and so notify the University in writing.

1.8 UNIVERSITY-FURNISHED, CONTRACTOR-INSTALLED PRODUCTS

A. The University will furnish certain items delivered to the jobsite as shown on the drawings. Contractor will receive, unload, move, set in position, anchor and connect such items and put them into operating condition.

B. The Contractor will be responsible for coordinating their work to accommodate these items including, but not limited to, physical space fit, utility connections and rough-in, power wiring and electrical characteristics.

C. Include in Project scheduling the latest times when information for such items is required and so notify the University in writing.

D. Cooperate with University in scheduling the delivery of these items and be responsible for accommodating their storage and protection in the building and their replacement or repair due to damage as a result of Contractor’s operations.

1.9 ACCESS TO SITE

A. General: Contractor shall have limited and restricted use of Project site for construction operations as indicated on Drawings by the Contract limits and as indicated by requirements of this Section.

B. Use of Site: Limit use of Project site to areas within the Contract limits indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.

1. Adjust means and methods of construction based on site limits and restrictions.
2. Locate staging areas only where permitted by University.
3. As part of this Project, replace damaged lawns, sprinkler systems, sidewalks and any other existing site improvements within staging area and access ways.

C. Construction Access and Travel:

1. Use only those entrances, exits, and travel ways on campus roads and within the building designated by University. Contractor's personnel are not permitted in non-designated areas of University's existing facilities. Use only designated travel ways for transporting demolition materials, new construction materials, tools and equipment.
2. Use of other than designated travel ways on campus roads and within existing buildings requires a minimum of 20 business days prior approval by University.

    a. Request variations to traffic flow including temporary fire lane, parking lot, sidewalk and road closures, regulatory signage, and traffic control devices in accordance with University "Procedure for Approval of Regulatory Signage, Traffic Control Devices and for Street Closures at the Anschutz Medical Campus" and "AMC Campus Street and Parking Lot Closure Request" available through University Project Manager.

3. Access to the site will be as permitted by the University. Prearrange delivery and use of cranes, heavy trucks and other heavy equipment at least 72 hours prior to need through the University’s Project Manager and University Police.
4. Maintain access to fire lanes and campus operations at all times. Provide flag personnel during the ingress or egress of large equipment.

a. When fire lanes and/or access way must be temporarily disrupted notify University Police and University Parking and Transportation at least 20 business days in advance and reconfirm 72 hours in advance through the University's Project Manager.

5. Arrange for and obtain all necessary permits from City of Aurora for any disruption to or temporary closures of public city streets. Coordinate procurement of permits with Anschutz Medical Campus Liaison and University Project Manager.

D. Construction Parking:

1. General: Contractor must pay for all parking and, if available, may be assigned parking spaces in designated contractor parking lots. Parking in lots designated for visitors and patients is not permitted. Make arrangements for designated spaces and payment for long term parking with University Parking Services through the University Project Manager.
2. Provide temporary parking or use designated areas of University's existing parking areas as applicable to the Project and in accordance with the following:

a. All parking on University property, including parking on University owned streets, is under the exclusive control and authority of University Parking and Transportation Services. Direct policy question to the department at (303) 724-2555.
b. There is no free parking on campus. Displacement or use of existing parking spaces by Contractor, either for parking or for staging, is a Contractor cost.
c. Use of existing parking spaces or other areas outside of Contractor's staging area must be approved in advance by University Parking and Transportation Services.
d. University Parking and Transportation Services may require and issue parking permits through the University Project Manager. Permits must be displayed and visible at all times while parked on the campus. Failure to display a permit will result in citations being written and possible removal of the vehicle from University property.
e. Keep all designated parking areas clean and free of litter and debris. University reserves the right to direct Contractor to clean areas not kept clean and orderly.
f. University Parking and Transportation Services may change parking assignments as deemed necessary, restrict the use of any space(s) or lot(s) at any time, and determine the hours of control and mode of operations for any parking area at any time. University Parking and Transportation Services may deny or revoke parking privileges to any person when deemed necessary and/or considered to be in the best interests of the University.

3. Parking on University property is at the Contractor's own risk. The University and any entity affiliated with it are not responsible for fire, theft, and damage to or loss of contractor's or subcontractor's vehicle or any article left therein. Only a license is granted to the user and no bailment is created.

E. Condition of Existing Building: Maintain portions of existing building affected by construction operations in a weathertight condition throughout construction period. Repair damage caused by construction operations.

1.10 COORDINATION WITH OCCUPANTS

A. University may occupy site and both existing and adjacent building(s) during entire construction period. Cooperate with University during construction and sequence operations to minimize conflicts and facilitate University usage. Perform the Work so as not to interfere with University's day-to-day operations.

1. Maintain existing exits from existing and adjacent building, unless otherwise indicated.
2. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from University and approval of authorities having jurisdiction.
3. Limit construction operations to those methods and procedures which will not adversely and unduly affect the working environment of University's occupied spaces, including noise, dust, odors, air pollution, ambient discomfort, poor lighting, hazards and other undesirable effects and conditions.
4. Coordinate with University Project Manager to schedule jack hammering or activities producing dusty conditions, excessive fumes or odors during off-hours.
5. When work must be accomplished in areas containing existing furniture, upon a minimum of 3 business days notification of the University Project Manager, University will remove or relocate existing furniture.
6. Provide not less than 72 hours' notice to University Project Manager of activities that will affect University's operations. University Project Manager will coordinate with campus tenants.

    a. Refer to "Work Restrictions" Article of this Section for procedures and notification requirements related to utility interruptions.

7. Provide temporary barriers and partitions, or other means as required to protect occupants of existing building and the general public from injury due to construction activities. Prevent the spread of dust and dirt to adjacent occupied areas and building.

1.11 WORK RESTRICTIONS

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

1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.
2. In planning and executing the Work, take into consideration the special needs of University patient care, teaching and research settings, for example, supply of critical utilities, noise and dust control, access to existing loading docks, occupied buildings, etc.

B. Normal Working Hours: Limit work to normal working hours of 7:00 a.m. to 6:00 p.m., Monday through Friday.

1. Notify University Project Manager of all proposed work outside of normal working hours. Include dates, times, names and contact information for contractors and subcontractor performing the Work with notification. University Project Manager will notify, as appropriate, other University personnel and departments including, but not limited to, Building Maintenance and Operations (BMO) Directors, BMO assigned representative, Campus Police and Facilities Management.

C. Noise and Vibration: Coordinate operations that may result in high levels of noise and vibration, or other disruption to University occupancy with University.

1. Noise during Normal Working Hours: Identify potentially disruptive construction activities at weekly Progress Meeting and adjust active time of day to reduce significant impacts on occupants.
2. Noise outside Normal Working Hours: Schedule construction work or demolition work outside of normal working hours with University Project Manager at minimum of 72 hours in advance.

a. The maximum permissible noise level is 75 decibels (dBA), measured at the adjacent property line.

D. Contractor Identification:

1. Supervisory staff for the primary contractor must obtain an identification badge at the University Anschutz Medical Center (AMC) Building 500. Submit the University Access Control Badge Application form through University Project Manager. Submitted forms shall be complete with all required information including a letter on company letterhead confirming employee status with company and stating whether the company completes background testing and/or drug screening. Contractor supervision must display badge on site during construction activities.
2. To the greatest extent possible, Contractor's and subcontractor's employees must wear a recognizable logo shirt or hardhat identifying them as members of the contractor's work force.

E. Use of Existing Elevators: Use "freight" elevators only and protect finishes during transport. Restrict use exclusively to time required to move construction materials.

1. Do not block corridors, aisles, passageways or doors leading to elevator except as, and only to the extent approved by University Project Manager.

F. Keys: Submit written request to University Project Manager on University Key Request Form.

1. To the extent the need for keys is demonstrated and required to complete the Work, University Project Manager will issue keys to Contractor.
2. Contractor is responsible for all costs related to lost or non-returned keys.
3. Electrical, mechanical and sensitive research space may require University escort in lieu of issuing keys.

G. Dock Deliveries: Restrict use exclusively to time required to unload and move construction materials.

H. Existing Utility Interruptions: Do not interrupt water, sewer, plumbing, gas, steam, chilled water, oxygen, HVAC, electrical power, lighting, telephone and other related utilities serving facilities occupied by University without prior notice to and approval by the University. Coordinate and schedule interruptions in advance through the University Project Manager in strict conformance with University Utility Interruption/Outage Request Procedure.

1. Form of Notice: University Utility Interruption and Start-up Request form.
2. Time of Notice: Notice for major and minor outages as defined by the Utility Interruption/Outage Request Procedure is 8 business days for minor outages and 31 business days for major outages.

I. Fire Alarm and Fire Sprinkler Interruptions: When construction activities require interruption of fire alarm or fire sprinkler service, or when dust from construction activities is likely to cause accidental alarm, advise University Project Manager who will submit an interruption request.

1. Form of Notice: University Fire Alarm/Sprinkler Disable Request Form.
2. Time of Notice: Prior to noon on the day before the anticipated interruption.

J. Nonsmoking Campus: Smoking, chewing tobacco, and other related tobacco product use is not permitted at any location on campus or on any adjacent property.

K. University Policies Applying to All Contractors: Comply with University policies applying to contractors including drug policy, sexual harassment policy and tobacco free policy. Obtain copies of University policies from University Project Manager.

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

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

1.12 SPECIFICATION AND DRAWING CONVENTIONS

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

1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.
3. Words in the singular number include the plural and those in the plural include the singular.
4. Words of any gender include any other gender.

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

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 21 00

ALLOWANCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements governing allowances See "Schedule Of Allowances" at end of Section.

1. Certain items are specified in the Contract Documents by allowances. Allowances have been established in lieu of additional requirements and to defer selection of actual materials and equipment to a later date when direction will be provided to Contractor. If necessary, additional requirements will be issued by Change Order.

B. Types of allowances include the following:

1. Lump-sum allowances.

C. Related Requirements:

1. Section 01 22 00 "Unit Prices" for procedures for using unit prices.

1.3 SELECTION AND PURCHASE

A. At the earliest practical date after award of the Contract, advise Architect/Engineer of the date when final selection and purchase of each product or system described by an allowance must be completed to avoid delaying the Work.

B. At Architect/Engineer's request, obtain proposals for each allowance for use in making final selections. Include recommendations that are relevant to performing the Work.

C. Purchase products and systems selected by Architect/Engineer from the designated supplier.

1.4 ACTION SUBMITTALS

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

1.5 INFORMATIONAL SUBMITTALS

A. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.

B. Submit time sheets and other documentation to show labor time and cost for installation of allowance items that include installation as part of the allowance.

C. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

1.6 COORDINATION

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

1.7 LUMP-SUM ALLOWANCES

A. Allowance shall include cost to Contractor of specific products and materials ordered by University or selected by Architect/Engineer under allowance and shall include taxes, freight, and delivery to Project site.

B. Unless otherwise indicated, Contractor's costs for receiving and handling at Project site, labor, installation, overhead and profit, and similar costs related to products and materials ordered by University and/or selected by Architect/Engineer under allowance shall be included as part of the Contract Sum and not part of the allowance.

C. Unused Materials: Return unused materials purchased under an allowance to manufacturer or supplier for credit to University, after installation has been completed and accepted.

1. If requested by Architect/Engineer, retain and prepare unused material for storage by University. Deliver unused material to University's storage space as directed.

1.8 ADJUSTMENT OF ALLOWANCES

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

1. Include installation costs in purchase amount only where indicated as part of the allowance.

B. Submit claims for increased costs because of a change in scope or nature of the allowance described in the Contract Documents, whether for the purchase order amount or Contractor's handling, labor, installation, overhead, and profit.

1. Do not include Contractor's or subcontractor's indirect expense in the Change Order cost amount unless it is clearly shown that the nature or extent of work has changed from what could have been foreseen from information in the Contract Documents.

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

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

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

3.3 SCHEDULE OF ALLOWANCES

A. Allowance No. 1: Lump Sum Allowance: Include the sum of $15,000 to replace damaged or stained ceiling tile and grid to match existing. See AI series Drawing's Construction Note 33.

1. This allowance includes material cost, receiving, handling, and installation.
2. Contractor's overhead and profit associated with this allowance shall be returned to University with any unused portion of this allowance.

B. Allowance No. 2: Lump Sum Allowance: Include the sum of $15,000 to repair fire rated partitions. See AI series Drawing's Construction Note 40.

1. This allowance includes material cost, receiving, handling, and installation.
2. Contractor's overhead and profit associated with this allowance shall be returned to University with any unused portion of this allowance.

END OF SECTION 01 21 00

SECTION 01 22 00

UNIT PRICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for unit prices. See "Schedule Of Unit Prices" at end of Section.

B. Related Requirements:

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

1.3 DEFINITIONS

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

1.4 PROCEDURES

A. Unit prices include all necessary material, plus cost for delivery, installation, insurance, applicable taxes, overhead, and profit.

B. Measurement and Payment: Upon completion of work involving unit prices, submit documentation to establish actual quantity of work provided. A Change Order will be issued in an amount equal to the actual quantity multiplied by the unit price.

C. University reserves the right to reject Contractor's measurement of work-in-place that involves use of established unit prices and to have this work measured, at University's expense, by an independent surveyor acceptable to Contractor.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF UNIT PRICES

A. Unit Price 1A - 1D: Funishing and installing through penetration firestopping (UL System No. F-A-0045) in vacated holes in existing fire-resistive rated concrete floor deck, for each size indicated below. See specification Section 07 84 43 "Penetration Firestopping" for additional requirements. See Drawing Detail B3/A1-401 "Slab Penetration Detail."

1. 1A: Device size = 1-1/2 inches.
2. 1B: Device size = 3-1/2 inches.
3. 1C: Device size = 4-1/2 inches.
4. 1D: Device size = 5-1/2 inches.

END OF SECTION 01 22 00

SECTION 01 23 00

ALTERNATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for alternates. See "Schedule Of Alternates" at end of Section.

1.3 DEFINITIONS

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

1. Alternates described in this Section are part of the Work only if enumerated in the Agreement.
2. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternate into the Work. No other adjustments are made to the Contract Sum.
3. Selection of alternates described in this Section may be deferred for possible selection at a subsequent date if so indicated in the Agreement.

1.4 PROCEDURES

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

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

B. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated revisions to alternates.

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

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

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

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

A. Add Alternate No. 1: Carpet Recycling.

1. Base Bid: Recycling of existing carpet removed from Project is not required.
2. Alternate: Recycle existing carpet removed from Project through Manningtons carpet recycling program. (Note: New carpet by Mannington is specified under Section 09 68 13 "Tile Carpeting.")

a. Broadloom Carpet: Cut into small pieces and palletize.
b. Carpet Tile: Palletize.
c. Transport and store carpet off-site for duration required until Manninton picks it up.
d. Contact Manninton representative for complete instructions, Julie Meseck, 303-717-8650.
e. Provide pallets and other materials required for transport and storage.

B. Add Alternate No. 2: Roller Window Shades.

1. Base Bid: Existing mini-blinds at exterior windows are to remain.
2. Alternate: Remove existing mini-blinds at exterior windows; replace with new window shades specified under Section 12 24 13 "Roller Window Shades."

END OF SECTION 01 23 00

SECTION 01 25 00

SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for substitutions.

B. Related Requirements:

1. Section 01 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. Samples, where applicable or requested.
f. Certificates and qualification data, where applicable or requested.
g. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
i. Research reports evidencing compliance with building code in effect for Project, from ICC-ES.
j. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
k. Cost information, including a proposal of change, if any, in the Contract Sum.
l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.
m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

3. Architect/Engineer's Action: If necessary, Architect/Engineer in consultation with the 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.

1. Change Order Bulletin Form: State Form SC-6.311 available on the website of the Office of the State Architect.
2. Work Change Order Bulletins issued by Architect/Engineer are not instructions either to stop work in progress or to execute the proposed change.

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

1. Change Order Bulletin Form: State Form SC-6.311 available from the website of the Office of the State Architect.
2. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.

1.7 CHANGE ORDER PROPOSAL

A. Change Order Proposal: In response to a University-Initiated Change Order Bulletin or accompanying a Contractor-Initiated Change Order Bulletin, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change described.

1. Change Order Proposal Form: State Form SC-6.312 available from the website of the Office of the State Architect.
2. Labor Rates: Prior to submitting first Change Order Proposal, submit bare, unburdened hourly labor rates for all contractor and subcontractor labor categories; submit itemized breakdown of all applicable additional labor benefit costs to be added to the bare labor cost to arrive at the total burdened hourly labor cost.
3. Equipment Costs: Provide cost backup for all equipment clearly indicating equipment billing rates and sufficient to demonstrate, as determined by the University Project Manager, that proposed rates are competitive and reasonable in all cases. Submit completed Change Order Proposal Form within the requested timeframe. Include backup documentation to support calculations consistent with Contract provisions, including but not limited to, the following:

    a. Contractor and Subcontractor labor, material and equipment costs including:

        1) A list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
        2) Applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
        3) Costs of labor and supervision directly attributable to the change and as permitted by the terms and conditions of the General Contract for Construction.

    b. Contractor and Subcontractor overhead and profit.
    c. Contractor's bond cost.
    d. Justification for Change in Contract Time: An updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity 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 1 PDF copy of digitally signed 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.

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 Architect/Engineer and University Project Manager to finalize the schedule of values at earliest possible date, but no later than 10 business days before the date scheduled for submittal of initial Certificates and Applications for Payment.
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 Architect/Engineer.
    c. Architect/Engineer's project number.
    d. Contractor's name and address.
    e. Date of submittal.

2. Arrange the schedule of values in tabular form with separate columns to indicate the following for each item listed:

    a. Related Specification Section or Division.
    b. Description of the Work.
    c. Name of subcontractor.
    d. Name of manufacturer or fabricator.
    e. Name of supplier.
    f. Change Orders (numbers) that affect value.
    g. Dollar value of the following, as a percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.

        1) Labor.
        2) Materials.
        3) Equipment.

3. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with Project Manual table of contents. Provide multiple line items for principal subcontract amounts in excess of five percent of the Contract Sum.
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. Architect/Engineer will return incomplete applications without action.

1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
3. Include amounts of Change Orders issued before last day of construction period covered by application.
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 1 PDF copy, digitally signed and notarized, of each Application for Payment to Architect/Engineer by a method ensuring receipt. Include PDF copies of waivers of lien and similar attachments if required.

1. Transmit PDFs with a PDF 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. Contractor's construction schedule (preliminary if not final).
4. Products list (preliminary if not final).
5. Schedule of unit prices.
6. Submittal schedule (preliminary if not final).
7. List of Contractor's staff assignments.
8. List of Contractor's principal consultants.
9. Copies of building permits.
10. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
11. Initial progress report.
12. Report of preconstruction conference.

K. Application for Payment at Substantial Completion: After Architect/Engineer issues the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.

1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
2. This application shall reflect Certificate(s) of Substantial Completion issued previously for University occupancy of designated portions of the Work.

L. Final Payment Application: After completing Project closeout requirements, submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:

1. All items on Pre-acceptance Checklist (State Form SBP-05) have been completed.
2. Notice of Acceptance (State Form SBP-6.27) has been issued.
3. Statements to support local sales tax refunds, if any submitted.
4. Notice of Contractor's settlement has been published.
5. Evidence of completion of Project closeout requirements, including but not limited to:

    a. Submittal of Record Documents.
    b. Submittal of all Operation and Maintenance Manuals.
    c. Completion of all required demonstration and training.

6. Updated final statement, accounting for final changes to the Contract Sum.
7. Evidence that claims have been settled.
8. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when University took possession of and assumed responsibility for corresponding elements of the Work.
9. Final liquidated damages settlement statement.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 29 00

SECTION 01 31 00

PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:

1. General coordination procedures.
2. Coordination drawings.
3. Requests for Information (RFIs).
4. Project Web site.
5. Project meetings.

B. Related Requirements:

1. Section 01 32 00 "Construction Progress Documentation" for preparing and submitting Contractor's construction schedule.
2. Section 01 73 00 "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
3. Section 01 77 00 "Closeout Procedures" for coordinating closeout of the Contract.

1.3 DEFINITIONS

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

1.4 INFORMATIONAL SUBMITTALS

A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Within 21 calendar days of Notice of Award submit, as complete as possible, a preliminary list to include all major subcontractors. Augment, complete and submit the final subcontractor list within 60 calendar days of Notice of Award, unless a longer duration is approved by the Architect/Engineer. Include the following information in tabular form:

1. Name, address, and telephone number of entity performing subcontract or supplying products.
2. Number and title of related Specification Section(s) covered by subcontract.
3. Drawing number and detail references, as appropriate, covered by subcontract.

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

1.5 GENERAL COORDINATION PROCEDURES

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

1. University Standard Project Management Forms

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

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

2. Site Utilization:

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

3. Layout:

a. It is recognized that the Contract Documents are diagrammatic in showing certain physical relationships of the various elements and systems and their interfacing with other elements and systems. Establishment and coordination of these relationships is the exclusive responsibility of the Contractor. Do not scale the drawings. Lay out and arrange all 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. Provide space to permit removal of coils, tubes, fan shafts, filters, other parts which may require replacement.
f. Locate operating and control equipment and devices for easy access. Furnish access panels where units are concealed by finishes and similar work.
g. Integrate mechanical work in ceiling plenums with suspension system, light fixtures and other work, so that required performances of each will be achieved.
h. Give the right-of-way to piping systems required to slope for drainage over other service lines and ductwork.
i. Advise other trades of openings required in their work for accommodation of mechanical and electrical elements. Provide and place sleeves and anchors required in other work.

5. Access to Equipment: Except where located above accessible ceilings, provide access panels wherever access is required to concealed valves, controls, dampers, pull boxes and other devices requiring ongoing or periodic access.

a. Acceptable types of access panels are specified in Division 08.
b. Each trade is responsible for providing access panels needed for access to their equipment and coordinating installation with other Division 03, 04, 06 and 09 trades.
c. Coordinate requirements and obtain approval of locations from Architect/Engineer.

G. Compatibility of Systems:

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

ITEM	FURNISHED BY	MOUNTED BY	LOW VOLTAGE WIRED BY	POWER WIRED & CONNECTED BY	LOW VOLTAGE CONTROL CONNECTED BY
Equipment motors	I	MI	MI	EI	--
Motor starters, contactors and overload heaters	MI	EI	EI	EI	MI
Fused and unfused disconnect switches	EI**	EI**	EI**	EI	--
Manual operating switches, speed switches, push-button	MI	EI	EI	EI	EI

stations and pilot lights					
Duct detectors	EI	MI	MI	EI	MI
Control relays and transformers	MI	MI	MI	EI	MI
Thermostats, time switches*	MI	MI	MI	EI	MI
Temperature control panels	MI	MI	MI	EI	MI
Motor and solenoid valves, damper motors, PE and EP switches	MI	MI	MI	--	MI
Refrigeration equipment, cooling tower and controls	MI	MI	MI	EI	MI
Electric meters	EI	EI	EI	EI	MI
Steam meters	MI	MI	MI	MI	MI
Chilled water meters,	MI	MI	MI	MI	MI
Water meters	MI***	MI	MI	MI	MI
Natural Gas	MI	MI	MI	MI	MI

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. 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.

I. 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. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
6. Mechanical and Plumbing Work: Show the following:

    a. Sizes and bottom elevations of ductwork, piping, and conduit runs, including insulation, bracing, flanges, and support systems.
    b. Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts and electrical distribution equipment.
    c. Fire-rated enclosures around ductwork.

7. Electrical Work: Show the following:

    a. Runs of vertical and horizontal conduit 1-1/4 inches in diameter and larger.
    b. Light fixture, exit light, emergency battery pack, smoke detector, and other fire-alarm locations.
    c. Panel board, switch board, switchgear, transformer, busway, generator, and motor control center locations.
    d. Location of pull boxes and junction boxes, dimensioned from column center lines.

8. Fire-Protection System: Show the following:

    a. Locations of standpipes, mains piping, branch lines, pipe drops, and sprinkler heads.

9. 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.
10. 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.

14. Space for response and signature by Architect/Engineer.

C. RFI Forms: Hard copy form or software-generated form with substantially the same content as indicated above, acceptable to Architect/Engineer.

1. Attachments shall be electronic files in Adobe Acrobat PDF format.

D. Architect/Engineer's Action: Architect/Engineer will review each RFI, determine action required, and respond. Allow seven calendar days for Architect/Engineer's response for each RFI. RFIs received by Architect/Engineer after 1:00 p.m. will be considered as received the following working day.

1. The following Contractor-generated RFIs will be returned without action:

    a. Requests for approval of submittals.
    b. Requests for approval of substitutions.
    c. Requests for approval of Contractor's means and methods.
    d. Requests for coordination information already indicated in the Contract Documents.
    e. Requests for adjustments in the Contract Time or the Contract Sum.
    f. Requests for interpretation of Architect/Engineer's actions on submittals.
    g. Incomplete RFIs or inaccurately prepared RFIs.

2. Architect/Engineer's action may include a request for additional information, in which case Architect/Engineer's time for response will date from time of receipt of additional information.
3. Architect/Engineer's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Contractor-Initiated Change Order Bulletin and Proposal according to Section 01 26 00 "Contract Modification Procedures."

    a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect/Engineer in writing within seven calendar days of receipt of the RFI response.

E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by RFI number. Submit log weekly. Use CSI Log Form 13.2B or Contractor-generated form of substantially same content. Include the following:

1. Project name.
2. Name and address of Contractor.
3. Name and address of Architect/Engineer.
4. RFI number including RFIs that were returned without action or withdrawn.
5. RFI description.
6. Date the RFI was submitted.
7. Date Architect/Engineer's response was received.

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

1.8 PROJECT WEB SITE

A. Provide, administer, and use Project Web site for purposes of hosting and managing project communication and documentation until Final Completion. Project Web site shall include the following functions:

1. Project directory.
2. Project correspondence.
3. Meeting minutes.
4. Contract modifications forms and logs.
5. RFI forms and logs.
6. Submittals forms and logs.
7. Electronic submittal document hosting, viewing and transmitting.
8. Drawing and specification document hosting, viewing, and updating.
9. Pay applications.
10. Change orders.

11. Daily reports.
12. Punchlists.
13. Archiving functions.

B. Provide up to twenty-five (25) Project Web site user licenses for use of the University, Architect/Engineer, and Architect/Engineer's consultants. Provide eight hours of software training at Project Site office for Project Web site users.

C. On completion of Project, provide one each complete archive copy of Project Web site files to University and to Architect/Engineer in a digital storage format acceptable to Architect/Engineer.

D. Software:

1. Basis-of-Design Product: Subject to compliance with requirements, provide Meridian Systems; Prolog (Procore) or ProjectTalk under their current published licensing agreements. Comparable software by other software suppliers may be provided if approved in writing at the sole discretion of the Architect/Engineer in consultation with the University Project Manager.

E. Contractor, subcontractors, and other parties granted access by Contractor to Project Web site shall execute a data licensing agreement in the form of Agreement acceptable to University and Architect/Engineer.

1.9 PROJECT MEETINGS

A. General: Schedule and conduct meetings and conferences at Project site unless otherwise indicated.

1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify University and Architect/Engineer of scheduled meeting dates and times a minimum of 4 business days prior to meeting.

a. Participants, including representatives of subcontractors and suppliers, shall be qualified, familiar with Project and authorized to conclude matters relating to the Work.

2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including University and Architect/Engineer, within three business days of the meeting.

B. Preconstruction Conference: Schedule and conduct a preconstruction conference before starting construction, at a time and site convenient to all parties, but not later than 14 calendar days after Notice to Proceed.

1. Conduct the conference to review responsibilities and personnel assignments.
2. Attendees: Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work and include the following:

a. Authorized representatives of University:

1) University Project Manager.
2) University Building Maintenance Operations (BMO) Representative.

b. Architect/Engineer and their consultants.
c. Contractor's project manager and superintendent.

d. Major subcontractors and suppliers.
e. Other concerned parties shall attend the conference.

3. Agenda: Discuss items of significance that could affect progress, including the following:

a. Designation of key personnel and their duties.
b. Lines of communications.
c. List of major subcontractors and suppliers.
d. Tentative construction schedule.

1) Phasing.
2) Critical work sequencing and long-lead items.
3) Equipment deliveries and priorities.

e. Procedures and processing of:

1) Change Order Bulletin, Change Order Proposal and Change Orders.
2) RFI's
3) Testing and inspecting.
4) Applications for Payment.
5) Submittals.
6) Preparation of record documents.

f. Use of the premises, existing building and adjacent buildings as applicable.

1) Work restrictions.
2) Working hours.
3) University's occupancy requirements.
4) Procedures for disruptions and shutdowns.
5) Construction parking and staging.
6) Construction route and site access.
7) Office, work, and storage areas.
8) Progress cleaning and housekeeping procedures.

g. Project coordination.
h. Distribution of the Contract Documents.
i. Temporary facilities and controls.
j. Indoor Air Quality Plan and Monitoring including procedures for moisture and mold control.
k. Construction waste management and recycling.
l. Safety.

1) Fire and Life Safety.
2) Health and Safety.

m. First aid.
n. Security.
o. Building Department.
p. Telecommunications.
q. Building Services.
r. Building Operations.
s. University Work Related Policies.
t. Contractor Contacts.
u. University Contacts.

v. University Process Forms.

1) Key Request Form.
2) Access Control Badge Application Form.
3) Utility Interruption Request Form.
4) Utility Start-Up Form.
5) Fire Alarm/ Sprinkler Disable Request Form.
6) Hot Work Permit Form.
7) Anschutz Medical Campus (AMC) Street and Parking Lot Closure Form.
8) Indoor Air Quality (IAQ) Plan.
9) IAQ Planning Checklist.
10) IAQ Inspection Checklist.
11) Request for Variance.

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

C. Preinstallation Conferences: Conduct a preinstallation conference at Project site for installations, systems or assemblies where required by individual Specification Sections, or where deemed necessary by Contractor.

1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect/Engineer of scheduled meeting dates.
2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following, as appropriate:

a. Contract Documents.
b. Options.
c. Related RFIs.
d. Related Change Orders.
e. Purchases.
f. Deliveries.
g. Submittals.
h. Review of mockups.
i. Possible conflicts.
j. Compatibility requirements.
k. Time schedules.
l. Weather limitations.
m. Manufacturer's written instructions.
n. Warranty requirements.
o. Compatibility of materials.
p. Acceptability of substrates.
q. Temporary facilities and controls.
r. Space and access limitations.
s. Regulations of authorities having jurisdiction.
t. Testing and inspecting requirements.
u. Installation procedures.
v. Coordination with other work.
w. Required performance results.
x. Protection of adjacent work.
y. 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 30 calendar days prior to the scheduled date of Substantial Completion or Partial Substantial Completion.

1. Conduct the conference to review requirements and responsibilities related to Project closeout.
2. Attendees: Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work and include the following:

    a. University Project Manager.
    b. University Building Maintenance Operations (BMO) Representative.
    c. Architect/Engineer and their consultants.
    d. Contractor's project manager and superintendent.
    e. Major subcontractors and suppliers.
    f. Other concerned parties.

3. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:

    a. Procedures related to:

        1) Notice of Completion, including preparation of Contractor's punch list.
        2) Final Inspection.
        3) Notice of Substantial Completion.
        4) Notice of Approval of Occupancy/Use.
        5) Supplemental Occupancy/Use Checklist.
        6) Supplemental Acceptance Checklist.
        7) Pre-acceptance Checklists.
        8) Notice of Acceptance.
        9) Settlement and Final Payment.

    b. Preparation of record documents.
    c. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
    d. Submittal of written warranties.
    e. Requirements for 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.
c. University Building Maintenance Operations Representative.
d. University Campus Building Official.
e. Architect/Engineer and their consultants.
f. Contractor's project manager and superintendent.
g. Major subcontractors and suppliers.
h. Other entities concerned with current progress or involved in planning, coordination, or performance of future activities.
i. As needed, University Building Maintenance Operations (BMO), Subject Matter Experts (SME), and University Facility Support Services (FSS) Representatives.

3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

a. Contractor's Construction Schedule:

1) Review progress since the last meeting.
2) Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule.
3) Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
4) Review schedule for next two week period.
5) Review schedule of deliveries.
6) Review off-site fabrication.

b. Site Safety.
c. Indoor Air Quality Management monitoring.
d. MS4 Storm Water and Water Quality monitoring.
e. Quality:

1) Quality and work standards.
2) Status of correction of deficient items.
3) Progress cleaning.
4) Field observations.

f. Status of submittals.
g. Status of RFIs.
h. Status of Changes including:

1) Change Order Bulletins.
2) Change Order Proposals.
3) Change Orders.
4) Pending claims and disputes.

i. 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, Superintendant and Scheduler.

2. Agenda: Review draft pay application and progress schedule update in accordance with the requirements of Section 01 29 00 "Payment Procedures" and Section 01 32 00 "Construction Progress Documentation."

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 31 00

SECTION 01 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. Cost Loading: The allocation of the schedule of values for the completion of an activity as scheduled. The sum of costs for all activities must equal the total Contract Sum .

C. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.

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

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

F. Float: The measure of leeway in starting and completing an activity.

1. Float time 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.

G. 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. Contractor's Preliminary Schedule and Startup Network Diagram: Of size required to display entire network for entire construction period. Show logic ties for activities.

C. Contractor's Detailed Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.

1. Submit a working electronic copy of schedule, using software indicated, and labeled to comply with requirements for submittals. Include type of schedule (initial or updated) and date on label.

D. CPM Reports: Concurrent with CPM schedule, submit each of the following reports. Format for each activity in reports shall contain activity number, activity description, cost and resource loading, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float in calendar days.

1. Activity Report: List of all activities sorted by activity number and then early start date, or actual start date if known.
2. Logic Report: List of preceding and succeeding activities for all activities, sorted in ascending order by activity number and then early start date, or actual start date if known.
3. Total Float Report: List of all activities sorted in ascending order of total float.
4. Earnings Report: Compilation of Contractor's total earnings from commencement of the Work until most recent Application for Payment.

E. 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.

F. Daily Construction Reports: Submit at weekly intervals.

G. Material Location Reports: Submit at monthly intervals.

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

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

J. Qualification Data: For scheduling consultant or in-house scheduling expert.

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 CONTRACTOR'S CONSTRUCTION SCHEDULE (CPM SCHEDULE)

A. General: Prepare network diagrams using AON (activity-on-node) format.

B. Contractor's Preliminary Schedule and Startup Network Diagram: Submit diagram within 14 calendar days of date established for commencement of the Work. Outline significant construction activities for the first 90 calendar days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.

C. CPM Schedule: Prepare Contractor's detailed construction schedule using a cost- and resource-loaded, time-scaled CPM network analysis diagram for the Work.

1. Develop network diagram and submit CPM schedule within 45 calendar days after date established for commencement of the Work.

    a. Failure to include any work item required for performance of this Contract shall not excuse Contractor from completing all work within applicable completion dates, regardless of Architect/Engineer's approval of the schedule.

2. Conduct educational workshops to train and inform key Project personnel, including subcontractors' personnel, in proper methods of providing data and using CPM schedule information.
3. Establish procedures for monitoring and updating CPM schedule and for reporting progress. Coordinate procedures with progress meeting and payment request dates.
4. Use "one workday" as the unit of time for individual activities. Indicate nonworking days and holidays incorporated into the schedule in order to coordinate with the Contract Time.

D. CPM Schedule Preparation: Prepare a list of all activities required to complete the Work. Using contractor's preliminary schedule and startup network diagram, prepare a skeleton network to identify probable critical paths.

1. Activities: Indicate the estimated time duration, sequence requirements, and relationship of each activity in relation to other activities. Include estimated time frames for the following activities:

    a. Preparation and processing of submittals.
    b. Mobilization and demobilization.
    c. Purchase of materials.
    d. Delivery.
    e. Fabrication.
    f. Utility interruptions.
    g. Installation.
    h. Work by University that may affect or be affected by Contractor's activities.
    i. Testing and commissioning.
    j. Punch list and final completion.
    k. Activities occurring following final completion.

2. Critical Path Activities: Identify critical path activities, including those for interim completion dates. Scheduled start and completion dates shall be consistent with Contract milestone dates.
3. Processing: Process data to produce output data on a computer-drawn, time-scaled network. Revise data, reorganize activity sequences, and reproduce as often as necessary to produce the CPM schedule within the limitations of the Contract Time.
4. Format: Mark the critical path. Locate the critical path near center of network; locate paths with most float near the edges.

    a. Subnetworks on separate sheets are permissible for activities clearly off the critical path.

5. Cost- and Resource-Loading of CPM Schedule: Assign cost to construction activities on the CPM schedule. Do not assign costs to submittal activities. Assign activities and costs for mobilization, bonds, permits and insurance. Obtain Architect/Engineer's approval prior to assigning costs to material procurement activities if intending to bill for materials stored on site. Assign costs under main subcontracts for testing and commissioning activities, operation and maintenance manuals, punch list activities, Project record documents, and demonstration and training (if applicable), in the amount of not more than 5 percent of the Contract Sum.

    a. Each activity cost shall reflect an appropriate value subject to approval by Architect/Engineer.
    b. Total cost assigned to activities shall equal the total Contract Sum .
    c. As requested by University, code activities to permit sorting of Schedule of Values by CSI Division, funding sources, sub-trades, building systems, Bid Packages as applicable, or combinations thereof.
    d. Resource load activities with forecasted manpower and code to permit production of graphically depicted manpower report. Show manpower effort for each subcontractor and as an aggregate for each month.

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

F. Initial Issue of Schedule: Prepare initial network diagram from a sorted activity list indicating straight "early start-total float." Identify critical activities. Prepare tabulated reports showing the following:

1. Contractor or subcontractor and the Work or activity.
2. Description of activity.
3. Main events of activity.
4. Immediate preceding and succeeding activities.
5. Early and late start dates.
6. Early and late finish dates.
7. Activity duration in workdays.
8. Total float or slack time.
9. Average size of workforce.
10. Dollar value of activity (coordinated with the schedule of values).

G. Schedule Updating: Concurrent with making revisions to schedule, prepare tabulated reports showing the following:

1. Identification of activities that have changed.
2. Changes in early and late start dates.
3. Changes in early and late finish dates.
4. Changes in activity durations in workdays.
5. Changes in the critical path.
6. Changes in total float or slack time.
7. Changes in the Contract Time.

H. 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.
4. Variance report comparing current dates to target dates.
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.

2.3 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. Meter readings and similar recordings.
12. Emergency procedures.
13. Orders and requests of authorities having jurisdiction.
14. Change Orders received and implemented.
15. Services connected and disconnected.
16. Equipment or system tests and startups.
17. Partial completions and occupancies.
18. Substantial Completions authorized.

B. Monthly Project Status Report: Prepare a monthly project status report including the following:

1. Current status of Project:

a. Schedule.
b. Cost.
c. MBE and WBE participation, as applicable.
d. RFI's.
e. Submittals.
f. Manpower.
g. Safety.

2. Narrative of progress achieved in previous month, activities anticipated for the next month, and issues affecting the rate of progress.
3. Progress photographs in accordance with Section 01 32 33 "Photographic Documentation."

C. 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.

D. 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.

2.4 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. Scheduling Consultant: Engage a consultant to provide planning, evaluation, and reporting using CPM scheduling.

1. In-House Option: University may waive the requirement to retain a consultant if Contractor employs skilled personnel with experience in CPM scheduling and reporting techniques. Submit qualifications.
2. Meetings: Scheduling consultant shall attend all meetings related to Project progress, alleged delays, and time impact.

B. 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.

C. 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.
6. List of Subcontractors.
7. Schedule of Values.
8. Inspection and test results.

9. Closeout documents.
10. Coordination drawings.
11. Street and Storm Water Quality Management Plan.
12. Indoor Air Quality Management Plan.
13. Anschutz Medical Campus Street Services Request.

C. File Transfer Protocol (FTP): Communications protocol that enables transfer of files to and from another computer over a network and that serves as the basis for standard Internet protocols. An FTP site is a portion of a network located outside of network firewalls within which internal and external users are able to access files.

D. Portable Document Format (PDF): An open standard file format licensed by Adobe Systems used for representing documents in a device-independent and display resolution-independent fixed-layout document format.

1.4 ACTION SUBMITTALS

A. Submittals: Refer to individual CSI divisions for additional submittal requirements. If CSI division submittal requirements does not fully cover project scope, contractor shall submittal product data, shop drawings, testing data, certifications, and additional information for all permanent materials and components.

B. 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. Initial Submittal: Submit concurrently with startup construction schedule and within 30 calendar days of Notice to Proceed or Commencement of Work, but not later than submittal of first application for payment. Include submittals required during the first 90 calendar days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
3. Final Submittal: Submit concurrently with the first complete submittal of Contractor's construction schedule.

    a. Submit revised submittal schedule to reflect changes in current status and timing for submittals.

4. Format: Arrange the following information in a tabular format:

    a. Scheduled date for first submittal.
    b. Specification Section number and title.
    c. Submittal category: Action; informational.
    d. Name of subcontractor.
    e. Description of the Work covered.
    f. Scheduled date for resubmittal.
    g. Scheduled date for Architect/Engineer's final release or approval.
    h. Scheduled date of fabrication.
    i. Scheduled dates for purchasing.
    j. Scheduled dates for installation.

k. Activity or event numbers.

1.5 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

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

1. Architect/Engineer will furnish Contractor one set of digital data drawing files of the Contract Drawings for use in preparing Shop Drawings and Project record drawings.

a. Architect/Engineer makes no representations as to the accuracy or completeness of digital data drawing files as they relate to the Contract Drawings.
b. Digital Drawing Software Program: The Contract Drawings are available in Revit 2021.
c. Contractor shall execute a data licensing agreement in the form of Agreement form acceptable to University and Architect/Engineer.

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

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
4. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.

a. Architect/Engineer reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect/Engineer's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

1. Initial Review: Allow 14 calendar days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect/Engineer will advise Contractor when a submittal being processed must be delayed for coordination.
2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
3. Resubmittal Review: Allow 14 calendar days for review of each resubmittal.
4. Large and/or Complex Submittals: For large and/or complex submittals, as determined by the Architect/Engineer and for submittals that require sequential reviews by Architect/Engineer's consultants, a review period greater than 14 calendar days may be required. Architect/Engineer and Contractor shall identify such submittals upon submission of the submittal schedule and determine a mutually agreed upon review period.

D. Paper Submittals: Delegated Design submittals shall be submitted as both digital and paper submittals. See Part 2 Article "Delegated-Design Services below.

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

1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
2. Name file with submittal number or other unique identifier, including revision identifier.

    a. File name shall use project identifier and Specification Section number followed by a dash and then a sequential number (e.g., LNHS-061000-01). Resubmittals shall include an alphabetic suffix after another dash (e.g., LNHS-061000-01-A).

3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Architect/Engineer.
4. Transmittal Form for Electronic Submittals: Use electronic form acceptable to University**,** containing the following information:

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

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

G. Deviations and Additional Information: On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect/Engineer on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.

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

I. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.

1. Note date and content of previous submittal.
2. Note date and content of revision in label or title block and clearly indicate extent of revision.
3. Resubmit submittals until they are marked with approval notation from Architect/Engineer's action stamp.

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

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

L. Record Documents: Retain complete additional copies of submittals on Project site to be submitted as record documents in accordance with requirements of Section 01 78 39 "Project Record Documents."

M. Legibility: Provide clear and legible submittals. Submittals that are blurry or are for any reason unreadable will be returned without action.

PART 2 - PRODUCTS

2.1 SUBMITTAL PROCEDURES

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

1. Post electronic submittals as PDF electronic files directly to Project Management Software Web site specifically established for Project.

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

2. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.

B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.

1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
2. Mark each copy of each submittal to show which products and options are applicable.
3. Include the following information, as applicable:

    a. Manufacturer's catalog cuts.
    b. Manufacturer's product specifications.
    c. Manufacturer's installation instructions.
    d. Manufacturer's printed recommendations.
    e. Standard color charts.
    f. Statement of compliance with specified referenced standards.
    g. Statement of compliance with specified trade association standards.
    h. Testing by recognized testing agency.
    i. Application of testing agency labels and seals.
    j. Notation of coordination requirements.
    k. Notation of dimensions verified by field measurement.

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

a. Wiring diagrams showing factory-installed wiring.
b. Printed performance curves.
c. Operational range diagrams.
d. Rough-in diagrams and templates indicating clearances required to other construction, if not indicated on accompanying Shop Drawings.

5. Submit Product Data before or concurrent with Samples.
6. Confirm compliance of Product Data with requirements of Contract Documents. Submit cover letter indicating Contractor's certification of compliance.
7. Submit additional copies of Product Data as required complying with requirements of Section 01 78 39 "Project Record Documents."

C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Highlight, encircle or otherwise indicate deviations from Contract Documents. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data, unless submittal based on Architect/Engineer's digital data drawing files is otherwise permitted. Standard information prepared without specific reference to the Project is not considered a shop drawing.

1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:

a. Identification of products.
b. Schedules.
c. Compliance with specified standards.
d. Notation of coordination requirements.
e. Notation of dimensions established by field measurement.
f. Relationship and attachment to adjoining construction clearly indicated.
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.

D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.

1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
2. Mount, display or package Samples in the manner specified to facilitate review of qualities indicated. Prepare Samples to match the Architect/Engineer's Sample.
3. Identification: Attach label on unexposed side of Samples that includes the following:

a. Generic description of Sample.
b. Product name and name of manufacturer.
c. Sample source.
d. Number and title of applicable Specification Section.
e. Specification paragraph number and generic name of each item.
f. Compliance with recognized standards.
g. Availability and delivery time.

4. For projects where electronic submittals are required, provide corresponding electronic submittal of Sample transmittal, digital image file illustrating Sample characteristics, and identification information for record.

5. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.

    a. Number of Samples: Submit one full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect/Engineer will return submittal with options selected.

6. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.

    a. Number of Samples: Submit three sets of Samples. Architect/Engineer will retain two Sample sets; remainder will be returned. Mark up and retain one returned Sample set as a project record sample.

        1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
        2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.

7. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.

    a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
    b. Samples not incorporated into the Work, or otherwise designated as University's property, are the property of Contractor.

8. Distribution of Samples: Prepare and distribute additional sets to Subcontractors, manufacturers, fabricators, suppliers, Installers, and others as required for performance of the Work. Show distribution on transmittal forms.
9. Field Samples and Mock-Ups: Field Samples and mock-ups specified in individual Sections are full-size examples erected on site to illustrate finishes, coatings, or finish materials and to establish the standard by which the Work will be judged.

E. Selection of Related Materials: Where selections of colors, patterns, textures are specified to be made by Architect/Engineer, assemble complete samples of all specified or approved products for all Specification Sections and submit to Architect/Engineer. Review specifications and assemble all such samples for a combined single submittal. Indicate on the transmittal the latest date for selections to be made for each item to permit delivery of material in accordance with Progress Schedule. Architect/Engineer's action is limited solely to the specified selections or rejection of submittal items not in accordance with Specifications.

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

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

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

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

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

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

L. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.

M. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.

N. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.

O. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.

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

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

R. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.

S. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

T. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. 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.

U. 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.

V. 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.

W. 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.

X. 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 one digital PDF and three paper copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.

1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.
2. Digital PDF of delegated-design submittal shall be digitally stamped.

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 35 44

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

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes special administrative and procedural requirements related to environmental health and safety.

B. University is Authority Having Jurisdiction (AHJ) for Fire and Life Safety. This responsibility is administered by the University's Fire and Life Safety Officer.

C. Related Requirements:

1. Section 01 35 46 "Indoor Air Quality Procedures" for procedure related to maintaining indoor air quality during construction.
2. Section 02 81 00 "Transportation/Disposal of Hazardous Materials."

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 ENVIRONMENTAL HEALTH AND SAFETY AND FIRE AND LIFE SAFETY PROCEDURES

A. Physical, Life, and Fire Safety:

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

    a. Do not block exit corridors. Install signage clearly identifying exit routes.

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

B. OSHA Hazard Communication Standard:

1. Every Contractor and Subcontractor performing work shall to comply with the OSHA Hazard Communication Standard. Compliance includes joint University and Contractor responsibilities for the purpose of providing timely communications and information sharing with regard to hazardous materials, chemicals and chemical sources which may be present on-site or brought in by Contractor.
2. University Project Manager will provide Contractor with the following:

    a. Information regarding known hazardous chemicals and agents or other hazards present at the job site.
    b. University emergency procedures and contact numbers.

3. Provide safety training and environmental surveillance of all workers.
4. Inform and provide University's Project Manager the following:

    a. Material safety data sheets (MSDS) for all chemicals introduced into the workplace.
    b. Information regarding potential sources of pollutants which may be entrained in University's air intakes, e.g., roofing tar fumes, nuisance dusts, exhaust from internal combustion engines, welding or cutting fumes, and asbestos - if damaged or encountered during the course of the work.

C. Asbestos and Lead Paint:

1. The presence of asbestos-containing materials and/or paint containing lead on the job site does not mean a problem exists. Areas where asbestos is friable and not contained or lead paint is present or will be caused to be present in airborne or settled dust are of concern.
2. Responsibilities of University and Contractor regarding asbestos and lead paint are as follows:

    a. University:

        1) Notify the Contractor of the condition and location(s) where asbestos is known to be present or may reasonably be encountered, e.g., asbestos insulation, ceiling tiles, floor tiles, fire doors, wall and ceiling plasters, concrete, grouting, etc., and lead paint on metal building materials, walls, windows, etc.
        2) Coordinate with Contractor when response action is required by a Subcontractor.
        3) Contract with third party contractor to monitor areas where friable asbestos and/or lead-containing particles are present during construction/renovation projects for its own records and purpose. Monitoring results can be shared with Contractors but are in no way to be used for Contractor employee monitoring.
        4) Final authority on all asbestos-related concerns and contractual arrangements.

    b. Contractor:

        1) Notify University's Project Manager of any suspected or existing problem involving asbestos or lead and cease work in that area until University has assessed the situation.
        2) Ensure that undamaged asbestos-containing material and/or material containing lead, not included in the scope of the project, are not damaged.
        3) Train and monitor their own employees, including Asbestos Awareness training and Lead Paint Awareness training, where applicable.
        4) Be responsible for all environmental/industrial hygiene surveillance of its work staff and subcontractors and for required area monitoring where potential contamination of adjacent areas exists.
        5) Prevent problems which can result in asbestos or lead exposure to building occupants.
        6) Coordinate with the University's EHS Department and Building Maintenance and Operations through University's Project Manager and perform all activities that may potentially disturb asbestos containing materials in a manner acceptable to the EHS.
        7) Follow State of Colorado regulation, Emission Standards for Asbestos, Part B, Control of Asbestos, "Regulation 8" and OSHA standards regulating exposure to asbestos and lead.
        8) Where applicable, comply with Section 02 81 00 "Transportation/Disposal of Hazardous Materials."
        9) Comply with current "Asbestos-Contaminated Soil Management Standard Operating Procedure Document, University of Colorado Anschutz Medical Campus" during excavation operations.

D. Carcinogens:

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

E. Hazardous Waste:

1. All hazardous wastes are to be handled and disposed of according to current EPA and CDPHE guidelines which can be obtained through University Project Manager. Only individuals specifically authorized by University may sign hazardous waste manifests for wastes generated on University's property. Only University approved transporters and disposal facilities are to be used for transportation and disposal of hazardous wastes.

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

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

G. Hot Work Operations:

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

H. Confined Space Entry:

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

I. Green Tagging of Work Area:

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

J. Coronavirus / COVID-19

1. Work in compliance with all current regulatory guidelines, CU Denver | Anschutz Medical Campus COVID-19 plan requirements, and university contractor COVID-19 plan requirements.
2. Contact the university project manager for the current COVID-19 contractor plan. Contractor to return a completed university COVID-19 contractor plan along with a company COVID-19 plan.
3. Contractor must receive plan acceptance from project manager prior to being granted access to the campus.
4. Plan requirements are evolving, the university project manager will provide additional updates as necessary.

END OF SECTION 01 35 44

SECTION 01 35 46

INDOOR AIR QUALITY PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for managing emissions and moisture control during construction. The following documents appended to the end of this Section:

1. Indoor Air Quality Plan.
2. Planning Checklist (to be completed weekly, original form is available from Owner upon request).
3. Inspection Checklist (to be completed weekly, original form is available from Owner upon request).

1.3 DEFINITIONS

A. Sustainable Design Related Terminology: As defined is ASTM E 2114.

B. Adequate Ventilation: Ventilation, including air circulation and air changes, required to cure materials, dissipate humidity, and prevent accumulation of particulates, dust, fumes, vapors, or gases.

C. Hazardous Materials: Any material that is regulated as a hazardous material in accordance with 49 CFR 173, requires a Material Safety Data Sheet (MSDS) in accordance with 29 CFR 1910.1200, or which during end use, treatment, handling, storage, transportation or disposal meets or has components which meet or have the potential to meet the definition of a Hazardous Waste in accordance with 40 CFR 261. Throughout this specification, hazardous material includes hazardous chemicals.

1. Hazardous materials include: pesticides, biocides, and carcinogens as listed by recognized authorities, such as the Environmental Protection Agency (EPA) and the International Agency for Research on Cancer (IARC).

D. Indoor Air Quality (IAQ): The composition and characteristics of the air in an enclosed space that affect the occupants of that space. The indoor air quality of a space refers to the relative quality of air in a building with respect to contaminants and hazards and is determined by the level of indoor air pollution and other characteristics of the air, including those that impact thermal comfort such as air temperature, relative humidity and air speed.

E. Interior Final Finishes: Materials and products that will be exposed at interior, occupied spaces including but not limited to flooring, wallcovering, finish carpentry, and ceilings.

F. Packaged Dry Products: Materials and products that are installed in dry form and are delivered to the site in manufacturer's packaging including but not limited to carpets, resilient flooring, ceiling tiles, and insulation.

G. Wet Products: Materials and products installed in wet form, including paints, sealants, adhesives, special coatings, and other materials which require curing.

1.4 QUALITY ASSURANCE

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

1.5 PRECONSTRUCTION MEETING

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

1.6 SUBMITTALS

A. Indoor Air Quality (IAQ) Management Plan: Not less than 10 business days before the Pre-construction meeting, prepare and submit an IAQ Management Plan including, but not limited to, the following:

1. Procedures for control of emissions during construction.

    a. Identify schedule for application of interior finishes.

B. Procedures for moisture control during construction.

1. Identify porous materials and absorptive materials.
2. Identify schedule for inspection of stored and installed absorptive materials.
3. Revise and resubmit Plan as required by University.

    a. Approval of Contractor's Plan will not relieve the Contractor of responsibility for compliance with applicable environmental regulations.

C. Product Data:

1. Submit product data for filtration media used during construction and during operation. Include Minimum Efficiency Reporting Value (MERV).
2. Submit air pressure difference maps for each mode of operation of HVAC.
3. Material Safety Data Sheets: Submit MSDSs for inclusion in Operation and Maintenance Manual for the following products. Coordinate with Section 01 78 23 "Operation and Maintenance Data."

    a. Adhesives.
    b. Floor and wall patching/leveling materials.
    c. Caulking and sealants.
    d. Insulating materials.
    e. Fireproofing and firestopping.

f. Carpet.
g. Paint.
h. Clear finish for wood surfaces.
i. Lubricants.
j. Cleaning products.

D. Inspection and Test Reports:

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

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 IAQ MANAGEMENT - EMISSIONS CONTROL

A. Provide point person responsible for the implementation and assurance that the Indoor Air Quality Plan is being implemented.

B. University Indoor Air Quality Plan: Comply with the requirements of the University IAQ Plan, latest version, appended to this Specification Section.

C. Flush-Out: After construction ends, prior to occupancy and with all interior finishes installed, perform a building flush-out by supplying a total air volume of 14,000 cu.ft. of outdoor air per sq.ft. of floor area while maintaining an internal temperature of at least 60 degrees F and relative humidity no higher than 60%.

3.2 IAQ MANAGEMENT - MOISTURE CONTROL

A. Housekeeping:

1. Keep materials dry. Protect stored on-site and installed absorptive materials from moisture damage.
2. Verify that installed materials and products are dry prior to installation.

B. Inspections: Document and report results of inspections; state whether or not inspections indicate satisfactory conditions.

1. Examine materials for dampness as they arrive. If acceptable to University, dry damp materials completely prior to installation; otherwise, reject materials that arrive damp.
2. Examine materials for mold as they arrive and reject materials that arrive contaminated with mold.
3. Inspect stored and installed absorptive materials regularly for dampness and mold growth. Inspect weekly**.**

a. Where stored on-site or installed absorptive materials become wet, notify Architect/Engineer and University. Inspect for damage. If acceptable to University, dry completely prior to closing in assemblies; otherwise, remove and replace with new materials.

4. Plumbing: Verify satisfactory pressure test of pipes and drains is performed before closing in and insulating lines.
5. HVAC: Inspect HVAC system as specified in Section 23 08 00 "Commissioning of HVAC."

    a. And, inspect HVAC to verify:

        1) Condensate pans are sloped and plumbed correctly.
        2) Access panels are installed to allow for inspection and cleaning of coils and ductwork downstream of coils.
        3) Ductwork and return plenums are air sealed.
        4) Duct insulation is installed and sealed.
        5) Chilled water line and refrigerant line insulation are installed and sealed**.**

C. Schedule:

1. Schedule work such that absorptive materials, including but not limited to porous insulations, paper-faced gypsum board, ceiling tile, and finish flooring, are not installed until they can be protected from construction-related water.

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

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

E. Testing for Support of Microbial Growth: Test and report in accordance with ASTM D6329 Standard Guide for Developing Methodology for Evaluating the Ability of Indoor Materials to Support Microbial Growth Using Static Environmental Chambers. Indicate susceptibility of product or material to colonization and amplification of microorganisms. Identify microorganisms and conditions of testing.

1. Normal conditions: Perform testing at 35 degrees Centigrade and 50 percent relative humidity.
2. Extreme conditions: Perform worst case scenarios screening tests by providing an atmosphere where environmental conditions may be favorable for microbial growth.
3. Perform testing for the following:

    a. Fireproofing material on appropriate substrate.
    b. Ceiling tile.
    c. Wall covering.
    d. Other appropriate material.

END OF SECTION 01 35 46

(see Indoor Air Quality Plan, Planning, and Inspection Checklist forms on next pages)

(see Indoor Air Quality Plan, Planning, and Inspection Checklist forms on next pages)

Indoor Air Quality Plan
DATE

Project PN 21_155291 / Fitz Bldg 5th 6th Cancer Center Paint Patch Code Reno

Completed by: _____
(Name & Company)

Date: _____

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

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

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

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

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

1. HVAC Protection

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

2. Source Control

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

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

3. Pathway Interruption

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

4. Housekeeping

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

5. Scheduling and Construction Activity Sequence

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

PLANNING AND INSPECTION CHECKLISTS

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

University of Colorado Anschutz | Denver IAQ
DATE

Planning Checklist
(Must be completed weekly**)**

Project _____

Completed by: _____
(Name & Company)

Date: _____

---

1. HVAC Protection

- ☐ MERV 13 filters at supply air intake
- ☐ MERV 8 filters at return air openings
- ☐ Seal supply diffusers and return air during demolition
- ☐ Seal supply diffusers and return air openings during construction
- ☐ Mechanical rooms clean and neat
- ☐ Periodic duct inspections during construction
- ☐ General Contractor to document with photographs

2. Source Control

- ☐ Low/no VOC products as indicated by specifications
- ☐ Restrict vehicle traffic volume and prohibit idling
- ☐ Utilize electric or natural gas alternatives for gasoline and diesel
- ☐ Cycle equipment off when not being used or needed
- ☐ Exhaust pollution sources to the outside
- ☐ Keep containers of wet products closed
- ☐ Cover or seal containers of waste materials
- ☐ Protect absorptive building materials from weather and moisture
- ☐ Prevent fume migration from construction vehicles and equipment into adjacent buildings
- ☐ General Contractor to document with photographs

3. Pathway Interruption

- ☐ Provide dust curtains or temporary enclosures
- ☐ Locate pollutant sources as far away as possible from supply dusts and areas occupied by workers
- ☐ General Contractor to document with photographs
- ☐ Isolate areas of work to prevent contamination of clean or occupied areas
- ☐ When using VOC emitting materials ventilate using 100% outside air

- ☐ General Contractor to document with photographs

4. Housekeeping

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

5. Scheduling and Construction Activity Sequence

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

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

Signed: _____ Date: _____
(Contractor)

University of Colorado Denver | Anschutz IAQ
DATE

Inspection Checklist
(Must be completed weekly**)**

Project _____

Completed by: _____
(Name & Company)

Date: _____

---

1. HVAC Protection

- ☐ MERV 13 filters at supply air intake
- ☐ MERV 8 filters at return air openings
- ☐ Seal supply diffusers and return air during demolition
- ☐ Seal supply diffusers and return air openings during construction
- ☐ Mechanical rooms clean and neat
- ☐ Periodic duct inspections during construction
- ☐ General Contractor to document with photographs

2. Source Control

- ☐ Low/no VOC products as indicated by specifications
- ☐ Restrict vehicle traffic volume and prohibit idling
- ☐ Utilize electric or natural gas alternatives for gasoline and diesel
- ☐ Cycle equipment off when not being used or needed
- ☐ Exhaust pollution sources to the outside
- ☐ Keep containers of wet products closed
- ☐ Cover or seal containers of waste materials
- ☐ Protect absorptive building materials from weather and moisture
- ☐ General Contractor to document with photographs

3. Pathway Interruption

- ☐ Provide dust curtains or temporary enclosures
- ☐ Locate pollutant sources as far away as possible from supply dusts and areas occupied by workers
- ☐ General Contractor to document with photographs
- ☐ Isolate areas of work to prevent contamination of clean or occupied areas
- ☐ When using VOC emitting materials ventilate using 100% outside air
- ☐ General Contractor to document with photographs

4. Housekeeping

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

5. Scheduling and Construction Activity Sequence

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

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

Signed: _____ Date: _____
(Contractor)

SECTION 01 35 96

SPECIAL PROCEDURES FOR PROPERTY PROTECTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Procedures for establishing existing conditions and monitoring procedures for protection of adjacent or nearby structures and improvements including, but not limited to, sidewalks, landscaping, parking facilities, roadways, or driveways, whether on or off the University's property arising from construction operations.

1.2 SUBMITTALS

A. Submit photographs of existing conditions susceptable to damage by construction operations.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 MONITORING

A. With University's Project Manager present, survey and photograph existing conditions that may be susceptable to damage by construction operations. Notify University's Project Manager not less than 5 days in advance of proposed meeting time.

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

3.2 REMEDIES

A. Conduct construction operations in a manner that will avoid damage to adjacent buildings, structures, properties or improvements. Promptly remedy any such damage whether to University's or other property and hold the University harmless from such damage.

3.3 POST-CONSTRUCTION SURVEY

A. Within 30 calendar days of completion of those construction activities that would potentially damage adjacent or nearby properties, re-survey existing conditions susceptable to damage by construction operations. Identify specifically each changed condition, its magnitude and probable cause.

END OF SECTION 01 35 96

SECTION 01 40 00

QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.

1. Specific quality-assurance and -control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
3. Requirements for Contractor to provide quality-assurance and -control services required by Architect/Engineer, University, or authorities having jurisdiction are not limited by provisions of this Section.
4. Specific test and inspection requirements are not specified in this Section.

C. Related Requirements:

1. Section 01 42 00 "Reference" for list of references, standards and definitions.
2. Section 01 91 13 "General Commissioning" for coordination of testing with commissioning activities.
3. Division 23 for testing, adjusting and balancing of mechanical systems.
4. Division 26 for testing of electrical systems.

1.3 DEFINITIONS

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

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

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

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

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

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

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

H. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.

1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).

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

1.4 CONFLICTING REQUIREMENTS

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

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

1.5 INFORMATIONAL SUBMITTALS

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

1. Seismic-force-resisting system, designated seismic system, or component listed in the designated seismic system quality-assurance plan prepared by Architect/Engineer.

2. Main wind-force-resisting system or a wind-resisting component listed in the wind-force-resisting system quality-assurance plan prepared by Architect/Engineer.

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

C. Schedule of Tests and Inspections: Prepare in tabular form and include the following:

1. Specification Section number and title.
2. Entity responsible for performing tests and inspections.
3. Description of test and inspection.
4. Identification of applicable standards.
5. Identification of test and inspection methods.
6. Number of tests and inspections required.
7. Time schedule or time span for tests and inspections.
8. Requirements for obtaining samples.
9. Unique characteristics of each quality-control service.

1.6 REPORTS AND DOCUMENTS

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

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

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

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

C. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:

1. Name, address, and telephone number of factory-authorized service representative making report.
2. Statement that equipment complies with requirements.
3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
4. Statement whether conditions, products, and installation will affect warranty.
5. Other required items indicated in individual Specification Sections.

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

1.7 QUALITY ASSURANCE

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

1. Monitor quality control over products, services, site conditions, and workmanship to produce work of specified quality.
2. Comply fully with manufacturers' instructions, including each step in sequence.
3. If manufacturers' instructions conflict with Contract Document requirements, request clarification from Architect/Engineer before proceeding.
4. Comply with specified standards as a minimum quality for the work except when more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
5. Perform work by persons qualified to produce workmanship of specified quality.

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

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

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

1. For all trades: Proof of applicable licensing.
2. Electrical contractors:

    a. Company: State of Colorado master electrician license.
    b. On-site electricians: State of Colorado journeyman license.

3. Plumbing Contractors:

a. Company: State of Colorado master plumbers license.
b. On-site plumbers: State of Colorado journeyman license.
c. Gas piping installations: State of Colorado master plumber with minimum 5 years institutional or heavy commercial gas piping experience. Provide an on-site supervisor with a minimum of 3 years of supervisory experience.

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

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

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

G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329 or ASTM D 3740 as appropriate; and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.

1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.
3. Independent Agency: Meeting "Recommended Requirements for Independent Laboratory Qualifications" published by American Council for Independent Laboratories.
4. Authorized to operate in the State of Colorado.
5. Calibrate testing equipment at reasonable intervals with devices of accuracy traceable to National Bureau of Standards or of accepted values of natural physical constants.

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

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

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

1. Contractor responsibilities include the following:

a. Provide test specimens representative of proposed products and construction.
b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
c. Provide sizes and configurations of test assemblies to adequately demonstrate capability of products to comply with performance requirements.
d. When required, build site-assembled test assemblies using installers who will perform same tasks for Project.
e. When testing is complete, remove test specimens, assemblies, as applicable; do not reuse products on Project.

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

1.8 QUALITY CONTROL

A. University Responsibilities: Where quality-control services are indicated as University's responsibility, University will engage a qualified testing agency to perform these services.

1. University will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
2. Payment for these services will be made by the University.
3. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor.

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

1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
2. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.

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

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

C. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 01 33 00 "Submittal Procedures."

D. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.

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

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

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

G. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:

1. Access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
4. Facilities for storage and field curing of test samples including, but not limited to, safe storage and proper curing of concrete test cylinders at Project site for first 24 hours after casting as required by ASTM C 31.
5. Delivery of samples to testing agencies.
6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
7. Security and protection for samples and for testing and inspecting equipment at Project site.

H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

1. Schedule times for tests, inspections, obtaining samples, and similar activities.

I. Manufactured Items and Equipment: Where manufactured products or equipment are required to have representative samples tested, do not use such materials or equipment until tests have been made and the materials or equipment found to be acceptable. Do not incorporate in the work any product which becomes unfit for use after acceptance.

J. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents. Coordinate and submit concurrently with Contractor's construction schedule. Update as the Work progresses.

1. Distribution: Distribute schedule to University, Architect/Engineer, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

1.9 SPECIAL TESTS AND INSPECTIONS

A. Special Tests and Inspections: University will engage a qualified testing agency or special inspector to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of University, and as follows:

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

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

A. Test and Inspection Log: Prepare a record of tests and inspections including instructions received from University. Include the following:

1. Date test or inspection was conducted.
2. Description of the Work tested or inspected.
3. Date test or inspection results were transmitted to Architect/Engineer.
4. Identification of testing agency or special inspector conducting test or inspection.
5. Disposition: Pass, fail, nature of defects, if any.
6. Date and descriptions of remedial or correction action taken.

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

3.2 REPAIR AND PROTECTION

A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.

1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 01 73 00 "Execution."

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

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

3.3 SCHEDULE OF INSPECTIONS AND TESTS BY UNIVERSITY

A. University will engage testing agency and pay for testing and inspection associated with the following materials and systems, where included in the Project:

1. Piping.
2. Ceiling hanger wire pull-out.
3. Elevator safety - overhead coiling fire curtains.
4. Fan vibration.

END OF SECTION 01 40 00

SECTION 01 41 00

REGULATORY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Building Department Authority.
2. Applicable Codes and Standards.

1.3 BUILDING DEPARTMENT AUTHORITY

A. The University of Colorado Denver is charged with the responsibility of ensuring that provision of applicable codes, standards and guidelines are met on its campuses.

B. The University Denver campus has an established Building Authority responsible to review and examine buildings and plan documents, to permit and inspect construction and/or demolition to ensure conformance to codes adopted by the University and issue certificates of temporary occupancy and occupancy if satisfactory conformance is demonstrated.

C. The authority is executed by the Campus Building Official (CBO) who has the responsibility to perform all the duties set forth in the Current Approved State Buildings Codes and other applicable codes and standards indicated in the "Applicable Codes and Standards" Article of this Section.

D. Permits: Obtain a separate permit for each Project from the Office of the CBO prior to erecting, constructing, enlarging, repairing, moving, removing, converting or demolishing any building or portion thereof. Coordinate and obtain all permits through the University Project Manager. The Contractor is not responsible for costs associated with construction permits.

1. Exempt work: A building permit is not required for the following:

a. Fences less than or equal to 6 feet tall.
b. Movable casework, counters and partitions not over 5 feet 9 inches tall with no electrical or plumbing.
c. Platforms, walks, and driveways not more than 30 inches above grade and not over any basement or story below.
d. Painting, papering and similar finish work.
e. Other work of limited scope at the discretion of the CBO.

E. Permit Issuance: The CBO, or at the discretion of the CBO a third party code consultant, will review application, Drawings, Specifications, computations and other data filed for permit. Complete the permit application with the University Project Manager. Permits require submittal of two (2) stamped, signed sets of Construction Documents, including Drawings, Specifications and all Addenda, and one (1) set of each engineering discipline's calculations, where such calculations are required. If CBO determines that submittal conforms to the requirements of the Building Code and other applicable codes, standards, laws, regulations and ordinances, an inspection record card will be issued with the building permit. Keep one stamped set of documents on site. The University will keep one stamped set in the Campus Support plan room.

F. Suspension or Revocation of Permit: CBO may, in writing, suspend or revoke a permit issued in error or on the basis of submitted information that is incorrect or that is in violation of the Building Code and other applicable codes and standards.

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

H. Inspection Record Card: Post the Inspection Record Card next to the permit in a visible and protected location near the access to the project. CBO will make required entries based on inspection of the work.

I. Inspection Requests:

1. Notify CBO that work is ready for inspection two business days before such inspection is desired by telephoning the number posted on the permit. The CBO retains the right to require requests in writing.
2. A re-inspection fee may be charged for prior rejected items.

J. Construction Inspections:

1. Contractor is not responsible for costs associated with construction inspections, except re-inspections. The CBO or his/her designee will perform all general building, electrical and plumbing inspections. All construction or work for which a permit is required must remain accessible and exposed for inspection purposes. Provide access to and means for inspection of work.
2. Site Utilities: Contact and comply with all requirements of City of Aurora.
3. Plumbing and Electrical Inspections: For new buildings and major additions, contact and comply with all requirements of State of Colorado Plumbing and Electrical Boards.
4. Provisions for structural and other special inspections required by Contract Documents, current approved State Building Codes and University Codes will be provided by the University.

K. Certification of Occupancy:

1. When CBO inspects the project and finds no violations of any provision of the Building Code, other applicable codes, standards, laws, regulations and ordinances, CBO will issue a Certification of Occupancy (CO) which will contain the following:

    a. Building permit number.
    b. Address of building.
    c. Name and address of Owner.
    d. Description of building or portion thereof for which certification is issued.
    e. Statement that described building or portion thereof has been inspected for compliance with the requirements of the Building Code, other applicable codes, standards, laws, regulations and ordinances, as relates to type of occupancy and use for which the building is intended.

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

1.4 APPLICABLE CODES AND STANDARDS

A. The following approved building codes and standards have been adopted by State Buildings Programs (SBP) as the minimum requirements to be applied to all state-owned buildings and physical facilities including capital construction and controlled maintenance construction projects. Current applicable codes can be obtained from The Office of the State Architect's website.

B. University of Colorado Denver Codes and Standards: The following codes and standards supplement those indicated on the Office of the State Architect website.

1. The Manual of Guidelines and Standards for Construction Projects.

    a. http://ucdenver.edu/about/departments/FacilitiesManagement/FacilitiesProjects/Pages/GuidelinesStandards.aspx

2. Colorado Rules and Regulations pertaining to Radiation Control, 6 CCR 1007 Part 1-20.
3. Colorado Rules and Regulations pertaining Air Quality Control Commission Regulations, 5 CCR 1001-10, Part B "Asbestos Control."
4. Colorado Rules and Regulations pertaining to Solid Waste, 6 CCR 1007-2.
5. Colorado Rules and Regulations pertaining to Hazardous Waste, 6 CCR 1007-3.
6. Federal Hazardous Waste Regulations, 40 CFR, Parts 260 through 264.
7. Federal Clean Water Act (CWA) is 33 U.S.C § 1251 et seq. (1972).
8. University of Colorado Denver | Anschutz Medical Campus, Asbestos Contaminated Soil Management, Standard Operating Procedure (SOP) Document.
9. NFPA 30: Flammable and Combustible Liquids Code.
10. NFPA 45: Standard on Fire Protection for Laboratories Using Chemicals.
11. NFPA 72: National Fire Alarm and Signaling Code.
12. Life Safety Code (NFPA 101) – latest edition.

    a. Use the most restrictive interpretation where NFPA 101 conflicts with the IBC requirements.

13. ANSI/AIHA Z9.5 Laboratory Ventilation – latest edition.

    a. http://www.aiha.org/insideaiha/standards/Pages/ANSIZ9.aspx

14. ANSI/AIHA Z9.6 Exhaust Systems for Grinding, Buffing and Polishing – latest edition.

    a. http://www.aiha.org/insideaiha/standards/Pages/ANSIZ9.aspx

15. ANSI/AIHA Z9.10 Fundamentals Governing the Design and Operation of Dilution Ventilation Systems in Industrial Occupancies – latest edition.

    a. http://www.aiha.org/insideaiha/standards/Pages/ANSIZ9.aspx

16. ANSI/ASHRAE/ASHE Standard 170 – Ventilation of Healthcare Facilities – latest edition.
17. ASHRAE 62.1 – Ventilation for Acceptable Indoor Air Quality.
18. OSHA "Safety and Health Regulation for Construction" (29 CFR 1926).
19. OSHA "Occupational Safety and Health Standards" (29 CRF 1910).
20. American Institute of Architects, Academy of Architecture for Health (AIA AAHA) and Facility Guidelines Institute (FGI), Guidelines for Design and Construction of Hospital and Healthcare Facilities – latest edition (FOR PATIENT CARE AREAS ONLY).
21. CDC-NIH Biosafety in Microbiological and Biomedical Laboratories (BMBL); latest edition.
22. NIH Design Requirements Manual (DRM) – latest edition.

    a. http://orf.nih.gov/PoliciesAndGuidelines/BiomedicalandAnimalResearchFacilitiesDesignPoliciesandGuidelines/DesignRequirementsManualPDF.htm

23. NIH Guidelines for Research Involving Recombinant DNA Molecules – latest edition.
24. ILAR Guide for Care and Use of Laboratory Animals - latest edition.
25. National Research Council of the National Academies, Institute for Laboratory Animal Research, Division on Earth and Life Studies: Guide for the Care and Use of Laboratory Animals - latest edition.
26. Uniform Federal Accessibility Standards (UFAS) – latest edition.
27. Metro Wastewater District's Rules and Regulations, (Sections 6.17, 6.13, 6.14 and 6.18).

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 www.aabc.com	(202) 737-0202
AAMA	American Architectural Manufacturers Association www.aamanet.org	(847) 303-5664
AASHTO	American Association of State Highway and Transportation Officials www.transportation.org	(202) 624-5800
AATCC	American Association of Textile Chemists and Colorists www.aatcc.org	(919) 549-8141
ABMA	American Bearing Manufacturers Association www.americanbearings.org	(202) 367-1155

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

API	American Petroleum Institute www.api.org	(202) 682-8000
ARI	Air-Conditioning & Refrigeration Institute (See AHRI)	
ARI	American Refrigeration Institute (See AHRI)	
ARMA	Asphalt Roofing Manufacturers Association www.asphaltroofing.org	(202) 207-0917
ASCE	American Society of Civil Engineers www.asce.org	(800) 548-2723 (703) 295-6300
ASCE/SEI	American Society of Civil Engineers/Structural Engineering Institute (See ASCE)	
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers www.ashrae.org	(800) 527-4723 (404) 636-8400
ASME	ASME International (American Society of Mechanical Engineers) www.asme.org	(800) 843-2763 (973) 882-1170
ASSE	American Society of Safety Engineers (The) www.asse.org	(847) 699-2929
ASSE	American Society of Sanitary Engineering www.asse-plumbing.org	(440) 835-3040
ASTM	ASTM International (American Society for Testing and Materials International) www.astm.org	(610) 832-9500
ATIS	Alliance for Telecommunications Industry Solutions www.atis.org	(202) 628-6380
AWEA	American Wind Energy Association www.awea.org	(202) 383-2500
AWI	Architectural Woodwork Institute www.awinet.org	(571) 323-3636
AWMAC	Architectural Woodwork Manufacturers Association of Canada www.awmac.com	(403) 453-7387
AWPA	American Wood Protection Association (Formerly: American Wood-Preservers' Association)	(205) 733-4077

	www.awpa.com	
AWS	American Welding Society www.aws.org	(800) 443-9353 (305) 443-9353
AWWA	American Water Works Association www.awwa.org	(800) 926-7337 (303) 794-7711
BHMA	Builders Hardware Manufacturers Association www.buildershardware.com	(212) 297-2122
BIA	Brick Industry Association (The) www.gobrick.com	(703) 620-0010
BICSI	BICSI, Inc. www.bicsi.org	(800) 242-7405 (813) 979-1991
BIFMA	BIFMA International (Business and Institutional Furniture Manufacturer's Association) www.bifma.com	(616) 285-3963
BISSC	Baking Industry Sanitation Standards Committee www.bissc.org	(866) 342-4772
BOCA	BOCA (Building Officials and Code Administrators International Inc.) (See ICC)	
BWF	Badminton World Federation (Formerly: International Badminton Federation) www.bwfbadminton.org	60 3 9283 7155
CDA	Copper Development Association www.copper.org	(800) 232-3282 (212) 251-7200
CEA	Canadian Electricity Association www.electricity.ca	(613) 230-9263
CEA	Consumer Electronics Association www.ce.org	(866) 858-1555 (703) 907-7600
CFFA	Chemical Fabrics & Film Association, Inc. www.chemicalfabricsandfilm.com	(216) 241-7333
CFSEI	Cold-Formed Steel Engineers Institute www.cfsei.org	(866) 465-4732 (202) 263-4488
CGA	Compressed Gas Association www.cganet.com	(703) 788-2700
CIMA	Cellulose Insulation Manufacturers Association	(888) 881-2462

	www.cellulose.org	(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.coolroofs.org	(866) 465-2523 (510) 485-7175
CRSI	Concrete Reinforcing Steel Institute www.crsi.org	(800) 328-6306 (847) 517-1200
CSA	Canadian Standards Association www.csa.ca	(800) 463-6727 (416) 747-4000
CSA	CSA International (Formerly: IAS - International Approval Services) www.csa-international.org	(866) 797-4272 (416) 747-4000
CSI	Construction Specifications Institute (The) www.csinet.org	(800) 689-2900 (703) 684-0300
CSSB	Cedar Shake & Shingle Bureau www.cedarbureau.org	(604) 820-7700
CTI	Cooling Technology Institute (Formerly: Cooling Tower Institute) www.cti.org	(281) 583-4087
CWC	Composite Wood Council (See CPA)	
DASMA	Door and Access Systems Manufacturers Association www.dasma.com	(216) 241-7333
DHI	Door and Hardware Institute www.dhi.org	(703) 222-2010
ECA	Electronic Components Association www.ec-central.org	(703) 907-8024

ECAMA	Electronic Components Assemblies & Materials Association (See ECA)	
EIA	Electronic Industries Alliance (See TIA)	
EIMA	EIFS Industry Members Association www.eima.com	(800) 294-3462 (703) 538-1616
EJMA	Expansion Joint Manufacturers Association, Inc. www.ejma.org	(914) 332-0040
ESD	ESD Association (Electrostatic Discharge Association) www.esda.org	(315) 339-6937
ESTA	Entertainment Services and Technology Association (See PLASA)	
EVO	Efficiency Valuation Organization www.evo-world.org	(415) 367-3643 44 20 88 167 857
FIBA	Fédération Internationale de Basketball (The International Basketball Federation) www.fiba.com	41 22 545 00 00
FIVB	Fédération Internationale de Volleyball (The International Volleyball Federation) www.fivb.org	41 21 345 35 45
FM Approvals	FM Approvals LLC www.fmglobal.com	(781) 762-4300
FM Global	FM Global (Formerly: FMG - FM Global) www.fmglobal.com	(401) 275-3000
FRSA	Florida Roofing, Sheet Metal & Air Conditioning Contractors Association, Inc. www.floridaroof.com	(407) 671-3772
FSA	Fluid Sealing Association www.fluidsealing.com	(610) 971-4850
FSC	Forest Stewardship Council U.S. www.fscus.org	(612) 353-4511
GA	Gypsum Association www.gypsum.org	(301) 277-8686

GANA	Glass Association of North America www.glasswebsite.com	(785) 271-0208
GS	Green Seal www.greenseal.org	(202) 872-6400
HI	Hydraulic Institute www.pumps.org	(973) 267-9700
HI/GAMA	Hydronics Institute/Gas Appliance Manufacturers Association (See AHRI)	
HMMA	Hollow Metal Manufacturers Association (See NAAMM)	
HPVA	Hardwood Plywood & Veneer Association www.hpva.org	(703) 435-2900
HPW	B. P. White Laboratory, Inc. www.hpwhite.com	(410) 838-6550
IAPSC	International Association of Professional Security Consultants www.iapsc.org	(415) 536-0288
IAS	International Approval Services (See CSA)	
ICBO	International Conference of Building Officials (See ICC)	
ICC	International Code Council www.iccsafe.org	(888) 422-7233 (202) 370-1800
ICEA	Insulated Cable Engineers Association, Inc. www.icea.net	(770) 830-0369
ICPA	International Cast Polymer Alliance www.icpa-hq.org	(703) 525-0511
ICRI	International Concrete Repair Institute, Inc. www.icri.org	(847) 827-0830
IEC	International Electrotechnical Commission www.iec.ch	41 22 919 02 11
IEEE	Institute of Electrical and Electronics Engineers, Inc. (The) www.ieee.org	(212) 419-7900
IES	Illuminating Engineering Society (Formerly: Illuminating Engineering Society of North America)	(212) 248-5000

	www.ies.org	
IESNA	Illuminating Engineering Society of North America (See IES)	
IEST	Institute of Environmental Sciences and Technology www.iest.org	(847) 981-0100
IGMA	Insulating Glass Manufacturers Alliance www.igmaonline.org	(613) 233-1510
IGSHPA	International Ground Source Heat Pump Association www.igshpa.okstate.edu	(405) 744-5175
ILI	Indiana Limestone Institute of America, Inc. www.iliai.com	(812) 275-4426
Intertek	Intertek Group (Formerly: ETL SEMCO; Intertek Testing Service NA) www.intertek.com	(800) 967-5352
ISA	International Society of Automation (The) (Formerly: Instrumentation, Systems, and Automation Society) www.isa.org	(919) 549-8411
ISAS	Instrumentation, Systems, and Automation Society (The) (See ISA)	
ISFA	International Surface Fabricators Association (Formerly: International Solid Surface Fabricators Association) www.isfanow.org	(877) 464-7732 (801) 341-7360
ISO	International Organization for Standardization www.iso.org	41 22 749 01 11
ISSFA	International Solid Surface Fabricators Association (See ISFA)	
ITU	International Telecommunication Union www.itu.int/home	41 22 730 51 11
KCMA	Kitchen Cabinet Manufacturers Association www.kcma.org	(703) 264-1690
LMA	Laminating Materials Association (See CPA)	
LPI	Lightning Protection Institute www.lightning.org	(800) 488-6864
MBMA	Metal Building Manufacturers Association	(216) 241-7333

	www.mbma.com	
MCA	Metal Construction Association www.metalconstruction.org	(847) 375-4718
MFMA	Maple Flooring Manufacturers Association, Inc. www.maplefloor.org	(888) 480-9138
MFMA	Metal Framing Manufacturers Association, Inc. www.metalframingmfg.org	(312) 644-6610
MHIA	Material Handling Industry of America www.mhia.org	(800) 345-1815 (704) 676-1190
MIA	Marble Institute of America www.marble-institute.com	(440) 250-9222
MMPA	Moulding & Millwork Producers Association (Formerly: Wood Moulding & Millwork Producers Association) www.wmmpa.com	(800) 550-7889 (530) 661-9591
MPI	Master Painters Institute www.paintinfo.com	(888) 674-8937 (604) 298-7578
MSS	Manufacturers Standardization Society of The Valve and Fittings Industry Inc. www.mss-hq.org	(703) 281-6613
NAAMM	National Association of Architectural Metal Manufacturers www.naamm.org	(630) 942-6591
NACE	NACE International (National Association of Corrosion Engineers International) www.nace.org	(800) 797-6223 (281) 228-6200
NADCA	National Air Duct Cleaners Association www.nadca.com	(202) 737-2926
NAIMA	North American Insulation Manufacturers Association www.naima.org	(703) 684-0084
NBGQA	National Building Granite Quarries Association, Inc. www.nbgqa.com	(800) 557-2848
NCAA	National Collegiate Athletic Association (The) www.ncaa.org	(317) 917-6222
NCMA	National Concrete Masonry Association www.ncma.org	(703) 713-1900
NEBB	National Environmental Balancing Bureau	(301) 977-3698

	www.nebb.org	
NECA	National Electrical Contractors Association www.necanet.org	(301) 657-3110
NeLMA	Northeastern Lumber Manufacturers Association www.nelma.org	(207) 829-6901
NEMA	National Electrical Manufacturers Association www.nema.org	(703) 841-3200
NETA	InterNational Electrical Testing Association www.netaworld.org	(888) 300-6382 (269) 488-6382
NFHS	National Federation of State High School Associations www.nfhs.org	(317) 972-6900
NFPA	NFPA (National Fire Protection Association) www.nfpa.org	(800) 344-3555 (617) 770-3000
NFPA	NFPA International (See NFPA)	
NFRC	National Fenestration Rating Council www.nfrc.org	(301) 589-1776
NHLA	National Hardwood Lumber Association www.nhla.com	(800) 933-0318 (901) 377-1818
NLGA	National Lumber Grades Authority www.nlga.org	(604) 524-2393
NOFMA	National Oak Flooring Manufacturers Association (See NWFA)	
NOMMA	National Ornamental & Miscellaneous Metals Association www.nomma.org	(888) 516-8585
NRCA	National Roofing Contractors Association www.nrca.net	(800) 323-9545 (847) 299-9070
NRMCA	National Ready Mixed Concrete Association www.nrmca.org	(888) 846-7622 (301) 587-1400
NSF	NSF International (National Sanitation Foundation International) www.nsf.org	(800) 673-6275 (734) 769-8010
NSPE	National Society of Professional Engineers www.nspe.org	(703) 684-2800

NSSGA	National Stone, Sand & Gravel Association www.nssga.org	(800) 342-1415 (703) 525-8788
NTMA	National Terrazzo & Mosaic Association, Inc. (The) www.ntma.com	(800) 323-9736
NWFA	National Wood Flooring Association www.nwfa.org	(800) 422-4556 (636) 519-9663
PCI	Precast/Prestressed Concrete Institute www.pci.org	(312) 786-0300
PDI	Plumbing & Drainage Institute www.pdionline.org	(800) 589-8956 (978) 557-0720
PLASA	PLASA (Formerly: ESTA - Entertainment Services and Technology Association) www.plasa.org	(212) 244-1505
RCSC	Research Council on Structural Connections www.boltcouncil.org	
RFCI	Resilient Floor Covering Institute www.rfci.com	(706) 882-3833
RIS	Redwood Inspection Service www.redwoodinspection.com	(925) 935-1499
SAE	SAE International (Society of Automotive Engineers) www.sae.org	(877) 606-7323 (724) 776-4841
SBCCI	Southern Building Code Congress International, Inc. (See ICC)	
SCTE	Society of Cable Telecommunications Engineers www.scte.org	(800) 542-5040 (610) 363-6888
SDI	Steel Deck Institute www.sdi.org	(847) 458-4647
SDI	Steel Door Institute www.steeldoor.org	(440) 899-0010
SEFA	Scientific Equipment and Furniture Association www.sefalabs.com	(877) 294-5424 (516) 294-5424
SEI/ASCE	Structural Engineering Institute/American Society of Civil Engineers (See ASCE)	

SIA	Security Industry Association www.siaonline.org	(866) 817-8888 (703) 683-2075
SJI	Steel Joist Institute www.steeljoist.org	(843) 293-1995
SMA	Screen Manufacturers Association www.smainfo.org	(773) 636-0672
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association www.smacna.org	(703) 803-2980
SMPTE	Society of Motion Picture and Television Engineers www.smpte.org	(914) 761-1100
SPFA	Spray Polyurethane Foam Alliance www.sprayfoam.org	(800) 523-6154
SPIB	Southern Pine Inspection Bureau www.spib.org	(850) 434-2611
SPRI	Single Ply Roofing Industry www.spri.org	(781) 647-7026
SRCC	Solar Rating and Certification Corporation www.solar-rating.org	(321) 638-1537
SSINA	Specialty Steel Industry of North America www.ssina.com	(800) 982-0355 (202) 342-8630
SSPC	SSPC: The Society for Protective Coatings www.sspc.org	(877) 281-7772 (412) 281-2331
STI	Steel Tank Institute www.steeltank.com	(847) 438-8265
SWI	Steel Window Institute www.steelwindows.com	(216) 241-7333
SWPA	Submersible Wastewater Pump Association www.swpa.org	(847) 681-1868
TCA	Tilt-Up Concrete Association www.tilt-up.org	(319) 895-6911
TCNA	Tile Council of North America, Inc. (Formerly: Tile Council of America) www.tileusa.com	(864) 646-8453
TEMA	Tubular Exchanger Manufacturers Association, Inc.	(914) 332-0040

	www.tema.org	
TIA	Telecommunications Industry Association (Formerly: TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance) www.tiaonline.org	(703) 907-7700
TIA/EIA	Telecommunications Industry Association/Electronic Industries Alliance (See TIA)	
TMS	The Masonry Society www.masonrysociety.org	(303) 939-9700
TPI	Truss Plate Institute www.tpinst.org	(703) 683-1010
TPI	Turfgrass Producers International www.turfgrasssod.org	(800) 405-8873 (847) 649-5555
TRI	Tile Roofing Institute www.tileroofing.org	(312) 670-4177
UBC	Uniform Building Code (See ICC)	
UL	Underwriters Laboratories Inc. www.ul.com	(877) 854-3577
UNI	Uni-Bell PVC Pipe Association www.uni-bell.org	(972) 243-3902
USAV	USA Volleyball www.usavolleyball.org	(888) 786-5539 (719) 228-6800
USGBC	U.S. Green Building Council www.usgbc.org	(800) 795-1747
USITT	United States Institute for Theatre Technology, Inc. www.usitt.org	(800) 938-7488 (315) 463-6463
WASTEC	Waste Equipment Technology Association www.wastec.org	(800) 424-2869 (202) 244-4700
WCLIB	West Coast Lumber Inspection Bureau www.wclib.org	(800) 283-1486 (503) 639-0651
WCMA	Window Covering Manufacturers Association www.wcmanet.org	(212) 297-2122
WDMA	Window & Door Manufacturers Association	(800) 223-2301

	www.wdma.com	(312) 321-6802
WI	Woodwork Institute (Formerly: WIC - Woodwork Institute of California) www.wicnet.org	(916) 372-9943
WMMPA	Wood Moulding & Millwork Producers Association (See MMPA)	
WSRCA	Western States Roofing Contractors Association www.wsrca.com	(800) 725-0333 (650) 938-5441
WWPA	Western Wood Products Association www.wwpa.org	(503) 224-3930

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

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

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

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

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

E. 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.

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

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 42 00

SECTION 01 50 00

TEMPORARY FACILITIES AND CONTROLS

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 temporary utilities, support facilities, and security and protection facilities.

1. Nothing in this Section is intended to limit types and amounts of temporary work required, and no omission from this Section will be recognized as an indication by Architect/Engineer that such temporary activity is not required for successful completion of the Work. The use of alternative facilities equivalent to those specified is the Contractor's option, subject to Architect/Engineer's and University acceptance.

B. Related Requirements:

1. Section 01 10 00 "Summary" for work restrictions and limitations on utility interruptions.
2. Section 01 35 46 "Indoor Air Quality Procedures" for temporary facility work including HVAC, air filtration, moisture management, air filtration and dust control partitions required to comply with indoor air quality requirements during construction.

1.3 USE CHARGES

A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities to use temporary services and facilities without cost, including, but not limited to, University's construction forces, Architect/Engineer, testing agencies, and authorities having jurisdiction.

B. Use Charges: As follows:

1. For renovations of existing facilities: Arrange for and University will pay for all use charges.

1.4 INFORMATIONAL SUBMITTALS

A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.

B. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire-prevention program.

C. Dust- and HVAC-Control Plan: Submit coordination drawing and narrative that indicates the dust- and HVAC-control measures proposed for use, proposed locations, and proposed time frame for their operation. Identify further options if proposed measures are later determined to be inadequate. Include the following:

1. Locations of dust-control partitions at each phase of work.
2. HVAC system isolation schematic drawing.
3. Location of proposed air-filtration system discharge.
4. Waste handling procedures.
5. Other dust-control measures.

D. Photographs: Submit the following to University Project Manager and Architect:

1. Photos of existing elevator(s) assigned for temporary use, in JPG digital format, prior to installing elevator protectives.
2. Photos of existing stairs assigned for temporary use, in JPG digital format, prior to installing stair protectives.
3. Photos of existing toilet room facilities assiged for temporary use, in JPG digital format, prior to commencement of contruction operations.

1.5 QUALITY ASSURANCE

A. General: Comply with governing regulations and utility company regulations and recommendations for the construction of temporary facilities including, but not necessarily limited to, code compliances, permits, inspections, testing, health, safety, pollution and environmental compliances.

B. Fire-safety: Comply with NFPA 421 "Standard for Safeguarding Construction, Alteration, and Demolition Operations."

C. Safety: Comply with ANSI/ASSE A10 "Construction Package" series of safety construction standards.

D. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

E. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

F. Accessible Temporary Egress: Where temporary accessible egress from existing buildings or portions thereof is provided, comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.

1.6 PROJECT CONDITIONS

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

B. Conditions of Use: Keep temporary services and facilities clean and neat in appearance. Operate in a safe and efficient manner. Take necessary fire prevention measures. Do not overload facilities, or permit them to interfere with progress. Do not allow hazardous, dangerous or unsanitary conditions, or public nuisances to develop or persist on the site.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Provide both new or used materials and equipment for temporary facilities, which are in substantially undamaged and serviceable condition. Provide types and qualities which are recognized in the construction industry as suitable for the intended use in each application. Comply with Utility Company requirements as applicable.

2.2 TEMPORARY FACILITIES

A. Field Offices, General: Locate field office(s) in room(s) located in area of Work. Location shall be approved by Owner's Project Manager.

B. Common-Use Field Office: Of sufficient size to accommodate needs of construction personnel office activities. Keep office clean and orderly. Conference room for Owner/Architect/Engineer/Contractor meetings will be provided by Owner.

1. At a minimum, furnish and equip office(s) as follows:

a. Furniture required for Project-site documents including file cabinets, plan tables, plan racks, and bookcases.
b. Coffee machine and supplies.

C. Storage and Fabrication Sheds: Will not be allowed on Site.

2.3 EQUIPMENT

A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

B. Air-Filtration Units: Primary and secondary HEPA-filter-equipped portable units with four-stage filtration. Provide single switch for emergency shutoff. Configure to run continuously.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate, expand and modify facilities as required by progress of the Work.

B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

C. Use qualified workers for the installation of temporary facilities.

3.2 TEMPORARY UTILITY INSTALLATION

A. General: Install temporary service or connect to existing service.

1. Arrange with utility company, University, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services. Comply with requirements in Section 01 10 00 "Summary" for existing utility disruption procedures.

B. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction. Where available, connect to University's existing water service facilities. Clean and maintain water service facilities in a condition acceptable to University. At Substantial Completion, restore these facilities to condition existing before initial use.

C. Sanitary Facilities:

1. Use of Owner's existing toilet facilities will be permitted, as long as facilities are monitored, cleaned, and maintained, not less than daily, in a condition acceptable to University's Project Manager. At Substantial Completion, restore these facilities to condition existing before initial use.
2. Take digital photographs of exposed surfaces of toilet facilities walls, floors and ceilings; and fixtures and accessories. Submit photos in JPG format to University's Project Manager and Architect prior to commencement of construction operations.

D. Heating: Provide temporary heating required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.

E. Isolation of Work Areas in Occupied Facilities: Prevent dust, fumes, and odors from entering occupied areas.

1. Prior to commencing work, isolate the HVAC system in area where work is to be performed.

a. Disconnect supply and return ductwork in work area from HVAC systems servicing occupied areas.
b. Maintain negative air pressure within work area using HEPA-equipped air-filtration units, starting with commencement of temporary partition construction, and continuing until removal of temporary partitions is complete.

2. Maintain dust partitions during the Work. Use vacuum collection attachments on dust-producing equipment. Isolate limited work within occupied areas using portable dust-containment devices.
3. Perform daily construction cleanup and final cleanup using approved, HEPA-filter-equipped vacuum equipment.

F. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.

1. Provide dehumidification systems when required to reduce substrate moisture levels to level required to allow installation or application of finishes.

G. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.

1. Provide temporary light to levels and as required by governing regulations but not less than minimum 5 foot-candle illumination in all areas accessible to workers during hours they are at the job; minimum 10 foot-candles for shop areas; 20 foot-candles or more where detailed or finishing work is being done, supplemented as may be required.
2. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
3. Where permanent light fixtures have been used for temporary lighting, supply temporary lamps and replace with new lamps at time of Completion.
4. Provide lighting in stairways and exits at all times.

H. Data Service: Provide temporary data service line in Contractor's field office. Coordinate installation with University Information Services (I/S) Department who will provide and maintain service until notified by Contractor to terminate and remove instruments and lines.

3.3 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:

1. Maintain support facilities until Architect/Engineer schedules Substantial Completion inspection. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to University.

B. Traffic Controls: Comply with requirements of authorities having jurisdiction.

1. Protect existing site improvements to remain including curbs, pavement, and utilities.
2. Maintain access for fire-fighting equipment and access to fire hydrants.

C. Parking: Comply with requirements in Section 01 10 00 "Summary."

D. Project Signs: Provide Project signs at locations indicated or directed. Unauthorized signs are not permitted.

1. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.

a. Provide temporary, directional signs for construction personnel and visitors. Locations include, but are not limited to, the following:

1) Elevators and lobbies.
2) Inside stairwells.

2. Engage an experience sign painter to apply required colors and graphics in a neat and professional manner.
3. Maintain and touchup signs so they are legible at all times.

E. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with progress cleaning requirements in Section 01 73 00 "Execution."

1. Coordinate with University Project Manager to obtain approval from University Environmental Services Manager.
2. Provide waste chutes as required in accordance with applicable laws and regulations.

F. Existing Elevator Use: When approved by University, one designated existing elevator may be used at no charge to Contractor or other subcontractors for transporting personnel, small tools, materials, and equipment. Comply with requirements of Section 01 10 00 "Summary" and the following:

1. Take digital photographs of exposed surfaces of elevator cab wall, floor and ceiling; hoistway doors, frames, and sills; and hall fixtures. Submit photos in JPG format to University Project Manager and Architect prior to installing elevator protectives.
2. Contractor will not be granted exclusive use of the designated elevator. University personnel and staff will be permitted to use this elevator as their work duties require.
3. Entire car is lined (floor, walls, ceiling) with 3/4 inch Fir plywood or equivalent.
4. Total load carried does not exceed rated capacity of elevator.
5. No materials, equipment, trash, tools or other items too large to be readily moved into and out of the car may be carried in the elevator.
6. Before acceptance of the building, linings are removed; all exposed surfaces are in same or better condition than prior to use; all controls, relays, other parts showing any wear have been replaced.
7. Entire elevator, including machinery, electrical components, doors, operators and controls shall be tested, adjusted, and put in same or better condition than prior to use with no diminution of University's existing warranties and maintenance aggreements; to take effect at date of Completion Certificate.
8. Written clearance has been obtained from the Elevator Service Company stating that the installation is safe and complete for this use prior to using it.
9. The Contractor signs the Elevator Service Company's standard agreement and release forms for this usage and pays charges for maintenance, service, repairs, and reconditioning.

G. Existing Stair Usage: Use of University's existing stairs will be permitted, provided stairs are cleaned and maintained in a condition acceptable to University. At Substantial Completion, restore stairs to condition existing before initial use.

1. Take digital photographs of exposed surfaces of stairs railings and enclosure. Submit photos in JPG format to University Project Manager and Architect prior to installing stair protectives.
2. Provide protective coverings, barriers, devices, signs, or other procedures to protect stairs and to maintain means of egress. If stairs become damaged, restore damaged areas so no evidence remains of correction work.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.

B. Protection of Work: Protect in-progress and completed work from damage or deterioration, other than normal weathering of exposed materials, through construction duration until completion, as appropriate and as recommended by manufacturer and Installer.

1. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings. Protect finished floors and stairs from traffic, movement of heavy objects, and storage.
2. Prohibit traffic and storage on lawn and landscaped areas.

3. Remove protective coverings and materials at the appropriate time but no later than final cleaning operations.

C. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

1. Comply with work restrictions specified in Section 01 10 00 "Summary."

D. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at Substantial Completion. Perform control operations lawfully, using environmentally safe materials.

E. Security: Provide security program and facilities to protect the Work, existing facilities, and University operations and to prevent unauthorized entrance, vandalism, theft, and similar violations of security.

1. Coordinate with University Police.
2. Provide lockable entrances and lock entrances at end of each work day.
3. After review and approval by University, install temporary enclosure around partially completed areas of construction.
4. Storage: Where materials and equipment must be stored, and are of value or attractive for theft, provide a secure lockup. Enforce discipline in connection with the installation and release of material to minimize the opportunity for theft and vandalism.

F. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting wherever required to prevent accidents and losses.

G. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.

H. Temporary Partitions: Provide floor-to-floor or floor-to-ceiling dustproof partitions terminating in dustproof floor or ceiling above to limit dust and dirt migration and to separate existing active elevator hoistways and other areas occupied by University from dust, fumes and noise in compliance with Section 01 35 46 "Indoor Air Quality" and the following:

1. Construct dustproof partitions with 5/8 inch gypsum wallboard with joints taped on occupied side, and 1/2 inch fire-retardant-treated plywood on construction operations side.
2. Where fire-resistance-rated temporary partitions are indicated or are required by authorities having jurisdiction, construct partitions according to the rated assemblies.
3. Insulate partitions to control noise transmission to occupied areas.
4. Seal joints and perimeter. Equip partitions with gasketed dustproof doors and security locks where openings are required.
5. Protect air-handling equipment.
6. Provide walk-off mats at each entrance through temporary partition.
7. At elevator hoistway entrances not used during construction, seal openings with plastic sheet and duct tape.

I. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire-prevention program.

1. Fire Extinguishers: Minimum one per floor at or near useable exit.

a. Provide additional extinguishers where convenient and effective for intended purpose.
b. Comply with NFPA 10 to the extent applicable.

2. Strictly enforce site prohibition against smoking.
3. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
4. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Coordinate with University Project Manager to review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
5. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.
6. Maintain unobstructed access to fire extinguishers, temporary fire protection facilities, stairways and other access routes for fighting fires.
7. Store combustible materials in containers in fire-safe locations.
8. Permanent Fire Protection System: Complete and make operational at earliest possible date. Instruct site personnel on use of permanent system.

3.5 MOISTURE AND MOLD CONTROL

A. Contractor's Moisture-Protection Plan: Comply with requirements in Section 01 35 46 "Indoor Air Quality Procedures."

3.6 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

1. Do not permit temporary offices and similar temporary or permanent spaces to be used as living quarters or for other unintended occupancies or uses.

B. Maintenance: Maintain facilities in good operating condition until removal.

1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.

C. Janitorial Services: Provide daily janitorial services for temporary offices, toilets, and similar areas at the project site. Require users of other temporary facilities to maintain clean and orderly premises.

D. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.

E. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion, unless Architect/Engineer requests that it be retained for a longer period of time. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are property of Contractor. University reserves right to take possession of Project identification signs.
2. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 01 77 00 "Closeout Procedures."

END OF SECTION 01 50 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. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.

1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.

3. See other Sections for specific content requirements and particular requirements for submitting special warranties.

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

D. Warranty Requirements:

1. Related Damages and Losses: When correcting warranted Work that has failed, remove and replace other Work that has been damaged as a result of such failure or that must be removed and replaced to provide access for correction of warranted Work.
2. Reinstatement of Warranty: When Work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.
3. Replacement Cost: Upon determination that Work covered by a warranty has failed, replace or rebuild the Work to an acceptable condition complying with requirements of Contract Documents. The Contractor is responsible for the cost of replacing or rebuilding defective Work regardless of whether the University has benefited from use of the Work through a portion of its anticipated useful service life.
4. University's Recourse:

a. Written warranties made to the University are in addition to implied warranties, and shall not limit the duties, obligations, rights and remedies otherwise available under the law, nor shall warranty periods be interpreted as limitations on time in which the University can enforce such other duties, obligations, rights, or remedies.
b. Rejection of Warranties: The University reserves the right to reject warranties and to limit selections to products with warranties not in conflict with requirements of the Contract Documents.
c. The University reserves the right to refuse to accept Work for the Project where a special warranty, certification, or similar commitment is required on such Work or part of the Work, until evidence is presented that entities required to countersign such commitments are willing to do so.

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

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

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

6. Or Equal: For products specified by name and accompanied by the term "or equal," or "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product and provide only products previously approved during bid phase by written Addendum. The determination of equivalence is at the sole discretion of the Architect/Engineer who has no obligation to prove non-equivalence.
7. Mechanical and electrical equipment design and their space requirements are based on the first named item of the Section in which specified or that scheduled on the Drawings. If other than the first named or scheduled item listed for use is selected, modification to other elements of Work may be required. Show all such modification on shop drawings and submittals as appropriate. The cost of such modifications is solely the responsibility of the Contractor.
8. Where manufacturers are listed as acceptable for specific proprietary products but precise identification by model, series, or trade name is not specified, submit detailed product information for such products for Architect/Engineer's acceptance prior to ordering. Include specific requirements for modifications to other construction, including but not limited to, power and utility requirements, characteristics, capacities, size and locations. The cost of such modifications is solely the responsibility of the Contractor.

B. Product Selection Procedures:

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

    a. Restricted List: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.

4. Manufacturers:

    a. Restricted List: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.

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

C. Visual Matching Specification: Where Specifications require "match Architect/Engineer's sample", provide a product that complies with requirements and matches Architect/Engineer's sample. Architect/Engineer's decision will be final on whether a proposed product matches.

1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Section 01 25 00 "Substitution Procedures" for proposal of product.

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

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:

1. Construction layout.
2. Field engineering and surveying.
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.
9. Correction of the Work.

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. 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.
e. Visual qualities of sight-exposed elements.
f. Cutting new openings in existing structural concrete walls, floors and suspended slabs.
g. 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. List services and systems that will be relocated and those that will be temporarily out of service. Indicate length of time permanent services and systems will be disrupted.

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. 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.
f. Control systems.
g. Communication systems.
h. Fire-detection and -alarm systems.
i. Conveying systems.
j. Electrical wiring systems.
k. Operating systems of special construction.

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.
c. Sprayed fire-resistive material.
d. Equipment supports.
e. Piping, ductwork, vessels, and equipment.
f. Noise- and vibration-control elements and systems.

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."

B. 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.

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. 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 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. If discrepancies are discovered, notify Architect/Engineer promptly.

3.4 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.
4. Maintain minimum headroom clearance of 96 inches in occupied spaces and 90 inches in unoccupied spaces.

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 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.

3.5 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 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. 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.
5. 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.

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

3.6 UNIVERSITY-INSTALLED PRODUCTS

A. Site Access: Provide access to areas of work 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.

3.7 PROGRESS CLEANING

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

1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
2. Do not hold waste materials more than seven 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 50 00 "Temporary Facilities And Controls."

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.

3.8 STARTING AND ADJUSTING

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

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

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

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

3.9 PROTECTION OF INSTALLED CONSTRUCTION

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

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

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.
9. Chemicals.
10. Light.
11. Radiation.
12. Puncture.
13. Abrasion.

14. Heavy traffic.
15. Soiling, staining and corrosion.
16. Bacteria.
17. Rodent and insect infestation.
18. Combustion.
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.
26. Unprotected storage.
27. Improper shipping or handling.
28. Theft.
29. Vandalism.

END OF SECTION 01 73 00

SECTION 01 73 05

UTILITY INTERRUPTION - MECHANICAL, ELECTRICAL, PLUMBING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements governing the shutdown of mechanical, electrical, and plumbing services for proper notification of all impacted by shutdown.

B. Contractor to complete UTILITY INTERRUPTION/SHUTDOWN REQUEST FORM attached to end of this Section and submit to university project manager; original copy of form available from Owner upon request.

C. Outage requests must be submitted in advance per the time periods identified on attached form.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 COORDINATION

A. University staff will coordinate and announce internally to all impacted areas.

B. Contractor & Subcontractors requesting outages must be present at specified time identified in approved outage request to initiate the start of outage. If contractors are not present, outage may be postponed.

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

END OF SECTION 01 73 05

(see UTILITY INTERRUPTION/SHUTDOWN REQUEST form on next pages)

(see UTILITY INTERRUPTION/SHUTDOWN REQUEST form on next pages)

University of Colorado
Anschutz Medical Campus

Facilities Management

UTILITY INTERRUPTION/ SHUTDOWN REQUEST FORM INSTRUCTIONS

1. Starting on page 2, fill out all necessary information on the Utility Interruption/ Shutdown Request Form.
2. On page 3, fill out all necessary information on the Utility Interruption/ Shutdown Method of Procedure.
3. Utility Interruption/ Shutdown Request Forms can only be submitted to the Outage Coordinator by a University Representative. All others will be returned to sender.
4. Contractors submit your request to your University Project Manager, not the contracts listed below.
   a. Submit the Utility Interruption/ Shutdown Request Form and the Utility Interruption/ Shutdown Method of Procedure to:
   Jesse.Walklett@CUAnschutz.edu
   Cc…
   David.Tilton@CUAnschutz.edu
   Ron.Turner@CUAnschutz.edu
5. Requests for minor outages (determined by severity of impact) must be submitted to the Outage Coordinator seven (7) working days prior to the requested start date.
6. Requests for major outages (determined by severity of impact) must be submitted to the Outage Coordinator thirty (30) working days prior to the scheduled outage.
7. After receiving both the Utility Interruption/ Shutdown Request Form and the Utility Interruption/ Shutdown Method of Procedure, the Outage Coordinator will create an outage file and begin coordinating the request.
8. After the outage has been successfully coordinated, the request will be submitted for approval.
9. After the outage has been approved, the Outage Coordinator will send out the approved outage notice, create a meeting reminder for Facilities Staff, and send out the MOP followed by a Campus Announcement.

When an Outage is requested without the benefit of the minimum advance notice (7 days for a minor outage - 30 days for a major outage), **the Outage Coordinator will request that the Project Manager and Contractor still submit an adequate Method of Procedure (MOP) for the outage**. The requester will be responsible for distributing notices to the occupants of any and all affected area(s). The requester will also distribute a copy of the Outage Posting and a copy of the MOP to the Contractor and/or person performing the outage. The requester will then send, via email, the names of all the people they have distributed notices to, as confirmation to the Outage Coordinator.
ANY AND ALL DISPUTES WITH THE OCCUPANTS OF THE AFFECTED AREA(S) WILL BE RESOLVED BY THE REQUESTER.

In case of an EMERGENCY, contact the CSC at 303-724-1777

University of Colorado
Anschutz Medical Campus

Facilities Management

UTILITY INTERRUPTION/ SHUTDOWN REQUEST FORM

Utility or Service Requesting to be Interrupted or Shutdown	
Affected Areas (Building & Room Numbers)	
Outage Requester (Name & Phone Number)	
Requested Start Time & Start Date	**Time:** **Date:**
Anticipated Finish Time & Finish Date	**Time:** **Date:**
University Project Manager (Name & Phone Number)	
University Back-Up Project Manager (Name & Phone Number)	
Contractor (Name & Phone Number)	
Sub-Contractor (Name & Phone Number)	
Facilities Management Building Representative (Name & Phone Number)	
Maximo Work Order Number or Project Number	
Additional Assistance Required? (Check All Required) *Facilities Maintenance Use Only*	Zone Staff ___ Electrical Staff ___ Plumbing Staff ___ HVAC Staff ___ Shift Staff ___ Other___ (Who?) _____

Completely fill out the Method of Procedure section on page 3.

A missing or incomplete MOP will result in an automatic denial of the outage request.

University of Colorado
Anschutz Medical Campus

Facilities Management

UTILITY INTERRUPTION/ SHUTDOWN METHOD OF PROCEDURE

Clearly list all necessary actions in a step-by-step format that will be required for completion of this request.

Additional Notes:

SECTION 01 73 06

UTILITY INTERRUPTION - FIRE PROTECTION SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements governing the shutdown of fire protection systems for proper notification of all impacted by shutdown.

B. Contractor to complete Fire Protection System Impairment Request Form attached to end of this Section and submit to university project manager; original copy of form available from Owner upon request.

C. Outage requests must be submitted in advance per the time periods identified on attached form.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 COORDINATION

A. University staff will coordinate and announce internally to all impacted areas.

B. Contractor & Subcontractors requesting outages must be present at specified time identified in approved outage request to initiate the start of outage. If contractors are not present, outage may be postponed.

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

END OF SECTION 01 73 06

(see Fire Protection System Impairment Request form on next pages)

(see Fire Protection System Impairment Request form on next pages)

University of Colorado Denver
Fire Protection System Impairment Request Form

(See instructions and additional information on pages 2 & 3)

All impairments, as a result of preplanned or emergency conditions, shall be inspected prior to generating the request to evaluate affected and unaffected areas. CU Project Manager, Fire & Life Safety, or BMO Rep. will submit this form.

IMPAIRMENT LOCATION/CONTACTS:

Project Location: _____

Permit# or PN#: _____ **(Mark "N/A" if work is done in house)**

Requestor-UCD PM or BMO Supervisor: _____

Email Address: _____ **Mobile #:** _____

Contractor: _____ **Office #:**_____

Jobsite Supervisor Name: _____ **Mobile #:** _____

Fire Alarm/Sprinkler Contractor: _____ **Mobile #:** _____

PRE-PLANNED IMPAIRMENT:

Date(s): _____ **to** _____ **Fire Protection System Test? Yes** ☐ **No** ☐

Time(s): _____ **to** _____ **Outside normal hours? Yes** ☐ **No** ☐

Fire Protection system devices to be added/deleted/moved? Yes ☐ **No** ☐

IMPAIRMENT DETAILS:

Device(s)/Component(s)/Function(s) to be impaired:

Reason for impairment (work being performed):

Method of fire alarm impairment(s): (To be completed by Fire & Life Safety prior to Approval)

Method of fire suppression impairment(s): (To be completed by Fire & Life Safety prior to Approval)

Fire watch to be employed? Yes ☐ **No** ☐

EMERGENCY IMPAIRMENT:

Describe emergency:

COMMENTS:

GENERAL INSTRUCTIONS

This form shall be used anytime a fire protection system (alarm or suppression), or portion thereof, is impaired as a result of pre-planned or emergency conditions, or if these systems could be impacted by dust or other adverse conditions related to construction activities. This form must be submitted and distributed by the responsible CU Project Manager (PM), CU BMO Supervisor, CU Fire & Life Safety, or other CU representative.

1. All pre-planned impairments to be done between the hours of 6:00 AM and 3:30 PM, Monday through Friday, unless requestor has made prior arrangements with the Fire and Life Safety Supervisor. (**Anschutz Campus**), Facilities Management. (**Denver Campus**).
2. Impairment requests for non-testing must be submitted by e-mail before 12:00 PM of the business day prior to the date of the requested impairment.
3. Impairment requests for testing must be submitted by e-mail before 12:00 PM two business days prior to the date of the requested impairment.
4. If there is a special hazard system in the area of the requested impairment (computer room, FM 200 System, etc.) it is the responsibility of the person requesting the impairment to have that system disabled by the owner of the system before starting work and enabling the system after completing work.
5. If system additions are made, ensure that devices are labeled accordingly with 8-digit addresses to ensure all field devices coincide with Fire Alarm Control Panel and Graphic Map.
6. **Noise related testing must be completed between 5:00am to 7:00am**.

SEND COMPLETED OUTAGE REQUEST FORMS TO APPROPRIATE FIRE & LIFE SAFETY (ANSCHUTZ), FACILITIES MANAGEMENT(DENVER) FOR APPROVAL

Anschutz Medical Campus
AMCFIRESYSTEMOUTAGE@UCDENVER.EDU

Denver Campus
DDCFIRESYSTEMOUTAGE@UCDENVER.EDU

ADDITIONAL INFORMATION

Steps for **FIRE ALARM / FIRE SPRINKLER** impairment:

1. **IMPAIRMENT LOCATION/CONTACTS:** Use placard information outside room and complete all contact information, input N/A if doesn't apply
2. **PRE-PLANNED IMPAIRMENT:** Refer to general instructions above for guidelines
3. **IMPAIRMENT DETAILS:** Locate devices in your area of work and input 8-digit address located on devices; provide details of work being performed. The rest will be completed by FLS.
4. **EMERGENCY IMPAIRMENT:** In the case of an emergency, FLS will assist with completing impairment. FLS is always available to assist immediately; you can find our information on page 3.

Steps for **FIRE ALARM** impairment throughout a project:

1. **Demo Impairment for Fire Alarm**: The intent of this impairment is for the fire alarm contractor to come in before the demo crew to safe off the existing system (existing wiring and devices). Then remove (de-program) smoke detection, pull stations, speakers, strobes, etc.… leave minimal notification coverage and install temporary heat detection at the deck if the sprinkler system is going to be drained.
2. **General Impairment for Fire Alarm**: The intent of this impairment is to support meetings, emergencies caused by construction activity, job walks to discuss existing, or additional support that cannot be provided by the GC.

3. **Tie-in / Program Impairment for Fire Alarm**: Project is almost complete; fire alarm contractor has passed the overhead inspection and the space has flooring and painting complete just working on final touches. Fire alarm contractor will come in and start connecting to the building system and program new devices. (This requires a lot of our time so we would prefer you narrow down the time as best as possible or provide details on the outage for your duration and in addition, give us a 12 – 24 hr. call before arrival so that we can adjust our schedules to support if the impairment is longer than a week.)
4. **Pre-Test / Final Impairment Fire Alarm**: These can be combined if the pre-test and final are within the same week otherwise we prefer separate impairments for each test.
    a. Typically combined with the fire sprinkler test.

Steps for **FIRE SPRINKLER** impairment throughout a project:

1. **Demo Impairment for Fire Sprinkler**: Upon completion of demo impairment for fire alarm and confirmation of temporary heat detection, the sprinkler contractor with support from our fluid group can drain down system.
2. **Re-Fill Impairment for Fire Sprinkler**: Project is almost complete; sprinkler contractor has passed the overhead inspection. Sprinkler contractor, with support from our fluid group, can then re-fill system.
3. **Pre-Test / Final Impairment Fire Sprinkler**: These can be combined if the pre-test and final are within the same week otherwise we prefer separate impairments for each test.
    a. Typically combined with the fire alarm test.

SYSTEM RESTORATION

Anschutz Medical Campus:

All fire protection system restorations shall be validated by the CU Fire & Life Safety for all affected impairments. Fire & Life Safety Supervisor and/or Campus Fire Marshall shall communicate applicable system restorations with local fire department and FM Global, as applicable to each impairment.

Denver Campus:

All fire protection system restorations shall be validated by Facilities Management and/or Code Official (possibly DFD) for all affected impairments and shall be communicated with local fire department and FM Global, as applicable to each impairment.

QUESTIONS AND CONTACTS

ANSCHUTZ MEDICAL CAMPUS FIRE & LIFE SAFETY:

Duxton Milam, Campus Fire Marshal: Mobile (720) 641-4490 Email: DUXTON.MILAM@CUANSCHUTZ.EDU
Mitch Brochu, Fire Alarm Supervisor: Mobile (720) 660-4431 Email: MITCHELL.BROCHU@CUANSCHUTZ.EDU
Tyler Dunlap, Fire Alarm Technician: Mobile: (720) 717-0560 Email: TYLER.DUNLAP@CUANSCHUTZ.EDU
Eric Bevins, Fire Alarm Technician: Mobile (720) 951-7039 Email: ERIC.BEVINS@CUANSCHUTZ.EDU
Mark Beall, Fire Sprinkler Systems: Mobile: (720) 951-3364 Email: MARK.BEALL@CUANSCHUTZ.EDU

DOWNTOWN DENVER CAMPUS:

Keith Lemieux, Facilities Management: Mobile: (303) 591-6993 Email: BYRON.LEMIEUX@UCDENVER.EDU
Jim Nelson, Facilities Management: Mobile: (303) 315-2278 Email: JIM.NELSON@UCDENVER.EDU

Updated: 10/01/21

SECTION 01 73 07

TEMPORARY FIRE DETECTION, SUPPRESSION, AND SITE PROTECTION 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. This section includes administrative and procedural requirements governing the temporary fire detection and suppression requirements when impacting active construction activities in occupied facilities.

B. Contractor shall comply with all fire and life safety code requirements for projects that impact the existing detection and suppression systems.

C. All temporary protection requirements must be complete and active prior to the disabling or modifications to the existing systems.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 GENERAL

A. All detection and suppression requirements during construction must meet the 2018 International Fire Code (IFC) Section 33 and 3308.7, and 3301. All requirements as outlined in NFPA 241, Standard for Safeguarding Construction, Alterations, and Demolition Operations must also be followed.

3.2 STEPS FOR FIRE ALARM / FIRE SPRINKLER WITHIN PROJECT WORK

A. Fire alarm and/or fire suppression systems protect all areas and need to be maintained throughout the entire duration of the project.

B. Smoke detection, heat detection, and fire suppression systems all rely on the ceiling structure as part of their functionality. All ceiling structures including ceiling tiles must be put back in place at the end of each workday to maintain functionality. A fire watch must be employed while any system impacts the functionality of suppression and detection systems. The use of a fire-retardant plastic covering at all openings is also acceptable.

C. If suppression, detection, and ancillary systems are impacted for longer than a fire watch can be employed, temporary heat detection will need to be install at the deck to maintain proper coverage and code requirements.

D. Fire detection and fire suppression systems can be taken offline to support project work; the FLS Impairment Form will need to be submitted through the CU project manager. Pages 2 and 3 of the Impairment form have instructions and additional information.

E. Fire detection and fire suppression contractors must always be the first to walk and address the project before demolition of any space begins. As mentioned, the ancillary systems including ceilings, are part of the protection systems and cannot be removed without temporary requirements being installed to maintain systems. Preferred methods are turning all sprinkler heads up towards the deck or installing heat detection at the deck before demolition.

F. Please note that fire suppression drain down require a re-fill at the end of each day unless fire watch or temporary heat detection is in place.

G. Contractors are expected to maintain all other code requirements as it pertains to fire and life safety.

END OF SECTION 01 73 07

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 73 00 "Execution" for progress cleaning of Project site.
2. Section 01 78 23 "Operation and Maintenance Data" for operation and maintenance manual requirements.
3. Section 01 78 39 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
4. 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.

C. Field Report: For pest control inspection.

1.5 MAINTENANCE MATERIAL SUBMITTALS

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

1.6 NOTICE OF COMPLETION AND SUBSTANTIAL COMPLETION PROCEDURES

A. Procedures and Submittals Prior to Notice of Completion: Complete and submit all of the following items prior to submitting Notice of Completion to Architect/Engineer. Include Contractor's comprehensive list of items to be completed, corrected or not in compliance with the Drawings and Specifications.

1. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's preliminary punch list), indicating the value of each item on the list and reasons why the Work is incomplete.
2. Building Inspection Record: Submit completed record with all required corrections noted.
3. Certificate of Occupancy: Submit Certificate of Occupancy (CO) or Temporary Certificate of Occupancy (TCO).
4. Final Completion Schedule: Submit schedule for performing and completing all work indicated on the Contractor' list of incomplete items.
5. Submit sustainable design documentation.
6. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information.
7. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
8. Submit test/adjust/balance records.

B. Final Inspection: Submit Notice of Completion to Architect/Engineer. Upon receipt, Architect/Engineer and University will review and if all items on the University Supplemental Notice of Completion Checklist are complete will, within the timeframe required by the Contract, schedule and make an inspection of the Project to determine whether the Work is substantially complete.

1. Final Punch List: Based on the inspection, Architect/Engineer will prepare a final punch list of work to be completed, work not in compliance with the Drawings or Specifications, and unsatisfactory work for any reason.
2. Re-inspection: If the cumulative number of items identified on the final punch list prevents a determination that the work is substantially complete, complete those items and when complete resubmit Notice of Completion. Upon receipt of resubmittal, Architect/Engineer and University will then schedule and make a re-inspection of the Project to determine whether the Work is substantially complete.

C. Notice of Substantial Completion: When inspection of the Work indicates that the Project is substantially complete and all other Contract provisions required for substantial completion have been satisfied, Architect/Engineer will issue a Notice of Substantial Completion (State Form SBP-07).

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.
o. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
p. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter on inspection.

1) Clean HVAC system in compliance with NADCA Standard 1992-01. Provide written report on completion of cleaning.

q. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.
r. Clean food service equipment to sanitary condition acceptable for intended food service use and approved by authority having jurisdiction.
s. Leave Project clean and ready for occupancy.

C. Pest Control: Comply with pest control requirements in Section 01 50 00 "Temporary Facilities and Controls." Prepare written report.

3.2 REPAIR OF THE WORK

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

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

1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.
2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that 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; original forms available from Owner by request:

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

(see Notice of Occupancy and Use List & Project Acceptance List forms on next pages)

(see Notice of Occupancy and Use List & Project Acceptance List forms on next pages)

University of Colorado
Denver | Anschutz Medical Campus

Supplemental Notice of Occupancy and Use List

Project Name & Number: PN 21_155291 / Fitz Bldg 5th 6th Cancer Center Paint Patch Code Reno

Contractor: _____

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

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

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

University Project Manager (sign & print name) Date

University BMO Rep. (sign & print name) Date

University FSS Rep (sign & print name) Date

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

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

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

3.1.12

University of Colorado
Denver | Anschutz Medical Campus

Supplemental Building / Project Acceptance List

Project Name & Number: _____

Contractor: _____

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

Activity	Date Completed	Remarks
1. Review State Buildings Pre-Acceptance check list & Notice of Approval of Occupancy / use form with BMO rep & confirm agreement with status		
*2. Establish list of post construction change orders & track separately from basic project until items are complete – call it Phase 2 to avoid delay on basic project		
3. O & M Manuals given to BMO Representative and BMO Archivist (2 hard copies and 1 electronic total**)**		
*4. Record Documents – a hard copy of plans and specifications are provided for plan room & given to BMO & electronic auto cad & specs are given to Archive Officer (Art Steinman) this is to include landscape drawings showing irrigation installation. Fire Alarm and suppression system shall have record drawings produced by the contractor and shall include PDFs and native graphic files, and CAD files include graphics maps and Fireworks graphics.		
*5. Final Site Walk is completed with University Grounds Supervisor. Drain barriers are removed and storm drains cleared. MS4 storm water plan, CDPHE permits, and evidence of final closeout received by Project Manager and all copied to University Engineering Division.		
*/**6. **Move-related work items complete including physical move, tours (occupants & police), mail, phone & electrical hook ups for equipment & furniture systems complete & freezers enrolled in University freezer program.**		
7. If exterior work is applicable: Landscape – Include a walk through with University Grounds for 1) new & established 1-year service date; 2) existing damaged landscape is repaired; and 3) irrigation – zone control test is complete.		
8. Attic stock, matches spec. requirements, is located in secured location, and is inventoried.		
9. Electrical system one line diagram framed and mounted in electrical room.		
10. Spare fire suppression heads in cabinets and tool: cabinet in main electrical room includes one complete set of spare fuses for major equipment.		
11. Contractor keys issued by University BMO returned to University Key Shop via PM/ BMO Rep.		
12. Interior Finishes Binder given to the University Project Manager: (Two hard copies)		

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

University Project Manager (sign & print name) Date

University BMO Rep. (sign & print name) Date

University FSS (sign & print name) Date

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

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

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

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

3.1.12

SECTION 01 78 23

OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

1. Operation and maintenance documentation directory.
2. Systems, subsystems, and equipment operation and maintenance manuals.
3. Product maintenance manuals.
4. Emergency manuals.
5. Framed operating and maintenance instructions.

B. Related Requirements:

1. Section 01 33 00 "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.
2. Section 01 91 13 "General Commissioning Requirements" for verification and compilation of data into operation and maintenance manuals.

1.3 DEFINITIONS

A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.

B. Subsystem: A portion of a system with characteristics similar to a system.

1.4 CLOSEOUT SUBMITTALS

A. Schedule: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 30 calendar days before commencing demonstration and training. Architect/Engineer will return copy with comments.

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

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

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

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

2. Paper copies. Assemble in accordance with the requirements of this Section.

    a. Submit three final copies, one to be retained by the Architect/Engineer and two to be retained by the University.

C. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 30 calendar days before commencing demonstration and training. Architect/Engineer will return copy with comments.

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

PART 2 - PRODUCTS

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.
3. Manual contents.

C. Title Page: Include the following information:

1. Subject matter included in manual.
2. Name and address of Project.
3. Name and address of University.
4. Date of submittal.
5. Name and contact information for Contractor.
6. Name and contact information for Construction Manager.
7. Name and contact information for Architect/Engineer.
8. Name and contact information for Commissioning Authority.
9. Names and contact information for major consultants to the Architect/Engineer that designed the systems contained in the manuals.
10. Cross-reference to related systems in other operation and maintenance manuals.

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

1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.

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

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

1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.

G. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.

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

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

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

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

    a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
    b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents, and indicate Specification Section number on bottom of spine. Indicate volume number for multiple-volume sets.

2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment.
4. Supplementary Text: Prepared on 8-1/2-by-11-inch, 20 lb., white bond paper.
5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.

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

2.3 SYSTEMS, SUBSYSTEMS AND EQUIPMENT OPERATION AND MAINTENANCE MANUALS

A. General: Provide operation and maintenance manuals where indicated in individual Specification Section and the following:

1. Heating, ventilating and air-conditioning equipment and systems.
2. Plumbing equipment and systems.
3. Special piping equipment and systems.

4. Electrical distribution systems.
5. Communications systems.
6. Fire alarm and detection systems.
7. Elevator door overhead coiling fire curtains.
8. Other special construction and conveying systems.

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

1. Additional Operation Content Required:

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

2. Descriptions: Include the following:

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

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

    a. Startup procedures.
    b. Equipment or system break-in procedures.
    c. Routine and normal operating instructions.
    d. Regulation and control procedures.
    e. Instructions on stopping.
    f. Normal shutdown instructions.
    g. Seasonal and weekend operating instructions.
    h. Required sequences for electric or electronic systems.
    i. Special operating instructions and procedures.

4. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.
5. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

C. Maintenance Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.

1. Source Information: Provide the following information in a list for each product included in manual:

    a. Name, address, and telephone number of Installer or supplier and maintenance service agent.
    b. Name, address, and telephone number of local source for supply of replacement parts.
    c. Name, address, and telephone number of maintenance contractor, where appropriate.
    d. Cross-reference Specification Section number and title.
    e. Drawing or schedule designation or identifier where applicable.

2. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:

    a. Standard maintenance instructions and bulletins.
    b. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
    c. Identification and nomenclature of parts and components.
    d. List of items recommended to be stocked as spare parts.

3. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:

    a. Test and inspection instructions.
    b. Troubleshooting guide.
    c. Precautions against improper maintenance.
    d. Disassembly; component removal, repair, and replacement; and reassembly instructions.
    e. Aligning, adjusting, and checking instructions.
    f. Demonstration and training video recording, if available.

4. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.

    a. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
    b. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.

5. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.
6. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.
7. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

    a. Include procedures to follow and required notifications for warranty claims.

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

2.4 PRODUCT MAINTENANCE MANUALS

A. Content: Organize manual into a separate section for each product, material, and finish. Separate into two manuals: one for exterior moisture protection products and those exposed to weather and one for interior products. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

B. Source Information: Provide the following information for each product included in manual:

1. Name, address, and telephone number of Installer or supplier and maintenance service agent.
2. Cross-reference Specification Section number and title.
3. Drawing or schedule designation or identifier where applicable.

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

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

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

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

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

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

1. Include procedures to follow and required notifications for warranty claims.

2.5 EMERGENCY MANUALS

A. Content: Organize manual into a separate section for each of the following:

1. Type of emergency.
2. Emergency instructions.
3. Emergency procedures.

B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:

1. Fire.

2. Flood.
3. Gas leak.
4. Water leak.
5. Power failure.
6. Water outage.
7. System, subsystem, or equipment failure.
8. Chemical release or spill.

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

D. Emergency Procedures: Include the following, as applicable:

1. Instructions on stopping.
2. Shutdown instructions for each type of emergency.
3. Operating instructions for conditions outside normal operating limits.
4. Required sequences for electric or electronic systems.
5. Special operating instructions and procedures.

2.6 FRAMED OPERATING AND MAINENANCE INSTRUCTIONS

A. All mechanically and electrically operated equipment and controls shall be provided with legible and complete wiring diagrams, schematics, operating instructions, and pertinent preventative maintenance instructions in a sturdy frame with clear glass or plastic cover. Use non-fading, permanent media.

B. Locate frames in the same room or service enclosure as equipment, or in the nearest mechanical or electrical room.

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 78 23

SECTION 01 78 39

PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

1. Record Drawings.
2. Record Specifications.
3. Record Product Data.
4. Record Samples.
5. Miscellaneous record submittals.

B. Related Requirements:

1. Section 01 73 00 "Execution" for final property survey.
2. Section 01 77 00 "Closeout Procedures" for general closeout procedures.
3. Section 01 78 23 "Operation and Maintenance Data" for operation and maintenance manual requirements.

1.3 CLOSEOUT SUBMITTALS

A. General: Submit record drawings with duplicate original transmittal letters containing:

1. Date.
2. Project title and number.
3. Contractor's name and address.
4. Certification that each document as submitted is complete and accurate.
5. Signature of authorized representative of the Contractor.

B. Record Drawings: Submit copies of record Drawings as follows:

1. Submit three paper-copy sets of marked-up record prints, two copies will be retained by the University and one copy retained by the Architect/Engineer.
2. Submit three paper-copy sets and three digital copies on CD of electronic files for all delegated-design submittals. Two copies will be retained by the University and one copy retained by the Architect/Engineer.

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 RECORD SAMPLES

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

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

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

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

2.5 MISCELLANEOUS RECORD SUBMITTALS

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

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

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

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

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

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 01 78 46

EXTRA STOCK MATERIALS

PART 1 - GENERAL

1.1 RELATED DOCUMETS

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

1.2 SUMMARY

A. Section includes descriptions and quantities of required extra stock materials.

1.3 INFORMATIONAL SUBMITTALS

A. Schedule of Maintenance Materials: Prepare a schedule in tabular form of all extra stock materials required in individual Specification Sections including:

1. Specification Section number and title.
2. Description of required material.
3. Quantity of required material.

1.4 MAINTENANCE MATERIALS

A. Furnish extra materials that match and are from the same production runs as the product installed.

B. Provide in the quantities indicated.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 MAINTENANCE MATERIAL SCHEDULE

A. SECTION 09 51 13 - ACOUSTICAL PANEL CEILINGS

1. Material Description: Acoustical Ceiling Panels.

a. Quantity: 100 sq. ft. of full-size panels.

B. SECTION 09 65 13 - RESILIENT BASE AND ACCESSORIES

1. Material Description and Quantity: Furnish 50 linear feet of each type, color, pattern, and size of wall base installed. Furnish 2% of each type, color, pattern, and size of all other resilient accessories installed.

C. SECTION 09 65 19.23 - VINYL TILE FLOORING - LVT-1

1. Any remaining full size vinyl tiles.

D. SECTION 09 68 13 - TILE CARPETING

1. Material Description: Carpet Tile.

a. Quantity: 100 sq. ft. of full-size units for each type indicated.

E. SECTION 21 10 00 - AUTOMATIC FIRE SPRINKLER SYSTEMS

1. See Section's Part 2 Article "Automatic Fire Sprinkler Heads," Paragraph F "Supply the Owner an extra stock . . ." for requirements.

F. SECTION 22 30 00 - PLUMBING FIXTURES, EQUIPMENT, AND SPECIALTIES

1. Material Description: Valve Key.

a. Quantity: 1 valve key for each key operated wall hydrant, post hydrant, hose bib, or faucet installed.

G. SECTION 23 31 00 - DUCTS AND ACCESSORIES

1. Material Description: Fire Dampers.

a. Quantity: 3 fusible links per type installed.

H. SECTION 26 09 43 - NETWORK LIGHTING CONTROLS

1. Material Description: Control Devices.

a. Quantity: 3 devices for each device used.

I. SECTION 28 31 00 - FIRE DETECTION AND ALARM

1. Material Description: Initiating and Control Devices.

a. Quantity: Provide 5 spare devices for each device type used.

2. Material Description: Notification Devices.

a. Quantity: Provide 5 spare devices for each device type used.

END OF SECTION 01 78 46

SECTION 01 79 00

DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for instructing University's personnel, including the following:

1. Demonstration of operation of systems, subsystems, and equipment.
2. Training in operation and maintenance of systems, subsystems, and equipment.

1.3 INFORMATIONAL SUBMITTALS

A. Instruction Program: Submit outline of instructional program for demonstration and training, including a list of training modules and a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include outline for each training module.

B. Qualification Data: For instructor, demonstrating qualifications and ability to instruct on maintenance and care of system, equipment and products.

C. Schedule of Demonstration and Training: Prepare a schedule in tabular form of all demonstration and training required in individual Specification Sections including:

1. Specification Section number and title.
2. Description of required demonstration and training.

D. Attendance Record: For each training module, submit list of participants and length of instruction time.

1.4 QUALITY ASSURANCE

A. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Section 01 40 00 "Quality Requirements," experienced in operation and maintenance procedures and training. Manufacturer's sales staff is not acceptable.

B. Pre-instruction Conference: Conduct conference at Project site to comply with requirements in Section 01 31 00 "Project Management and Coordination." Review methods and procedures related to demonstration and training.

PART 2 - PRODUCTS

2.1 INSTRUCTION PROGRAM

A. Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections.

B. Training Modules: For each module, include instruction for the following as applicable to the system, equipment, or component:

1. Basis of System Design, Operational Requirements, and Criteria: Include the following:

    a. System, subsystem, and equipment descriptions.
    b. Performance and design criteria if Contractor is delegated design responsibility.
    c. Operating standards.
    d. Regulatory requirements.
    e. Equipment function.
    f. Operating characteristics.
    g. Limiting conditions.
    h. Performance curves.

2. Documentation: Review the following items in detail:

    a. Emergency manuals.
    b. Operations manuals.
    c. Maintenance manuals.
    d. Project record documents.
    e. Identification systems.
    f. Warranties and bonds.
    g. Maintenance service agreements and similar continuing commitments.

3. Emergencies: Include the following, as applicable:

    a. Instructions on meaning of warnings, trouble indications, and error messages.
    b. Instructions on stopping.
    c. Shutdown instructions for each type of emergency.
    d. Operating instructions for conditions outside of normal operating limits.
    e. Sequences for electric or electronic systems.
    f. Special operating instructions and procedures.
    g. A tour of the installation identifying the location of all system components.

4. Operations: Include the following, as applicable:

    a. Startup procedures.
    b. Equipment or system break-in procedures.
    c. Routine and normal operating instructions.
    d. Regulation and control procedures.
    e. Control sequences.
    f. Safety procedures.
    g. Instructions on stopping.
    h. Normal shutdown instructions.

i. Operating procedures for emergencies.
j. Operating procedures for system, subsystem, or equipment failure.
k. Seasonal and weekend operating instructions.
l. Required sequences for electric or electronic systems.
m. Special operating instructions and procedures.
n. Sequence of operation.

5. Adjustments: Include the following:

a. Alignments.
b. Checking adjustments.
c. Noise and vibration adjustments.
d. Economy and efficiency adjustments.

6. Troubleshooting: Include the following:

a. Diagnostic instructions.
b. Test and inspection procedures.

7. Maintenance: Include the following:

a. Inspection procedures.
b. Types of cleaning agents to be used and methods of cleaning.
c. List of cleaning agents and methods of cleaning detrimental to product.
d. Procedures for routine cleaning
e. Procedures for preventive maintenance.
f. Procedures for routine maintenance.
g. Instruction on use of special tools.

8. Repairs: Include the following:

a. Diagnosis instructions.
b. Repair instructions.
c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
d. Instructions for identifying parts and components.
e. Review of spare parts needed for operation and maintenance.
f. Product support/service model.
g. Purchasing of replacement parts.

9. Instruction specific to Instrumentation and Controls, Electrical Gateway, Network Lighting Controls, or any other new technology that is integrated with another system: Include the following:

a. Overview and theory.
b. Wiring diagrams, including the one line diagram.
c. Creation, editing, and programming of the point database.
d. Integration topology and platform for communication.
e. Graphics packages and touch screens for the system.
f. Alarms and diagnostics.
g. Reporting functions dynamically and historically.
h. Remote access to the system.
i. Database back-up and maintenance.
j. Replacement and re-programming of replacement parts.
k. Point type and functionality for each type of point.

l. Programming.
m. Point/object editing.
n. Loop tuning.
o. Help files and other troubleshooting documentation.
p. Instruction is given by the staff that setup the integration.

C. Operation and Maintenance Manuals: Provide appropriate Operation and Maintenance manuals in each training session so that the detail drawings and maintenance activities are outlined and discussed for each application.

PART 3 - EXECUTION

3.1 PREPARATION

A. Assemble educational materials necessary for instruction, including documentation and training module.

B. Set up instructional equipment at instruction location.

3.2 INSTRUCTION

A. Engage qualified instructors to instruct University's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.

1. University will furnish Contractor with names and positions of participants.

B. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.

1. Coordinate schedule for all training with University Project Manager and provide the following:

a. Minimum 3 weeks notification.
b. Training matrix in calendar format.
c. Training outline for each session.

2. Do not schedule training until equipment has been started up, commissioned, and is currently operating in its normal condition.
3. Do not schedule overlapping training sessions.
4. Schedule training sessions for a maximum of 4 hours per day; afternoons preferred.
5. Provide separate training session on each system for operational/maintenance groups and user groups.
6. Training sessions will be cancelled and rescheduled unless the following documentation is received:

a. Instruction qualifications.
b. Evidence that equipment has been started up, commissioned, and is currently operating in its normal condition.
c. Operation and Maintenance manuals.

C. Training Location and Reference Material: Conduct training on-site in the completed and fully operational facility using the actual equipment in-place. Conduct training using final operation and maintenance data submittals.

D. Travel, Room and Board: Coordinate any out-of-state training with the University Project Manager.

E. Cleanup: Collect used and leftover educational materials and remove from Project site. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

3.3 DEMONSTRATION SCHEDULE

A. SECTION 08 33 44 - OVERHEAD COILING FIRE CURTAINS

1. See Section's Part 3 Article "Demonstration And Training" for requirements.

B. SECTION 21 00 00 - AUTOMATIC FIRE SPRINKLER SYSTEMS

1. See Section's Part 3 Article "Demonstration" for requirements.

C. SECTION 22 10 00 - PLUMBING PIPING SYSTEMS

1. See Section's Part 3 Article "Demonstration" for requirements.

D. SECTION 23 09 00 - INSTRUMENTATION AND CONTROLS FOR HVAC

1. See Section's Part 3 Article "Demonstration And Training" for requirements and comply with following:

a. Engage a factory-authorized trained representative to conduct a minimum of 1-four hour on-site training course and an additional 1-four hour on-site training course per 25,000 sq. ft. for designated University personnel.

E. SECTION 26 05 00 - COMMON WORK RESULTS FOR ELECTRICAL

1. See Section's Part 3 Article "Commissioining (Demonstration)" for requirements.

F. SECTION 28 31 00 - FIRE DETECTION AND ALARM

1. See Section's Part 3 Article "Commissioining (Demonstration)" for requirements.

END OF SECTION 01 79 00

SECTION 02 41 19

SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes the following as indicated on Drawings:

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

B. Related Requirements:

1. Section 01 10 00 "Summary" for restrictions on use of the premises, Owner-occupancy requirements, and phasing requirements.
2. Section 00 31 26 "Existing Hazardous Material Information."
3. Section 01 73 00 "Execution" for cutting and patching procedures.

1.2 DEFINITIONS

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

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

C. Remove and Reinstall: Detach items from existing construction, in a manner to prevent damage, prepare for reuse, and reinstall where indicated.

D. Existing to Remain: Leave existing items that are not to be removed and that are not otherwise indicated to be salvaged or reinstalled.

E. Dismantle: To remove by disassembling or detaching an item from a surface, using gentle methods and equipment to prevent damage to the item and surfaces; disposing of items unless indicated to be salvaged or reinstalled.

1.3 MATERIALS OWNERSHIP

A. Unless otherwise indicated, demolition waste becomes property of Contractor.

1.4 PREINSTALLATION MEETINGS

A. Predemolition Conference: Conduct conference at Project site.

1. Inspect and discuss condition of construction to be selectively demolished.
2. Review structural load limitations of existing structure.

3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
5. Review areas where existing construction is to remain and requires protection.

1.5 INFORMATIONAL SUBMITTALS

A. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property, for environmental protection , for dust control and , for noise control. Indicate proposed locations and construction of barriers.

B. Schedule of Selective Demolition Activities: Indicate the following:

1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's and other tenants' on-site operations are uninterrupted.
2. Interruption of utility services. Indicate how long utility services will be interrupted.
3. Coordination for shutoff, capping, and continuation of utility services.
4. Use of elevator and stairs.
5. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.

C. Predemolition Photographs or Video: Show existing conditions of adjoining construction, including finish surfaces, that might be misconstrued as damage caused by salvage and demolition operations. Submit before Work begins.

1.6 CLOSEOUT SUBMITTALS

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

1.7 FIELD CONDITIONS

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

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

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

D. Hazardous Materials: Present in buildings and structures to be selectively demolished. See Section 00 31 26 "Existing Hazardous Material Information." Examine reports to become aware of locations where hazardous materials are present.

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

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

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

1.8 COORDINATION

A. Arrange selective demolition schedule so as not to interfere with Owner's operations.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

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

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

PART 3 - EXECUTION

3.1 EXAMINATION

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

B. Review Project Record Documents of existing construction or other existing condition and hazardous material information provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in Project Record Documents.

C. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs or video.

1. Inventory and record the condition of items to be removed and salvaged.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off utility services and mechanical/electrical systems serving areas to be selectively demolished.

1. Owner will arrange to shut off indicated services/systems when requested by Contractor.
2. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
3. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated on Drawings to be removed.

a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material and leave in place.
c. Equipment to Be Removed: Disconnect and cap services and remove equipment.

d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
f. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
g. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material and leave in place.

3.3 PROTECTION

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

1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
2. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
3. Cover and protect furniture, furnishings, and equipment that have not been removed.
4. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Section 01 50 00 "Temporary Facilities and Controls."

B. Remove temporary barricades and protections where hazards no longer exist.

3.4 SELECTIVE DEMOLITION, GENERAL

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

1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.
3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
5. Maintain fire watch during and for at least 2 hours after flame-cutting operations.
6. Maintain adequate ventilation when using cutting torches.
7. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
8. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
9. Dispose of demolished items and materials promptly.

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

C. Removed and Salvaged Items:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's storage area designated by Owner.
5. Protect items from damage during transport and storage.

D. Removed and Reinstalled Items:

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

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

3.5 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

A. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI's "Recommended Work Practices for the Removal of Resilient Floor Coverings." Do not use methods requiring solvent-based adhesive strippers.

3.6 DISPOSAL OF DEMOLISHED MATERIALS

A. Remove demolition waste materials from Project site and dispose of them in an EPA-approved construction and demolition waste landfill acceptable to authorities having jurisdiction.

1. Do not allow demolished materials to accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Burning: Do not burn demolished materials.

3.7 CLEANING

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

END OF SECTION 02 41 19

SECTION 05 50 00

METAL FABRICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Steel tube reinforcement for half-high partitions.

1.3 ACTION SUBMITTALS

A. Shop Drawings: Show fabrication and installation details. Provide Shop Drawings for the following:

1. Steel tube reinforcement for half-high partitions.

1.4 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1.5 FIELD CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 METALS

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

B. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

C. Steel Tubing: ASTM A 500/A 500M, cold-formed steel tubing.

2.2 FASTENERS

A. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors.

1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, unless otherwise indicated.

2.3 MISCELLANEOUS MATERIALS

A. Anti-Corrosive Shop Primer: Either of following, compatible with finish paints specified to be used over it; use primer containing pigments that make it easily distinguishable from zinc-rich primer:

1. Anti-Corrosive Alkyd Primer for Metal: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.
2. Rust-Inhibitive, Water-Based Primer: Emulsion type, anticorrosive primer for mildly corrosive environments that is resistant to flash rusting when applied to cleaned steel, complying with MPI#107 and compatible with topcoat.

2.4 FABRICATION, GENERAL

A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

C. Form exposed work with accurate angles and surfaces and straight edges.

D. Weld corners and seams continuously to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing[and contour of welded surface matches that of adjacent surface].

E. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.

F. Provide for anchorage of type indicated; coordinate with supporting structure.

2.5 STEEL TUBE SUPPORT FRAMING FOR HALF-HIGH PARTITIONS

A. Fabricate half-high wall support framing from square steel tubing 3-1/2 by 3-1/2 by 1/4 inch wall-thickness.

B. Fabricate support framing with 3/8-inch- thick steel baseplates for bolting to concrete slab. Drill baseplates at all 4 corners for 1/4-inch anchor bolts.

C. Shop Finish:

1. Anti-corrosive primer.
2. Exception: Primer not required where framing is completely concealed in interior wall or ceiling construction.

2.6 FINISHES, GENERAL

A. Finish metal fabrications after assembly.

2.7 STEEL AND IRON FINISHES

A. Shop prime iron and steel items unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.

B. Preparation for Shop Priming: Prepare surfaces to comply with requirements indicated below:

1. Items Indicated to Receive Anti-Corrosive Shop Primer: SSPC-SP 3, "Power Tool Cleaning."

C. Shop Priming: Apply shop primer to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

B. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction.

3.2 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.

END OF SECTION 05 50 00

SECTION 06 10 53

MISCELLANEOUS ROUGH CARPENTRY

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. Wood blocking - architectural work.
2. Wood nailers - architectural work.
3. Fire-retardant treatment (FRT).
4. Fasteners.

1.3 REFERENCES

A. Acronyms:

1. NeLMA - Northeastern Lumber Manufacturers Association.
2. NLGA - National Lumber Grades Authority.
3. SPIB - the Southern Pine Inspection Bureau.
4. WCLIB - West Coast Lumber Inspection Bureau.
5. WWPA - Western Wood Products Association.

B. Definitions:

1. Applications:

    a. Architectural Work: Applications for carpentry work requiring a greater degree of precision, less warp, less bow, fewer knots and other defects which may affect finish tolerances and other performance of the Work.
    b. Utility Work: Applications for carpentry where economy is of greater importance than precision and performance of the Work; temporary rough carpentry.

2. Boards or Strips: Lumber of less than 2 inches nominal size in least dimension.
3. Dimension Lumber: Lumber of 2 inches nominal or greater size but less than 5 inches nominal size in least dimension.
4. Blocking: Wood material typically concealed in other construction used to secure, join, or reinforce members, or to fill spaces between them, or to attach other construction such as fixtures, accessories, casework, and other materials.
5. Nailers: Wood pieces attached to a surface, used as a base for fastening another material.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1. For Fire-Retardant Treated Materials:

a. Include data from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
b. Include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D 5664.
c. For materials receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

1.5 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For the following, from ICC-ES:

1. Fire-retardant-treated wood.

1.6 QUALITY ASSURANCE

A. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant-treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Stack lumber flat with spacers beneath and between each bundle to provide air circulation. Protect lumber from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

A. Named Wood Species: Lumber species named in this Section may be known by other names (e.g. Idaho white pine may also be known as Western white pine or White pine). Provide named species or same species as known by another name that can be verified in an authoritative reference such as "The Encyclopedia of Wood", Sterling Publishing Co., Inc.

B. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.

1. Factory mark each piece of lumber with grade stamp of grading agency.
2. For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on end or back of each piece.

    a. If acceptable with Authorities having Jurisdiction, markings may be omitted if certificates of grade compliance issued by grading agency are submitted.

3. Dress lumber, S4S, unless otherwise indicated.

C. Maximum Moisture Content of Lumber:

1. 19 percent.

2.2 FIRE-RETARDANT-TREATED (FRT) MATERIALS

A. General: Where fire-retardant-treated materials are indicated, materials shall comply with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.

B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.

1. Treatment shall not promote corrosion of metal fasteners.
2. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D 2898. Use for exterior locations and where indicated.
3. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D 3201 at 92 percent relative humidity. Use where exterior type is not indicated.
4. Design Value Adjustment Factors: Treated lumber shall be tested according to ASTM D 5664, and design value adjustment factors shall be calculated according to ASTM D 6841.

C. Lumber: Kiln-dry after treatment to a maximum moisture content of 19 percent.

D. Plywood: Kiln-dry after treatment to a maximum moisture content of 15 percent.

E. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency.

1. For exposed lumber or plywood indicated to receive a stained or natural finish, mark end or back of each piece.

    a. If acceptable with Authorities having Jurisdiction, markings may be omitted if certificates of treatment compliance issued by inspection agency are submitted.

F. For exposed items indicated to receive a stained or natural finish, chemical formulations shall not bleed through, contain colorants, or otherwise adversely affect finishes.

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

1. Wood blocking.
2. Wood nailers.

2.3 MISCELLANEOUS LUMBER

A. General: Provide the following miscellaneous lumber where indicated and lumber for support or attachment of other construction.

B. Blocking - architectural work:

1. General:

a. Where used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.
b. Where not used for attachment of other construction, Stud, No. 3, Standard, or Utility grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.

2. Dimension Lumber:

a. Grade: No. 2, Construction, or better.
b. Species: Any of following:

1) NeLMA; Spruce-pine-fir (south), or other eastern softwood.
2) NLGA; Hem-fir (north), Spruce-pine-fir, or other northern species.
3) SPIB; Mixed southern pine or southern pine.
4) WCLIB; Hem-fir, Spruce-pine-fir (south), or other western wood.
5) WWPA; Hem-fir, Spruce-pine-fir (south), or other western wood.

c. Provide fire-retardant-treated (FRT) lumber where indicated.

3. Plywood: Limit use only for attaching other construction such as fixtures, accessories, casework, and other materials.

a. DOC PS 1, Exposure 1, Grade C-D Plugged or better.
b. Nominal Thickness:

1) Not less than 1/2 inch unless indicated otherwise.
2) As indicated on Drawings.
3) Not less than 3/4 inch where used to support railings, handrails, grab bars, seating, and similar conditions.

c. Provide fire-retardant-treated (FRT) plywood where indicated.

C. Nailers - architectural work:

1. General: Where used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.

2. Dimension Lumber:

    a. Grade: No. 2, Construction, or better.
    b. Species: Any of following:

        1) NeLMA; Spruce-pine-fir (south), or other eastern softwood.
        2) NLGA; Hem-fir (north), Spruce-pine-fir, or other northern species.
        3) SPIB; Mixed southern pine or southern pine.
        4) WCLIB; Hem-fir, Spruce-pine-fir (south), or other western wood.
        5) WWPA; Hem-fir, Spruce-pine-fir (south), or other western wood.

3. Board Lumber:

    a. Grade: No. 2, No. 2 Common, Construction, or better.
    b. Species: Any of following:

        1) NeLMA; Spruce-pine-fir (south), Spruce-pine-fir, or other eastern softwoods.
        2) NLGA; Hem-fir or hem-fir (north), Spruce-pine-fir (south), Spruce-pine-fir, or other northern species.
        3) SPIB; Mixed southern pine or southern pine.
        4) WCLIB; Hem-fir, Hem-fir (north), Spruce-pine-fir (south), Spruce-pine-fir, or other western woods.
        5) WWPA; Hem-fir, Hem-fir (north), Spruce-pine-fir (south), Spruce-pine-fir, or other western woods.

4. Provide fire-retardant-treated (FRT) lumber where indicated.

2.4 FASTENERS

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

1. Provide fasteners either with hot-dip zinc coating complying with ASTM A 153/A 153M or of Type 304 stainless steel for the following work:

    a. Carpentry exposed to weather.
    b. Carpentry in areas of high relative humidity.
    c. Carpentry fire-resistive-treated (FRT).

2. Provide only Type 304 stainless steel fasteners for the following work:

    a. Carpentry is in contact with ground.

B. Wood Screws: ASME B18.6.1.

C. Screws for Fastening to Metal Framing: Length as recommended by screw manufacturer for material being fastened and complying with the following for metal thickness fastened to:

1. ASTM C 1002 for following metal thicknesses:

    a. 18 mil (25 gage).
    b. 27 mil (22 gage).
    c. 30 mil (20 gage drywall).

2. ASTM C 954 for following metal thicknesses:

a. 33 mil (20 gage structural).
b. 43 mil (18 gage).
c. 54 mil (16 gage).
d. 68 mil (14 gage).

D. Lag Bolts: ASME B18.2.1.

E. Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

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

B. Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit carpentry accurately to other construction. Locate supports to comply with requirements for attaching other construction.

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

D. Sort and select lumber so that natural characteristics do not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

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

1. ICC-ES evaluation report for fastener.

F. Fastening to Metal: Use screw type fasteners unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood. Do not countersink screw heads unless otherwise indicated.

G. Bolt and Nut Fastening: Where indicated, bolt and nut fasten carpentry work. Recess bolts and nuts flush with surfaces unless otherwise indicated.

3.2 WOOD BLOCKING INSTALLATION

A. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.

B. Attach items to substrates to support applied loading.

3.3 WOOD NAILERS INSTALLATION

A. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.

B. Attach items to substrates to support applied loading.

3.4 PROTECTION

A. Protect miscellaneous rough carpentry from weather. If, despite protection, miscellaneous rough carpentry becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 06 10 53

SECTION 06 41 16

PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

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

1.2 REFERENCES

A. Acronyms:

1. AWS - Architectural Woodwork Standards and its joint adoptees and publishers including:

   a. AWI - Architectural Woodwork Institute.

B. Definitions:

1. Exposed Surfaces: (See AWS for detailed inclusions and exclusions.)

   a. Exterior surfaces exposed to view.
   b. Interior surfaces exposed to view in open casework or behind transparent doors.

2. Semi-Exposed Surfaces: Interior surfaces only exposed to view when doors or drawers are opened. (See AWS for detailed inclusions and exclusions.)
3. Concealed surfaces: Exterior or interior surfaces that are covered or not normally exposed to view. (See AWS for detailed inclusions and exclusions.)

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.

1. Show details full size.
2. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.

C. Samples for Verification:

1. Plastic laminates, 8 by 10 inches, for each type, color, pattern, and surface finish.

1.4 QUALITY ASSURANCE

A. Fabricator and Installer Qualifications:

1. Fabrication shop and installer that employs skilled workers who custom fabricate and install products similar to those required for this Project and whose products have a record of successful in-service performance. Fabrication shop and installer need not be the same unless indicated otherwise below.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver cabinets until painting and similar operations that could damage woodwork have been completed in installation areas. If cabinets must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.

1.6 FIELD CONDITIONS

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

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

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

C. Established Dimensions: Where cabinets are indicated to fit to other construction, establish dimensions for areas where cabinets are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.7 COORDINATION

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

PART 2 - PRODUCTS

2.1 ARCHITECTURAL PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS, GENERAL

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

1. The Contract Documents contain selections chosen from options in the quality standard and additional requirements beyond those of the quality standard. Comply with those selections and requirements in addition to the quality standard.

2.2 PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS

A. Grade: Custom.

B. Type of Construction: Type A - Frameless.

C. Cabinet, Door, and Drawer Front Interface Style: Flush overlay.

D. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or if not indicated, as required by woodwork quality standard.

E. Laminate Cladding for Exposed Surfaces:

1. Horizontal Surfaces: Grade HGL.
2. Vertical Surfaces: Grade VGS.
3. Edges: Grade VGS.
4. Pattern Direction: As indicated.

F. Materials for Semiexposed Surfaces:

1. Surfaces Other Than Drawer Bodies: Thermoset decorative panels.

a. Edges of Thermoset Decorative Panel Shelves: PVC or polyester edge banding.

2. Drawer Sides and Backs: Thermoset decorative panels with PVC or polyester edge banding.
3. Drawer Bottoms: Thermoset decorative panels.

G. Concealed Backs of Panels with Exposed Plastic-Laminate Surfaces: High-pressure decorative laminate, NEMA LD 3, Grade BKL.

H. Drawer Construction: Fabricate with exposed fronts fastened to subfront with mounting screws from interior of body.

1. Join subfronts, backs, and sides with glued rabbeted joints supplemented by mechanical fasteners.

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

1. As indicated by laminate manufacturer's designations as indicated on Drawing's Finish Legend.

2.3 WOOD MATERIALS

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

1. Wood Moisture Content: 5 to 10 percent.

B. Composite Wood and Agrifiber Products:

1. Provide materials that comply with requirements of referenced quality standard for each type of woodwork and quality grade specified unless otherwise indicated.
2. Sustainability Characteristics:

   a. Composite Wood Products: Products shall be made without urea formaldehyde.

3. Medium-Density Fiberboard: ANSI A208.2, Grade 130.
4. Particleboard: ANSI A208.1, Grade M-2.

5. Softwood Plywood: DOC PS 1.
6. Thermoset Decorative Panels: Particleboard or medium-density fiberboard finished with thermally fused, melamine-impregnated decorative paper and complying with requirements of NEMA LD 3, Grade VGL, for test methods 3.3, 3.4, 3.6, 3.8, and 3.10.

2.4 CABINET HARDWARE AND ACCESSORIES

A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets

B. Frameless Concealed Hinges (European Type): BHMA A156.9, B01602, 100 degrees of opening, self-closing.

C. Wire Pulls: Back mounted, solid metal, 4 inches long, 5/16 inch in diameter.

D. Shelf Rests: BHMA A156.9, B04013; metal.

E. Drawer Slides: BHMA A156.9.

1. Grade 1HD-100 and Grade 1HD-200: Side mounted; full-extension type; zinc-plated-steel ball-bearing slides.
2. For drawers more than 3 inches high but not more than 6 inches high and not more than 24 inches wide, provide Grade 1HD-100.
3. For drawers more than 6 inches high or more than 24 incheswide, provide Grade 1HD-200.

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

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

1. Satin Chromium Plated: BHMA 626 for brass or bronze base; BHMA 652 for steel base.
2. Satin Stainless Steel: BHMA 630.

H. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in BHMA A156.9.

2.5 MISCELLANEOUS MATERIALS

A. Furring, Blocking, Shims, and Hanging Strips: , kiln dried to less than 15 percent moisture content.

B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.

C. Adhesives: Do not use adhesives that contain urea formaldehyde.

D. Adhesive for Bonding Plastic Laminate:

1. For the following uses:

a. General Use: Unpigmented contact cement, contact cement, PVA, or resorcinol.

2. Adhesive for Bonding Edges: Hot-melt adhesive or adhesive specified above for faces.

2.6 FABRICATION

A. Fabricate cabinets to dimensions, profiles, and details indicated.

B. Complete fabrication, including assembly and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

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

C. Shop-cut openings to maximum extent possible to receive hardware, appliances, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

PART 3 - EXECUTION

3.1 PREPARATION

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

B. Before installing cabinets, examine shop-fabricated work for completion and complete work as required.

3.2 INSTALLATION

A. Grade: Install cabinets to comply with same grade as item to be installed.

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

C. Install cabinets level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches.

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

E. Anchor cabinets to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with woodwork.

1. Use filler matching finish of items being installed.

F. Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.

1. Install cabinets with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
2. Fasten wall cabinets through back, near top and bottom, and at ends not more than 16 inches o.c. using following fastener types:

a. Wood Framing, Blocking or Hanging Strips: No. 10 wafer-head screws sized for not less than 1-1/2-inch penetration into wood.
b. Metal Backing or Framing Behind Wall Finish:

1) No. 10 wafer-head sheet metal screws.
2) Toggle bolts.

3.3 ADJUSTING AND CLEANING

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

B. Clean, lubricate, and adjust hardware.

C. Clean cabinets on exposed and semiexposed surfaces.

END OF SECTION 06 41 16

SECTION 06 41 77.16

SOLID SURFACING COUNTERTOPS - SS-1

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Solid surface material countertops.
2. Solid surface material backsplashes.
3. Solid surface material end splashes.

1.3 ACTION SUBMITTALS

A. Product Data: For countertop materials.

B. Shop Drawings: For countertops. Show materials, finishes, edge and backsplash profiles, methods of joining, and cutouts for plumbing fixtures.

1. Show direction of directional pattern, if any.

C. Samples for Verification: For the following products:

1. Countertop material, 6 inches square.
2. One full-size solid surface material countertop, with front edge and backsplash, 8 by 10 inches , of construction and in configuration specified.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For solid surface material countertops to include in maintenance manuals. Include Product Data for care products used or recommended by Installer and names, addresses, and telephone numbers of local sources for products.

1.5 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate countertops similar to that required for this Project, and whose products have a record of successful in-service performance.

B. Installer Qualifications: Fabricator of countertops.

1.6 FIELD CONDITIONS

A. Field Measurements: Verify dimensions of countertops by field measurements after base cabinets are installed but before countertop fabrication is complete.

1.7 COORDINATION

A. Coordinate locations of utilities that will penetrate countertops or backsplashes.

PART 2 - PRODUCTS

2.1 SOLID SURFACE COUNTERTOP MATERIALS

A. Solid Surface Material: Homogeneous-filled plastic resin complying with ICPA SS-1.

1. Type: Provide the following unless Special Purpose type is indicated:

a. Standard type.
b. Veneer type made from material complying with requirements for Standard type where 1/4 inchthick material is indicated.

2. Colors and Patterns: As indicated by manufacturer's designations Drawing's Finish Schedule.

B. Composite Wood Products: Products shall be made without urea formaldehyde.

C. Particleboard Backing: ANSI A208.1, Grade as follows:

1. At Dry Counters: Grade M-2
2. At Wet Counters and Counters with Sinks: Grade M-2-Exterior Glue.

2.2 COUNTERTOP FABRICATION

A. Fabricate countertops according to solid surface material manufacturer's written instructions and to the AWI/AWMAC/WI's "Architectural Woodwork Standards."

1. Grade: Custom.

B. Configuration:

1. Front: Straight, slightly eased at top.
2. Backsplash: Straight, slightly eased at corner.
3. End Splash: Matching backsplash.

C. Countertops: 1/4-inch- thick, solid surface material laminated to 3/4-inch- thick particleboard with exposed edges faced with 1/4-inch- thick, solid surface material.

D. Backsplashes: 1/2-inch- thick, solid surface material.

E. Fabricate tops with shop-applied edges unless otherwise indicated. Comply with solid surface material manufacturer's written instructions for adhesives, sealers, fabrication, and finishing.

1. Fabricate with loose backsplashes for field assembly.

F. Joints: Fabricate countertops without joints.

G. Cutouts and Holes:

1. Undercounter Plumbing Fixtures: Make cutouts for fixtures using template or pattern furnished by fixture manufacturer. Form cutouts to smooth, even curves.

a. Provide vertical edges, slightly eased at juncture of cutout edges with top and bottom surfaces of countertop and projecting 3/16 inch into fixture opening.
b. Provide vertical edges, rounded to 3/8-inch radius at juncture of cutout edges with top surface of countertop, slightly eased at bottom, and projecting 3/16 inch into fixture opening.
c. Provide 3/4-inch full bullnose edges projecting 3/8 inch into fixture opening.

2. Fittings: Drill countertops in shop for plumbing fittings, undercounter soap dispensers, and similar items.

2.3 INSTALLATION MATERIALS

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

1. Adhesives shall have a VOC content of 70 g/L or less.

B. Sealant for Countertops: Comply with applicable requirements in Section 07 92 00 "Joint Sealants."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates to receive solid surface material countertops and conditions under which countertops will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of countertops.

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

3.2 INSTALLATION

A. Install countertops level to a tolerance of 1/8 inch in 8 feet, 1/4 inch maximum. Do not exceed 1/64-inch difference between planes of adjacent units.

B. Fasten countertops by screwing through corner blocks of base units into underside of countertop. Predrill holes for screws as recommended by manufacturer. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.

C. Fasten subtops to cabinets by screwing through subtops into cornerblocks of base cabinets. Shim as needed to align subtops in a level plane.

D. Secure countertops to subtops with adhesive according to solid surface material manufacturer's written instructions. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.

E. Install backsplashes and end splashes by adhering to wall and countertops with adhesive. Mask areas of countertops and splashes adjacent to joints to prevent adhesive smears.

F. Complete cutouts not finished in shop. Mask areas of countertops adjacent to cutouts to prevent damage while cutting. Make cutouts to accurately fit items to be installed, and at right angles to finished surfaces unless beveling is required for clearance. Ease edges slightly to prevent snipping.

G. Apply sealant to gaps at walls; comply with Section 07 92 00 "Joint Sealants."

END OF SECTION 06 41 77.16

SECTION 07 84 13

PENETRATION FIRESTOPPING

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. Penetrations in fire-resistance-rated walls.
2. Penetrations in horizontal assemblies.
3. Penetrations in smoke barriers.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Product Schedule: For each penetration firestopping system. Include location, illustration of firestopping system, and design designation of qualified testing and inspecting agency.

1. Engineering Judgments: Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular penetration firestopping system, submit illustration, with modifications marked, approved by penetration firestopping system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly. Obtain approval of authorities having jurisdiction prior to submittal.

1.5 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For each penetration firestopping system, for tests performed by a qualified testing agency.

1.6 CLOSEOUT SUBMITTALS

A. Installer Certificates: From Installer indicating that penetration firestopping systems have been installed in compliance with requirements and manufacturer's written instructions.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not install penetration firestopping system when ambient or substrate temperatures are outside limits permitted by penetration firestopping system manufacturers or when substrates are wet because of rain, frost, condensation, or other causes.

B. Install and cure penetration firestopping materials per manufacturer's written instructions using natural means of ventilations or, where this is inadequate, forced-air circulation.

1.8 COORDINATION

A. Coordinate construction of openings and penetrating items to ensure that penetration firestopping systems can be installed according to specified firestopping system design.

B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate penetration firestopping systems.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics:

1. Perform penetration firestopping system tests by a qualified testing agency acceptable to authorities having jurisdiction.
2. Test per testing standards referenced in "Penetration Firestopping Systems" Article. Provide rated systems complying with the following requirements:

a. Penetration firestopping systems shall bear classification marking of a qualified testing agency.

1) UL in its "Fire Resistance Directory."
2) Intertek Group in its "Directory of Listed Building Products."
3) FM Global in its "Building Materials Approval Guide."

2.2 PENETRATION FIRESTOPPING SYSTEMS

A. Penetration Firestopping Systems: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems shall be compatible with one another, with the substrates forming openings, and with penetrating items if any.

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

a. 3M Fire Protection Products.
b. Hilti, Inc.
c. Specified Technologies, Inc.

B. Penetrations in Fire-Resistance-Rated Walls: Penetration firestopping systems with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.

1. F-Rating: Not less than the fire-resistance rating of constructions penetrated.

C. Penetrations in Horizontal Assemblies: Penetration firestopping systems with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.

1. F-Rating: At least one hour, but not less than the fire-resistance rating of constructions penetrated.
2. T-Rating: At least one hour, but not less than the fire-resistance rating of constructions penetrated except for floor penetrations within the cavity of a wall.

D. Penetrations in Smoke Barriers: Penetration firestopping systems with ratings determined per UL 1479, based on testing at a positive pressure differential of 0.30-inch wg.

1. L-Rating: Not exceeding 5.0 cfm/sq. ft. of penetration opening at and no more than 50-cfm cumulative total for any 100 sq. ft. at both ambient and elevated temperatures.

E. Exposed Penetration Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, per ASTM E 84.

F. Sealant shall have a VOC content of 250 g/L or less.

G. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping system manufacturer and approved by qualified testing and inspecting agency for conditions indicated.

1. Permanent forming/damming/backing materials.
2. Substrate primers.
3. Collars.
4. Steel sleeves.

2.3 MIXING

A. Penetration Firestopping Materials: For those products requiring mixing before application, comply with penetration firestopping system manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of the Work.

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

3.2 PREPARATION

A. Surface Cleaning: Before installing penetration firestopping systems, clean out openings immediately to comply with manufacturer's written instructions and with the following requirements:

1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of penetration firestopping materials.
2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with penetration firestopping materials. Remove loose particles remaining from cleaning operation.
3. Remove laitance and form-release agents from concrete.

B. Prime substrates where recommended in writing by manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

3.3 INSTALLATION

A. General: Install penetration firestopping systems to comply with manufacturer's written installation instructions and published drawings for products and applications.

B. Install forming materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings.

1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not forming permanent components of firestopping.

C. Install fill materials by proven techniques to produce the following results:

1. Fill voids and cavities formed by openings, forming materials, accessories and penetrating items to achieve required fire-resistance ratings.
2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
3. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 IDENTIFICATION

A. Wall Identification: Permanently label walls containing penetration firestopping systems with the words "FIRE AND/OR SMOKE BARRIER - PROTECT ALL OPENINGS," using lettering not less than 3 inches high and with minimum 0.375-inch strokes.

1. Locate in accessible concealed floor, floor-ceiling, or attic space at 15 feet from end of wall and at intervals not exceeding 30 feet.

B. Penetration Identification: Identify each penetration firestopping system with legible metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of penetration firestopping system edge so labels are visible to anyone seeking to remove penetrating items or firestopping systems. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:

1. The words "Warning - Penetration Firestopping - Do Not Disturb. Notify Building Management of Any Damage."
2. Contractor's name, address, and phone number.
3. Designation of applicable testing and inspecting agency.
4. Date of installation.
5. Manufacturer's name.
6. Installer's name.

3.5 FIELD QUALITY CONTROL

A. Owner will engage a qualified testing agency to perform tests and inspections according to ASTM E 2174.

B. Where deficiencies are found or penetration firestopping system is damaged or removed because of testing, repair or replace penetration firestopping system to comply with requirements.

C. Proceed with enclosing penetration firestopping systems with other construction only after inspection reports are issued and installations comply with requirements.

3.6 CLEANING AND PROTECTION

A. Clean off excess fill materials adjacent to openings as the Work progresses by methods and with cleaning materials that are approved in writing by penetration firestopping system manufacturers and that do not damage materials in which openings occur.

B. Provide final protection and maintain conditions during and after installation that ensure that penetration firestopping systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, immediately cut out and remove damaged or deteriorated penetration firestopping material and install new materials to produce systems complying with specified requirements.

END OF SECTION 07 84 13

SECTION 07 84 43

JOINT FIRESTOPPING

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. Joints in or between fire-resistance-rated constructions.
2. Joints in smoke barriers.

B. Related Requirements:

1. Section 07 84 13 "Penetration Firestopping" for penetrations in fire-resistance-rated walls, horizontal assemblies, and smoke barriers and for wall identification.
2. Section 09 22 16 "Non-Structural Metal Framing" for firestop tracks for metal-framed partition heads.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Test Reports: For each joint firestopping system, for tests performed by a qualified testing agency.

1.5 CLOSEOUT SUBMITTALS

A. Installer Certificates: From Installer indicating that joint firestopping systems have been installed in compliance with requirements and manufacturer's written instructions.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A firm that has been approved by FM Global according to FM Global 4991, "Approval of Firestop Contractors," or been evaluated by UL and found to comply with UL's "Qualified Firestop Contractor Program Requirements."

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not install joint firestopping systems when ambient or substrate temperatures are outside limits permitted by joint firestopping system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.

B. Install and cure joint firestopping systems per manufacturer's written instructions using natural means of ventilation or, where this is inadequate, forced-air circulation.

1.8 COORDINATION

A. Coordinate construction of joints to ensure that joint firestopping systems can be installed according to specified firestopping system design.

B. Coordinate sizing of joints to accommodate joint firestopping systems.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics:

1. Perform joint firestopping system tests by a qualified testing agency acceptable to authorities having jurisdiction.
2. Test per testing standards referenced in "Joint Firestopping Systems" Article. Provide rated systems complying with the following requirements:

a. Joint firestopping systems shall bear classification marking of a qualified testing agency.

1) UL in its "Fire Resistance Directory."
2) Intertek Group in its "Directory of Listed Building Products."

2.2 JOINT FIRESTOPPING SYSTEMS

A. Joint Firestopping Systems: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of assemblies in or between which joint firestopping systems are installed. Joint firestopping systems shall accommodate building movements without impairing their ability to resist the passage of fire and hot gases.

B. Joints in or between Fire-Resistance-Rated Construction: Provide joint firestopping systems with ratings determined per ASTM E 1966 or UL 2079.

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

a. 3M Fire Protection Products.
b. Hilti, Inc.
c. Specified Technologies, Inc.

2. Fire-Resistance Rating: Equal to or exceeding the fire-resistance rating of the wall, floor, or roof in or between which it is installed.

C. Joints in Smoke Barriers: Provide fire-resistive joint systems with ratings determined per UL 2079 based on testing at a positive pressure differential of 0.30-inch wg.

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

a. 3M Fire Protection Products.
b. Hilti, Inc.
c. Specified Technologies, Inc.

2. L-Rating: Not exceeding 5.0 cfm/ft. of joint at both ambient and elevated temperatures.

D. Sealant shall have a VOC content of 250 g/L or less.

E. Accessories: Provide components of fire-resistive joint systems, including primers and forming materials, that are needed to install elastomeric fill materials and to maintain ratings required. Use only components specified by joint firestopping system manufacturer and approved by the qualified testing agency for conditions indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for joint configurations, substrates, and other conditions affecting performance of the Work.

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

3.2 PREPARATION

A. Surface Cleaning: Before installing fire-resistive joint systems, clean joints immediately to comply with fire-resistive joint system manufacturer's written instructions and the following requirements:

1. Remove from surfaces of joint substrates foreign materials that could interfere with adhesion of elastomeric fill materials or compromise fire-resistive rating.
2. Clean joint substrates to produce clean, sound surfaces capable of developing optimum bond with elastomeric fill materials. Remove loose particles remaining from cleaning operation.
3. Remove laitance and form-release agents from concrete.

B. Prime substrates where recommended in writing by joint firestopping system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

3.3 INSTALLATION

A. General: Install fire-resistive joint systems to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.

B. Install forming materials and other accessories of types required to support elastomeric fill materials during their application and in position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.

1. After installing elastomeric fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of fire-resistive joint system.

C. Install elastomeric fill materials for fire-resistive joint systems by proven techniques to produce the following results:

1. Elastomeric fill voids and cavities formed by joints and forming materials as required to achieve fire-resistance ratings indicated.
2. Apply elastomeric fill materials so they contact and adhere to substrates formed by joints.
3. For elastomeric fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 IDENTIFICATION

A. Joint Identification: Identify joint firestopping systems with legible metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of joint edge so labels are visible to anyone seeking to remove or joint firestopping system. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:

1. The words "Warning - Joint Firestopping - Do Not Disturb. Notify Building Management of Any Damage."
2. Contractor's name, address, and phone number.
3. Designation of applicable testing agency.
4. Date of installation.
5. Manufacturer's name.
6. Installer's name.

3.5 FIELD QUALITY CONTROL

A. Inspecting Agency: Owner will engage a qualified testing agency to perform tests and inspections according to ASTM E 2393.

B. Where deficiencies are found or joint firestopping systems are damaged or removed due to testing, repair or replace joint firestopping systems so they comply with requirements.

C. Proceed with enclosing joint firestopping systems with other construction only after inspection reports are issued and installations comply with requirements.

3.6 CLEANING AND PROTECTION

A. Clean off excess elastomeric fill materials adjacent to joints as the Work progresses by methods and with cleaning materials that are approved in writing by joint firestopping system manufacturers and that do not damage materials in which joints occur.

B. Provide final protection and maintain conditions during and after installation that ensure joint firestopping systems are without damage or deterioration at time of Substantial Completion. If damage or deterioration occurs despite such protection, cut out and remove damaged or deteriorated fire-resistive joint systems immediately and install new materials to produce fire-resistive joint systems complying with specified requirements.

END OF SECTION 07 84 43

SECTION 07 92 00

JOINT SEALANTS

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. The following joint sealant compositions:

a. Silicone joint sealants.
b. Nonstaining silicone joint sealants.
c. Urethane joint sealants.
d. Silyl-terminated polyether joint sealants.
e. Mildew-resistant joint sealants.
f. Latex joint sealants.

2. Joint sealant backings:

a. Cylindrical backings.
b. Bond-breaker tape.

3. Miscellaneous materials including:

a. Primers.
b. Cleaners.
c. Masking tape.

B. Joint Sealant Schedule: Select joint sealant compositions from the following application schedules for each severity of use, substrate, and joint type. Where more than one sealant composition is listed, select the one best suited for the conditions indicated or encountered.

1. Interior joints in horizontal traffic surfaces.

a. Cast-in-place concrete slabs and decks:

1) Contraction control joints: JS-011, JS-012, JS-014, JS-016, JS-019, JS-021, JS-106, JS-109, JS-113, JS-114, JS-122, JS-124, JS-127, JS-129.
2) Expansion joints: JS-011, JS-016, JS-021, JS-106.
3) Isolation joints: JS-011, JS-012, JS-016, JS-021, JS-106, JS-122, JS-127.

2. Interior joints in vertical surfaces and horizontal nontraffic surfaces, subject to differential movement, including ceilings, soffits and other overhead surfaces.

a. Exposed interior surfaces including ceilings, soffits, walls, and partitions:

1) Control joints: JS-001, JS-002, JS-011, JS-012, JS-106, JS-117, JS-122, JS-202, JS-206, JS-207; except as follows:

a) Do not use silicone sealants and joints receiving field applied paint coatings.

2) Expansion joints: JS-001, JS-011, JS-106, JS-206; except as follows:

a) Do not use silicone sealants at joints receiving field applied paint coatings.

3. Interior joints in vertical surfaces and horizontal nontraffic surfaces not subject to significant movement; dry locations only.

a. Joints in ceilings, soffits, and other overhead surfaces: JS-401, except do not use silicone containing sealant for joints receiving field applied paint coatings.
b. Control joints on exposed interior surfaces of exterior walls: JS-401; except do not use silicone containing sealant for joints receiving field applied paint coatings.
c. Joints between interior wall surfaces and perimeter of door and opening frames, windows, and elevator entrances. JS-401, except do not use silicone containing sealant for joints receiving field applied paint coatings.

4. Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces, including ceilings, soffits and other overhead surfaces; including in rooms with sinks, showers, toilets, urinals, and similar plumbing fixtures.

a. Plumbing fixtures and adjoining walls, floors, and counters:

1) Joints between fixture and adjacent surface: JS-254, JS-257; except use only JS-257 where receiving field applied paint coatings.

1.3 ACTION SUBMITTALS

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

B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.

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

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

1.4 QUALITY ASSURANCE

A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

1.5 FIELD CONDITIONS

A. Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
2. When joint substrates are wet.
3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

PART 2 - PRODUCTS

2.1 JOINT SEALANTS, GENERAL

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.

B. VOC Content: Sealants and sealant primers shall comply with the following:

1. Architectural sealants shall have a VOC content of 250 g/L or less.
2. Sealants and sealant primers for nonporous substrates shall have a VOC content of 250 g/L or less.
3. Sealants and sealant primers for nonporous substrates shall have a VOC content of 775 g/L or less.

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

2.2 SILICONE JOINT SEALANTS

A. JS-001 - Silicone, S, NS, 100/50, NT: Single-component, nonsag, plus 100 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 100/50, Use NT.

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

a. GE Construction Sealants; SCS2700 SilPruf LM .

B. JS-002 - Silicone, S, NS, 50, NT: Single-component, nonsag, plus 50 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 50, Use NT.

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

a. Dow Corning Corporation; 791.
b. GE Construction Sealants; Momentive Performance Materials Inc; SCS2000 SilPruf.

C. JS-003 - Silicone, S, NS, 35, NT: Single-component, nonsag, plus 35 percent and minus 35 percent movement capability. nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 35, Use NT.

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

a. GE Construction Sealants; Momentive Performance Materials Inc; SWS.

D. JS-004 - Silicone, S, NS, 25, NT: Single-component, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 25, Use NT.

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

a. Dow Corning Corporation; 758.
b. GE Construction Sealants; Momentive Performance Materials Inc; SCS2350.

E. JS-009 - Silicone, Acid Curing, S, NS, 25, NT: Single-component, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, acid-curing silicone joint sealant: ASTM C 920, Type S, Grade NS, Class 25, Use NT.

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

a. Bostik, Inc.; Chem-Calk 1200.
b. Dow Corning Corporation; 999A.
c. Pecora Corporation; 860.

F. JS-011 - Silicone, S, NS, 100/50, T, NT: Single-component, nonsag, plus 100 percent and minus 50 percent movement capability, traffic- and nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 100/50, Uses T and NT.

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

a. Dow Corning Corporation; NS.

G. JS-012 - Silicone, S, NS, 50, T, NT: Single-component, nonsag, plus 50 percent and minus 50 percent movement capability, traffic- and nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 50, Uses T and NT.

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

a. Dow Corning Corporation; 799 or CCS.

H. JS-014 - Silicone, S, NS, 25, T, NT: Single-component, nonsag, plus 25 percent and minus 25 percent movement capability, traffic- and nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 25, Uses T and NT.

I. JS-016 - Silicone, S, P, 100/50, T, NT: Single-component, pourable, plus 100 percent and minus 50 percent movement capability traffic- and nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade P, Class 100/50, Uses T and NT.

J. JS-019 - Silicone, S, P, 25, T, NT: Single-component, pourable, plus 25 percent and minus 25 percent movement capability, traffic- and nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade P, Class 25, Uses T and NT.

K. JS-021 - Silicone, M, P, 100/50, T, NT: Multicomponent, pourable, plus 100 percent and minus 50 percent movement capability, traffic- and nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type M, Grade P, Class 100/50, Uses T and NT.

2.3 NONSTAINING SILICONE JOINT SEALANTS

A. Nonstaining Joint Sealants: No staining of substrates when tested according to ASTM C 1248.

B. JS-051 - Silicone, Nonstaining, S, NS, 100/50, NT: Nonstaining, single-component, nonsag, plus 100 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 100/50, Use NT.

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

    a. Tremco Incorporated; Spectrem 1.

C. JS-052 - Silicone, Nonstaining, S, NS, 50, NT: Nonstaining, single-component, nonsag, plus 50 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 50, Use NT.

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

    a. Dow Corning Corporation; 756 SMS or 795.
    b. GE Construction Sealants; Momentive Performance Materials Inc; SilPruf NB.
    c. Tremco Incorporated; Spectrem 2 or Spectrem 3.

D. JS-056 - Silicone, Nonstaining, S, NS, 100/50, T, NT: Nonstaining, single-component, nonsag, plus 100 percent and minus 50 percent movement capability, traffic- and nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 100/50, Uses T and NT.

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

    a. Dow Corning Corporation; 790.

E. JS-062 - Silicone, Nonstaining, M, NS, 50, NT: Nonstaining, multicomponent, nonsag, plus 50 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type M, Grade NS, Class 50, Use NT.

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

    a. Tremco Incorporated; Spectrem 4-TS.

2.4 URETHANE JOINT SEALANTS

A. JS-104 - Urethane, S, NS, 25, NT: Single-component, nonsag, nontraffic-use, plus 25 percent and minus 25 percent movement capability, urethane joint sealant; ASTM C 920, Type S, Grade NS, Class 25, Use NT.

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

    a. BASF Construction Chemicals - Building Systems; Sonalastic TX1.
    b. Bostik, Inc.; Chem-Calk.
    c. Pecora Corporation; Dynatrol I-XL.
    d. Tremco Incorporated; Dymonic.

B. JS-106 - Urethane, S, NS, 100/50, T, NT: Single-component, nonsag, plus 100 percent and minus 50 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C 920, Type S, Grade NS, Class 100/50, Uses T and NT.

C. JS-109 - Urethane, S, NS, 25, T, NT: Single-component, nonsag, plus 25 percent and minus 25 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C 920, Type S, Grade NS, Class 25, Uses T and NT.

D. JS-113 - Urethane, S, P, 35, T, NT: Single-component, pourable, plus 35 percent and minus 35 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C 920, Type S, Grade P, Class 35, Uses T and NT.

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

    a. Bostik, Inc.; Chem-Calk 955-SL.

E. JS-114 - Urethane, S, P, 25, T, NT: Single-component, pourable, plus 25 percent and minus 25 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C 920, Type S, Grade P, Class 25, Uses T and NT.

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

    a. BASF Construction Chemicals - Building Systems; Sonolastic SL 1.
    b. Pecora Corporation; NR-201.

F. JS-117 - Urethane, M, NS, 50, NT: Multicomponent, nonsag, plus 50 percent and minus 50 percent movement capability nontraffic-use, urethane joint sealant; ASTM C 920, Type M, Grade NS, Class 50, Use NT.

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

    a. Pecora Corporation; Dynatrol II.

G. JS-119 - Urethane, M, NS, 25, NT: Multicomponent, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, urethane joint sealant; ASTM C 920, Type M, Grade NS, Class 25, Use NT.

H. JS-122 - Urethane, M, NS, 50, T, NT: Multicomponent, nonsag, plus 50 percent and minus 50 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C 920, Type M, Grade NS, Class 50, Uses T and NT.

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

    a. Tremco Incorporated; Dymeric 240.

I. JS-124 - Urethane, M, NS, 25, T, NT: Multicomponent, nonsag, plus 25 percent and minus 25 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C 920, Type M, Grade NS, Class 25, Uses T and NT.

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

a. Bostik, Inc.; Chem-Calk 505.

J. JS-127 - Urethane, M, P, 50, T, NT: Multicomponent, pourable, plus 50 percent and minus 50 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C 920, Type M, Grade P, Class 50, Uses T and NT.

K. JS-129 - Urethane, M, P, 25, T, NT: Multicomponent, pourable, plus 25 percent and minus 25 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C 920, Type M, Grade P, Class 25, Uses T and NT.

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

a. Bostik, Inc.; Chem-Calk 555-SL.
b. Pecora Corporation; Dynatrol II SG or Urexpan NR 200
c. Tremco Incorporated; THC 900/901.

2.5 SILYL-TERMINATED POLYETHER (STPE) JOINT SEALANTS

A. JS-202 - STPE, S, NS, 50, NT: Single-component, nonsag, plus 50 percent and minus 50 percent movement capability, nontraffic-use, silyl-terminated polyether joint sealant; ASTM C 920, Type S, Grade NS, Class 50, Use NT.

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

a. GE Construction Sealants; Momentive Performance Materials Inc; SCS7000.
b. Pecora Corporation; DynaTrol I-XL Tru-White.

B. JS-203 - STPE, S, NS, 35, NT: Single-component, nonsag, plus 35 percent and minus 35 percent movement capability, nontraffic-use, silyl-terminated polyether joint sealant; ASTM C 920, Type S, Grade NS, Class 35, Use NT.

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

a. Tremco Incorporated; Dymonic FC.

C. JS-204 - STPE, S, NS, 25, NT: Single-component, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, silyl-terminated polyether joint sealant; ASTM C 920, Type S, Grade NS, Class 25, Use NT.

D. JS-206 - STPE, S, NS, 100/50, T, NT: Single-component, nonsag, plus 100 percent and minus 50 percent movement capability, traffic- and nontraffic-use, silyl-terminated polyether joint sealant; ASTM C 920, Type S, Grade NS, Class 100, Uses T and NT.

E. JS-207 - STPE, S, NS, 50, T, NT: Single-component, nonsag, plus 50 percent and minus 50 percent movement capability, traffic- and nontraffic-use, silyl-terminated polyether joint sealant; ASTM C 920, Type S, Grade NS, Class 50, Uses T and NT.

F. JS-208 - STPE, S, NS, 35, T, NT: Single-component, nonsag, plus 35 percent and minus 35 percent movement capability, traffic- and nontraffic-use, silyl-terminated polyether joint sealant; ASTM C 920, Type S, Grade NS, Class 35, Uses T and NT.

G. JS-209 - STPE, S, NS, 25, T, NT: Single-component, nonsag, plus 25 percent and minus 25 percent movement capability, traffic- and nontraffic-use, silyl-terminated polyether joint sealant; ASTM C 920, Type S, Grade NS, Class 25, Uses T and NT.

2.6 MILDEW-RESISTANT JOINT SEALANTS

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

B. JS-254 - Silicone, Mildew Resistant, Acid Curing, S, NS, 25, NT: Mildew-resistant, single-component, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, acid-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 25, Use NT.

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

    a. Dow Corning Corporation; 786-M White.
    b. BASF Building Systems; Omniplus.
    c. GE Construction Sealants; Momentive Performance Materials Inc.; SCS1700 Sanitary.
    d. Tremco Incorporated; Tremsil 200 Sanitary .

C. JS-257 - STPE, Mildew Resistant, S, NS, 50, NT: Mildew-resistant, single-component, nonsag, plus 50 percent and minus 50 percent movement capability, nontraffic-use, silyl-terminated polyether joint sealant; ASTM C 920, Type S, Grade NS, Class 50, Use NT.

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

    a. BASF Construction Chemicals - Building Systems; Sonolastic 150.

2.7 LATEX JOINT SEALANTS

A. JS-401 - Acrylic Latex: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.

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

    a. BASF Construction Chemicals - Building Systems; Sonolac.
    b. Bostik, Inc.; Chem-Calk 600.
    c. Pecora Corporation; AC-20+.
    d. Tremco Incorporated; Tremflex 834.

2.8 JOINT-SEALANT BACKING

A. Sealant Backing Material, General: Nonstaining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Cylindrical Sealant Backings: ASTM C 1330, Type indicated below and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance, and type indicated below except where approved otherwise in writing by joint-sealant manufacturer for joint application indicated:

1. Location, Interior:

a. Exposure, Wet:

1) Position, Vertical:

a) Type C (closed cell material with a surface skin).
b) Type B (bicellular material with a surface skin).

2) Position, Horizontal:

a) Type C (closed cell material with a surface skin).
b) Type B (bicellular material with a surface skin).

b. Exposure, Dry:

1) Position, Vertical:

a) Type O (open-cell material)
b) Type B (bicellular material with a surface skin).

2) Position, Horizontal: Type B (bicellular material with a surface skin).

C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

2.9 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting performance of the Work.

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

3.2 PREPARATION

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

1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air.
3. Remove laitance and form-release agents from concrete.
4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.

B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of sealant backings.
2. Do not stretch, twist, puncture, or tear sealant backings.
3. Remove absorbent sealant backings that have become wet before sealant application, and replace them with dry materials.

D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:

1. Place sealants so they directly contact and fully wet joint substrates.
2. Completely fill recesses in each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealant from surfaces adjacent to joints.
2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
3. Provide concave joint profile per Figure 8A in ASTM C 1193 unless otherwise indicated.

3.4 CLEANING

A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out, remove, and repair damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

END OF SECTION 07 92 00

SECTION 07 92 19

ACOUSTICAL JOINT SEALANTS

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 exposed and concealed joint sealants.

1.3 ACTION SUBMITTALS

A. Product Data: For each acoustical joint sealant.

B. Samples for Initial Selection: For exposed sealants, manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.

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

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

1.4 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For each kind of acoustical joint sealant, for tests performed by manufacturer and witnessed by a qualified testing agency or a qualified testing agency.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Provide acoustical joint-sealant products that effectively reduce airborne sound transmission through perimeter joints and openings in building construction, as demonstrated by testing representative assemblies according to ASTM E 90.

2.2 SUSTAINABILITY CHARACTERISTICS

A. Sealant shall have a VOC content of 250 g/L or less.

2.3 ACOUSTICAL JOINT SEALANTS

A. Acoustical Sealant for Exposed Joints: Manufacturer's standard nonsag, paintable, nonstaining latex acoustical sealant complying with ASTM C 834.

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

a. Pecora Corporation; AC-20 FTR or AIS-919.
b. USG Corporation; SHEETROCK Acoustical Sealant.

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

B. Acoustical Sealant for Concealed Joints: Manufacturer's standard nonsag, nondrying, nonhardening, nonskinning, nonstaining, gunnable, synthetic-rubber acoustical sealant.

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

a. Pecora Corporation; BA-98.

2.4 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by acoustical-joint-sealant manufacturer where required for adhesion of sealant to joint substrates.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive acoustical joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting performance of the Work.

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

3.2 PREPARATION

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

B. Joint Priming: Prime joint substrates where recommended by acoustical-joint-sealant manufacturer. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF ACOUSTICAL JOINT SEALANTS

A. Comply with acoustical joint-sealant manufacturer's written installation instructions unless more stringent requirements apply.

B. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical joint sealant. Install acoustical joint sealants at both faces of partitions, at perimeters, and through penetrations. Comply with ASTM C 919, ASTM C 1193, and manufacturer's written recommendations for closing off sound-flanking paths around or through assemblies, including sealing partitions to underside of floor slabs above acoustical ceilings.

C. Acoustical Ceiling Areas: Apply acoustical joint sealant at perimeter edge moldings of acoustical ceiling areas in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.

3.4 CLEANING

A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of acoustical joint sealants and of products in which joints occur.

3.5 PROTECTION

A. Protect acoustical joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out, remove, and repair damaged or deteriorated acoustical joint sealants immediately so installations with repaired areas are indistinguishable from original work.

END OF SECTION 07 92 19

SECTION 07 92 20

ACOUSTICAL CONTROL PUTTY PADS

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 acoustical control, moldable putty pads for applications to concealed, non-porous, metal and plastic surfaces including the following:

1. Electrical outlet and junction boxes in acoustically rated gypsum board partitions.

B. Related Sections:

1. Section 07 84 42 "Joint Firestopping" for sealing joints in fire-resistance-rated construction.
2. Section 07 92 19 "Acoustical Joint Sealants" for sealing joints.

1.3 SUBMITTALS

A. Product Data: For each acoustical putty pad product indicated.

B. Qualification Data: For qualified Installer.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.

B. Source Limitations: Obtain each kind of acoustical putty pad from single source from single manufacturer.

C. Mockups: Install acoustical putty pads in mockups of assemblies specified in other Sections that are indicated to receive sound control components specified in this Section. Use materials and installation methods specified in this Section.

D. Preinstallation Conference: Conduct conference at Project site.

1.5 PROJECT CONDITIONS

A. Do not proceed with installation of acoustical putty pads under the following conditions:

1. When ambient and substrate temperature conditions are outside limits permitted by acoustical putty pad manufacturer or are below 40 deg F.
2. When box substrates are wet.
3. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

PART 2 - PRODUCTS

2.1 ACOUSTICAL CONTROL PUTTY

A. Acoustical Putty Pads: Pre-manufactured, moldable pads designed for hand pressing into place, formulated to remain permanently pliable, and containing no volatile solvents. . Product shall effectively reduce airborne sound transmission through metal and plastic outlet and junction boxes in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

1. Density: Not less than 1.3 grams/cu. cm.
2. Size: Not less than 6 inch by 7 inches by 1/8 inch thick.
3. Sound Transmission Class: Not less than STC 54 when tested per ASTM E 90 Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions And Elements.
4. Flame-spread and smoke-developed indexes of less than 5 and 10 respectively per ASTM E 84.
5. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. Hilti, Inc.; Type CP 617 Firestop Putty Pad.
    b. Nelson Firestop Products; FSP Firestop Putty Pads.

2.2 MISCELLANEOUS MATERIALS

A. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of acoustical putty pad materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of putty pads to box substrates.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine boxes indicated to receive acoustical putty pads, with Installer present, for compliance with requirements for box configuration, installation tolerances, and other conditions affecting putty pad performance.

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

3.2 PREPARATION

A. Surface Cleaning of Substrates: Clean surfaces of box immediately before installing acoustical putty pads to comply with putty pad manufacturer's written instructions and the following requirements:

1. Remove all foreign material from box substrates that could interfere with adhesion of putty pad, including dust, oil, grease, water, surface dirt, and frost.
2. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of putty pads. Nonporous joint substrates include the following:

    a. Metal.
    b. Plastic.

3.3 INSTALLATION OF ACOUSTICAL PUTTY PADS

A. General: Comply with acoustical putty pad manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Acoustical Putty Pad Installation: At sound-rated assemblies and elsewhere as indicated, seal concealed surfaces of the following components with a continuous membrane of putty pad material, completely sealing all openings.

1. Electrical Junction and Outlet Boxes:

    a. Adhere pad to sides of box, overlapping all edges of box, and lapping onto stud approximately 1/2 inch.
    b. Where gypsum board has been installed over face of box, lap pad material approximately 1/2 inch on to back surface of gypsum board.
    c. Where gypsum board is not yet installed, lap pad material around front edge of box so that it will compress as gypsum board is installed.
    d. Cut and mold putty pad to fit around conduit, cables, and other penetrations into box.
    e. Trim excess putty pad material at box corners and apply to conduit, cable, and other penetration fittings.

3.4 PROTECTION

A. Protect installed putty pad from damage resulting from construction operations If, despite such protection, damage occurs, repaired areas with same material used in original work.

END OF SECTION 07 92 20

SECTION 07 95 13.13

INTERIOR EXPANSION JOINT COVER ASSEMBLIES

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 following types of expansion joint cover assemblies:

1. For Floors:

a. Metal-plate floor joint cover.

2. For Walls:

a. Metal-plate wall joint cover.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for expansion joint cover assemblies.

B. Shop Drawings: For each expansion joint cover assembly.

1. Include plans, elevations, sections, details, splices, block-out requirement, attachments to other work, and line diagrams showing entire route of each expansion joint.
2. Where expansion joint cover assemblies change planes, provide isometric or clearly detailed drawing depicting how components interconnect.

1.4 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For each fire-resistance-rated expansion joint cover assembly, for tests performed by manufacturer and witnessed by a qualified testing agency or a qualified testing agency.

PART 2 - PRODUCTS

2.1 ASSEMBLY DESCRIPTION

A. Furnish units in longest practicable lengths to minimize field splicing.

B. Include factory-fabricated closure materials and transition pieces, T-joints, corners, curbs, cross-connections, and other accessories as required to provide continuous expansion joint cover assemblies.

2.2 FLOOR EXPANSION JOINT COVERS

A. Metal-Plate Floor Joint Cover : Metal cover plate fixed on one side of joint gap and free to slide on other.

1. Performance Requirements:

a. Joint Design Criteria:

1) Type of Movement: Thermal and Wind sway.

a) Nominal Joint Width: As indicated on Drawings.

b. Fire-Resistance Ratings: Provide expansion joint cover assemblies with fire barriers identical to those of systems tested for fire resistance according to UL 2079 or ASTM E 1966 by a qualified testing agency.

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

a. Balco, Inc.; EXBF-Smooth.
b. Construction Specialties, Inc.; Restofit RFB.
c. MM Systems Corporation; Model ASJ

3. Application: Floor to floor.
4. Installation: Surface mounted.
5. Load Capacity:

a. Uniform Load: 50 lb/sq. ft..
b. Concentrated Load: 300 lb .
c. Maximum Deflection: 0.0625 inch .

6. Fire-Resistance Rating: Not less than that indicated on Drawings .
7. Cover-Plate Design: Plain.
8. Exposed Metal:

a. Aluminum: Mill .

2.3 WALL EXPANSION JOINT COVERS

A. Metal-Plate Wall Joint Cover : Metal cover plate fixed on one side of joint gap and free to slide on other.

1. Performance Requirements:

    a. Joint Design Criteria:

        1) Type of Movement: Thermal and Wind sway.

            a) Nominal Joint Width: As indicated on Drawings.

    b. Fire-Resistance Ratings: Provide expansion joint cover assemblies with fire barriers identical to those of systems tested for fire resistance according to UL 2079 or ASTM E 1966 by a qualified testing agency.

        1) Assemblies shall be subjected to hose stream testing.

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

    a. Balco, Inc.
    b. Construction Specialties, Inc.
    c. MM Systems Corporation.

3. Application: Wall to wall.
4. Fire-Resistance Rating: Not less than one hour.
5. Exposed Metal:

    a. Aluminum: Clear anodic, Class II .

2.4 MATERIALS

A. Aluminum: ASTM B 221 , Alloy 6063-T5 for extrusions; ASTM B 209 , Alloy 6061-T6 for sheet and plate.

    1. Apply manufacturer's standard protective coating on aluminum surfaces to be placed in contact with cementitious materials.

B. Fire Barriers: Any material or material combination, when fire tested after cycling, designated to resist the passage of flame and hot gases through a movement joint and to comply with performance criteria for required fire-resistance rating.

2.5 ALUMINUM FINISHES

A. Mill finish.

B. Clear Anodic Finish: AAMA 611, AA-M12C22A31, Class II, 0.010 mm or thicker.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine surfaces where expansion joint cover assemblies will be installed for installation tolerances and other conditions affecting performance of the Work.

B. Notify Architect where discrepancies occur that will affect proper expansion joint cover assembly installation and performance.

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

3.2 PREPARATION

A. Prepare substrates according to expansion joint cover assembly manufacturer's written instructions.

B. Coordinate and furnish anchorages, setting drawings, and instructions for installing expansion joint cover assemblies. Provide fasteners of metal, type, and size to suit type of construction indicated and to provide for secure attachment of expansion joint cover assemblies.

3.3 INSTALLATION

A. Comply with manufacturer's written instructions for storing, handling, and installing expansion joint cover assemblies and materials unless more stringent requirements are indicated.

B. Metal Frames: Perform cutting, drilling, and fitting required to install expansion joint cover assemblies.

1. Repair or grout block out as required for continuous frame support using nonmetallic, shrinkage-resistant grout.
2. Install frames in continuous contact with adjacent surfaces.

    a. Shimming is not permitted.

3. Install in true alignment and proper relationship to joints and adjoining finished surfaces measured from established lines and levels.
4. Adjust for differences between actual structural gap and nominal design gap due to ambient temperature at time of installation.
5. Cut and fit ends to accommodate thermal expansion and contraction of metal without buckling of frames.
6. Locate anchors at interval recommended by manufacturer, but not less than 3 inches from each end and not more than 24 inches o.c.

C. Install with hairline mitered corners where expansion joint cover assemblies change direction or abut other materials.

D. Terminate exposed ends of expansion joint cover assemblies with field- or factory-fabricated termination devices.

E. Fire-Resistance-Rated Assemblies: Coordinate installation of expansion joint cover assembly materials and associated work so complete assemblies comply with performance requirements.

1. Fire Barriers: Install fire barriers to provide continuous, uninterrupted fire resistance throughout length of joint, including transitions and field splices.

3.4 PROTECTION

A. Do not remove protective covering until finish work in adjacent areas is complete. When protective covering is removed, clean exposed metal surfaces to comply with manufacturer's written instructions.

B. Protect the installation from damage by work of other Sections. Where necessary due to heavy construction traffic, remove and properly store cover plates or seals and install temporary protection over expansion joint cover assemblies. Reinstall cover plates or seals prior to Substantial Completion.

END OF SECTION 07 95 13.13

SECTION 08 11 13

HOLLOW METAL DOORS AND FRAMES

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 hollow-metal work for the following:

1. Interior frames complying with SDI Standards.

1.3 DEFINITIONS

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

STEEL SHEET THICKNESSES		
Gage (MSG)	Minimum Uncoated Thickness	
	Inch	Mils
20	0.032	32
18	0.042	42
16	0.053	53
14	0.067	67
12	0.093	93
10	0.123	123
7	0.167	167

1.4 COORDINATION

A. Coordinate anchorage installation for hollow-metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, core descriptions, fire-resistance ratings, temperature-rise ratings, and finishes.

B. Shop Drawings: Include the following:

1. Elevations of each door type.
2. Details of doors, including vertical- and horizontal-edge details and metal thicknesses.
3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
4. Locations of reinforcement and preparations for hardware.
5. Details of each different wall opening condition.
6. Details of anchorages, joints, field splices, and connections.
7. Details of accessories.
8. Details of conduit and preparations for power, signal, and control systems.

C. Schedule: Provide a schedule of hollow-metal work prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with final Door Hardware Schedule.

1.6 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For the following, for tests performed by a qualified testing agency.

1. Each type of fire-rated door and frame assembly.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver hollow-metal work palletized, packaged, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.

B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

C. Store hollow-metal work vertically under cover at Project site with head up. Place on minimum 4-inch-high wood blocking. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Ceco Door; ASSA ABLOY.
2. Concept Frames, Inc.
3. Curries Company; ASSA ABLOY.
4. Custom Metal Products.
5. Republic Doors and Frames.
6. Steelcraft; an Ingersoll-Rand company.

B. Source Limitations: Obtain hollow-metal work from single source from single manufacturer.

2.2 REGULATORY REQUIREMENTS

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

2.3 INTERIOR DOORS AND FRAMES

A. Construct interior doors and frames to comply with the standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.

B. Frame Construction:

1. Face welded unless indicated otherwise.

C. Extra-Heavy-Duty 1-3/4 inch Thick Doors with Frames, Ungalvanized: SDI A250.8, Level 3.

1. Locations: Where indicated in the Door and Frame Schedule.

2. Physical Performance: Level A according to SDI A250.4.

3. Frames:

a. Materials: Uncoated, steel sheet, minimum thickness of 0.053 inch.

4. Exposed Finish: Prime.

2.4 FRAME ANCHORS

A. Jamb Anchors:

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

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

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

2.5 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

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

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

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

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

F. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow-metal frames of type indicated.

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

H. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.

2.6 FABRICATION

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

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

1. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
2. Floor Anchors: Weld anchors to bottoms of jambs with at least four spot welds per anchor; however, for slip-on drywall frames, provide anchor clips or countersunk holes at bottoms of jambs.
3. Jamb Anchors: Provide number and spacing of anchors as follows:

    a. Stud-Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:

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

4. Head Anchors: Two anchors per head for frames more than 42 inches wide and mounted in metal-stud partitions.
5. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers as follows. Keep holes clear during construction.

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

C. Fabricate concealed stiffeners and edge channels from either cold- or hot-rolled steel sheet.

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

1. Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.
2. Comply with applicable requirements in SDI A250.6 and BHMA A156.115 for preparation of hollow-metal work for hardware.

2.7 STEEL FINISHES

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

1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with SDI A250.10; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.

C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

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

3.2 PREPARATION

A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.

B. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

3.3 INSTALLATION

A. General: Install hollow-metal work plumb, rigid, properly aligned, and securely fastened in place. Comply with Drawings and manufacturer's written instructions.

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

1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.

    a. At fire-rated openings, install frames according to NFPA 80.
    b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
    c. Install frames with removable stops located on secure side of opening.
    d. Install door silencers in frames before grouting.
    e. Remove temporary braces necessary for installation only after frames have been properly set and secured.
    f. Check plumb, square, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.

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

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

3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation inside frames.
4. Installation Tolerances: Adjust hollow-metal door frames for squareness, alignment, twist, and plumb to the following tolerances:

    a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
    b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
    c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
    d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.

3.4 ADJUSTING AND CLEANING

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

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

C. Touchup Painting:

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

END OF SECTION 08 11 13

SECTION 08 14 16

FLUSH WOOD DOORS

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. Wood doors complying with WDMA Quality Standards:

a. Interior solid-core doors with wood-veneer faces.
2. Factory finishing wood doors indicated.
3. Factory fitting flush wood doors to frames.
4. Factory machining wood doors for hardware.

1.3 REFERENCES

A. Acronyms:

1. WDMA - Window & Door Manufacturers Association.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of door. Include the following:

1. Details of core and edge construction.
2. Factory-finishing specifications.

B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; and the following:

1. Dimensions and locations of blocking.
2. Dimensions and locations of mortises and holes for hardware.
3. Dimensions and locations of cutouts.
4. Undercuts.
5. Requirements for veneer matching.
6. Doors to be factory finished and finish requirements.
7. Fire-protection ratings for fire-rated doors.

C. Samples for Verification:

1. Factory finishes applied to actual door face materials, approximately 8 by 10 inches, for each material and finish.

1.5 INFORMATIONAL SUBMITTALS

A. Sample Warranty: For special warranty.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of referenced standard and manufacturer's written instructions.

B. Packaging Doors:

1. Factory Finished Doors: Package individually in plastic bags or cardboard cartons; if in cardboard cartons, wrap bundles of doors in plastic sheeting.

C. Mark each door on top and bottom rail with opening number used on Shop Drawings.

1.7 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining temperature between 60 and 90 deg F and relative humidity between 25 and 55 percent during remainder of construction period.

1.8 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Warping (bow, cup, or twist) more than 1/4 inchin a 42-by-84-inch section.
b. Telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch span.

2. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
3. Warranty Period: As follows from date of Substantial Completion:

a. WDMA Interior Solid-Core Doors with Wood-Veneer Faces: Life of installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Algoma Hardwoods, Inc.
2. Marshfield Door Systems, Inc.
3. Oshkosh Door Company.
4. VT Industries, Inc.

B. Source Limitations: Obtain flush wood doors from single manufacturer.

2.2 FLUSH WOOD DOORS, GENERAL

A. Quality Standard: In addition to requirements specified, comply with the following:

1. WDMA I.S.1-A, "Architectural Wood Flush Doors" where WDMA doors specified.

2. Contract Documents contain selections chosen from options in quality standard and additional requirements beyond those of quality standard. Comply with those selections and requirements in addition to quality standard.

B. Adhesives: Do not use adhesives that contain urea formaldehyde.

C. Composite Wood Products: Products shall be made without urea formaldehyde.

D. Fire-Rated Wood Doors: Doors complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.

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

E. Mineral-Core Doors:

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

a. Screw-Holding Capability: As follows per WDMA T.M.-10 performance specified for each door type:

1) Extra Heavy Duty: 550 lbf.
2) Heavy Duty: 475 lbf.
3) Standard Duty: 400 lbf.

2.3 WDMA INTERIOR SOLID-CORE DOORS WITH WOOD-VENEER FACES

A. WDMA Aesthetic Grade: Premium with Grade A faces.

B. Finish: Factory finish.

C. Species, Cut, Match between Veneer Leaves: Match existing.

D. Core: Either of the following:

1. Particleboard: ANSI A208.1:

a. Grade for WDMA I.S.1-A Performance Grade:

1) Grade LD-2 for Extra Heavy Duty Performance Grade.
2) Grade LD-2 for Heavy Duty Performance Grade.
3) Grade LD-1 for LD-2 for Standard Duty Performance Grade.

b. Blocking: Provide wood blocking in particleboard-core doors as needed to eliminate through-bolting hardware.

c. Provide doors with glued-wood-stave or structural-composite-lumber cores instead of particleboard cores for the following:

1) Doors receiving exit devices.
2) Doors indicated to be Extra Heavy Duty Performance Grade.

2. Glued wood stave.
3. Structural Composite Lumber: WDMA I.S.10.

a. Screw Withdrawal, Face: 700 lbf.
b. Screw Withdrawal, Edge: 400 lbf.

E. Panel Construction:

1. Bonded Core: Five or seven plies. Stiles and rails are bonded to core, then entire unit is abrasive planed before veneering.

F. WDMA I.S.1-A Performance Grade:

1. Heavy Duty unless otherwise indicated.
2. Extra Heavy Duty: At following locations:

a. Classrooms.
b. Public toilets.
c. Janitor's closets.
d. Assembly spaces.
e. Exits.
f. Where indicated.

G. Transparent Factory Finish:

1. Grade: Same as specified for doors.
2. WDMA Finish: Either of following systems:

a. TR-6 catalyzed polyurethane.

3. Staining, Effect, and Sheen: Match existing.

FABRICATION

H. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.

1. Comply with NFPA 80 requirements for fire-rated doors.

I. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, BHMA-156.115-W, and hardware templates.

1. Coordinate with hardware mortises in metal frames to verify dimensions and alignment before factory machining.
2. Metal Astragals: Factory machine astragals and formed-steel edges for hardware for pairs of fire-rated doors.

2.4 FACTORY FINISHING

A. General: Comply with referenced quality standard for factory finishing. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.

1. Finish faces, all four edges, edges of cutouts, and mortises. Stains and fillers may be omitted on bottom edges, edges of cutouts, and mortises.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine doors and installed door frames, with Installer present, before hanging doors.

1. Verify that installed frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
2. Reject doors with defects.

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

3.2 INSTALLATION

A. Hardware: For installation, see Section 08 71 00 "Door Hardware."

B. Installation Instructions: Install doors to comply with manufacturer's written instructions and referenced quality standard, and as indicated.

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

C. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.

D. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

3.3 ADJUSTING

A. Operation: Rehang or replace doors that do not swing or operate freely.

B. Finished Doors: Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if Work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION 08 14 16

SECTION 08 33 44 - OVERHEAD COILING FIRE CURTAINS

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. Fire- and smoke-protective curtain assemblies for elevator entrances.

1.3 REFERENCE STANDARDS

A. ASCE - American Society of Civil Engineers.

1. ASCE/SEI 7 Minimum Design Loads for Buildings and Other Structures.

B. ASME - The American Society of Mechanical Engineers.

1. ASME A17.1/CSA B44 Safety Code for Elevators and Escalators.

C. ASTM - ASTM International (American Society for Testing and Materials International).

1. ASTM A240/A240M Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
2. ASTM A500/A500M Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
3. ASTM A653/A653M Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
4. ASTM E119 Standard Test Methods for Fire Tests of Building Construction and Materials.

D. ICC - International Code Council.

1. ICC-ES AC77 Smoke-Containment Systems Used with Fire-resistance-rated Elevator Hoistway Doors and Frames and at the Intersection of Elevator Lobby and Corridor.

E. NFPA - National Fire Protection Association.

1. NFPA 70 National Electrical Code (NEC).
2. NFPA 80 Fire Doors and Other Opening Protectives.
3. NFPA 105 Standard Practice for the Installation of Smoke Door Assemblies and Other Opening Protectives.
4. NFPA 701 Standard Methods of Fire Tests for Flame Propagation of Textiles and Films.

F. UL - Underwriters Laboratories Inc.

1. UL 10B Standard for Fire Tests of Door Assemblies.
2. UL 10D Standard for Fire Tests of Fire-Protective Curtain Assemblies.
3. UL 263 Standard for Fire Tests of Building Construction and Materials.
4. UL 325 Door, Drapery, Gate, Louver, and Window Operators and Systems.
5. UL 1784 Standard for Air Leakage Tests of Door Assemblies and Other Opening Protectives.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.5 COORDINATION

A. Coordinate fire- and smoke-protective curtain assemblies with power, signal, fire-alarm, and smoke-detection systems specified in Division 26 and Division 28.

B. Coordinate elevator fire- and smoke-protective curtain assemblies with existing elevator hoistway door frames.

C. Coordinate fire- and smoke-protective curtain assemblies with ceilings for operational clearances and maintenance access requirements.

D. Coordinate fire- and smoke-protective curtain assemblies with walls for support requirements, rating continuity above ceilings, and recessed wall switches.

E. Coordinate requirements for metal supports required for fire- and smoke-protective curtain assemblies.

1.6 ACTION SUBMITTALS

A. Product Data: For each type of fire- and smoke-protective curtain assembly and fire door.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for fire protective curtain assemblies.
2. Include points of attachment and their corresponding static and dynamic loads imposed on structure.
3. Include ratings, operating components, electrical characteristics, control systems, and furnished specialties and accessories.

B. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data.

1. Include plans, elevations, sections, and attachment details.
2. Include details of fire- and smoke-protective curtain assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location of each field connection.
3. Include points of attachment and their corresponding static and dynamic loads imposed on structure.
4. Detail fabrication and assembly of fire- and smoke-protective curtain assemblies.
5. Show locations of controls, detectors or replaceable fusible links, and other accessories.
6. Include diagrams for power, signal, and control wiring.

C. Product Schedule: For fire- and smoke-protective curtain assemblies. Use same elevator designations indicated on Drawings.

1.7 INFORMATIONAL SUBMITTALS

A. Qualification Data: For the following:

1. Installer.
2. Manufacturer.
3. Testing agency for field quality control.
4. Factory-authorized service representative.

B. Evaluation Reports: For curtain assemblies, from ICC-ES.

C. Field quality-control reports.

D. Sample Warranty: For manufacturer's special warranty.

1.8 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For fire- and smoke-protective curtain assemblies to include in emergency, operation, and maintenance manuals.

B. Field quality-control reports for required testing.

1.9 QUALITY ASSURANCE

A. Manufacturer Qualifications: An entity experienced in manufacturing fire- and smoke-protective curtain assemblies that have been successfully installed in compliance with requirements of authorities having jurisdiction.

B. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer for both installation and maintenance of units required for this Project.

C. Curtain Assembly Inspector Qualifications: Inspector for field quality control inspections of fire- and smoke-protective curtain assemblies complying with NFPA 80.

1.10 FIELD CONDITIONS

A. Field Measurements: Field-verify and coordinate dimensions and indicate measurements on Shop Drawings.

1.11 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of curtain assemblies that fail in materials or workmanship within specified warranty period.

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

PART 2 - PRODUCTS

2.1 MANUFACTURERS, GENERAL

A. Source Limitations: Obtain fire- and smoke-protective curtains from single source from single manufacturer.

1. Obtain operators and controls from fire- and smoke-protective curtain manufacturer.

2.2 FIRE- AND SMOKE-PROTECTIVE CURTAIN ASSEMBLIES FOR ELEVATOR ENTRANCES

A. Alarm-activated flame-resistant fabric smoke curtain assembly complying with ICC-ES A77.

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

1. Door Systems.
2. Fire Curtain Technologies.
3. McKeon Rolling Steel Door Company, Inc.
4. U.S. Smoke & Fire.

C. Performance Criteria:

1. Fire-Resistance: Provide assemblies complying with the following:

a. NFPA 80; listed and labeled by qualified testing agency for fire-protection ratings indicated.

1) Base fire rating on testing at as close to neutral pressure as possible in accordance with UL 10D.
2) Identify products with appropriate markings of applicable testing agency.
3) Fire Rating: 1 hour (20 min. required).

2. Smoke Containment: Provide assemblies complying with the following:

a. Listed and labeled with the letter "S" on the rating label by a qualified testing agency for smoke- and draft-control based on testing in accordance with UL 1784; with maximum air-leakage rate of 3.0 cfm/sq. ft. of opening at 0.10 inch wg for both ambient and elevated temperature tests.
b. Requirements of ASME 17.1/CSA B44.

3. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

D. Operation: Motorized automatic operation with controlled descent.

E. Automatic-Closing Device: Equip each deployable curtain assembly with fail-safe, gravity-closing device or holder-release mechanism and governor unit complying with UL 325 and NFPA 105, and an easily tested and reset release mechanism. Automatic-closing device shall be designed for activation by the following:

1. Building fire-detection, smoke-detection, and fire-alarm systems.

F. Hood/Head Box: Manufactured from galvanized steel in accordance with ASTM A653/A653M; rated at the same temperature as the curtain fabric.

G. Curtain: Manufacturer's standard multilayer glass-fiber fabric woven-coated on one or both sides with egress and vision panel.

1. Fire Rating: UL-listed fabric tested in accordance with UL 10D, and ASTM E119 or UL 263, for fire resistance indicated under "Performance Criteria" above.

H. Roller: Manufacturer's standard curtain roller assembly to contain motor.

I. Weighted Bottom Bar: Provide weighted bottom bar to ensure smooth operation and hold curtain taut.

J. Curtain Guides: As selected by Architect from manufacturer's available standard materials and finishes.

K. Motor Operator: Provide factory-assembled electric operation system of size and capacity recommended by curtain manufacturer for assembly specified, with electric motors and factory-prewired motor controls, control devices, and accessories required for proper operation.

1. Include wiring from control stations to motors. Coordinate operator wiring requirements and electrical characteristics with building electrical system.
2. Battery Backup: Not required - connect to emergency power circuit indicated on Electrical Drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for substrate construction and other conditions affecting performance of the Work.

B. Examine locations of electrical connections.

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

3.2 INSTALLATION, GENERAL

A. Install anchorage devices to securely fasten assembly to substrate and building framing without distortion or stress.

B. Securely brace components suspended from structure.

C. Fit and align assembly, including vertical guides, level and plumb, to provide smooth operation.

D. Adjust fire- and smoke-protective curtain assemblies to function smoothly, as recommended by manufacturer.

3.3 INSTALLATION OF SMOKE- AND FIRE-PROTECTIVE CURTAIN ASSEMBLIES FOR ELEVATOR ENTRANCES

A. Install fire- and smoke-protective curtain assemblies in accordance with manufacturer's written installation instructions, NFPA 80, NFPA 105, and ASME A17.1/CSA B44.

B. Power-Operated Curtains: Install in accordance with UL 325.

3.4 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified opening protective assembly inspector to perform tests and inspections and to furnish reports to Architect.

B. Perform the following tests and inspections with the assistance of a factory-authorized service representative:

1. Test release mechanism, closing, and alarm operations when activated by smoke detector or building's fire-alarm system. Test manual operation of closed curtain. Reset closing mechanism after successful test.
2. Inspections: Inspect each fire- and smoke-protective curtain in accordance with NFPA 80.

C. Repair or remove and replace installations where inspections indicate that they do not comply with specified requirements.

1. Reinspect repaired or replaced installations to determine if replaced or repaired door assembly installations comply with specified requirements.

D. Prepare and submit separate inspection report for each fire- and smoke-protective curtain assembly indicating compliance with each item listed in NFPA 80.

3.5 DEMONSTRATION AND TRAINING

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain overhead coiling smoke curtains.

3.6 MAINTENANCE

A. Engage a manufacturer's authorized service representative to test, adjust, and maintain the fire- and smoke-protective curtain assemblies once per year as required by NFPA 80.

END OF SECTION 08 33 44

SECTION 08 71 00

DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes: Finish Hardware for door openings, except as otherwise specified herein.

1. Door hardware for steel (hollow metal) doors.
2. Door hardware for wood doors.
3. Keyed cylinders as indicated.

B. Related Sections:

1. Section 08 11 13 "Hollow Metal Doors And Frames."
2. Section 08 14 16 "Flush Wood Doors."
3. Division 26 "Electrical."
4. Division 28 Electronic Safety And Security."

C. References: Comply with applicable requirements of the following standards. Where these standards conflict with other specific requirements, the most restrictive shall govern.

1. Builders Hardware Manufacturing Association (BHMA)
2. NFPA 101 Life Safety Code
3. NFPA 80 -Fire Doors and Windows
4. ANSI-A156.xx- Various Performance Standards for Finish Hardware
5. UL10C – Positive Pressure Fire Test of Door Assemblies
6. ANSI-A117.1 – Accessible and Usable Buildings and Facilities
7. DHI /ANSI A115.IG – Installation Guide for Doors and Hardware
8. ICC – International Building Code

D. Intent of Hardware Groups

1. Should items of hardware not definitely specified be required for completion of the Work, furnish such items of type and quality comparable to adjacent hardware and appropriate for service required.
2. Where items of hardware aren’t definitely or correctly specified, are required for completion of the Work, a written statement of such omission, error, or other discrepancy to be submitted to Architect, prior to date specified for receipt of bids for clarification by addendum; or, furnish such items in the type and quality established by this specification, and appropriate to the service intended.

1.3 SUBSTITUTIONS

A. Comply with Section 01 25 00 "Substitution Procedures."

1.4 SUBMITTALS

A. Comply with Section "Submittal Procedures."

B. Special Submittal Requirements: Combine submittals of this Section with Sections listed below to ensure the "design intent" of the system/assembly is understood and can be reviewed together.

C. Product Data: Manufacturer's specifications and technical data including the following:

1. Detailed specification of construction and fabrication.
2. Manufacturer's installation instructions.
3. Wiring diagrams for each electric product specified. Coordinate voltage with electrical before submitting.
4. Submit 6 copies of catalog cuts with hardware schedule.
5. Provide 9001-Quality Management and 14001-Environmental Management for products listed in Materials Section 2.2

D. Shop Drawings - Hardware Schedule: Submit 6 complete reproducible copy of detailed hardware schedule in a vertical format.

1. List groups and suffixes in proper sequence.
2. Completely describe door and list architectural door number.
3. Manufacturer, product name, and catalog number.
4. Function, type, and style.
5. Size and finish of each item.
6. Mounting heights.
7. Explanation of abbreviations and symbols used within schedule.
8. Detailed wiring diagrams, specially developed for each opening, indicating all electric hardware, security equipment and access control equipment, and door and frame rough-ins required for specific opening.

E. Templates: Submit templates and "reviewed Hardware Schedule" to door and frame supplier and others as applicable to enable proper and accurate sizing and locations of cutouts and reinforcing.

1. Templates, wiring diagrams and "reviewed Hardware Schedule" of electrical terms to electrical for coordination and verification of voltages and locations.

F. Samples: (If requested by the Architect)

1. 1 sample of Lever and Rose/Escutcheon design, (pair).
2. 3 samples of metal finishes

G. Contract Closeout Submittals: Comply with Section 01 78 23 "Operation And Maintenance Data" including specific requirements indicated.

1. Operating and maintenance manuals: Submit PDF electronic file and 3 paper sets containing the following.

a. Complete information in care, maintenance, and adjustment, and data on repair and replacement parts, and information on preservation of finishes.
b. Catalog pages for each product.
c. Name, address, and phone number of local representative for each manufacturer.
d. Parts list for each product.

2. Copy of final hardware schedule, edited to reflect, "As installed".
3. Copy of final keying schedule
4. As installed “Wiring Diagrams” for each piece of hardware connected to power, both low voltage and 110 volts.
5. One set of special tools required for maintenance and adjustment of hardware, including changing of cylinders.

1.5 QUALITY ASSURANCE

A. Comply with Section 01 40 00 "Quality Requirements."

1. Statement of qualification for distributor and installers.
2. Statement of compliance with regulatory requirements and single source responsibility.
3. Distributor's Qualifications: Firm with 3 years experience in the distribution of commercial hardware.

    a. Distributor to employ full time Architectural Hardware Consultants (AHC) for the purpose of scheduling and coordinating hardware and establishing keying schedule.
    b. Hardware Schedule shall be prepared and signed by an AHC.

4. Installer's Qualifications: Firm with 3 years experienced in installation of similar hardware to that required for this Project, including specific requirements indicated.
5. Regulatory Label Requirements: Provide testing agency label or stamp on hardware for labeled openings.

    a. Provide UL listed hardware for labeled and 20 minute openings in conformance with requirements for class of opening scheduled.
    b. Underwriters Laboratories requirements have precedence over this specification where conflict exists.

6. Single Source Responsibility: Except where specified in hardware schedule, furnish products of only one manufacturer for each type of hardware.

B. Review Project for extent of finish hardware required to complete the Work. Where there is a conflict between these Specifications and the existing hardware, notify the Architect in writing and furnish hardware in compliance with the Specification unless otherwise directed in writing by the Architect.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Packing and Shipping: Comply with Section 01 60 00 "Product Requirements."

1. Deliver products in original unopened packaging with legible manufacturer's identification.
2. Package hardware to prevent damage during transit and storage.
3. Mark hardware to correspond with "reviewed hardware schedule".
4. Deliver hardware to door and frame manufacturer upon request.

B. Storage and Protection: Comply with manufacturer's recommendations.

1.7 PROJECT CONDITIONS:

A. Coordinate hardware with other work. Furnish hardware items of proper design for use on doors and frames of the thickness, profile, swing, security and similar requirements indicated, as necessary for the proper installation and function, regardless of omissions or conflicts in the information on the Contract Documents.

B. Review Shop Drawings for doors and entrances to confirm that adequate provisions will be made for the proper installation of hardware.

1.8 WARRANTY

A. Refer to Conditions of the Contract

B. Manufacturer's Warranty:

1. Closers: Ten years
2. Exit Devices: Five Years
3. Locksets & Cylinders: Three years
4. All other Hardware: Two years.

1.9 OWNER'S INSTRUCTION

A. Instruct Owner's personnel in operation and maintenance of hardware units.

1.10 MAINTENANCE

A. Extra Service Materials: Deliver to Owner extra materials from same production run as products installed. Package products with protective covering and identify with descriptive labels. Comply with Division 1 Closeout Submittals Section.

1. Special Tools: Provide special wrenches and tools applicable to each different or special hardware component.
2. Maintenance Tools: Provide maintenance tools and accessories supplied by hardware component manufacturer.
3. Delivery, Storage and Protection: Comply with Owner's requirements for delivery, storage and protection of extra service materials.

B. Maintenance Service: Submit for Owner's consideration maintenance service agreement for electronic products installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. The following manufacturers are approved subject to compliance with requirements of the Contract Documents. Approval of manufacturers other than those listed shall be in accordance with Division 1.

Item:	Manufacturer:	Approved:
Hinges	Stanley	Hager
Locksets	Best 9K Series	Falcon T Series
Cylinders	Best	
Exit Devices	VonDuprin	Precision
Closers	LCN	Norton
Protection Plates	Trimco	Burns, Ives, Rockwood
Overhead Stops	ABH	Rixson, Glynn Johnson
Door Stops	Trimco	Burns, Ives, Rockwood
Threshold & Gasketing	National Guard	Pemko, Reese, K.N. Crowder

2.2 MATERIALS:

A. Hinges: Shall be Five Knuckle Ball bearing hinges

1. Template screw hole locations
2. Bearings are to be fully hardened.
3. Bearing shell is to be consistent shape with barrel.
4. Minimum of 2 permanently lubricated non-detachable bearings on standard weight hinge and 4 permanently lubricated bearing on heavy weight hinges.
5. Equip with easily seated, non-rising pins.
6. Non Removable Pin screws shall be slotted stainless steel screws.
7. Hinges shall be full polished, front, back and barrel.
8. Hinge pin is to be fully plated.
9. Bearing assembly is to be installed after plating.
10. Sufficient size to allow 180-degree swing of door
11. Furnish five knuckles with flush ball bearings
12. Provide hinge type as listed in schedule.
13. Furnish 3 hinges per leaf to 7 foot 6 inch height. Add one for each additional 30 inches in height or fraction thereof.
14. Tested and approved by BHMA for all applicable ANSI Standards for type, size, function and finish
15. UL10C listed for Fire rated doors.

B. Cylindrical Type Locks and Latchsets:

1. Provide locksets tested and approved by BHMA/ANSI A156.2, Series 4000, Operational Grade 1, Extra-Heavy Duty.
2. Provide locksets listed by Underwriters Laboratories for use on fire rated single or double swinging doors.
3. Provide locksets that meet the design and operation of the cylindrical lock to meet the accessible requirements of ANSI A117.1 and ADA–Americans with Disabilities Act.
4. Provide locksets that meet Florida Building Code and Miami-Dade County Code:
    a. 9/16” latch throw – Listed by Florida Building Code and Miami-Dade County at ± 75 PSF for single doors.
    b. 3/4” latch throw – Listed by Florida Building Code and Miami Dade County at ± 80 PSF for single doors and ± 50 PSF for double doors.
5. Provide locksets made in a manufacturing facility to compliant with ISO 9001-Quality Management and ISO 14001-Environmental Management.
6. Provide locksets that meet or exceed 50 Million cycle test verified by third party testing agency.
7. Provide locksets with the following mechanical features
    a. Locksets outside locked lever must withstand minimum 1400 inch-pounds of torque. In excess of that, a replaceable part will shear. Key from outside and/or inside lever will still operate lockset.
    b. Locksets shall fit modified ANSI A115.2 door preparation.
    c. 2-3/4 inch (70 mm) backset, standard.
    d. Door thickness – Available for 1 3/4” to 2 1/4” doors.
    e. 9/16 inch (14 mm) throw latchbolt.
    f. Latch to have single piece tail-piece construction.
    g. Chassis – Critical latch and chassis components to be brass or corrosion-treated steel.
    h. Lock shall allow the lever handle to move 45 degrees from parallel to the horizontal plane without engaging the latchbolt assembly.
    i. Hub, side plate, shrouded rose, locking pin to be a one-piece casting with a shrouded locking lug.
    j. Locksets to have anti-rotational studs that are thru-bolted.

k. Provide sufficient curved strike lip to protect door trim at single doors. At pairs of doors, provide 7/8" Lip to Center Strike.
l. Each lever to have independent spring mechanism.
m. Lever springs to be contained in the main lock hub.
n. Outside lever sleeve to be seamless, of one-piece construction made of a hardened steel alloy.
o. Keyed lever to be removable only after core is removed, by authorized control key.

8. Locksets to have the capability of supporting manufacturers' conventional core as well as large and small interchangeable cores.
9. Provide core face with the same finish as the lockset.
10. Provide functions and design as indicated in the hardware groups.

C. Exit Devices shall:

1. Tested and approved by BHMA for ANSI 156.3, Grade 1
2. Provide 9001-Quality Management and 14001-Environmental Management.
3. Furnish UL or recognized independent laboratory certified mechanical operational testing to 10 million cycles minimum.
4. Provide a deadlocking latchbolt
5. Non-fire rated exit devices shall have cylinder dogging.
6. Touchpad shall be "T" style
7. Exposed components shall be of architectural metals and finishes.
8. Lever design shall match lockset lever design
9. Provide strikes as required by application.
10. Fire exit devices to be listed for UL10C
11. UL listed for Accident Hazard
12. Shall consist of a cross bar or push pad, the actuating portion of which extends across, shall not be less than one half the width of the door leaf.
13. Provide vandal resistant or breakaway trim
14. Aluminum vertical rod assemblies are acceptable only when provide with the manufacturers optional top and bottom stainless steel rod guard protectors.

D. Cylinders:

1. Provide the necessary cylinder housings, collars, rings & springs as recommended by the manufacturer for proper installation.
2. Provide the proper cylinder cams or tail piece as required to operate all locksets and other keyed hardware items listed in the hardware sets.
3. Coordinate and provide as required for related sections.

E. Door Closers shall:

1. Tested and approved by BHMA for ANSI 156.4, Grade 1
2. UL10C certified
3. Provide 9001-Quality Management and 14001-Environmental Management.
4. Closer shall have extra-duty arms and knuckles
5. Conform to ANSI 117.1
6. Maximum 2 7/16 inch case projection with non-ferrous cover
7. Separate adjusting valves for closing and latching speed, and backcheck
8. Provide adapter plates, shim spacers and blade stop spacers as required by frame and door conditions
9. Full rack and pinion type closer with 1½" minimum bore
10. Mount closers on non-public side of door, unless otherwise noted in specification
11. Closers shall be non-handed, non-sized and multi-sized.

F. Door Stops: Provide a dome floor or wall stop for every opening as listed in the hardware sets.

1. Wall stop and floor stop shall be wrought bronze, brass or stainless steel.
2. Provide fastener suitable for wall construction.
3. Coordinate reinforcement of walls where wall stop is specified.
4. Provide dome stops where wall stops are not practical. Provide spacers or carpet riser for floor conditions encountered

G. Over Head Stops: Provide a Surface mounted or concealed overhead when a floor or wall stop cannot be used or when listed in the hardware set.

1. Concealed overhead stops shall be heavy duty bronze or stainless steel.
2. Surface overhead stops shall be heavy duty bronze or stainless steel.

H. Power Transfer: Power transfer device shall be a steel housing and flexible tube. Secure and inconspicuous channel is to bring power from the frame to the door.
1. Von Duprin EPT Series
2. EPT-2, two 18 Ga. wires
3. EPT-10 ten 24 Ga. wires

I. Power Supply: UL Listed, Field Selectable 12VDC or 24VDC output. The power supply will specifically designed to support electric locks and access controls. The power supply uses universal 120-240 VAC input. The power shall be able to be expanded to four station controls. The filtered and regulated output power is field selectable for 12 or 24 VDC.

1. Fire Alarm/Life Safety emergency release included in power supply.
2. Available options for multiple door options four or more control stations, Adjustable Time delay relay, Battery charging, Battery Back up.

J. Door Position Switch: Provide door position switch for door status monitoring as indicated in hardware sets.

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

K. Magnetic Door Holders: Provide magnetic door holders with Tri-Voltage that can be wired 12VDC, 24V AC/DC or 120V AC

1. Wall magnetic door holders shall be surface mount.
2. Armature shall be thru-bolted and can be provided with any projection required.
3. Models will be available in US28, sprayed finishes and US32D.
4 Floor mounted shall be provided for a single door or double door hold open application.

L. Seals: All seals shall be finished to match adjacent frame color. Seals shall be furnished as listed in schedule. Material shall be UL listed for labeled openings.

M. Weatherstripping: Provide at head and jambs only those units where resilient or flexible seal strip is easily replaceable. Where bar-type weatherstrip is used with parallel arm mounted closers install weatherstrip first.

1. Weatherstrip shall be resilient seal of (Neoprene, Polyurethane, Vinyl, Pile, Nylon Brush, Silicone)
2. UL10C Positive Pressure rated seal set when required.

N. Door Bottoms/Sweeps: Surface mounted or concealed door bottom where listed in the hardware sets.

1. Door seal shall be resilient seal of (Neoprene, Polyurethane, Nylon Brush, Silicone)
2. UL10C Positive Pressure rated seal set when required.

O. Thresholds: Thresholds shall be aluminum beveled type with maximum height of ½" for conformance with ADA requirements. Furnish as specified and per details. Provide fasteners and screws suitable for floor conditions.

P. Silencers: Furnish silencers on all interior frames, 3 for single doors, 2 for pairs. Omit where any type of seals occur.

2.3 FINISH

A. Designations used in Schedule of Finish Hardware - 3.05, and elsewhere to indicate hardware finishes are those listed in ANSI/BHMA A156.18 including coordination with traditional U.S. finishes shown by certain manufacturers for their products

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

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

2.4 KEYS AND KEYING

A. Provide keyed brass construction cores and keys during the construction period. Construction control and operating keys and core shall not be part of the Owner's permanent keying system or furnished in the same keyway (or key section) as the Owner's permanent keying system. Permanent cores and keys (prepared according to the accepted keying schedule) will be furnished to the Owner.

B. Cylinders, removable and interchangeable core system: Facility Standard Best CORMAX™ Patented 7-pin

C. Permanent keys and cores: Stamped with the applicable key mark for identification. These visual key control marks or codes will not include the actual key cuts. Permanent keys will also be stamped "Do Not Duplicate."

D. Transmit Grand Masterkeys, Masterkeys and other Security keys to Owner by Registered Mail, return receipt requested.

E. Furnish keys in the following quantities:

1. 1 each Grand Masterkeys
2. 4 each Masterkeys
3. 2 each Change keys each keyed core
4. 15 each Construction masterkeys
5. 1 each Control keys

F. The Owner, or the Owner's agent, will install permanent cores and return the construction cores to the Hardware Supplier. Construction cores and keys remain the property of the Hardware Supplier.

G. Keying Schedule: Arrange for a keying meeting, and programming meeting with Architect Owner and hardware supplier, and other involved parties to ensure locksets and locking hardware, are functionally

correct and keying and programming complies with project requirements. Furnish 3 typed copies of keying and programming schedule to Architect.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of conditions: Examine doors, frames, related items and conditions under which Work is to be performed and identify conditions detrimental to proper and or timely completion.

1. Do not proceed until unsatisfactory conditions have been corrected.

3.2 HARDWARE LOCATIONS

A. Mount hardware units at heights indicated in the following publications except as specifically indicated or required to comply with the governing regulations.

1. Recommended Locations for Builder's Hardware for Standard Steel Doors and Frames, by the Door and Hardware Institute (DHI).

2. Recommended locations for Architectural Hardware for flush wood doors (DHI).

3. WDMA Industry Standard I.S.-1A-04, Industry Standard for Architectural wood flush doors.

3.3 INSTALLATION

A. Install each hardware item per manufacturer's instructions and recommendations. Do not install surface mounted items until finishes have been completed on the substrate. Set units level, plumb and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.

B. Conform to local governing agency security ordinance.

C. Install Conforming to ICC/ANSI A117.1 Accessible and Usable Building and Facilities.

1. Adjust door closer sweep periods so that from the open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches from the latch, measured to the landing side of the door.

D. Installed hardware using the manufacturers fasteners provided. Drill and tap all screw holes located in metallic materials. Do not use "Riv-Nuts" or similar products.

3.4 FIELD QUALITY CONTROL AND FINAL ADJUSTMENT

A. Contractor/Installers, Field Services: After installation is complete, contractor shall inspect the completed door openings on site to verify installation of hardware is complete and properly adjusted, in accordance with both the Contract Documents and final shop drawings.

1. Check and adjust closers to ensure proper operation.

2. Check latchset, lockset, and exit devices are properly installed and adjusted to ensure proper operation.

a. Verify levers are free from binding.
b. Ensure latchbolts and dead bolts are engaged into strike and hardware is functioning.

3. Report findings, in writing, to architect indicating that all hardware is installed and functioning properly. Include recommendations outlining corrective actions for improperly functioning hardware if required.

3.5 SCHEDULE OF FINISH HARDWARE:

Manufacturer List

Code	Name
BE	Best Access Systems
BY	By Others
LC	LCN Closers
NA	National Guard
SC	Schlage
ST	Stanley
TR	Trimco
VO	Von Duprin

Option List

Code	Description
17	17 Lever Design
900-4RL-FA	4 Relay Board Output Integr. Logic w/FA
CON	Molex Electrical Connector
CXA	CHEXIT Device - to 7' w/RGO's
LBR	Less Bottom Rod
LBRAFL	Less Bottom Rod with Fire Latch Kit
RX	Request to Exit
S3B	ANSI Strike Package w/Plastic Box

Finish List

Code	Description
26D	Satin Chrome
626	Satin Chromium Plated
AL	Aluminum (BHMA 689)
GREY	Grey
SP28	Lacquer Sprayed Aluminum
US26D	Chromium Plated, Dull

Hardware Sets:

Set #1A
Doors: 5334, 6004N

3	Hinges	FBB179 4.5" x 4.5"	26D	ST
1	Lockset Office	9K3-7EA14D PATD S3B	626	BE
1	Floor Stop or Wall Stop	1215CKU or 1270CV - AS REQUIRED	626	TR
3	Silencer	1229A	GREY	TR

Set #1B
Doors: 6004J, 6004K, 6004L, 6004M

3	Hinges	FBB179 4.5" x 4.5"	26D	ST
1	Lockset Office	9K3-7EA14D PATD S3B	626	BE
1	Closer	1461 REGARM	AL	LC
1	Floor Stop or Wall Stop	1215CKU or 1270CV - AS REQUIRED	626	TR
1	Smoke Seal	5075 B @ HEAD & JAMBS		NA
1	Sweep Brush	B606 A		NA

Set #1C
Doors: 6004H

3	Hinges	FBB179 4.5" x 4.5"	26D	ST
1	Passage Set	9K3-0N14D S3B	626	BE
1	Closer	1461 REGARM	AL	LC
1	Floor Stop or Wall Stop	1215CKU or 1270CV - AS REQUIRED	626	TR
1	Smoke Seal	5075 B @ HEAD & JAMBS		NA
1	Sweep Brush	B606 A		NA

Set #2
Doors: 6004D, 6115, 6203

3	Hinges	FBB179 4.5" x 4.5"	26D	ST
1	Passage Set	9K3-0N14D S3B	626	BE
1	Floor Stop or Wall Stop	1215CKU or 1270CV - AS REQUIRED	626	TR
3	Silencer	1229A	GREY	TR

Set #3
Doors: 6004A, 6004B, 6317A, 6317B

3	Hinges	FBB168 4.5" x 4.5"	26D	ST
1	Exit Device Passage	98L-BE-F x 996L-BE-R&V 17	US26D	VO
1	Closer w/Stop Arm	4040XP SCUSH	AL	LC
1	Smoke Seal	5075 B @ HEAD & JAMBS		NA
1	Sweep Brush	B606 A		NA

Set #4
Doors: 6C02

6	Hinges	FBB168 4.5" x 4.5" NRP	26D	ST
2	Electric Power Transfer	EPT 10 CON	SP28	VO
1	Exit Device EO REX	RX 9827EO-F CON LBR	US26D	VO
1	Exit Device EO Delayed Egress	CXA 9827EO-F CON LBRAFL	US26D	VO
1	Mortise Cylinder @ Chexit	1E-74 PATD	626	BE
1	Electromagnetic HO Wall Mnt	REUSE EXISTING		BY
2	Closer	4040XPT DE STDTRK w/BUMP	AL	LC
1	Meeting Edge Astragal	5070 B		
1	Smoke Seal	5075 B @ HEAD & JAMBS		NA
2	Power Supply Extension	CON-6W		SC
2	Wire Harness	CON-192		SC
2	Wire Harness	CON-12		SC
2	Door Position Switch	PROVIDED BY SECURITY ACCESS		BY
1	Card Reader	PROVIDED BY SECURITY ACCESS		BY
1	Power Supply	PS904 900-4RL-FA		VO

Note: Electromagnetic hold open used at RH door swinging into Corridor only. No electromagnetic hold open used at LHR door swinging out of corridor into lobby.

END OF SECTION 08 71 00

SECTION 08 80 00

GLAZING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Glass for the following:

a. Doors.
b. Interior borrowed lites.

2. Glazing sealants and accessories.
3. Monolithic Glass Units: See end of Section for detailed glass schedule.

a. GL-1: Clear annealed float glass.
b. GL-1S: Clear fully tempered float glass.

1.2 DEFINITIONS

A. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.

B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.

C. IBC: International Building Code.

1.3 COORDINATION

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

1.4 DELIVERY, STORAGE, AND HANDLING

A. Protect glazing materials according to manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations for Glass: Obtain from single source from single manufacturer for each glass type.

B. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.

2.2 PERFORMANCE REQUIREMENTS

A. General: Installed glazing systems shall withstand normal thermal movement without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.

B. Safety Glazing: Where safety glazing is indicated, provide glazing that complies with 16 CFR 1201, Category II.

C. Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:

1. For monolithic-glass lites, properties are based on units with lites 6 mm thick.
2. Visible Reflectance: Center-of-glazing values, according to NFRC 300.

2.3 GLASS PRODUCTS, GENERAL

A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below unless more stringent requirements are indicated. See these publications for glazing terms not otherwise defined in this Section or in referenced standards.

1. GANA Publications: "Glazing Manual."

B. Safety Glazing Labeling:

1. Where safety glazing is indicated, permanently mark glazing with certification label of one of the following:

a. SGCC.
b. Another certification agency acceptable to authorities having jurisdiction.
c. Manufacturer.

2. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.

C. Thickness: Where glass thickness is indicated, it is a minimum.

D. Strength:

1. Where annealed float glass is indicated, provide annealed float glass, heat-strengthened float glass, or fully tempered float glass as needed to comply with "Performance Requirements" Article.
2. Where heat-strengthened float glass is indicated, provide heat-strengthened float glass or fully tempered float glass as needed to comply with "Performance Requirements" Article.
3. Where fully tempered float glass is indicated, provide fully tempered float glass.

2.4 GLASS PRODUCTS

A. Clear Annealed Float Glass: ASTM C 1036, Type I, Class 1 (clear), Quality-Q3.

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

1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.

2.5 GLAZING SEALANTS

A. General:

1. Compatibility: Compatible with one another and with other materials they contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
3. Application Limitations: As indicated.
4. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.

B. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 50, Use NT.

1. Application Limitations:

a. Not for use at expansion joints.

C. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 25, Use NT.

1. Application Limitations:

a. Not for use at expansion joints.

D. Glazing Sealant: Acid-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 25, Use NT.

1. Application Limitations:

a. Interior exposure only.
b. Not for use at expansion joints.

2.6 MISCELLANEOUS GLAZING MATERIALS

A. General: Provide products of material, size, and shape complying with referenced glazing standard, with requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.

D. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.

E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

F. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

2.7 FABRICATION OF GLAZING UNITS

A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

B. Butt-Glazed Lite: Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites to produce square edges with slight chamfers at junctions of edges and faces.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine framing, glazing channels, and stops, with Installer present, for compliance with the following:

1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
2. Minimum required face and edge clearances.
3. Effective sealing between joints of glass-framing members.

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

3.2 PREPARATION

A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

3.3 GLAZING, GENERAL

A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

B. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass includes glass with edge damage or other imperfections that, when installed, could weaken glass, impair performance, or impair appearance.

C. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

D. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

E. Provide spacers for glass lites where length plus width is larger than 50 inches.

1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
2. Provide 1/8-inch minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.

F. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.

G. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

3.4 CLEANING AND PROTECTION

A. Immediately after installation remove nonpermanent labels and clean surfaces.

B. Protect glass from contact with contaminating substances resulting from construction operations. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains.

1. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer. Remove and replace glass that cannot be cleaned without damage to coatings.

C. Remove and replace glass that is damaged during construction period.

D. Wash glass on both exposed surfaces not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

3.5 MONOLITHIC GLASS SCHEDULE

A. Glass Type GL-1: Clear annealed float glass.

1. Minimum Thickness: 6 mm.

B. Glass Type GL-1S: Clear fully tempered float glass.

1. Minimum Thickness: 6 mm.
2. Safety glazing required.

END OF SECTION 08 80 00

SECTION 08 85 13

GLAZING HARDWARE FOR LITE AND PANEL GLAZING

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 following hardware for installing lite and panel glazing:

1. Track/channel hardware.

1.3 COORDINATION

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

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect glazing hardware according to manufacturer's written instructions. Prevent damage to hardware from condensation or other causes.

1.6 FIELD CONDITIONS

A. Field Measurements: Verify actual dimensions of openings and construction contiguous with glazing lite/panel units and hardware installation by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations for Glazing Hardware: Obtain from single source from single manufacturer, for each product type and installation method.

2.2 GLAZING MATERIALS

A. Glazing Sealants, Tapes, and Miscellaneous Glazing Materials:

1. Colors: As selected by Architect from manufacturer's full range.

2.3 TRACK/CHANNEL HARDWARE

A. Continuous Bottom Floor Track for Wet Sealed Glazing:

1. Dimensions: 1 inch high with channel width for glass thickness indicated on Drawings.
2. Material and Finish: Mill finish or clear anodized.

B. Continuous Top Ceiling Track for Wet Sealed Glazing:

1. Dimensions: 1-1/2 inches high with channel width for glass thickness indicated on Drawings.
2. Material and Finish: Mill finish or clear anodized.

C. Fasteners: Fabricated of same basic metal and alloy as fastened metal and matching it in finished color and texture where fasteners are exposed.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine glazing lite/panel framing members, with Installer present, for compliance with the following:

1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
2. Minimum required face or edge clearances.
3. Effective sealing between joints of glazing lite/panel framing members.

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

3.2 PREPARATION

A. Clean glazing channels, grips, and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

B. Examine glazing lite/panel units to locate orientation of outer surfaces[as indicated on Drawings]. Label or mark units as needed so that surface orientation is readily identifiable. Do not use materials that leave visible marks in the completed Work.

3.3 INSTALLATION

A. Set glazing lite/panel units in each series true in line with uniform orientation, pattern, draw, bow, and similar characteristics.

B. Set glazing lite/panel units with proper orientation so that each outer surface faces the direction indicated on Drawings.

C. Set glazing lite/panel units in locations indicated on Drawings.

1. Install lite/panel units with hardware and accessories according to hardware manufacturer's written instructions.
2. Attach hardware securely to mounting surfaces.

END OF SECTION 08 85 13

SECTION 09 22 16

NON-STRUCTURAL METAL FRAMING

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. Non-load-bearing steel framing systems for interior partitions and soffits clad with the following:

    a. Gypsum board.

2. Conventional and grid suspension systems for interior ceilings clad with the following:

    a. Gypsum board.

B. Components used with fire-resistance-rated head of wall systems (other than top metal track assembly) are specified in Section 07 84 43 "Joint Firestopping."

C. Contractor's Discretion:

1. Steel Framing: Provide steel studs and track fabricated from conventional steel sheet or embossed, high strength steel sheet.
2. Partition Head of Wall Systems:

    a. For fire-resistance-rated head of wall systems (at Partition Types R###) provide joint firestopping utilizing slip-type head joints of any type indicated or firestop track of any type indicated, except:

        1) Where head of wall is exposed to view, provide joint firestopping specified for exposed locations only.

    b. For non-fire-resistance-rated head of wall systems (at Partition Types A### and S###) provide slip-type head joints of any type indicated, except:

        1) Where head of wall is exposed to view, provide slip-type head joints specified for exposed locations only.

3. For Metal Suspension Framing: Provide either of following:

    a. Metal framing fabricated from conventional sheet steel.
    b. Metal framing fabricated from embossed, high strength sheet steel.
    c. Grid suspension system.

1.3 DEFINITIONS

A. Partition types are indicated on Drawings as:

1. Types A### for Acoustic rated partitions.
2. Types R### for Fire-Resistive-Rated partitions.
3. Types S### for Standard partitions (not fire-resistive-rated or acoustic-rated).
4. Types F### for Furred partitions.

B. Walls: In this Section the term "walls" is synonymous with the term "partition walls" or "partitions."

C. Composite Partition Assemblies: Clad continuously full height on both sides of stud framing.

D. Non-Composite Partition Assemblies: Clad full height on only one side of stud framing; or clad partial height on either side of stud framing.

E. Steel sheet thickness for metal framing specified in this Section is for uncoated conventional steel sheet. Where thickness is indicated by gage, comply with minimum thickness indicated in table below.

STEEL SHEET THICKNESSES				
DW = Drywall ST = Structural	Flat Steel Sheet			Gage Equivalent for Dimpled Steel Sheet
Gage	Uncoated Thickness	Minimum Thickness	Design Thickness	Uncoated Thickness
	Inch	Mils	Inch	Inch
25	0.018	18	0.0188	0.015
22	0.027	27	0.0283	-
20 DW	0.030	30	0.0312	0.025
20 ST	0.033	33	0.0346	0.028
18	0.043	43	0.0451	-
16	0.054	54	0.0566	-
14	0.068	68	0.0713	-
12	0.097	97	0.1017	-
10	0.118	118	0.1242	-

F. Tie wire and hanger wire diameters (uncoated) and corresponding U.S. steel wire gage are indicated in the table below:

WIRE DIAMETER				
	Minimum Steel Base Metal (Uncoated) Diameter			Minimum Steel Base Metal (Uncoated) Diameter
Gage	Inch		Gage	Inch
20	0.0348		13	0.0915
19	0.0410		12	0.1055
18	0.0475		11	0.1205
17	0.0540		10	0.1350
16	0.0625		9	0.1483
14	0.0800		8	0.1620

G. Dry Exposures: A location not normally subjected to dampness or wetness. A location classified as dry may be temporarily subject to dampness or wetness, as in the case of kitchens or locker rooms.

H. Damp Exposures: Locations protected from weather and not subject to saturation with water or other liquids but subject to moderate degrees of moisture. Examples of such locations include partially protected locations under canopies, marquees, roofed open balconies/porches, and like locations; and interior locations subject to moderate degrees of moisture, such as rooms with tubs and pools, rooms open to damp and wet exposures, crawl spaces, and like locations.

I. Wet Exposures: Unprotected locations exposed to weather; locations subject to saturation with water or other liquids, such as showers, vehicle washing areas; installations underground or in concrete slabs or masonry in direct contact with the earth; installations in direct contact with water or other liquids, such as pools, fountains, and like locations.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product. Include the following:

1. Image or description of label or other identifying mark applied to steel studs and track visually indicating metal thickness or gage.
2. Embossed, High Strength Steel Studs and Tracks: Include framing manufacturer produced Limiting Wall Height table(s). Include letter signed by authorized representative of framing contractor certifying that steel thicknesses used in framing will comply with framing manufacturer's LWH tables for stud height or length, depth, lateral load, and deflection indicated for each partition type required Project.

B. Design Variation(s) for Suspended Ceilings: Where indicated, Contractor may propose variations in sizing and spacing of suspension hangers, carrying channels, and furring channels from those specified. For each area and variation proposed, submittal shall include the following:

1. Ceiling area for which variation is proposed.
2. All applicable tables from ASTM C754 annotated to indicate proposed variation(s).

1.5 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For the following from ICC-ES, an ANSI/CLASS ISO 17065 accredited agency, or other qualified agency acceptable to authorities having jurisdiction.

1. Embossed, high strength steel studs and tracks.
2. Firestop tracks.
3. Power-actuated hanger fasteners.
4. Screw type hanger fasteners.

1.6 QUALITY ASSURANCE

A. Code-Compliance Certification of Studs and Tracks: Framing members shall be certified according to the product-certification program of the Certified Steel Stud Association, the Steel Framing Industry Association, or the Steel Stud Manufacturers Association.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated, according to ASTM E119 by an independent testing agency.

B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated on Drawings, according to ASTM E90 and classified according to ASTM E413 by an independent testing agency.

C. Structural Performance: of Partition Assemblies Select stud base-steel thickness based on following criteria:

1. Gypsum Board Clad Partitions:

   a. Stud Depth and Spacing: As indicated on Drawings Partition Type Diagrams.
   b. Horizontal Deflection: As indicated on Drawings Limiting Wall Height (LWH) Tables.
   c. Horizontal Loading: 5 lbf/sq. ft., except as follows:

      1) Partitions at Perimeter of Shafts (Shaftwalls): Base-steel thickness shall be selected from framing manufacturer's published LWH Tables using the following criteria:

         a) Non-Pressurized Shafts Open through 4 to 7 floor levels. 7.5 lbf/sq. ft..
         b) Non-Pressurized Shafts Open Through 8 floor levels or more: 10 lbf/sq. ft..
         c) Pressurized Shafts: 15 lbf/sq. ft..

2.2 FRAMING MEMBERS, GENERAL

A. Comply with ASTM C754 for conditions indicated.

1. Steel Sheet Components: Comply with ASTM C645 requirements for metal unless otherwise indicated.
2. Protective Coating: See Part 1 Article for Definitions of Dry, Damp, and Wet Exposures.

   a. Framed Assemblies at Dry Exposures: Hot dip galvanized per ASTM A653/A653M, G40 or coating with equivalent corrosion resistance of ASTM A653/A653M, G40, unless otherwise indicated.
   b. Framed Assemblies at Damp and Wet Exposures: Hot dip galvanized per ASTM A653/A653M, G60. Wet and damp exposures include, but are not limited to, the following:

      1) Shower rooms and rooms containing water spray devices.
      2) Toilet rooms and bathrooms with openings, including doorways, to shower rooms.
      3) Locker rooms with openings, including doorways, to shower rooms.

2.3 FRAMING SYSTEMS FOR PARTITIONS AND SOFFITS

A. Studs and Tracks: ASTM C645. Use either conventional steel studs and tracks or embossed, high-strength steel studs and tracks.

1. Conventional Steel Studs and Tracks:

a. Minimum Base-Metal Thickness: As indicated on Drawing's Limiting Wall Height (LWH) Tables. Partition Type Drawings refer to LWH Table used for determining minimum base-steel thickness based on Limiting Wall Height of stud.

b. Depth: As indicated on Drawings.

2. Embossed, High Strength Steel Studs and Tracks: Roll-formed and embossed with surface deformations to stiffen the framing members so that they are structurally comparable to conventional ASTM C645 steel studs and tracks.:

a. Minimum Base-Metal Thickness: As required by structural performance requirements specified under Part 2 Article "Performance Requirements" and as selected from thicknesses available from manufacturer's published LWH Tables.
b. Depth: As indicated on Drawings.

B. Slip-Type Head Joints: Where indicated, provide system capable of allowing partition heads to expand and contract with movement of the structure to prevent axial loading on partition.

1. Minimum Vertical Movement: As indicated on Drawings.
2. Provide one of the following:

a. Clip System: Clips designed for use in head-of-wall deflection conditions that provide a positive attachment of studs to tracks while allowing for vertical movement indicated.

b. Single Long-Leg Track System: ASTM C645 top track with 2-inch- deep flanges in thickness not less than indicated for studs, installed with studs friction fit into top track and with continuous bridging located within 12 inches of the top of studs to provide lateral bracing.
c. Double-Track System: ASTM C645 top outer tracks, inside track with 2-inch- deep flanges in thickness not less than indicated for studs and fastened to studs, and outer track sized to friction fit over inner track.
d. Deflection Track: Steel sheet top track manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.

3. Firestop Tracks: Top track manufactured to allow partition heads to expand and contract with movement of structure while maintaining continuity of fire-resistance-rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs. Only products reported under ICC-ES will be accepted.

C. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.

1. Minimum Base-Metal Thickness:

a. For Bracing: 0.018 inch unless indicated otherwise on Drawings.

b. For Blocking: 0.033 inch unless indicated otherwise on Drawings.

D. Cold-Rolled Channel Bridging: Steel, 0.053-inch minimum base-steel thickness, with minimum 1/2-inch- wide flanges.

1. Depth: 1-1/2 inches unless indicated otherwise on Drawings.
2. Clip Angle: Not less than 1-1/2 by 1-1/2 inches, 0.068-inch- thick, galvanized steel.

E. Hat-Shaped, Rigid Furring Channels: ASTM C645.

1. Minimum Base-Metal Thickness: 0.018 inch unless indicated otherwise on Drawings.
2. Depth: As indicated on Drawings.

F. Resilient Furring Channels: 1/2-inch- deep, steel sheet members designed to reduce sound transmission.

1. Configuration: As indicated on Drawings.

G. Z-Shaped Furring: With slotted or nonslotted web, face flange of 1-1/4 inches, wall attachment flange of 7/8 inch.

1. Minimum Base-Metal Thickness: 0.018 inch unless indicated otherwise on Drawings.
2. Depth: As indicated on Drawings.

2.4 SUSPENSION SYSTEMS

A. Tie Wire: ASTM A641/A641M, Class 1 zinc coating, soft temper, 0.062-inch- diameter wire, or double strand of 0.048-inch- diameter wire.

B. Hanger Attachments to Concrete:

1. Post-Installed Anchors: For securing hangers to structure.

a. Type: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on following ICC-ES reports as appropriate for the substrate.

1) Torque-controlled, expansion anchor; ICC-ES AC01 Expansion Anchors in Masonry Elements.
2) Torque-controlled, expansion anchor; ICC-ES AC193 Mechanical Anchors in Concrete Elements.
3) Torque-controlled, adhesive anchor; ICC-ES AC308 Post-Installed Adhesive Anchors Installed in Concrete Elements.
4) Adhesive anchor; ICC-ES AC58 Adhesive Anchors Installed in Masonry Elements.

b. Material:

1) For Interior Locations with Dry Exposure: Carbon-steel components zinc-plated to comply with ASTM B633 or ASTM F1941 (ASTM F1941M), Class Fe/Zn 5, unless otherwise indicated.
2) For Interior Locations with Damp Exposures, and where Stainless Steel Is Indicated: Alloy Group 1 (A1) stainless-steel bolts, ASTM F593 (ASTM F738M), and nuts, ASTM F594 (ASTM F836M).
3) For Interior Locations with Wet Exposures: Alloy Group 2 (A4) stainless-steel bolts, ASTM F593 (ASTM F738M), and nuts, ASTM F594 (ASTM F836M).

c. Adhesive Anchor Limitations: Adhesive anchors shall not be used to resist tension loads in fire-resistive rated assemblies unless approved for such use in evaluation report or approved by authorities having jurisdiction.

2. Power-Actuated Anchors: For securing hangers to structure.

a. Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70 Power-actuated Fasteners Driven into Concrete, Steel and Masonry Elements.
b. Limit use to interior locations with Dry Exposure only.

C. Screw Fasteners: For securing hangers to Metal Decking (Not Concrete Filled). Self-tapping screw designed for use with sheet metal decking; fastener includes self-drilling point and self-tapping threaded shank below a washer-like collar, and above the collar a smooth, straight shank transitioning to a flattened portion with an hole for attaching ceiling suspension wire; manufactured from steel with corrosion resistant coating.

1. Only fasteners with a Evaluation Service Report from ICC-ES, Technical Evaluation Report from an ANSI/CLASS ISO 17065 accredited agency, or other agency approved by the AHJ will be accepted.
2. Use of screw shall be limited to weight not exceeding that which ceiling system's hanger wire supports, as allowed by manufacturer's Service or Technical Evaluation Report with respect to base metal thickness and minimum tensile strength of metal roof decking.
3. Available Products: Subject to compliance with requirements, products that may be incorporated in the work include, but are not limited to the following:

a. Doc's Marketing Corp.; I-LAG Brand Eye Lag Screws, 175 SD or 750 SD (ICC ESR-3135).
b. Or Equal.

D. Wire Hangers: ASTM A641/A641M, Class 1 zinc coating, soft temper, in following size:

1. Not less than 0.1055 inch inch diameter. Provide greater diameter as required for conditions indicated per ASTM C754, Table 6. See Part 3 Article "Installing Ceiling Suspension Systems" for Design Variation options.

E. Round Rod and Flat Sheet/Bar Hangers: Steel sheet, bar, or rod, length sufficient for conditions indicated on Drawings, in following size:

1. Not less than 3/16 inch dia. rod. Provide larger size rod, rectangular sheet, or bar as required for conditions indicated per ASTM C754, Table 6. See Part 3 Article "Installing Ceiling Suspension Systems" for Design Variation options.

F. Carrying Channels (Main Runners): Cold-rolled, commercial-steel sheet with a base-steel thickness of 0.053 inch and minimum 1/2-inch- wide flanges.

1. Depth: 1-1/2 inches, unless indicated otherwise on Drawings. Do not exceed allowable spans indicated under Table 7 of ASTM C754. See Part 3 Article "Installing Ceiling Suspension Systems" for Design Variation options.

G. Furring Channels (Furring Members):

1. Steel Studs and Tracks: ASTM C645.

a. Minimum Base-Steel Thickness: 0.018 inch unless indicated otherwise on Drawings.
b. Depth: As follows unless indicated otherwise on Drawings:

1) For Spans Not Exceeding 5 ft.: 1-5/8 inches.
2) For Spans Not Exceeding 6 ft.: 2-1/2 inches.
3) For Spans Not Exceeding 8 ft.: 3-5/8 inches.

2. Embossed, High Strength Steel Studs and Tracks: ASTM C645.

a. Minimum Base-Steel Thickness: 0.015 inch unless indicated otherwise on Drawings.
b. Depth: As follows unless indicated otherwise on Drawings:

1) For Spans Not Exceeding 5 ft.: 1-5/8 inches.
2) For Spans Not Exceeding 6 ft.: 2-1/2 inches.
3) For Spans Not Exceeding 8 ft.: 3-5/8 inches.

3. Hat-Shaped, Rigid Furring Channels: ASTM C645, 7/8 inch deep.

a. Minimum Base-Steel Thickness: 0.018 inch unless indicated otherwise on Drawings.
b. For spans not exceeding 4 ft..

4. Resilient Furring Channels: 1/2-inch- deep members designed to reduce sound transmission.

a. Configuration: Asymmetrical unless hat shaped indicated on Drawings.

H. Grid Suspension System for Gypsum Board Ceilings: ASTM C645, direct-hung system composed of main beams and cross-furring members that interlock.

2.5 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards.

1. Fasteners for Steel Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance of the Work.

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

3.2 PREPARATION

A. Suspended Assemblies: Coordinate installation of suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive hangers at spacing required to support the Work and that hangers will develop their full strength.

1. Furnish concrete inserts and other devices indicated to other trades for installation in advance of time needed for coordination and construction.

3.3 INSTALLATION, GENERAL

A. Install framing and accessories plumb, square, and true to line, with connections securely fastened.

B. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.

C. Install bracing at terminations in assemblies.

D. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

3.4 INSTALLING FRAMED ASSEMBLIES

A. Installation Standard: ASTM C754.

1. Gypsum Board Assemblies: Also comply with requirements in ASTM C840 that apply to framing installation.

B. Install framing system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.

1. For partitions, comply with spacings indicated on Partition Types Drawings.
2. For framed assemblies other than partitions, but including soffits, comply with ASTM C754, Table 1 except as follows:

a. Tile Backing Panels: 16 inches o.c. maximum.

C. Install studs so flanges within framing system point in same direction.

D. Install tracks at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts that penetrate partitions above ceiling.

1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install track section (for cripple studs) at head and secure to jamb studs.

a. Install two studs at each jamb unless otherwise indicated.

b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch clearance from jamb stud to allow for installation of control joint in finished assembly.

3. Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
4. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.

a. Firestop Track: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.

5. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.

E. Direct Furring:

1. Screw to wood framing.
2. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.

F. Z-Shaped Furring Members:

1. Space furring members as indicated on Drawings.
2. Except at exterior corners, securely attach narrow flanges of furring members to wall with concrete stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.
3. At exterior corners, attach wide flange of furring members to wall with short flange extending beyond corner; on adjacent wall surface, screw-attach short flange of furring channel to web of attached channel. At interior corners, space second member no more than 12 inches from corner.

G. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

3.5 INSTALLING CEILING SUSPENSION SYSTEMS

A. Installation Standard: ASTM C754.

1. Gypsum Board Assemblies: Also comply with requirements in ASTM C840 that apply to framing installation.

B. Install suspension system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.

1. Hangers: 48 inches o.c. unless indicated otherwise on Drawings. Contractor may submit Design Variation, at their discretion, allowed by ASTM C754, Tables 6 & 7 for each area and condition indicated.
2. Carrying Channels, Main Runners, and Main Grid Beams: 48 inches o.c. unless indicated otherwise on Drawings. Contractor may submit Design Variation, at their discretion, allowed by ASTM C754, Tables 6 & 7 for each area and condition indicated.
3. Furring Channels (Furring Members): 16 inches o.c. unless indicated otherwise on Drawings. Contractor may submit Design Variation, at their discretion, allowed by ASTM C754, Tables 1 & 2 for each area and condition indicated.

C. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.

D. Suspend hangers from building structure as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.

    a. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.

2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.

    a. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced installation standards.

3. Wire Hangers: Secure by looping and wire tying, either directly to structures or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.
4. Round Rod and Flat Sheet/Bar Hangers: Secure to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices and fasteners that are secure and appropriate for structure and hanger, and in a manner that will not cause hangers to deteriorate or otherwise fail.
5. Do not connect or suspend steel framing from ducts, pipes, or conduit.

E. Fire-Resistance-Rated Assemblies: Wire tie furring channels to supports.

F. Grid Suspension Systems: Attach perimeter wall track or angle where grid suspension systems meet vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.

G. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

END OF SECTION 09 22 16

SECTION 09 29 00

GYPSUM BOARD

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Interior gypsum board.

B. Components used with fire-resistance-rated head of wall systems are specified under Section 07 84 43 "Joint Firestopping." Metal top runner for metal wall framing are selected under Section 09 22 16 "Non-Structural Metal Framing."

1.3 DEFINITIONS

A. Partition type are indicated on Drawings as:

1. Types A### for Acoustic rated partitions.
2. Types R### for Fire-Resistive-Rated partitions.
3. Types S### for Standard partitions (neither fire-resistive- or acoustic rates).
4. Types F### for Furred partitions.

B. Wet and Humid Spaces: Includes, but is not limited to, the following:

1. Toilet rooms
2. Bath rooms.
3. Shower rooms.
4. Locker rooms abutting shower rooms and bath rooms.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.5 DELIVERY, STORAGE AND HANDLING

A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

1.6 FIELD CONDITIONS

A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.

B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.

C. Do not install panels that are wet, those that are moisture damaged, and those that are mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

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

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

2.2 GYPSUM BOARD, GENERAL

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

2.3 INTERIOR GYPSUM BOARD

A. Gypsum Wallboard, Regular Type: ASTM C 1396/C 1396M.

1. Thickness: As indicated on Drawing's Partition Type sheets.
2. Long Edges: Tapered.

B. Gypsum Board, Type X: ASTM C 1396/C 1396M.

1. Thickness: As indicated on Drawing's Partition Type sheets.
2. Long Edges: Tapered.

C. Moisture- and Mold-Resistant Gypsum Board: ASTM C 1396/C 1396M. With moisture- and mold-resistant core and paper surfaces.

1. Core: As indicated on Drawing's Partition Type sheets.
2. Long Edges: Tapered.

3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.
4. Application: Painted walls and partitions in wet and humid spaces.

D. Gypsum Board, Type C: ASTM C 1396/C 1396M. Manufactured to have increased fire-resistive capability.

1. Thickness: As required by fire-resistance-rated assembly indicated on Drawing's Partition Type sheets.
2. Long Edges: Tapered.

2.4 TRIM ACCESSORIES

A. Interior Trim for Dry Spaces: ASTM C 1047.

1. Material: Any of the following:

a. Galvanized or aluminum-coated steel sheet.
b. Rolled zinc.
c. Paper-faced galvanized steel sheet

2. Shapes:

a. Cornerbead.
b. LC-Bead: J-shaped; exposed long flange receives joint compound.
c. L-Bead: L-shaped; exposed long flange receives joint compound.
d. U-Bead: J-shaped; exposed short flange does not receive joint compound.
e. Expansion (control) joint.

B. Interior Trim for Backing Panels and Wet or Humid Spaces: ASTM C 1047.

1. Material: Any of the following:

a. Galvanized or aluminum-coated steel sheet.
b. Rolled zinc.

2. Shapes:

a. Cornerbead.
b. LC-Bead: J-shaped; exposed long flange receives joint compound.
c. L-Bead: L-shaped; exposed long flange receives joint compound.
d. U-Bead: J-shaped; exposed short flange does not receive joint compound.
e. Expansion (control) joint.

2.5 JOINT TREATMENT MATERIALS

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

B. Joint Tape:

1. Interior Gypsum Board: Paper.

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

1. Prefilling: At open joints and damaged surface areas, use setting-type taping compound.
2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use the following:

    a. Dry Spaces: Drying-type, all-purpose compound, except:

        1) Use setting-type taping compound for installing paper-faced metal trim accessories.
        2) Setting-type taping compound may be used at Contractor's discretion.

    b. Wet or Humid Spaces: Setting-type taping compound.

3. Fill Coat: For second coat, use the following:

    a. Dry Spaces: Drying-type, all-purpose compound, except setting-type, sandable topping may be used at Contractor's discretion.
    b. Wet or Humid Spaces: Setting-type sandable topping compound.

4. Finish Coat: For third coat, use the following:

    a. Dry Spaces: Drying-type, all-purpose compound, except setting-type, sandable topping may be used at Contractor's discretion.
    b. Wet or Humid Spaces: Setting-type sandable topping compound.

5. Skim Coat: For final coat of Level 5 finish, use the following:

    a. Dry Spaces: Either of following:

        1) Drying-type, all-purpose compound, except setting-type, sandable topping compound may be used at Contractor's discretion.
        2) High-build interior coating product designed for application by airless sprayer and to be used instead of skim coat to produce Level 5 finish.

    b. Wet or Humid Spaces: Setting-type, sandable topping compound.

2.6 AUXILIARY MATERIALS

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

B. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.

1. Use screws comply with ASTM C 1002 for fastening panels to steel members less than 0.033 inch thick (20 ga. ST).
2. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch thick.

C. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.

1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.

D. Acoustical Joint Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

1. Sealant shall have a VOC content of 250 g/L or less.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates including welded hollow-metal frames and framing, with Installer present, for compliance with requirements and other conditions affecting performance.

B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.

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

3.2 APPLYING AND FINISHING PANELS, GENERAL

A. Comply with ASTM C 840.

B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.

C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.

D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.

E. Form control and expansion joints with space between edges of adjoining gypsum panels.

F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.

1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
2. Fit gypsum panels around ducts, pipes, and conduits.
3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8 inch- wide joints to install sealant.

G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4- to 1/2 inch- wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

I. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written recommendations for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.

J. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

3.3 APPLYING INTERIOR GYPSUM BOARD

A. Install interior gypsum board in the following locations:

1. Wallboard Type: As indicated on Drawings.
2. Type X: Vertical surfaces unless otherwise indicated.

B. Single-Layer Application:

1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing unless otherwise indicated.
2. On partitions/walls, apply gypsum panels vertically (parallel to framing) unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.

    a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
    b. At stairwells and other high walls, install panels horizontally unless otherwise indicated or required by fire-resistance-rated assembly.

3. On Z-furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
4. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

C. Multilayer Application:

1. On ceilings, apply gypsum board indicated for base layers before applying base layers on walls/partitions; apply face layers in same sequence. Apply base layers at right angles to framing members and offset face-layer joints one framing member, 16 inches minimum, from parallel base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly.
2. On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.
3. On Z-furring members, apply base layer vertically (parallel to framing) and face layer either vertically (parallel to framing) or horizontally (perpendicular to framing) with vertical joints offset at least one furring member. Locate edge joints of base layer over furring members.

4. Fastening Methods:

    a. For acoustic rated partitions Types A### comply with acoustic performance test references indicated on Drawing's Partition Types sheet.
    b. For fire-resistive-rated partitions Types R### comply with fire-resistance test references indicated on Drawing's Partition Types sheet.
    c. For standard partition Types S### and furred partition Types F### fasten base layers and face layers separately to supports with screws or fasten base layers with screws and fasten face layers with adhesive and supplementary fasteners.

3.4 INSTALLING TRIM ACCESSORIES

A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.

B. Control Joints: Install control joints according to ASTM C 840 (System XIII: Control (Expansion) Joints) and in specific locations approved by Architect for visual effect.

C. Interior Trim: Install in the following locations:

1. Cornerbead: Use at outside corners unless otherwise indicated.
2. LC-Bead: Use at panel edges where edge is exposed to view.
3. L-Bead: Use at panel edges stopping short of another material or abutting another material, where edge is not exposed to view, and where panel face is exposed to view.
4. U-Bead: Use at panel edges receiving sealant, and where face of panel is not exposed to view.

3.5 FINISHING GYPSUM BOARD

A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.

B. Prefill open joints and damaged surface areas.

C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.

D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:

1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
2. Level 4:

    a. At following locations:

        1) At panel surfaces that will be exposed to view unless otherwise indicated.

    b. Primer and its application to surfaces are specified in Section 09 91 23 "Interior Painting."
3. Level 5:

    a. At following locations:

        1) At panel surfaces recieving smooth, gloss sheen paints and coatings.

b. Primer and its application to surfaces are specified in Section 09 91 23 "Interior Painting."

3.6 PROTECTION

A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.

B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

C. Remove and replace panels that are wet, moisture damaged, and mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 09 29 00

SECTION 09 51 13

ACOUSTICAL PANEL CEILINGS - ACT-1

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 suspended ceiling system(s) with the following:

1. Acoustical Panels - ACT-1.
2. Exposed suspension system for ACT-1.
3. Metal edge moldings and trim.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of size indicated below.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For finishes to include in maintenance manuals.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Quantity required is specified under Section 01 78 46 "Extra Stock Materials."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver acoustical panels, suspension-system components, and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.

B. Before installing acoustical panels, permit them to reach room temperature and a stabilized moisture content.

C. Handle acoustical panels carefully to avoid chipping edges or damaging units in any way.

1.7 FIELD CONDITIONS

A. Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Class A: Flame spread index 0 - 25; smoke developed index 0 - 450.

2.2 ACOUSTICAL PANELS, GENERAL

A. Source Limitations: Obtain each type of acoustical ceiling panel and supporting suspension system from single source from single manufacturer.

B. Acoustical Panel Standard: Provide manufacturer's standard panels of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectances unless otherwise indicated.

1. Mounting Method for Measuring NRC: Type E-400; plenum mounting in which face of test specimen is 15-3/4 inches away from test surface according to ASTM E 795.

C. Acoustical Panel Colors and Patterns: Match appearance characteristics indicated for each product type.

1. Where appearance characteristics of acoustical panels are indicated by referencing pattern designations in ASTM E 1264 and not manufacturers' proprietary product designations, provide products selected by Architect from each manufacturer's full range that comply with requirements indicated for type, pattern, color, light reflectance, acoustical performance, edge detail, and size.

2.3 ACOUSTICAL PANELS - ACT-1

A. Basis-of-Design Product: Subject to compliance with requirements, provide Armstrong product indicated on Drawings or comparable product by one of the following:

1. CertainTeed Corp.
2. USG Interiors, Inc.; Subsidiary of USG Corporation.

B. Classification: Provide panels complying with ASTM E 1264 for type, form, and pattern as follows:

1. Type and Form: Type IV, mineral base with membrane-faced overlay; Form 2, water felted; with fiberglass-fabric overlay on face.

C. Color: White.

D. LR: Not less than 0.85.

E. NRC: Not less than 0.75 .

F. CAC: Not less than 35.

G. AC: Not less than 170.

H. Edge/Joint Detail: Reveal sized to fit flange of exposed suspension-system members.

I. Thickness: 3/4 inch.

J. Modular Size: 24 by 24 inches .

K. Broad Spectrum Antimicrobial Fungicide and Bactericide Treatment: Provide acoustical panels treated with manufacturer's standard antimicrobial formulation that inhibits fungus, mold, mildew, and gram-positive and gram-negative bacteria and showing no mold, mildew, or bacterial growth when tested according to ASTM D 3273 and evaluated according to ASTM D 3274 or ASTM G 21.

2.4 METAL SUSPENSION SYSTEMS, GENERAL

A. Metal Suspension-System Standard: Provide manufacturer's standard direct-hung metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable requirements in ASTM C 635/C 635M.

B. Hanger Attachments to Concrete:

1. Post-Installed Anchors: For securing hangers to structure.

a. Type: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on following ICC-ES reports as appropriate for the substrate.

1) Torque-controlled, expansion anchor; ICC-ES AC01 Expansion Anchors in Masonry Elements.
2) Torque-controlled, expansion anchor; ICC-ES AC193 Mechanical Anchors in Concrete Elements.
3) Torque-controlled, adhesive anchor; ICC-ES AC308 Post-Installed Adhesive Anchors Installed in Concrete Elements.
4) Adhesive anchor; ICC-ES AC58 Adhesive Anchors Installed in Masonry Elements.

b. Material:

1) For Interior Locations with Dry Exposure: Carbon-steel components zinc-plated to comply with ASTM B633 or ASTM F1941 (ASTM F1941M), Class Fe/Zn 5, unless otherwise indicated.

2) For Exterior and Interior Locations with Damp Exposures, and where Stainless Steel Is Indicated: Alloy Group 1 (A1) stainless-steel bolts, ASTM F593 (ASTM F738M), and nuts, ASTM F594 (ASTM F836M).
3) For Exterior and Interior Locations with Wet Exposures: Alloy Group 2 (A4) stainless-steel bolts, ASTM F593 (ASTM F738M), and nuts, ASTM F594 (ASTM F836M).

c. Adhesive Anchor Limitations: Adhesive anchors shall not be used to resist tension loads in fire-resistive rated assemblies unless approved for such use in evaluation report or approved by authorities having jurisdiction.

2. Power-Actuated Anchors: For securing hangers to structure.

a. Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70 Power-actuated Fasteners Driven into Concrete, Steel and Masonry Elements.
b. Limit use to interior locations with Dry Exposure only.

C. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:

1. For Interior Locations with Dry Exposure: Zinc-coated, carbon-steel wire complying with ASTM A 641/A 641M, Class 1 zinc coating, soft temper.
2. Size: Select wire diameter so its stress at three times hanger design load (ASTM C 635/C 635M, Table 1, "Direct Hung") will be less than yield stress of wire, but provide not less than 0.106-inch diameter wire.

2.5 METAL SUSPENSION SYSTEM - ACT-1

A. Wide-Face, Capped, Double-Web, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet; prepainted, electrolytically zinc coated, or hot-dip galvanized according to ASTM A 653/A 653M, not less than G30 coating designation; with prefinished 15/16-inch wide metal caps on flanges.

1. Structural Classification: Intermediate -duty system.
2. End Condition of Cross Runners: Override (stepped) or butt-edge type.
3. Face Design: Flat, flush.
4. Cap Material: Steel or aluminum cold-rolled sheet.
5. Cap Finish: Painted white .

2.6 METAL EDGE MOLDINGS AND TRIM

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

1. Provide manufacturer's standard edge moldings that fit acoustical panel edge details and suspension systems indicated and that match width and configuration of exposed runners unless otherwise indicated.
2. For circular penetrations of ceiling, provide edge moldings fabricated to diameter required to fit penetration exactly.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.

B. Examine acoustical panels before installation. Reject acoustical panels that are wet, moisture damaged, or mold damaged.

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

3.2 PREPARATION

A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders, and comply with layout shown on reflected ceiling plans.

3.3 INSTALLATION

A. General: Install acoustical panel ceilings to comply with ASTM C 636/C 636M and seismic design requirements indicated, according to manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."

B. Suspend ceiling hangers from building's structural members and as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension-system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
4. Secure wire hangers to ceiling-suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
5. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, postinstalled mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
6. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
7. Space hangers not more than 48 inches o.c. along each member supported directly from hangers unless otherwise indicated; provide hangers not more than 8 inches from ends of each member.
8. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.

C. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.

1. Attach moldings to substrate at intervals not more than 16 inches o.c. and not more than 3 inches from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet. Miter corners accurately and connect securely.
2. Do not use exposed fasteners, including pop rivets, on moldings and trim.

    a. Where use of exposed fasteners is unavoidable, use only pop rivets with heads factory finished to match moldings and trim.

D. Install suspension-system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.

E. Install acoustical panels with undamaged edges and fit accurately into suspension-system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide a neat, precise fit.

1. Arrange directionally patterned acoustical panels as follows:

    a. As indicated on reflected ceiling plans.
2. For reveal-edged panels on suspension-system runners, install panels with bottom of reveal in firm contact with top surface of runner flanges.
3. Paint cut edges of panel remaining exposed after installation; match color of exposed panel surfaces using coating recommended in writing for this purpose by acoustical panel manufacturer.

3.4 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and prepare test reports.

B. Assist Owner's testing agency in performing the following tests of completed installations of acoustical panel ceiling hangers and anchors and fasteners in successive stages and beginning when installation of ceiling suspension systems on each floor has reached 20 percent completion but no panels have been installed. Do not proceed with installations of acoustical panel ceiling hangers for the next area until test results for previously completed installations show compliance with requirements.

1. Within each test area, testing agency will select one of every 10 power-actuated fasteners and postinstalled anchors used to attach hangers to concrete and will test them for 200 lbf of tension; it will also select one of every two postinstalled anchors used to attach bracing wires to concrete and will test them for 440 lbf of tension.
2. When testing discovers fasteners and anchors that do not comply with requirements, testing agency will test those anchors not previously tested until 20 pass consecutively and then will resume initial testing frequency.

C. Acoustical panel ceiling hangers and anchors and fasteners will be considered defective if they do not pass tests and inspections.

D. Owner's testing agency will prepare testing reports

3.5 CLEANING

A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension-system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 09 51 13

SECTION 09 65 13

RESILIENT BASE AND ACCESSORIES - B-1 TS-1

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. Thermoset-rubber base or,
2. Thermoplastic-rubber base.
3. Rubber molding and metal edge strip (TS-1) accessories.

B. Base Product Option: Provide either thermoset-rubber or thermoplastic-rubber base at Contractor's discretion.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples for Verification: For each type of product indicated and for each color, texture, and pattern required in manufacturer's standard-size Samples, but not less than 12 inches long.

1.4 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Quantity required is specified under Section 01 78 46 "Extra Stock Materials."

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F.

1.6 FIELD CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive resilient products during the following time periods:

1. 48 hours before installation.
2. During installation.
3. 48 hours after installation.

B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.

C. Install resilient products after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 THERMOSET-RUBBER BASE

A. Basis-of-Design Product: Subject to compliance with requirements, provide Roppe Corporation, USA product indicated on Drawings or comparable product by one of the following:

1. Burke Mercer Flooring Products, Division of Burke Industries Inc.
2. Flexco.

B. Product Standard: ASTM F 1861, Type TS (rubber, vulcanized thermoset), Group I (solid, homogeneous).

1. Style and Location:

a. Style A, Straight: Provide in areas with carpet.
b. Style B, Cove: Provide in areas with resilient flooring.

C. Thickness: 0.125 inch.

D. Height: As indicated on Drawings.

E. Lengths: Coils in manufacturer's standard length.

F. Outside Corners: Job formed.

G. Inside Corners: Job formed.

H. Colors: Match color indicated by manufacturer's designations on Drawings.

2.2 THERMOPLASTIC-RUBBER BASE

A. Basis-of-Design Product: Subject to compliance with requirements, provide Roppe Corporation, USA product indicated on Drawings or comparable product by one of the following:

1. AB; American Biltrite.
2. Allstate Rubber Corp.
3. Armstrong World Industries, Inc.
4. Burke Mercer Flooring Products, Division of Burke Industries Inc.
5. Flexco.
6. Johnsonite; A Tarkett Company.

7. Mondo Rubber International, Inc.
8. Nora Systems, Inc.
9. VPI, LLC, Floor Products Division.

B. Product Standard: ASTM F 1861, Type TP (rubber, thermoplastic).

1. Group: I (solid, homogeneous).
2. Style and Location:

a. Style A, Straight: Provide in areas with carpet.
b. Style B, Cove: Provide in areas with resilient flooring.

C. Thickness: 0.125 inch.

D. Height: As indicated on Drawings.

E. Lengths: Coils in manufacturer's standard length.

F. Outside Corners: Job formed.

G. Inside Corners: Job formed.

H. Colors: Match color indicated by manufacturer's designations on Drawings.

2.3 RUBBER MOLDING ACCESSORY

A. Basis of Design Products: Subject to compliance with requirements, provide the following:

1. Roppe Corporation, USA.
2. Or comparable products by, but not limited to, the following:

a. VPI, LLC, Floor Products Division.

B. Description:

1. Carpet and Tile or Sheet Flooring Joiner: For transitions between carpet and ceramic tile, resilient tile and resilient sheet provide one or more of the following products as required to fit transition profile and dimension conditions:

a. Roppe; #50 Tile/Carpet Joiner 7/32".
b. Roppe; #60 Tile/Carpet Joiner 3/8".
c. Roppe; #56 Tile/Carpet Joiner 1/2".

2. Carpet Edge for Glue-Down Applications. For transitions between carpet unfinished slab or deck provide one or more of the following products as required to fit transition profile and dimension conditions:

a. Roppe; #42 Custom Carpet Edging 3/16" Undercut.
b. Roppe #43 Custom Carpet Edging 1/4" Undercut.
c. Roppe; #38 Glue-Down Carpet Edge 1/4".
d. Roppe #40 Carpet Edge Guard 9/32".
e. Roppe; #39 Glue-Down Carpet Edge 5/16".

3. Reducer Strip for Resilient Floor Covering. For transitions between resilient flooring (tile and sheet) and unfinished slab or deck provide one or more of the following products as required to fit transition profile and dimension conditions:

   a. Roppe; #21 Reducer Strip 0.080".
   b. Roppe; #22 Reducer Strip 1/8".
   c. Roppe; #48 Reducer Strip 3/32".
   d. Roppe; #23 Reducer Strip 3/16".
   e. Roppe; #25 Reducer Strip 5/16".
   f. Roppe; #26 Reducer Strip 3/8".
   g. Roppe; #20 Transitional Reducer 7/16".
   h. Roppe; #49 Transitional Reducer 9/16".

C. Locations: Provide rubber molding accessories in areas indicated.

D. Colors and Patterns: As selected by Architect from full range of industry colors.

2.4 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by resilient-product manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by resilient-product manufacturer for resilient products and substrate conditions indicated.

1. Adhesives shall have a VOC content of 50 g/L or less.

C. Metal Edge Strips - TS-1: Extruded aluminum with mill finish of width and height required to protect exposed edges of flooring, and in maximum available lengths to minimize running joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.

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

1. Installation of resilient products indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.

B. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.

C. Do not install resilient products until they are the same temperature as the space where they are to be installed.

1. At least 48 hours in advance of installation, move resilient products and installation materials into spaces where they will be installed.

D. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient products.

3.3 RESILIENT BASE INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient base.

B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.

C. Install resilient base in lengths as long as practical without gaps at seams and with tops of adjacent pieces aligned.

D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.

E. Do not stretch resilient base during installation.

F. Job-Formed Corners:

1. Outside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches in length.

a. Form without producing discoloration (whitening) at bends.

2. Inside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches in length.

a. Miter or cope corners to minimize open joints.

3.4 RESILIENT MOLDING ACCESSORY INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient accessories.

B. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of floor covering that would otherwise be exposed.

3.5 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protecting resilient products.

B. Perform the following operations immediately after completing resilient-product installation:

1. Remove adhesive and other blemishes from exposed surfaces.
2. Sweep and vacuum horizontal surfaces thoroughly.
3. Damp-mop horizontal surfaces to remove marks and soil.

C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

D. Cover resilient products subject to wear and foot traffic until Substantial Completion.

END OF SECTION 09 65 13

SECTION 09 65 19.23

VINYL TILE FLOORING - LVT-1

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. Luxury vinyl tile - LVT-1.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples for Verification: Full-size units of each color and pattern of floor tile required.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each type of floor tile to include in maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Quantity required is specified under Section 01 78 46 "Extra Stock Materials."

1.7 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs workers for this Project who are competent in techniques required by manufacturer for floor tile installation and seaming method indicated.

1. Engage an installer who employs workers for this Project who are trained or certified by floor tile manufacturer for installation techniques required.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store floor tile and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F. Store floor tiles on flat surfaces.

1.9 FIELD CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 65 deg F or more than 85 deg F, in spaces to receive floor tile during the following time periods:

1. 48 hours before installation.
2. During installation.
3. 48 hours after installation.

B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 65 deg F or more than 85 deg F.

C. Close spaces to traffic during floor tile installation.

D. Close spaces to traffic for 48 hours after floor tile installation.

E. Install floor tile after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: For resilient tile flooring, as determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.

1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

2.2 LUXURY VINYL FLOOR TILE - LVT-1

A. Basis-of-Design Product: Subject to compliance with requirements, provide Armstrong World Industries, Inc. product indicated on Drawings or comparable product by one of the following:

1. AB; American Biltrite.
2. Altro Group.
3. Amtico International Inc.
4. Armstrong World Industries, Inc.
5. Burke Mercer Flooring Products, Division of Burke Industries Inc.
6. Flexco, Inc.
7. Johnsonite; A Tarkett Company.
8. Roppe Corporation, USA.

B. Tile Standard: ASTM F 1700.

1. Class: Class III, printed film vinyl tile.
2. Type: B, embossed surface.

C. Thickness: 0.100 inch.

D. Size: As indicated on Drawing's Finish Legend .

E. Seaming Method for Installation:

1. Seams butted.

F. Colors and Patterns: Matching that indicated by manufacturer's designations on Drawings Finish Legend.

2.3 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by floor tile manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by floor tile and adhesive manufacturers to suit floor tile and substrate conditions indicated.

1. Adhesives shall have following VOC content:

a. Luxury Vinyl Floor Tile: 50 g/L or less.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of floor tile.

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

3.2 PREPARATION

A. Prepare substrates according to floor tile manufacturer's written instructions to ensure adhesion of resilient products.

B. Concrete Substrates: Prepare according to ASTM F 710.

1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.

2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by floor tile manufacturer. Do not use solvents.
3. Alkalinity and Adhesion Testing: Perform tests recommended by floor tile manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than 9 pH.
4. Moisture Testing: Proceed with installation only after substrates pass testing according to floor tile manufacturer's written recommendations, but not less stringent than the following:

    a. Perform anhydrous calcium chloride test according to ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
    b. Perform relative humidity test using in situ probes according to ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level.

C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.

D. Do not install floor tiles until they are the same temperature as the space where they are to be installed.

1. At least 48 hours in advance of installation, move resilient floor tile and installation materials into spaces where they will be installed.

E. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient floor tile.

3.3 FLOOR TILE INSTALLATION

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

B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.

1. Lay tiles in pattern indicated.

C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.

1. Lay tiles in pattern of colors and sizes indicated.

D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.

E. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.

F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent marking device.

G. Install floor tiles on covers for telephone and electrical ducts, building expansion-joint covers, and similar items in finished floor areas. Maintain overall continuity of color and pattern between pieces of tile installed on covers and adjoining tiles. Tightly adhere tile edges to substrates that abut covers and to cover perimeters.

H. Adhered Tile: Adhere to flooring substrates to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections. Use a full spread of adhesive applied to substrate unless recommended otherwise by flooring manufacturer.

3.4 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protecting floor tile.

B. Perform the following operations immediately after completing floor tile installation:

1. Remove adhesive and other blemishes from exposed surfaces.
2. Sweep and vacuum surfaces thoroughly.
3. Damp-mop surfaces to remove marks and soil.

C. Protect floor tile from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

D. Cover floor tile until Substantial Completion.

END OF SECTION 09 65 19.23

SECTION 09 68 13

TILE CARPETING - CPT-1 -2 -3

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 the following:

1. Modular carpet tile - CPT-1 -2 - 3.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review methods and procedures related to carpet tile installation including, but not limited to, the following:

a. Review delivery, storage, and handling procedures.
b. Review ambient conditions and ventilation procedures.
c. Review subfloor preparation procedures.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include manufacturer's written data on physical characteristics, durability, and fade resistance.
2. Include manufacturer's written installation recommendations for each type of substrate.

B. Samples: For each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.

1. Carpet Tile: Full-size Sample.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For carpet tiles to include in maintenance manuals. Include the following:

1. Methods for maintaining carpet tile, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
2. Precautions for cleaning materials and methods that could be detrimental to carpet tile.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Quantity required is specified under Section 01 78 46 "Extra Stock Materials."

1.8 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who is certified by the International Certified Floorcovering Installers Association at the Commercial II certification level.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Comply with CRI 104 Section 4.0 "Storage and Handling."

1.10 FIELD CONDITIONS

A. Comply with CRI 104 Section 7.0 "Site Conditions" for temperature, humidity, and ventilation limitations.

B. Environmental Limitations: Do not deliver or install carpet tiles until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at occupancy levels during the remainder of the construction period.

C. Do not install carpet tiles over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive and concrete slabs have pH range recommended by carpet tile manufacturer.

D. Where demountable partitions or other items are indicated for installation on top of carpet tiles, install carpet tiles before installing these items.

1.11 WARRANTY

A. Special Warranty for Carpet Tiles: Manufacturer agrees to repair or replace components of carpet tile installation that fail in materials or workmanship within specified warranty period.

1. Warranty does not include deterioration or failure of carpet tile due to unusual traffic, failure of substrate, vandalism, or abuse.
2. Failures include, but are not limited to, the following:

a. More than 10 percent edge raveling, snags, and runs.
b. Dimensional instability.
c. Excess static discharge.
d. Loss of tuft-bind strength.
e. Loss of face fiber.
f. Delamination.

3. Warranty Period: Minimum 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 CARPET TILE - CPT-1 -2 -3

A. Basis-of-Design Product: Subject to compliance with requirements, provide Mannington products indicated on Drawings Finish Schedule. Substitutions will not be accepted.

B. Color, Pattern and other Characteristic: Matching product indicated by manufacturer's designations.

C. Fiber Content: 100 percent nylon 6, 6.

D. Density: 240.34 kg/sq. m.

E. Pile Thickness: 0.028 inch for finished carpet tile.

F. Gage: 5/64 (64 ends per 5 inches).

G. Total Weight: 23 oz/sq. yd for finished carpet tile.

H. Primary Backing/Backcoating: Manufacturer's standard composite materials .

I. Secondary Backing: Manufacturer's standard material.

J. Size: As indicated on Drawings Finish Legend.

K. Applied Soil-Resistance Treatment: Manufacturer's standard material.

L. Antimicrobial Treatment: Manufacturer's standard material.

M. Sustainable Design Requirements:

1. Sustainable Product Certification: Gold level certification according to ANSI/NSF 140.

N. Performance Characteristics: As follows:

1. Critical Radiant Flux Classification: Not less than 0.45 W/sq. cm (Class 1) according to NFPA 253 or ASTM E648.
2. Dimensional Stability: 0.2 percent or less according to ISO 2551 (Aachen Test).
3. Antimicrobial Activity: Not less than 2-mm halo of inhibition for gram-positive bacteria, not less than 1-mm halo of inhibition for gram-negative bacteria, and no fungal growth, according to AATCC 174.
4. Electrostatic Propensity: Less than 3.0 kV according to AATCC 134.

2.2 INSTALLATION ACCESSORIES

A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer.

B. Adhesives: Water-resistant, mildew-resistant, nonstaining, pressure-sensitive type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet tile and is recommended by carpet tile manufacturer for releasable installation.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet tile performance.

B. Examine carpet tile for type, color, pattern, and potential defects.

C. Concrete Slabs: Verify that that surfaces are free of cracks, ridges, depressions, scale, and foreign deposits.

1. Moisture Testing: Perform tests so that each test area does not exceed 1000 sq. ft., and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.

a. Anhydrous Calcium Chloride Test: ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
b. Relative Humidity Test: Using in situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.
c. Perform additional moisture tests recommended in writing by adhesive and carpet tile manufacturers. Proceed with installation only after substrates pass testing.

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

3.2 PREPARATION

A. General: Comply with CRI 104, Sections 7.0, "Site Conditions" and 8.0 "Substrate Preparation," and with carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile.

B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions 1/8 inch wide or wider and protrusions more than 1/32 inch unless more stringent requirements are required by manufacturer's written instructions.

C. Concrete Substrates: Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by adhesive and carpet tile manufacturers.

D. Broom and vacuum clean substrates to be covered immediately before installing carpet tile.

3.3 INSTALLATION

A. General: Comply with CRI 104, Section 10, "Carpet Tile Installation," and with carpet ile manufacturer's written installation instructions.

B. Installation Method, - CPT-1:

1. As recommended in writing by carpet tile manufacturer.

C. Maintain dye lot integrity. Do not mix dye lots in same area.

D. Maintain pile-direction patterns indicated on Drawings.

E. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet tile manufacturer.

F. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.

G. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish carpet tile as marked on subfloor. Use nonpermanent, nonstaining marking device.

H. Install pattern parallel to walls and borders.

3.4 CLEANING AND PROTECTION

A. Perform the following operations immediately after installing carpet tile:

1. Remove excess adhesive and other surface blemishes using cleaner recommended by carpet tile manufacturer.
2. Remove yarns that protrude from carpet tile surface.
3. Vacuum carpet tile using commercial machine with face-beater element.

B. Protect installed carpet tile to comply with CRI 104, Section 11, "Post Installation."

C. Protect carpet tile against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet tile manufacturer.

END OF SECTION 09 68 13

SECTION 09 91 23

INTERIOR PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

1. Steel and iron.
2. Gypsum board.

B. See INTERIOR PAINTING SCHEDULE at end of Section.

1.3 DEFINITIONS

A. MPI Gloss Level 1 (Flat): Not more than five units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.

B. MPI Gloss Level 2 (Velvet-Like): Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.

C. MPI Gloss Level 3 (Eggshell-Like): 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.

D. MPI Gloss Level 4 (Satin-Like): 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.

E. MPI Gloss Level 5 (Semi-Gloss): 35 to 70 units at 60 degrees, according to ASTM D 523.

F. MPI Gloss Level 6 (Gloss): 70 to 85 units at 60 degrees, according to ASTM D 523.

G. MPI Gloss Level 7 (High Gloss): More than 85 units at 60 degrees, according to ASTM D 523.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

1. Include Printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
2. Indicate VOC content.

3. MSDS: Submit Material Safety Data Sheets (MSDS) for all coatings to the University Project Manager prior to application

B. Samples for Verification: For each type of paint system and in each color and gloss of topcoat.

1. Submit Samples on rigid backing, 8 inches square.
2. Apply coats on Samples in steps to show each coat required for system.
3. Label each coat of each Sample.
4. Label each Sample for location and application area.

1.5 QUALITY ASSURANCE

A. All painting must be of journeyman level craftsmanship, paying special attention to preparation, etching, priming and undercoating.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.7 FIELD CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.

B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Behr Process Corporation.
2. Benjamin Moore & Co.
3. Diamond Vogel Paints.
4. Glidden Professional.
5. PPG Paints.
6. Pratt & Lambert.
7. Sherwin-Williams Company (The).

B. Products (As Scheduled): Subject to compliance with requirements provide products listed in the Interior Painting Schedule at end of this Section. Products are listed (with some exceptions) by MPI number and shall be selected from the "MPI Approved Products Lists" (see www.paintinfo.com/mpi/approved/Manufactory_index.shtml). Equivalent products not included in the "MPI Approved Products Lists" shall be submitted as substitution requests.

2.2 PAINT, GENERAL

A. MPI Standards: Unless indicated otherwise, products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products Lists," except if approved by a substitution request.

B. Material Compatibility:

1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.

C. Colors: As indicated on Drawings Paint Schedule.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

1. Gypsum Board: 12 percent.

C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.

D. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.

E. Proceed with coating application only after unsatisfactory conditions have been corrected.

1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

D. Bare Steel Substrates: Remove rust, loose mill scale, and residual coatings, if any. Clean using methods recommended in writing by paint manufacturer but not less than the following:

1. Substrates Not Subject to Wetting by Condensation, Dampness, or Humidity: SSPC-SP 2, Hand Tool Cleaning or SSPC-SP 3, Power Tool Cleaning as required to achieve a clean surface.
2. Substrates Subject to Wetting by Condensation, Dampness, or Humidity: SSPC-SP 7/NACE No. 4, Brush-Off Blast Cleaning or SSPC-SP 11, Power Tool Cleaning to Bare Metal.

E. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 (Shop, Field, and Maintenance Painting of Steel) for touching up shop-primed surfaces.

3.3 APPLICATION

A. Apply paints according to manufacturer's written instructions and to recommendations in "MPI Manual."

1. Use applicators and techniques suited for paint and substrate indicated.
2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.

B. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

C. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

3.4 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.5 INTERIOR PAINTING SCHEDULE

A. Steel Substrates.

1. Institutional Low-Odor/VOC Latex System MPI INT 5.1S:

a. 1st Prime Coat: One of following:

1) Rust inhibitive, water based MPI #107.
2) Shop primer specified in Section where substrate is specified.

b. 2nd Prime Coat (Required): Rust inhibitive, water based MPI #107.
c. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat. Apply where Premium Grade system is indicated.
d. Topcoat: One of following matching gloss level indicated:

1) Latex, interior, institutional low odor/VOC, semi-gloss (MPI Gloss Level 5), MPI #147.

B. Gypsum Board Substrates.

1. Institutional Low-Odor/VOC Latex System MPI INT 9.2M:

a. Prime Coat: Primer sealer, interior, institutional low odor/VOC, MPI #149.
b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat. Apply where Premium Grade system is indicated.
c. Topcoat: One of following matching gloss level indicated:

1) Ceilings: Latex, interior, institutional low odor/VOC, flat (MPI Gloss Level 1), MPI #143.
2) Typical: Latex, interior, institutional low odor/VOC (MPI Gloss Level 2), MPI #144.
3) Typical: Latex, interior, institutional low odor/VOC (MPI Gloss Level 3), MPI #145.
4) Typical: Latex, interior, institutional low odor/VOC (MPI Gloss Level 4), MPI #146.
5) Wet Areas: Latex, interior, institutional low odor/VOC, semi-gloss (MPI Gloss Level 5), MPI #147.

END OF SECTION 09 91 23

SECTION 09 93 00

STAINING AND TRANSPARENT FINISHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes surface preparation and application of transparent finishes on the following substrates:

1. Interior Substrates:

a. Existing wood door panels.

1.3 DEFINITIONS

A. MPI Gloss Level 5 (Semi-Gloss): 35 to 70 units at 60 degrees, according to ASTM D 523.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.5 FIELD CONDITIONS

A. Apply finishes only when temperature of surfaces to be finished and ambient air temperatures are between 50 and 95 deg F.

B. Do not apply finishes when relative humidity exceeds 85 percent, at temperatures less than 5 deg F above the dew point, or to damp or wet surfaces.

C. Do not apply exterior finishes in snow, rain, fog, or mist.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Benjamin Moore & Co.
2. PPG Architectural Finishes, Inc.
3. Sherwin-Williams Company (The).

2.2 MATERIALS, GENERAL

A. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products List."

B. Material Compatibility:

1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, products shall be recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

C. VOC Content: For field applications, paints and coatings shall comply with VOC content limits of authorities having jurisdiction and the following VOC content limits:

1. Clear Wood Finishes, Varnishes: 275 g/L.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Maximum Moisture Content of Interior Wood Substrates: 15 percent, when measured with an electronic moisture meter.

C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

D. Proceed with finish application only after unsatisfactory conditions have been corrected.

1. Beginning finish application constitutes Contractor's acceptance of substrates and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and finishing.

1. After completing finishing operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

C. Clean and prepare surfaces to be finished according to manufacturer's written instructions for each substrate condition and as specified.

1. Remove dust, dirt, oil, and grease by washing with a detergent solution; rinse thoroughly with clean water and allow to dry. Remove grade stamps and pencil marks by sanding lightly. Remove loose wood fibers by brushing.
2. Remove mildew by scrubbing with a commercial wash formulated for mildew removal and as recommended by stain manufacturer.

D. Interior Wood Substrates:

1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
2. Apply wood filler paste to open-grain woods, as defined in "MPI Architectural Painting Specification Manual," to produce smooth, glasslike finish.
3. Sand surfaces exposed to view and dust off.
4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dry.

3.3 APPLICATION

A. Apply finishes according to manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual."

1. Use applicators and techniques suited for finish and substrate indicated.
2. Finish surfaces behind movable equipment and furniture same as similar exposed surfaces.
3. Do not apply finishes over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.

B. Apply finishes to produce surface films without cloudiness, holidays, lap marks, brush marks, runs, ropiness, or other surface imperfections.

3.4 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing finish application, clean spattered surfaces. Remove spattered materials by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from finish application. Correct damage by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced finished wood surfaces.

3.5 INTERIOR WOOD -FINISH-SYSTEM SCHEDULE

A. Wood Substrates: Existing wood door panels.

1. Water-Based Varnish System MPI INT 6.3Q:

a. Prime Coat: Water-based varnish matching topcoat.
b. Intermediate Coat: Water-based varnish matching topcoat.
c. Topcoat: Varnish, water based, clear, semi-gloss (MPI Gloss Level 5), MPI #129.

END OF SECTION 09 93 00

SECTION 10 14 00 - SIGNAGE

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. Way finding signs.

a. Type A1 - Directional by Department.
b. Type A2 - Directional by Room Number.
c. Type B1 - Room Identification (Room Number with Paper Insert).
d. Type B2 - Suite Identification (Room Number with Paper Insert).
e. Type B3 - Room Identification (no number).
f. Type B4 - Identification Frame.
g. Type C - Room Number.
h. Type E - Unique Door Identification.
i. Type F - Exterior Door Identification.
j. Type G - Elevator Identification.
k. Type H - Paper Insert: For use with Type B1, B2, and B4.

2. Safety/Code Signs.

a. Type L - Room Capacity.
b. Type M1 - Outside the Stair/Stairwell.
c. Type M2 - Outside the Transitional Stair/Stairwell.
d. Type N - Inside the Stair/Stairwell.
e. Type Q - Emergency Quick Reference Guide.

1.3 DEFINITIONS

A. Accessible: In accordance with the accessibility standard.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For panel signs.

1. Include fabrication and installation details and attachments to other work.
2. Show sign mounting heights, locations of supplementary supports to be provided by others, and accessories.

3. Show message list, typestyles, graphic elements, including raised characters and Braille, and layout for each sign at least half size.

C. Samples for Verification: For each type of sign assembly showing all components and with the required finish(es), in manufacturer's standard size unless otherwise indicated and as follows:

1. Panel Signs: Not less than 12 inches square, including corner.
2. Room-Identification Signs: Full-size Sample.
3. Field-Applied, Vinyl-Character Signs: Full-size Sample of characters on glass.
4. Variable Component Materials: Full-size Sample of each base material, character (letter, number, and graphic element) in each exposed color and finish not included in Samples above.
5. Exposed Accessories: Full-size Sample of each accessory type.

D. Sign Schedule: Use same designations specified.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

1.6 CLOSEOUT SUBMITTALS

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

1.7 QUALITY ASSURANCE

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

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Accessibility Standard: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities and ICC/ANSI A117.1-2003 for signs.

2.2 SIGNS

A. Basis-of-Design Product: Subject to compliance with requirements, provide ASI Sign Systems (303-755-0997); ASI Interior 20 Series (including Interior "Paperflex" "Inhouse" updatable signs and other basis of design products indicated) or comparable products by one of the following:

1. Art Form Signs (303-975-4641).
2. Forum Engraving (303-761-8084).

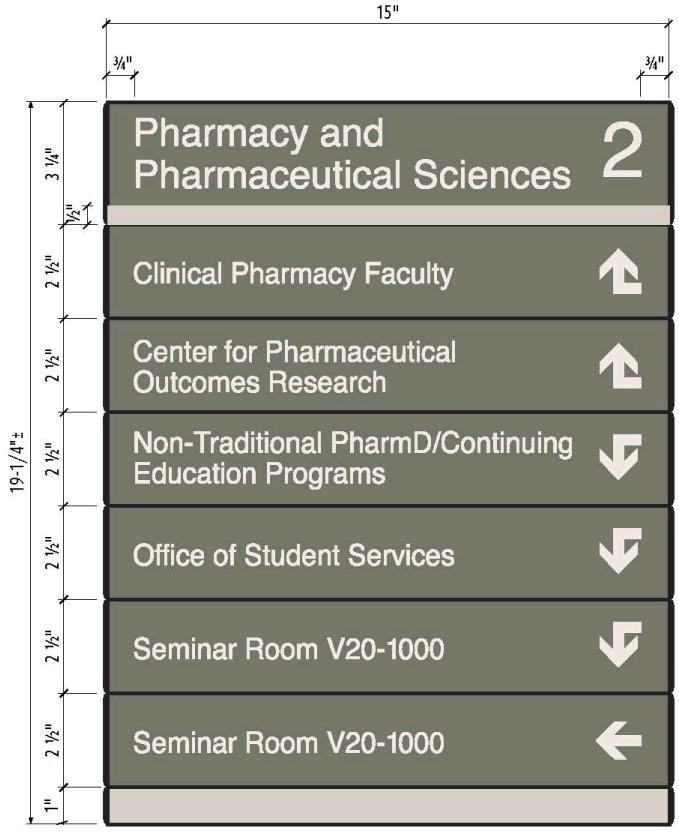
B. Way Finding Signs.

1. Type A1 - Directional by Department.

a. Location: Place one wall mounted sign at each corridor junction and main entry points in each building. The size of the sign can vary depending on the quantity of department names required; use two signs if required due to sign length limitations. Locate to be most readily visible to the preponderance of the traffic flow at the intersection.
b. Header Panel: Provide 1-1/2" Helvetica Regular font for floor level number, and 3/4" Helvetica Regular font for building name.
c. Tenant Panel: Provide 5/8" Helvetica Regular font. Arrows indicate which direction to go for each department, conference room, etc.
d. Colors:

1) Main Background Color: ASI color SC-903 Medium Grey.
2) Font: ASI color SC-922 Bone.
3) Rule Line: ASI color SC-906 Cool Grey (where applicable).

e. Mounting: Wall Rails with adhesive.
f. The following illustrations represent examples of long and short length signs.



2. Type A2 - Directional by Room Number.

   a. Location: Place one overhead sign at each corridor junction where a wall is not available to accept a Type A1 sign. Indicate room number ranges in lieu of departments.
   b. Type: Double Faced or single faced as appropriate for conditions indicated.
   c. Text: 3" Helvetica Regular, #, Condensed 80 percent font. Provide uppercase letters only.
   d. Colors:

      1) Main Background Color: ASI color SC-903 Medium Grey.
      2) Font: ASI color SC-922 Bone.
      3) Rule Line: ASI color SC-906 Cool Grey (where applicable).

   e. Mounting: Ceiling Mounted.
   f. The following illustration represents an example of sign.

3. Type B1 - Room Identification (Room Number with Paper Insert).

   a. Location: Place at each active corridor entrance to a room, install a sign with the room number. Not used for mechanical, electrical, janitorial, telecom, restrooms, or most storage rooms.
   b. Header Panel: Provide raised text, 5/8" Helvetica Regular font with 24 pt, grade II Braille 3/8" below copy. Provide uppercase letters at all letters within the room number text except the last character, where applicable.
   c. Paper insert content, font, and character size may vary per building. Coordinate with the University Project Manager. Provide paper for insert and computer program with all fonts to the University.

1) Paper insert (Sign Type H) content may vary and can include the following information: Administrative unit name, the name(s) if each individual(s) working in the room, and individual's title (this will be the department's option). Coordinate with the University Project Manager.

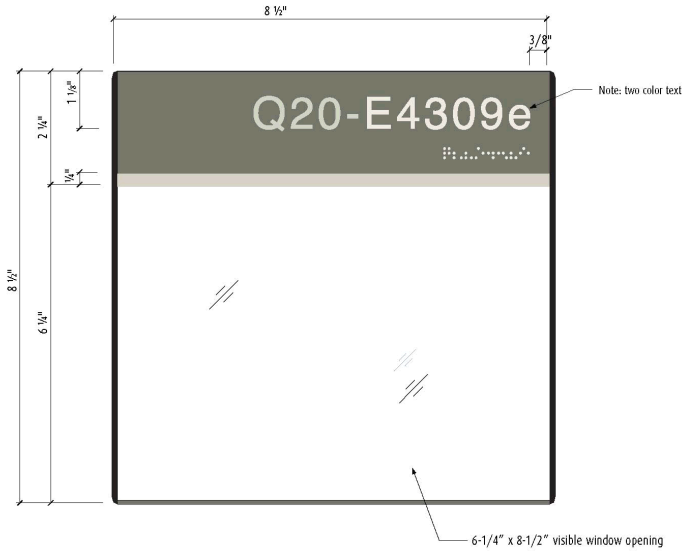
d. Colors:

1) Main Background Color: ASI color SC-903 Medium Grey.
2) Building number and dash: ASI color SC-906 Cool Grey.
3) Rule line: ASI color SC-906 Cool Grey.
4) Font & Logos: ASI color SC-922 Bone.
5) Paper Insert: White.

e. Mounting: Wall Rails with adhesive.

1) Top of sign to be 60" from the finished floor surface on the latch side of the door, with the sign edge one inch from the door frame. Where architectural constraints preclude this location, the Building Administrator will determine an alternate location through the University Project Manager.

f. The following illustration represents an example of sign.



4. Type B2 - Suite Identification (Room Number with Paper Insert).

a. Location: Place at each active corridor entrance to a suite, install a sign with the range of room numbers. Not used for mechanical, electrical, janitorial, telecom, restrooms, or most storage rooms.
b. Header Panel: Provide raised text, 5/8" Helvetica Regular font with 24 pt, grade II Braille 3/8" below copy. Provide uppercase letters only.
c. Paper insert content, font, and character size may vary per building. Coordinate with the University Project Manager. Provide paper for insert and computer program with all fonts to the University.

1) Paper insert (Sign Type H) content may vary and can include the following information: Administrative unit name, the name(s) if each individual(s) working in the room, and individual's title (this will be the department's option). Coordinate with the University Project Manager.

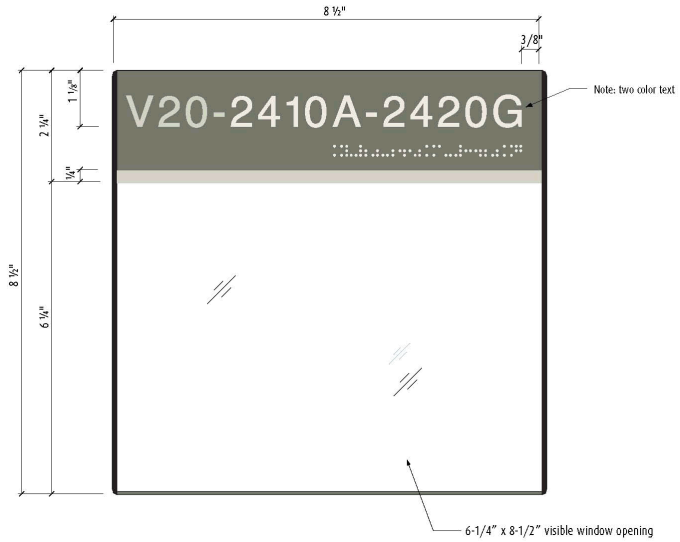
d. Colors:

1) Main Background Color: ASI color SC-903 Medium Grey.
2) Building number and dash: ASI color SC-906 Cool Grey.
3) Rule line: ASI color SC-906 Cool Grey.
4) Font & Logos: ASI color SC-922 Bone.
5) Paper Insert: White.

e. Mounting: Wall Rails with adhesive.

1) Top of sign to be 60" from the finished floor surface on the latch side of the door, with the sign edge one inch from the door frame. Where architectural constraints preclude this location, the Building Administrator will determine an alternate location through the University Project Manager.

f. The following illustration represents an example of sign.

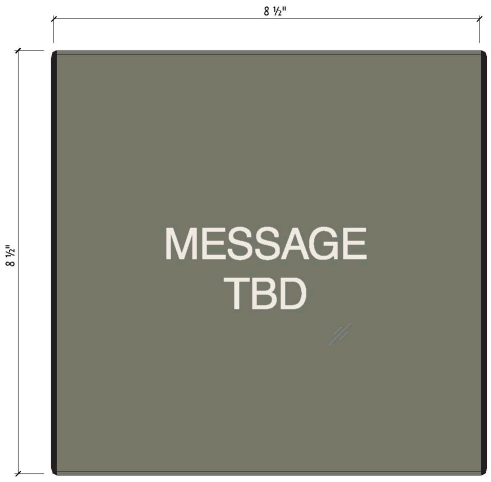


5. Type B3 - Room Identification (no number).

a. Location: Placed directly below sign type B1 or B2 when used to provide additional suite or room information.
b. Provide 5/8" Helvetica Regular font. Coordinate text with the University Project Manager.
c. Option: Silk Screen Symbol. Coordinate with the University Project Manager.
d. Colors:

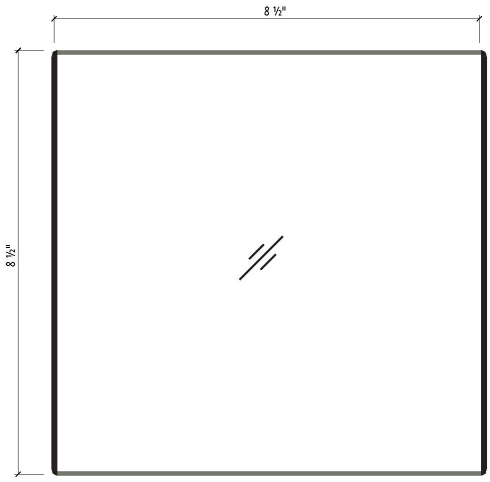
1) Main Background Color: ASI color SC-903 Medium Grey.
2) Font & Logos: ASI color SC-922 Bone.

e. Mounting: Wall Rails with adhesive.
f. The following illustration represents an example of sign.



6. Type B4 - Identification Frame.

a. Typically used to hold unique sign plaques.
b. Mounting: Wall Rails with adhesive.
c. The following illustration represents an example of sign.



7. Type C - Room Number.

a. Location: Where Room Identification Signs (Type B1 or B2) are not installed, place at each doorway from a corridor into a room, and each doorway from one room into an adjoining room. These signs are used for mechanical, electrical, janitorial, telecom, restrooms, and most storage rooms.
b. Provide 5/8" Helvetica Regular font. Provide uppercase letters at all letters within the room number text except the last character, where applicable.
c. Provide second surface silk-screened copy on 1/8" phenolic.

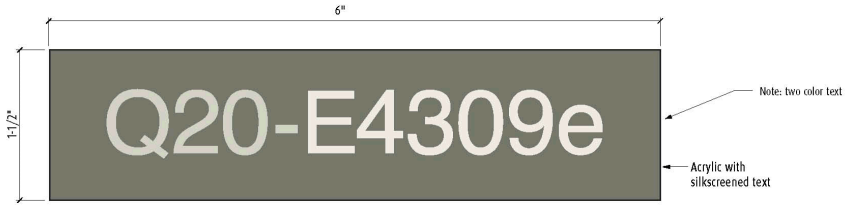
d. Colors:

1) Main Background Color: ASI color SC-903 Medium Grey.
2) Font: ASI color SC-922 Bone.
3) Rule Line: ASI color SC-906 Cool Grey (where applicable).

e. Mounting: Adhesive.

1) Mount on the corridor side of the door frame, on the head, centered above the door.
2) Mount at door header height when used to identify lab alcoves and bays.

f. The following illustration represents an example of sign.

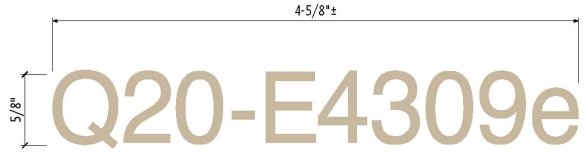


8. Type E - Unique Door Identification.

a. Location: Where a door number is not the same as a room number (i.e. more than one door into a room) or where doors separate portions of corridors and are not associated with a room number, install signs identifying the "unique" door number.
b. Provide 5/8" Helvetica Regular font. Provide uppercase letters at all letters within the door number text except the last character, where applicable.
c. Material: Prespaced vinyl die-cut characters die cut from 3- to 3.5-mil thick, weather-resistant vinyl film with release liner on the back and carrier film on the front for on-site alignment and application.
d. Font Color: ASI color SC-922 Bone, except provide appropriate contrast with door frame color to meet all applicable code requirements
e. Mounting:

1) Mount right justified on the corridor side of the door header.
2) Mount right justified on the both sides of the door header at doors separating portions of corridors or between two rooms.

f. The following illustration represents an example of sign.



9. Type F - Exterior Door Identification.

a. Location: Place at the exterior face of all exterior doors, to identify the designated door number.

b. Provide Door Number information in 5/8" Helvetica Regular. Provide uppercase letters only.
c. Provide second surface silk-screened copy on 1/8" phenolic.
d. Colors:

1) Main Background Color: ASI color SC-903 Medium Grey.
2) Font: ASI color SC-922 Bone.
3) Rule Line: ASI color SC-906 Cool Grey (where applicable).

e. Mounting: Adhesive.

1) Mount on the head of the door frame, centered above the door.

f. The following illustration represents an example of sign.

10. Type G - Elevator Identification.

a. Location: Place at each elevator. Include the University building number and elevator cab number.
b. Provide 5/8" Helvetica Regular. Provide uppercase letters only.
c. Material: Prespaced vinyl die-cut characters die cut from 3- to 3.5-mil thick, weather-resistant vinyl film with release liner on the back and carrier film on the front for on-site alignment and application.
d. Colors:

1) Main Background Color: ASI color SC-903 Medium Grey.
2) Font: ASI color SC-922 Bone.
3) Rule Line: ASI color SC-906 Cool Grey (where applicable).

e. Mounting:

1) Mount centered on head of elevator door frame.

f. The following illustration represents an example of sign.

11. Type H - Paper Insert: For use with Type B1, B2, and B4.

a. Coordinate information to be printed on paper insert with the University Project Manager.
b. Paper insert content, font, and character size may vary per building.

c. Provide paper for insert and computer program with all fonts to the University.
d. The following illustration represents an example of sign.

(No illustration provided)

C. Safety/Code Signs.

1. Type L - Room Capacity.

a. Location: Locate at the main exit from the room.
b. Provide 3/8" Helvetica Regular for text; 1/2" Helvetica Regular for numerical characters. Provide uppercase letters only.
c. Colors:

1) Main Background Color: ASI color SC-903 Medium Grey.
2) Font: ASI color SC-922 Bone.
3) Rule Line: ASI color SC-906 Cool Grey (where applicable).

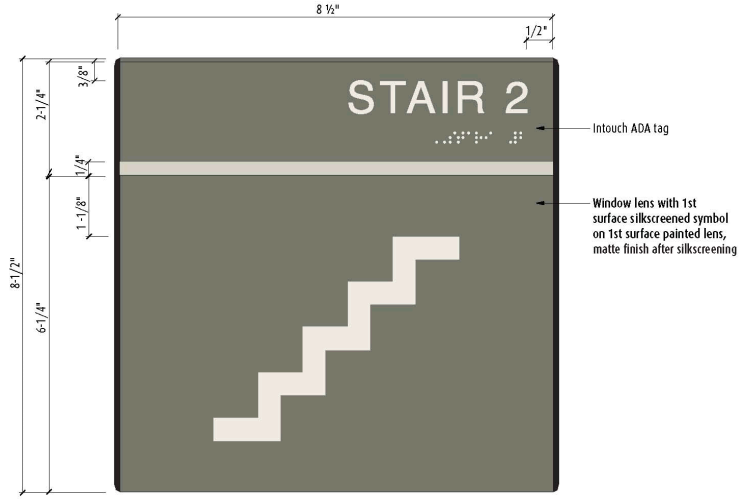
d. Mounting: Adhesive.
e. The following illustration represents an example of sign.

2. Type M1 - Outside the Stair/Stairwell.

a. Location: Mount adjacent to door leading into the stairwell.
b. Header Panel: Provide 5/8" Helvetica Regular font with 24 pt, grade II Braille 3/8" below copy. Provide uppercase letters only.
c. Main Panel: Provide silk screened stair symbol.
d. Colors:

1) Main Background Color: ASI color SC-903 Medium Grey.
2) Font: ASI color SC-922 Bone.
3) Rule Line: ASI color SC-906 Cool Grey (where applicable).

e. Mounting: Wall Rails with adhesive.
f. The following illustration represents an example of sign.

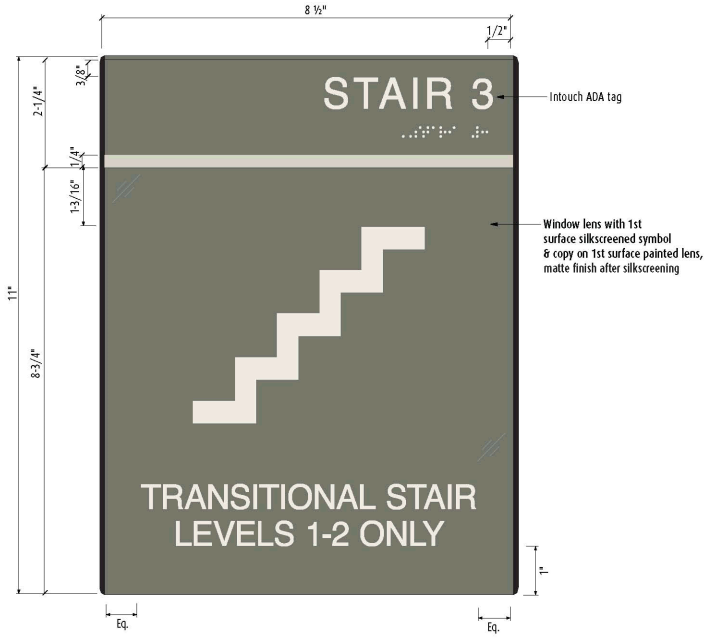


3. Type M2 - Outside the Transitional Stair/Stairwell.

    a. Location: Mount adjacent to door leading into the stairwell.
    b. Header Panel: Provide 5/8" Helvetica Regular font with 24 pt, grade II Braille 3/8" below copy. Provide uppercase letters only.
    c. Main Panel: Provide 1/2" Helvetica Regular. Provide uppercase letters only. Provide silk screened stair symbol.
    d. Colors:

        1) Main Background Color: ASI color SC-903 Medium Grey.
        2) Font: ASI color SC-922 Bone.
        3) Rule Line: ASI color SC-906 Cool Grey (where applicable).

    e. Mounting: Wall Rails with adhesive.
    f. The following illustration represents an example of sign.

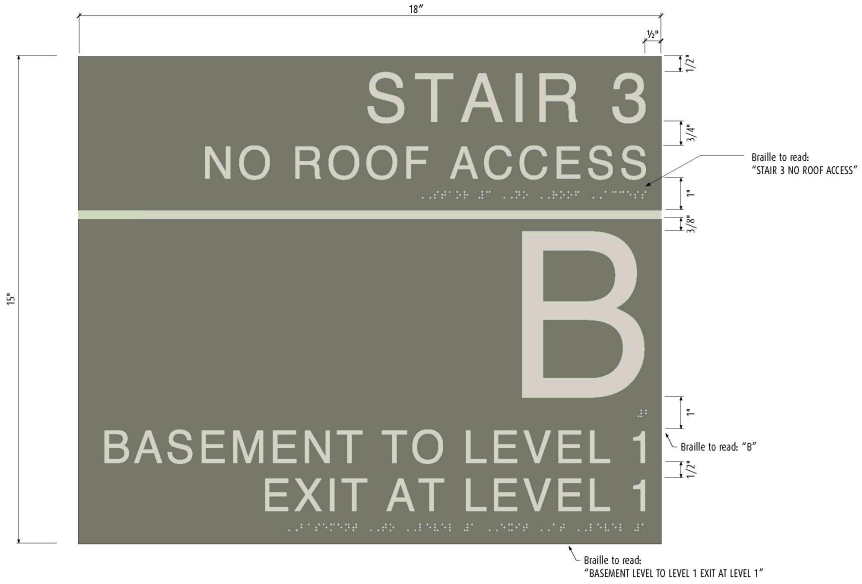


4. Type N - Inside the Stair/Stairwell.

    a. Location: Mount adjacent to door leading out of the stairwell.
    b. Provide Helvetica Regular font with 24 pt, grade II Braille 3/8" below copy. Provide uppercase letters only.
    c. Comply with UFC text size requirements.
    d. Colors:

        1) Main Background Color: ASI color SC-903 Medium Grey.
        2) Font: ASI color SC-922 Bone.
        3) Rule Line: ASI color SC-906 Cool Grey (where applicable).

    e. Mounting: Adhesive.
    f. The following illustration represents an example of sign.

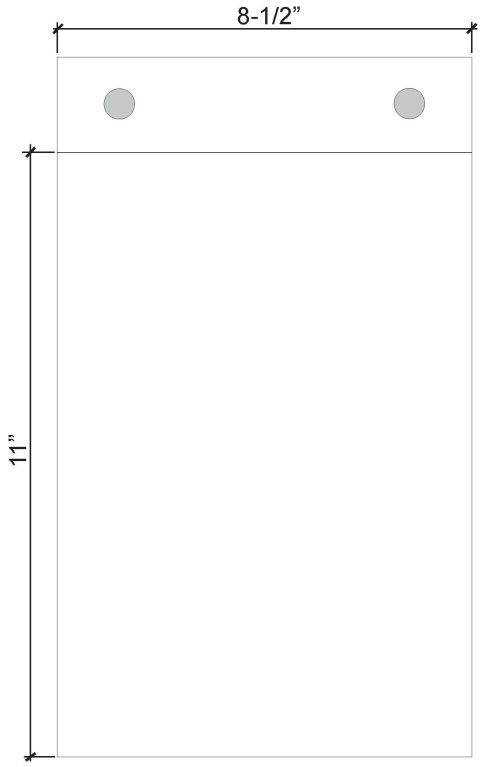


5. Type Q - Emergency Quick Reference Guide.

   a. Location: Mount in every public space or room, classrooms, laboratories, meeting spaces, and near red phones. Can be used to display non-emergency information.
   b. Basis of Design: Deflect-O Classic Image Wall Mount Sign Holder, Clear, 8-1/2" x 11" Portrait.
   c. Colors:

      1) Main Background Color: ASI color SC-903 Medium Grey.
      2) Font: ASI color SC-922 Bone.
      3) Rule Line: ASI color SC-906 Cool Grey (where applicable).

   d. Mounting: Anchors set in wall surface.
   e. The following illustration represents an example of sign.



2.3 PANEL-SIGN MATERIALS AND COMPONENTS (Basis of Design)

A. Fixture Aluminum Panels: Extruded aluminum, alloy AA6060, with high temperature cured polyester color coating. Provide one piece formed aluminum/photopolymer panel for ADA-Ready sizes of 3-1/4" high and above.

B. Face Components:

1. ADA-Ready Panels: Aluminum-based ASI Intouch photopolymer tactile and Braille characters with high temperature cured polyester color coating.
2. Graphic Panels: High-strength, cold-rolled, 1/32” aluminum alloy with high temperature cured polyester coating.
3. Flexible Modules: Individual injection molded Noryl letter tiles press fit to cast polycarbonate knob foil textured base.

C. End Clips:

1. ASI 6" and 8" ADA-Ready Panels Extruded aluminum, alloy AA6060, with high temperature cured polyester color coating or similar.
2. ASI Panels: Injection molded plastic or similar.

D. Mounting Hardware:

1. Wall Rails: Extruded aluminum, alloy AA6060, track-type rail mounted to wall with manufacturer recommended mechanical fasteners or similar.
2. Adhesive: 3M VHB Adhesive Transfer Tape.
3. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of signage, noncorrosive and compatible with each material joined, and complying with the following:

    a. Through Fasteners: Exposed metal fasteners matching sign finish, installed in predrilled holes.

2.4 FABRICATION

A. General: Provide manufacturer's standard sign assemblies according to requirements indicated.

1. Preassemble signs and assemblies in the shop to greatest extent possible. Disassemble signs and assemblies only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation; apply markings in locations concealed from view after final assembly.
2. Mill joints to a tight, hairline fit.

B. Surface Treatment Finish: Manufacturer’s standard two-phase screen finishing process.

1. Phase One: Chromatized priming with 2u depth chrome layer for optimum surface coat adhesion and weatherability.
2. Phase Two: Painting process employing two component, water-based, non-toxic, lead-free, zero emissions, high temperature cured polyester coating of 20 - 30u deep.

C. Signs with Changeable Message Capability: Fabricate signs to allow insertion of changeable messages as follows:

1. For slide-in changeable inserts, fabricate slot without burrs or constrictions that inhibit function. Furnish initial changeable insert. Furnish two blank inserts for each sign for Owner's use.

D. Brackets: Fabricate brackets, fittings, and hardware for bracket-mounted signs to suit sign construction and mounting conditions indicated. Modify manufacturer's standard brackets as required.

2.5 GENERAL FINISH REQUIREMENTS

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

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

C. Directional Finishes: Run grain with long dimension of each piece and perpendicular to long dimension of finished trim or border surface unless otherwise indicated.

D. Organic, Anodic, and Chemically Produced Finishes: Apply to formed metal after fabrication but before applying contrasting polished finishes on raised features unless otherwise indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of signage work.

B. Verify that sign-support surfaces are within tolerances to accommodate signs without gaps or irregularities between backs of signs and support surfaces unless otherwise indicated.

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

3.2 INSTALLATION

A. General: Install signs using mounting methods indicated and according to manufacturer's written instructions.

1. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.
2. Install signs so they do not protrude or obstruct according to the accessibility standard.
3. Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.

B. Mounting Methods:

1. Through Fasteners: Drill holes in substrate using predrilled holes in sign as template. Countersink holes in sign if required. Place sign in position and flush to surface. Install through fasteners and tighten.
2. Brackets: Remove loose debris from substrate surface and install backbar or bracket supports in position so that signage is correctly located and aligned.
3. Two-Face Tape: Clean bond-breaking materials from substrate surface and remove loose debris. Apply tape strips symmetrically to back of sign and of suitable quantity to support weight of sign without slippage. Keep strips away from edges to prevent visibility at sign edges. Place sign in position, and push to engage tape adhesive.

C. Field-Applied, Vinyl-Character Signs: Clean and dry substrate. Align sign characters in final position before removing release liner. Remove release liner in stages, and apply and firmly press characters into final position. Press from the middle outward to obtain good bond without blisters or fishmouths. Remove carrier film without disturbing applied vinyl film.

D. Signs Mounted on Glass: Provide opaque sheet matching sign material and finish onto opposite side of glass to conceal back of sign.

3.3 ADJUSTING AND CLEANING

A. Remove and replace damaged or deformed signs and signs that do not comply with specified requirements. Replace signs with damaged or deteriorated finishes or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.

B. Remove temporary protective coverings and strippable films as signs are installed.

C. On completion of installation, clean exposed surfaces of signs according to manufacturer's written instructions, and touch up minor nicks and abrasions in finish. Maintain signs in a clean condition during construction and protect from damage until acceptance by Owner.

END OF SECTION 10 14 00

SECTION 10 26 13 - CORNER GUARDS

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. Corner guards.

a. Surface-mounted, stainless-steel corner guards.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, impact strength, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: For each type of wall protection showing locations and extent.

1. Include plans, elevations, sections, and attachment details.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Store wall protection in original undamaged packages.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain wall-protection products from single source from single manufacturer.

2.2 CORNER GUARDS

A. Surface-Mounted, Stainless-Steel Corner Guards : Fabricated as one piece from formed or extruded metal with formed edges; with 90- or 135-degree turn to match wall condition.

1. Material: Stainless-steel sheet, Type 304.

a. Thickness: Minimum 0.0500 inch (18 ga.) .
b. Finish: Directional satin, No. 4.

2. Wing Size: Nominal 1-1/2 by 1-1/2 inches .
3. Length: 48 inches unless indicated otherwise on Drawings.
4. Corner Radius: 1/8 inch.
5. Mounting: Adhesive.

2.3 MATERIALS

A. Adhesive: As recommended by protection product manufacturer.

1. Adhesives shall have a VOC content of 70 g/L or less.

2.4 FABRICATION

A. Fabricate wall protection according to requirements indicated for design, performance, dimensions, and member sizes, including thicknesses of components.

B. Quality: Provide surfaces free of dents, uneven coloration, and other imperfections.

2.5 FINISHES

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

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and wall areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine walls to which wall protection will be attached.

1. For wall protection attached with adhesive, verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

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

3.2 PREPARATION

A. Complete finishing operations, including painting, before installing wall protection.

B. Before installation, clean substrate to remove dust, debris, and loose particles.

3.3 INSTALLATION

A. Installation Quality: Install wall protection according to manufacturer's written instructions, level, plumb, and true to line without distortions. Do not use materials with stains, or other defects that might be visible in the finished Work.

3.4 CLEANING

A. Remove excess adhesive using methods and materials recommended in writing by manufacturer.

END OF SECTION 10 26 13

SECTION 10 44 13

FIRE PROTECTION CABINETS

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. Fire-Protection Cabinet - FPC-1: Non-security type for portable fire extinguishers; semirecessed .
2. Fire-Protection Cabinet - FPC-2: Non-security type for portable fire extinguishers; surface-mounted.
3. Fire-Protection Cabinet - FPC-3: Non-security type for fire hose valves fire hoses and racks; recessed.

B. Related Requirements:

1. Section 10 44 16 "Fire Extinguishers."
2. Section 21 12 00 "Fire-Suppression Standpipes" for fire-hose connections.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product. Show door hardware, cabinet type, trim style, and panel style. Include roughing-in dimensions and details showing recessed-, semirecessed-, or surface-mounting method and relationships of box and trim to surrounding construction.

B. Shop Drawings: For fire-protection cabinets. Include plans, elevations, sections, details, and attachments to other work.

C. Product Schedule: For fire-protection cabinets. Indicate whether recessed, semirecessed, or surface mounted. Coordinate final fire-protection cabinet schedule with fire-extinguisher schedule to ensure proper fit and function. Use same designations indicated on Drawings.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For fire-protection cabinets to include in maintenance manuals.

PART 2 - PRODUCTS

2.1 FIRE-PROTECTION CABINET - FPC-1

A. Cabinet: Non-security type, suitable for the following:

1. Fire extinguisher.

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

1. Guardian Fire Equipment, Inc.
2. JL Industries, Inc.; a division of the Activar Construction Products Group.
3. Larsens Manufacturing Company.
4. Nystrom, Inc.
5. Potter Roemer LLC.

C. Cabinet Construction: 1-hour fire rated 2-hour fire rated.

1. Fire-Rated Cabinets: Construct fire-rated cabinets with double walls fabricated from 0.043-inch-thick cold-rolled steel sheet lined with minimum 5/8-inch- thick fire-barrier material. Provide factory-drilled mounting holes.

D. Cabinet Material:

1. Stainless-steel sheet:

a. Finish: No. 4 directional satin finish.

E. Semirecessed Cabinet: One-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend).

1. Square-Edge Trim: 1-1/4- to 1-1/2-inch backbend depth.

F. Cabinet Trim Material:

1. Same material and finish as door.

G. Door Style:

1. Vertical duo panel glazing with metal frame.

H. Door Frame or Panel Material:

1. Stainless-Steel Sheet:

a. Finish: No. 4 directional satin finish.

I. Door Glazing:

1. Acrylic sheet, clear transparent.

J. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.

1. Pull/Handle and Latch:

a. Projecting door pull and friction latch.

2. Hinge: Permitting door to open 180 degrees.

a. Continuous, of same material and finish as trim.

K. Accessories:

1. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate on door.

a. Identify fire extinguisher in fire-protection cabinet with the words "FIRE EXTINGUISHER."

1) Location: Applied to cabinet door.
2) Application Process: Pressure-sensitive vinyl letters.
3) Lettering Color: Red.
4) Orientation: Vertical.

L. Materials:

1. Stainless Steel: ASTM A 666, Type 304; in finish(es) specified.
2. Transparent Acrylic Sheet: ASTM D 4802, Category A-1 (cell-cast sheet); in thickness and with Finish specified.

2.2 FIRE-PROTECTION CABINET - FPC-2

A. Cabinet: Non-security type, suitable for the following:

1. Fire extinguisher.

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

1. Guardian Fire Equipment, Inc.
2. JL Industries, Inc.; a division of the Activar Construction Products Group.
3. Larsens Manufacturing Company.
4. Nystrom, Inc.
5. Potter Roemer LLC.

C. Cabinet Construction: Nonrated.

D. Cabinet Material:

1. Stainless-steel sheet:

a. Finish: No. 4 directional satin finish.

E. Surface-Mounted Cabinet: Cabinet box fully exposed and mounted directly on wall with no trim.

F. Door Style:

1. Vertical duo panel glazing with metal frame.

G. Door Frame or Panel Material:

1. Stainless-Steel Sheet:

a. Finish: No. 4 directional satin finish.

H. Door Glazing:

1. Acrylic sheet, clear transparent.

I. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.

1. Pull/Handle and Latch:

a. Projecting door pull and friction latch.

2. Hinge: Permitting door to open 180 degrees.

a. Continuous, of same material and finish as trim.

J. Accessories:

1. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate on door.

a. Identify fire extinguisher in fire-protection cabinet with the words "FIRE EXTINGUISHER."

1) Location: Applied to cabinet door.
2) Application Process: Pressure-sensitive vinyl letters.
3) Lettering Color: Red.
4) Orientation: Vertical.

K. Materials:

1. Stainless Steel: ASTM A 666, Type 304; in finish(es) specified.
2. Transparent Acrylic Sheet: ASTM D 4802, Category A-1 (cell-cast sheet); in thickness and with Finish specified.

2.3 FIRE-PROTECTION CABINET - FPC-3

A. Cabinet: Non-security type, suitable for the following:

1. Hose valve.
2. Hose and hose rack.

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

1. Guardian Fire Equipment, Inc.
2. JL Industries, Inc.; a division of the Activar Construction Products Group.
3. Larsens Manufacturing Company.
4. Nystrom, Inc.
5. Potter Roemer LLC.

C. Cabinet Construction: 2-hour fire rated.

1. Fire-Rated Cabinets: Construct fire-rated cabinets with double walls fabricated from 0.043-inch-thick cold-rolled steel sheet lined with minimum 5/8-inch- thick fire-barrier material. Provide factory-drilled mounting holes.

D. Cabinet Material:

1. Stainless-steel sheet:

a. Finish: No. 4 directional satin finish.

E. Recessed Cabinet:

1. Exposed Flat Trim: One-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend).

F. Cabinet Trim Material:

1. Same material and finish as door.

G. Door Style:

1. Horizontal duo panel glazing with metal frame.

H. Door Frame or Panel Material:

1. Stainless-Steel Sheet:

a. Finish: No. 4 directional satin finish.

I. Door Glazing:

1. Acrylic sheet, clear transparent.

J. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.

1. Pull/Handle and Latch:

a. Projecting door pull and friction latch.

2. Hinge: Permitting door to open 180 degrees.

a. Continuous, of same material and finish as trim.

K. Accessories:

1. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate on door.

a. Identify fire extinguisher in fire-protection cabinet with the words "FIRE VALVE AND HOSE."

1) Location: Applied to cabinet door.
2) Application Process: Pressure-sensitive vinyl letters.
3) Lettering Color: Red.
4) Orientation: Horizontal.

L. Materials:

1. Stainless Steel: ASTM A 666, Type 304; in finish(es) specified.
2. Transparent Acrylic Sheet: ASTM D 4802, Category A-1 (cell-cast sheet); in thickness and with Finish specified.

2.4 FABRICATION

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

1. Weld joints and grind smooth.
2. Provide factory-drilled mounting holes.
3. Prepare doors and frames to receive locks.
4. Install door locks at factory.

B. Cabinet Doors: Fabricate doors according to manufacturer's standards, from materials indicated and coordinated with cabinet types and trim styles.

2.5 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's AMP 500, "Metal Finishes Manual for Architectural and Metal Products," for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces of fire-protection cabinets from damage by applying a strippable, temporary protective covering before shipping.

C. Finish fire-protection cabinets after assembly.

D. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine walls and partitions for suitable framing depth and blocking where the following will be installed:

1. Semirecessed fire-protection cabinets.

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

3.2 PREPARATION

A. Prepare recesses for the following as required by type and size of cabinet and trim style:

1. Semirecessed fire-protection cabinets.

3.3 INSTALLATION

A. General: Install fire-protection cabinets in locations and at mounting heights indicated or, if not indicated, at heights acceptable to authorities having jurisdiction.

B. Fire-Protection Cabinets: Fasten cabinets to structure, square and plumb.

3.4 ADJUSTING AND CLEANING

A. Remove temporary protective coverings and strippable films, if any, as fire-protection cabinets are installed unless otherwise indicated in manufacturer's written installation instructions.

B. Adjust fire-protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.

C. On completion of fire-protection cabinet installation, clean interior and exterior surfaces as recommended by manufacturer.

D. Touch up marred finishes, or replace fire-protection cabinets that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by fire-protection cabinet and mounting bracket manufacturers.

E. Replace fire-protection cabinets that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 10 44 13

SECTION 10 44 16

FIRE EXTINGUISHERS

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 the following:

1. Portable, hand-carried fire extinguishers.

B. Related Requirements:

1. Section 10 44 13 "Fire Protection Cabinets."

1.3 ACTION SUBMITTALS

A. Product Data: For each type of the following product(s). Include rating and classification, material descriptions, dimensions of individual components and profiles, and finishes.

1. Portable, hand-carried fire extinguishers.

1.4 INFORMATIONAL SUBMITTALS

A. Warranty: Sample of special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For fire extinguishers to include in maintenance manuals.

1.6 COORDINATION

A. Coordinate type and capacity of fire extinguishers with fire-protection cabinets to ensure fit and function.

1.7 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace fire extinguishers that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

    a. Failure of hydrostatic test according to NFPA 10.
    b. Faulty operation of valves or release levers.

2. Warranty Period: Six years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS

A. Fire Extinguishers: Type, size, and capacity for each fire-protection cabinet indicated.

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

    a. Amerex Corporation.
    b. Ansul Incorporated.
    c. Guardian Fire Equipment, Inc.
    d. JL Industries, Inc.; a division of the Activar Construction Products Group.
    e. Kidde Residential and Commercial Division; Subsidiary of Kidde plc.
    f. Larsens Manufacturing Company.
    g. Nystrom Building Products.
    h. Potter Roemer LLC.

2. Valves: Manufacturer's standard.
3. Handles and Levers: Manufacturer's standard.
4. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B, and bar coding for documenting fire-extinguisher location, inspections, maintenance, and recharging.

B. Multipurpose Dry-Chemical Type: UL-rated of nominal capacity and container type indicated below, filled with monoammonium phosphate-based dry chemical.

1. Manufacturer's Standard Enameled-Metal Container: UL-rated 4-A:60-B:C, 10-lb nominal capacity.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine fire extinguishers for proper charging and tagging.

1. Remove and replace damaged, defective, or undercharged fire extinguishers.

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

3.2 INSTALLATION

A. Fire Extinguishers: Install in locations indicated and in compliance with requirements of authorities having jurisdiction.

END OF SECTION 10 44 16

SECTION 12 24 13

ROLLER WINDOW SHADES (ALT. #2)

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. Manually operated roller shades with single rollers.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include styles, material descriptions, construction details, dimensions of individual components and profiles, features, finishes, and operating instructions for roller shades.

B. Shop Drawings: Show fabrication and installation details for roller shades, including shadeband materials, their orientation to rollers, and their seam and batten locations.

C. Samples for Initial Selection: For each type and color of shadeband material.

1. Include Samples of accessories involving color selection.

D. Samples for Verification: For each type of roller shade.

1. Shadeband Material: Not less than 10 inches square. Mark inside face of material if applicable.

E. Roller-Shade Schedule: Use same designations indicated on Shop Drawings.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For roller shades to include in maintenance manuals.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Fabricator of products.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver roller shades in factory packages, marked with manufacturer, product name, and location of installation using same designations indicated on Drawings.

1.8 FIELD CONDITIONS

A. Environmental Limitations: Do not install roller shades until construction and finish work in spaces, including painting, is complete and dry and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

B. Field Measurements: Where roller shades are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Allow clearances for operating hardware of operable glazed units through entire operating range. Notify Architect of installation conditions that vary from Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

2.2 MANUALLY OPERATED SHADES WITH SINGLE ROLLERS

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

1. Draper Inc.
2. MechoShade Systems, Inc.
3. Nysan Solar Control Inc.; Hunter Douglas Company.

B. Chain-and-Clutch Operating Mechanisms: With continuous-loop bead chain and clutch that stops shade movement when bead chain is released; permanently adjusted and lubricated.

1. Bead Chains: Nickel-plated metal or Stainless steel.

a. Loop Length: Full length of roller shade.
b. Limit Stops: Provide upper and lower ball stops.
c. Chain-Retainer Type: Clip, jamb mount.

2. Spring Lift-Assist Mechanisms: Manufacturer's standard for balancing roller-shade weight and lifting heavy roller shades.

a. Provide for shadebands that weigh more than 10 lb or for shades as recommended by manufacturer, whichever criteria are more stringent.

C. Rollers: Corrosion-resistant steel or extruded-aluminum tubes of diameters and wall thicknesses required to accommodate operating mechanisms and weights and widths of shadebands indicated without deflection. Provide with permanently lubricated drive-end assemblies and idle-end assemblies designed to facilitate removal of shadebands for service.

1. Roller Drive-End Location: In location recommended by fabricator. Indicate location for each shade on submittal for Architect's review.
2. Direction of Shadeband Roll: Regular, from back of roller.
3. Shadeband-to-Roller Attachment: Removable spline fitting integral channel in tube.

D. Mounting Hardware: Brackets or endcaps, corrosion resistant and compatible with roller assembly, operating mechanism, installation accessories, and mounting location and conditions indicated.

E. Shadebands:

1. Material Orientation on Shadeband: Up the bolt .
2. Material: .

a. Light-Filtering Fabric: Woven fabric, stain and fade resistant.

1) Source: Roller-shade manufacturer .
2) Type: PVC-coated polyester .
3) Weave: Mesh.
4) Weight: Minimum 14 oz./sq. yd..
5) Roll Width: Not less than 48 inches.

a) See Drawings for approximate window jamb opening dimensions.

6) Openness Factor: 1 percent.
7) Color: Charcoal.

3. Shadeband Bottom (Hem) Bar: Steel or extruded aluminum.

a. Type: Enclosed in sealed pocket of shadeband material.

F. Installation Accessories:

1. Front Fascia: Aluminum extrusion that conceals front and underside of roller and operating mechanism and attaches to roller endcaps without exposed fasteners.

a. Shape: L-shaped.
b. Height: Manufacturer's standard height required to conceal roller and shadeband when shade is fully open, but not less than 3 inches.

2. Installation Accessories Color and Finish: As selected from manufacturer's full range.

2.3 ROLLER-SHADE FABRICATION

A. Product Safety Standard: Fabricate roller shades to comply with WCMA A 100.1, including requirements for flexible, chain-loop devices; lead content of components; and warning labels.

B. Unit Sizes: Fabricate units in sizes to fill window and other openings as follows, measured at 74 deg F:

1. Between (Inside) Jamb Installation: Width equal to jamb-to-jamb dimension of opening in which shade is installed less 1/4 inch per side or 1/2-inch total, plus or minus 1/8 inch. Length equal to head-to-sill or -floor dimension of opening in which shade is installed less 1/4 inch, plus or minus 1/8 inch.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, operational clearances, and other conditions affecting performance of the Work.

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

3.2 ROLLER-SHADE INSTALLATION

A. Install roller shades level, plumb, and aligned with adjacent units according to manufacturer's written instructions.

1. Opaque Shadebands: Located so shadeband is not closer than 2 inches to interior face of glass. Allow clearances for window operation hardware.

3.3 ADJUSTING

A. Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.

3.4 CLEANING AND PROTECTION

A. Clean roller-shade surfaces after installation, according to manufacturer's written instructions.

B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that roller shades are without damage or deterioration at time of Substantial Completion.

C. Replace damaged roller shades that cannot be repaired, in a manner approved by Architect, before time of Substantial Completion.

END OF SECTION 12 24 13

SECTION 21 05 00

COMMON WORK RESULTS FOR FIRE SUPPRESSION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. General requirements for all Division 21 sections
2. Piping materials and installation instructions common to most piping systems
3. Dielectric fittings
5. Sleeves
6. Escutcheons
7. Miscellaneous electrical equipment
8. Access doors
9. Identification
10. Fire-suppression equipment and piping demolition
11. Equipment installation requirements common to equipment sections
12. Painting and finishing
13. Supports and anchorages

B. All electrical work installed under Division 21 shall be in compliance with Division 26.

1.3 DRAWINGS AND SPECIFICATIONS

A. The drawings are diagrammatic in character indicating design concept and do not indicate every required duct or piping offset, valve, fitting, etc.

B. All drawings relating to this structure, together with these specifications, shall be considered in bidding and construction. The drawings and specifications are complementary, and what is called for in either of these shall be as binding as though called for by both. Should any conflict or omissions arise between the drawings and specifications, such conflict shall be brought to the attention of the Architect/ Engineer for resolution.

C. Unless otherwise indicated, all equipment and performance data listed is for job site conditions (elevation 5300 feet).

D. Drawings are not to be scaled.

1.4 DEFINITIONS

A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe chases, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.

B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.

C. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in chases.

D. The following are industry abbreviations for plastic materials:

1. CPVC: Chlorinated polyvinyl chloride plastic.

E. The following are industry abbreviations for rubber materials:

1. EPDM: Ethylene-propylene-diene terpolymer rubber.
2. NBR: Acrylonitrile-butadiene rubber.

1.5 SUBMITTALS

A. Division 21 Submittal Data and Shop Drawings:

1. Refer to Division 01, for general submittal requirements.
2. Contractor agrees that shop drawings and/or submittals processed by the Engineer are not change orders; that the purpose of shop drawings and/or submittals by the Contractor is to inform the Engineer which equipment and materials he intends to furnish and install.
3. Submittals and/or shop drawings are to be edited to show specific data and all options for the mechanical equipment that the Contractor intends to provide.
4. Submittals and/or shop drawings are to be identified with numbers or letters identical to those listed on the drawings and/or specifications.
5. All shop drawings for special systems (temperature controls, fire suppression, etc.) that will become permanent record documents shall be prepared on AutoCAD Version 2007 or later, using the same drawing size as the project construction documents.
6. Approved Manufacturers and Substitutions:

a. Equipment and/or materials manufactured by any one of the Engineer-approved manufacturers listed in this specification or on the drawings shall be acceptable if the equipment and material is equivalent in performance, capacity, and configuration.
b. Substitution Requests prior to bid: Refer to Division 01. No prior approvals will be given by the Engineer unless specifically mentioned in these specifications.
c. Substitution Requests after Execution of Contract: If Contractor wishes to furnish or use a substitute item of material and/or equipment, he must submit a change order request to the Engineer. The request for change order shall itemize each of the proposed substitutions identified by applicable specification section, paragraph number, and/or drawing number. A price change (increase or decrease) shall be listed for each item along with complete data showing performance over entire range, physical dimensions, electrical characteristics, material construction, operating weight, and other applicable data. Justification of substitution must be more than just cost justification. The Engineer will review the change order request for equality, suitability, and reasonableness of price differential. A single substitution change order listing the approved items will be issued with the net cost of the

change order being the sum of the approved item costs. No subsequent substitution change orders will be considered. The Engineer's decision will be final.

d. It shall be the responsibility of the Contractor to assure that the substitute material and/or equipment fits into the space provided and the Contractor shall pay for all extra costs incurred by other trades for any and all changes necessitated by these substitutions. No time extension will be allowed due to substitution on equipment.

e. Equipment and/or materials manufactured by any one of the Engineer-approved manufacturers listed in this specification or on the drawings shall be acceptable if the equipment and material is equivalent in performance, capacity, and configuration.

7. Submittals Schedule:

a. Comply with Division 01 construction progress documentation and submittal requirements and the additional submittal requirements specified below. . Unless otherwise specified in Division 01, comply with the submittal periods specified below. Engineer will schedule submittal reviews based upon submittal schedule. Failure to submit schedule may result in inability to review submittals within the periods stated in the submittal schedule. These delays shall not be cause for extension of Contact completion date.

b. Processing Time: Allow enough time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

c. Submit schedule within 14 days of commencement of work. Allow 15 days days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.

d. Allow 15 days for review of each resubmittal.

e. Submit a minimum of three copies of schedule. Arrange the following information in a tabular format:

1) Scheduled date for first submittal.
2) Specification Section number and title.
3) Submittal category (action or informational).
4) Name of subcontractor.
5) Description of the Work covered.
6) Scheduled date for Architect's final release of reviewed submittal.

8. Schedule of Deviations: Equipment and material submittals of approved manufacturers, including basis of design manufacture, shall provide a written itemization of exceptions to the specification and deviations from the basis of design for all features, design, configuration, physical dimension, performance, and operation of the submitted product. Those elements not identified and itemized as exceptions in the submittal will not be reviewed by Engineer and shall be provided as specified.

B. Close-out Submittals:

1. Operating and Maintenance (O&M) Manual:

a. Provide O&M manuals in accordance with Division 01.

b. The Contractor shall prepare an operating and maintenance manual that shall cover all systems and equipment installed under this Division. Incorporate the standard technical literature into system-specific formats for this facility as designed and actually installed. The resulting manual shall also serve as the training manual and shall be specific, concise, to the point, and tailored specifically for this facility.

c. Unless specified otherwise in Division 01, the maintenance manual shall be submitted to the Engineer in draft form for approval prior to preparation of two copies for final submission to the Architect for delivery to the Owner.
d. The maintenance manual shall be 8-1/2" x 11" size and assembled in loose-leaf three-ring or post binder. Provide manufacturers' original literature. Facsimiles are not acceptable. The manual shall be adequately indexed and contain the following information:

1) Contractors' names, addresses, and telephone numbers
2) Alphabetical list of all system components with the name and address and 24-hour phone number of the company responsible for servicing each item during the first year of operation
3) Guarantees and warranties of all equipment whenever applicable.
4) All manufacturers' data that is applicable to the installed equipment, with appropriate highlighting, such as the following:

a) Shop drawings (latest copy)
b) Installation instructions
c) Lubrication instructions
d) Wiring diagrams

5) A simplified description of the operation of all systems including the function of each piece of equipment within each system, including both normal and emergency operation. These descriptions shall be supported with a schematic flow diagram when applicable.

2. Record Drawings:

a. Comply with record drawing requirements in Division 01.
b. Record Prints: All RFIs, change orders and other directives if not recorded on the contract drawings and amendments shall be red-lined on the record drawings. Record drawings simply tabulating the amendments onto the drawings shall be returned for clarification of installed conditions and red-line mark-up.

C. Non-Responsive Submittals: Submittals are intended to be reviewed in an initial submittal with comments corrected and submitted in a resubmittal. Non-responsiveness to the initial submittal comments in the resubmittal will result in return of the documents for correction and additional resubmittals. Any time charged by the Engineer in review of additional resubmittals due to non-responsiveness shall be deducted from the Contractor's billings.

D. Product Data:

1. Dielectric fittings
2. Escutcheons.

E. Certificates: Welding certificates

F. Schedules:

1. Equipment Label Schedule: Include a listing of all fire suppression equipment to be labeled with the proposed content for each label.
2. Valve numbering scheme.
3. Valve Schedules: For fire suppression piping system to include in maintenance manuals.

1.6 QUALITY ASSURANCE

A. Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code--Steel."

B. Steel Pipe Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."

1. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."
2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.

C. Electrical Characteristics for Fire-Suppression Equipment: Equipment of lower or higher electrical characteristics may be furnished provided such proposed equipment variations are specifically identified as a deviation from contract documents and approved in writing and connecting electrical services, circuit breakers, and conduit sizes are appropriately modified at no cost to the Owner. If minimum energy ratings or efficiencies are specified, equipment shall comply with requirements.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.

B. Store plastic pipes protected from direct sunlight. Support piping to prevent sagging and bending.

1.8 COORDINATION

A. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction, to allow for fire-suppression installations.

B. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.

C. Coordinate requirements for access panels and doors for fire-suppression items requiring access that are concealed behind finished surfaces. Access panels and doors are specified in Division 8.

D. Identification:

1. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
2. Coordinate installation of identifying devices with locations of access panels and doors.
3. Install identifying devices before installing acoustical ceilings and similar concealment.

E. Coordinate with all trades to maintain clearances to access panels, equipment, control and electrical panels. Intrusions into access space shall be brought to the attention of other trades. Notify Engineer of conflicts shown on drawings prior to installation.

F. Prior to fabricating work or commencing the work, Contractor shall prepare coordination drawings combining disciplines of all trades prior to installation of systems and equipment. Indicate architectural, structural, HVAC, plumbing, fire suppression, electrical, and telecommunications. Drawings shall correlate with elements of all trades to predict and prevent conflicts and identify pathways and adequate

space. Drawings shall identify required access to equipment and panels and shall identify zones over electrical panels and equipment to be free of ductwork and piping.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:

1. Subject to compliance with requirements, provide products by the manufacturers specified.

2.2 PIPE, TUBE, AND FITTINGS

A. Refer to individual Division 21 piping Sections for pipe, tube, and fitting materials and joining methods.

1. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

2.3 JOINING MATERIALS

A. Refer to individual Division 21 fire suppression piping Sections for special joining materials not listed below.

B. Solder Filler Metals: ASTM B32, lead-free alloys. Include water-flushable flux according to ASTM B813.

C. Brazing Filler Metals: AWS A5.8, BCuP Series, copper-phosphorus alloys for general-duty brazing, unless otherwise indicated.

D. Welding Filler Metals: Comply with AWS D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

2.4 DIELECTRIC FITTINGS

A. Description: Combination fitting of copper alloy and ferrous materials with threaded, solder-joint, plain, or weld-neck end connections that match piping system materials.

B. Insulating Material: Suitable for system fluid, pressure, and temperature.

C. Dielectric Unions: Use dielectric couplings.

D. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 150 or 300 psig minimum working pressure as required to suit system pressures.

1. Available Manufacturers:

a. Capitol Manufacturing Co.
b. Central Plastics Company
c. Epco Sales, Inc.
d. Watts Industries, Inc.; Water Products Div.

E. Dielectric-Flange Kits: Companion-flange assembly for field assembly. Include flanges, full-face- or ring-type neoprene or phenolic gasket, phenolic or polyethylene bolt sleeves, phenolic washers, and steel backing washers.

1. Available Manufacturers:

a. Advance Products & Systems, Inc.
b. Calpico, Inc.
c. Central Plastics Company
d. Pipeline Seal and Insulator, Inc.

2. Separate companion flanges and steel bolts and nuts shall have 150 or 300 psig minimum working pressure where required to suit system pressures.

F. Dielectric Couplings: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining; threaded ends; and 300 psig minimum working pressure at 225°F.

1. Available Manufacturers:

a. Calpico, Inc.
b. Lochinvar Corp.

G. Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300 psig minimum working pressure at 225°F.

1. Available Manufacturers:

a. Perfection Corp.
b. Precision Plumbing Products, Inc.
c. Sioux Chief Manufacturing Co., Inc.
d. Victaulic Co. of America

2.5 SLEEVE

A. Galvanized-Steel Sheet: 0.0239-inch min. thickness; round tube closed with welded longitudinal joint.

B. Steel Pipe: ASTM A53, Type E, Grade B, Schedule 40, galvanized, plain ends.

C. Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.

2.6 ESCUTCHEONS

A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.

1. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with polished chrome-plated finish.
2. Split-Casting, Cast-Brass Type: With concealed hinge and set screw. Finish: Polished chrome plated
3. One-Piece, Floor-Plate Type: Cast-iron floor plate.
4. Split-Casting, Floor-Plate Type: Cast brass with concealed hinge and set screw.

5. Split-Casting, Cast-Brass Type: With concealed hinge and set screw. Finish: Polished chrome plated
6. One-Piece, Floor-Plate Type: Cast-iron floor plate.
7. Split-Casting, Floor-Plate Type: Cast brass with concealed hinge and set screw.

2.7 MISCELLANEOUS ELECTRICAL DEVICES

A. Furnish all necessary control devices such as speed controls, transformers, and relays as required for proper operation of all equipment furnished under this Division.

B. Furnish all remote switches and/or pushbutton stations required for manually operated equipment complete with low energy pilot lights of an approved type.

C. Enclosures: NEMA Type 1, general purpose enclosures with padlock ears, except in wet locations shall be NEMA Type 4 with conduit hubs, or units in hazardous locations that shall have NEC proper class and division explosion-proof enclosure.

D. Furnish circuit and purpose identification for each remote manual switch and/or pushbutton station furnished herein. Identification may be either engraved plastic sign for permanent mounting to wall below switch, or stamping on switch coverplate. All such identification signs and/or switch covers in finished areas shall match other hardware in the immediate area.

2.8 ACCESS PANELS OTHER THAN SHEET METAL

A. Refer to Division 8 for specification of access doors.

2.9 IDENTIFICATION

A. Equipment Labels:

1. Metal Labels for Equipment:

   a. Material and Thickness: Brass, 0.032-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.
   b. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 x3/4 inch.
   c. Minimum Letter Size: 1/4 inch for name of units. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
   d. Fasteners: Stainless steel rivets or self-tapping screws.
   e. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

2. Plastic Labels for Equipment:

   a. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.
   b. Letter Color: White.
   c. Background Color: Black or blue.
   d. Maximum Temperature: Able to withstand temperatures up to 160°F.
   e. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 x 3/4 inch.

f. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inchfor viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
g. Fasteners: Stainless steel rivets or self-tapping screws.
h. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

3. Label Content: Include equipment's unique equipment number, Drawing numbers where equipment is indicated (plans, details, and schedules).
4. Equipment Label Schedule: For each item of equipment to be labeled, on 8-1/2-by-11-inch bond paper. Tabulate equipment identification number and identify Drawing numbers where equipment is indicated (plans, details, and schedules), plus the specification section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.

B. Pipe Labels:

1. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction.
2. Pretensioned Pipe Labels: Precoiled, semi-rigid plastic formed to cover full circumference of pipe and to attach to pipe without fasteners or adhesive.
3. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.
4. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.
5. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings, pipe size, and an arrow indicating flow direction.

a. Flow-Direction Arrows: Integral with piping system service lettering to accommodate both directions, or as separate unit on each pipe label to indicate flow direction.
b. Lettering Size: At least 1-1/2 inches.

C. Stencils:

1. Stencils: Prepared with letter sizes according to ASME A13.1 for piping; minimum letter height of 2 inches for ducts; and minimum letter height of 3/4 inch for access panel and door labels, equipment labels, and similar operational instructions.
2. Stencil Material: Fiberboard or metal.
3. Stencil Paint: Exterior, gloss enamel black unless otherwise indicated. Paint may be in pressurized spray-can form.
4. Identification Paint: Exterior enamel in colors according to ASME A13.1 unless otherwise indicated.

D. Valve Tags:

1. Valve Tags: Stamped or engraved with 1/4-inch letters for piping system abbreviation and 1/2-inch numbers.

a. Tag Material: Brass, 0.032-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.
b. Fasteners: Brass wire-link or beaded chain; or S-hook.

2. Valve Schedules: For each piping system, on 8-1/2" x 11" bond paper. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal-operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.

a. Valve-tag schedule shall be included in operation and maintenance data.

2.10 SECURITY FASTENERS

A. Security Fasteners: Provide security fasteners for all Division 21 items mounted in secured areas. Security fasteners shall be 5-lobe "TORXplus" as manufactured by TAMPER-PRUF SCREWS, Paramount, California.

PART 3 – EXECUTION

3.1 FIRE-SUPPRESSION DEMOLITION

A. Refer to Division 01 and Division 02 for general demolition requirements and procedures.

B. Disconnect, demolish, and remove fire-suppression systems, equipment, and components indicated to be removed.

1. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
2. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.
3. Equipment to Be Removed: Disconnect and cap services and remove equipment.
4. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
5. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to the Owner.

C. If pipe, insulation, or equipment to remain is damaged in appearance or is unserviceable, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.

3.2 PIPING SYSTEMS - COMMON REQUIREMENTS

A. Install piping according to the following requirements and Division 21 Sections specifying fire suppression piping systems.

B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

C. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.

D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

F. Install piping to permit valve servicing.

G. Install piping at indicated slopes.

H. Install piping free of sags and bends.

I. Install fittings for changes in direction and branch connections.

J. Install piping to allow application of insulation.

K. Select system components with pressure rating equal to or greater than system operating pressure.

L. Install escutcheons for penetrations of walls, ceilings, and floors according to the following:

1. New Piping:

a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.
b. Chrome-Plated Piping: One-piece, cast-brass type with polished chrome-plated finish.
c. Insulated Piping: Split, cast-brass type with spring clips.
d. Bare Piping at Wall, Floor, and Ceiling Penetrations in Finished Spaces, Unfinished Service Spaces, and Equipment Rooms: One-piece or split, cast-brass type with polished chrome-plated finish.

2. Existing Piping:

a. Chrome-Plated Piping: Split-casting, cast-brass type with chrome-plated finish.
b. Insulated Piping: Split, cast-brass type with spring clips.
c. Bare Piping at Wall, Floor, and Ceiling Penetrations in Finished Spaces, Unfinished Service Spaces, and Equipment Rooms: Split, cast-brass type with polished chrome-plated finish.

M. Sleeves are not required for core-drilled holes.

N. Install sleeves for pipes passing through concrete and masonry walls, gypsum board partitions, and concrete floor and roof slabs.

1. Cut sleeves to length for mounting flush with both surfaces.

Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.

2. Install sleeves in new walls and slabs as new walls and slabs are constructed.
3. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials:

a. Steel Pipe Sleeves: For pipes smaller than NPS 6.
b. Steel Sheet Sleeves: For pipes NPS 6 and larger, penetrating gypsum-board partitions. Seal space outside of sleeve fittings with grout.

4. Except for underground wall penetrations, seal annular space between sleeve and pipe or pipe insulation, using joint sealants appropriate for size, depth, and location of joint. Refer to Division 7 for materials and installation.

O. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials listed for application. Refer to Division 7 for firestopping materials.

P. Verify final equipment locations for roughing-in.

Q. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

3.3 PIPING JOINT CONSTRUCTION

A. Join pipe and fittings according to the following requirements and Division 21 Sections specifying piping systems.

B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

D. Soldered Joints: Apply ASTM B813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B32.

E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.

F. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

G. Welded Joints: Construct joints according to AWS D10.12, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.

H. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

I. Plastic Piping Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:

1. Comply with ASTM F402 for safe-handling practice of cleaners, primers, and solvent cements.
2. CPVC Piping: Join according to ASTM D2846 Appendix.

J. Plastic Pressure Piping Gasketed Joints: Join according to ASTM D3139.

3.4 ACCESS PANELS

A. Furnish access panels where required for access to concealed mechanical items such as dampers, valves, strainers, shock absorbers, cleanouts, control devices, and where required for equipment servicing.

B. Deliver all panels to General Contractor for installation. Provide instructions for their location in sufficient time so panels can be installed in the normal course of work.

3.5 IDENTIFICATION COMMON REQUIREMENTS

A. Provide pipe identification, valve tags, stencils, or engraved name plates to clearly identify all mechanical equipment, including motors, piping and controls of the various mechanical systems and direction of flow in piping.

B. Plastic Pipe Markers: On bare pipe when surface temperature exceeds 180 degree F provide a 1- inch thick insulation band under marker for protection from the hot pipe.

C. Piping, Ducts, and Equipment Identification:

1. Piping:

a. Identify all piping accessible for maintenance in crawl spaces, tunnels, above ceilings, and access spaces as well as exposed to view utilizing stenciled markings according to the following procedures:

1) Use an arrow marker for each pipe-content legend. The arrow shall always point away from the pipe legend and in the direction of flow. Color and height of arrow to be same as content legend lettering.
2) If flow can be in both directions, use a double-headed arrow indication.
3) Apply pipe legend and arrow indication at every point of pipe entry or exit where line goes through wall or ceiling cut.
4) Apply pipe legend and arrow indication within 3 inch of each valve to show proper identification of pipe contents and direction of flow.
5) Apply legend to the pipe so that lettering is in the most legible position. For overhead piping, apply legend on the lower half of the pipe where view is unobstructed, so that legend can be read at a glance from floor level.
6) Pipes under 3/4 inch O.D.: Fasten brass tags securely at specified legend locations.

2. Valves:

a. System service valves located inside the building: Tag and identify as to type of service.
b. Valves or cocks controlling branch mains or risers to various portions of the building: Tag and identified as to service and location.

3. Controls:

a. Magnetic starters and relays: Install nameplates or stencil to identify connecting or controlled equipment.
b. Manual operating switches, fused disconnect switches and thermal over-load switches which have not been specified as furnished with indexed face plates: Install nameplates or be stencil as to controlled equipment.
c. Automatic controls, control panels, zone valves, pressure electric, electric pressure switches, relays, and starters: Clearly identified with unit served and function.
d. Identify all starters, disconnect switches, and manually operated controls, except integral equipment switches with nomenclature corresponding to operating instructions in the "Operation and Maintenance Manual". Coordinate with the university Facilities Operations personnel through the university Project Manager.

4. Access Doors:

a. Provide engraved nameplates or painted stencils to identify concealed valves, controls, dampers or other similar concealed mechanical equipment.

b. Identify the locations of fire dampers above accessible ceilings with a red circular dot at least 3/4 inch in diameter, or embossed tape, adhered to the nearest T-bar. Access door shall be painted red.
c. Obtain the university Project Manager's approval before installation on all access doors in finished areas.

5. Lift-Out Ceilings:

a. Provide engraved nameplates on ceiling tee stem (screwed or riveted, adhesive not allowed) to identify concealed valves, VAV boxes, filters, fire/smoke dampers or similar concealed mechanical equipment that is directly above nameplate in ceiling space.
b. Obtain the University Project Manager's approval of tag locations before installation.

D. Piping Label Tags

Classification	Color of Field	Letter Colors	Code
Materials Inherently Hazardous:			
Flammable or Explosive:			
Natural Gas	Yellow	Black	NG
Lab Waste	Yellow	Black	AW
Extreme Temperatures or Pressures:	Yellow	Black	
Domestic Hot Water	Yellow	Black	Dom HW
Domestic Hot Water, Circulating	Yellow	Black	Dom HWC
Heating Water Supply	Yellow	Black	HWS
Heating Water Return	Yellow	Black	HWR
Low Pressure Steam	Yellow	Black	LPS
Low Pressure Steam Condensate	Yellow	Black	LPSC
High Pressure Steam	Yellow	Black	HPS
High Pressure Steam Condensate	Yellow	Black	HPSC
Boiler Feed Water	Yellow	Black	BFW
Refrigerant	Yellow	Black	REF
High Pressure Compressed Air (over 90 psig)	Yellow	Black	CA
Materials of Inherently Low Hazard:			
Liquid or Liquid Admixture:	Green	White	
Distilled Water	Green	White	DW
Domestic Cold Water	Green	White	Dom CW
Sanitary Sewer	Green	White	SAN
Waste Vent	Green	White	V
Chilled Water Supply	Green	White	CWS
Chilled Water Return	Green	White	CWR
Condenser Water Supply	Green	White	CS
Condenser Water Return	Green	White	CR
Gas or Gaseous Admixture:	Blue	White	
Medium Pressure Compressed Air (30 to 90 psig)	Blue	White	CA
Low Pressure Compressed Air (less than 30 psig)	Blue	White	CA
Vacuum	White	Black	VAC

Classification	Color of Field	Letter Colors	Code
Fire Quenching Materials:			
Fire Lines	Red	White	FL

E. Mechanical Equipment Naming Strategy:

1. Equipment identification numbers may be up to 32 characters. Equipment naming strategy is:

   System – Bld – Number
   ###-#####-##-###

2. The first three placeholders are reserved for the system designation (alpha characters)
3. The fourth character is a hyphen.
4. The fifth through ninth placeholders are reserved for the building designation (alpha and/or numeric)
5. The tenth character is a hyphen
6. The eleventh through sixteenth placeholders are a "smart number." It is composed of a two-digit, alpha or numeric, floor location designator followed by a hyphen and a three digit numeric sequential indicator.
7. The seventeenth character is a hyphen
8. In some instances the point name will be followed by a hyphen and a sub-point name
9. All device and point names will be assigned by the Facilities Operations, Building Operations Department.
10. All references to equipment and devices in drawings, labels, equipment tags, BAS system, etc., must use this naming convention.
11. Equipment designation, for prints may exclude the building

3.6 PAINTING

A. Painting of fire-suppression systems, equipment, and components is specified in Division 9 for interior painting and exterior painting.

B. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

END OF SECTION 21 05 00

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SECTION 21 10 00

AUTOMATIC FIRE SPRINKLER SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This section covers the design and installation of a complete fire protection system as indicated on the drawings and as specified herein consisting of the following but not limited to:

1. Modify existing piping wet-type sprinkler system to match new space configuration. Modify piping and head layout. Remove and add pipe and sprinkler heads for new room and ceiling layout.

B. The requirements of the specifications and drawings may require construction beyond that required by Code. Contractor shall provide this system, fully complying with the requirements of these contract documents.

1.3 FIRE PROTECTION MEETINGS

A. Predesign/Presubmittal Conference: Conduct a conference at Project site prior to commencing preparation of delegated design and other submittals specified in this Section. (Similar to Preconstruction Conference specified under Section 01 31 00 "Project Management And Coordination" but at a separate time.) Meeting may be conducted at same time as fire protection meeting specified in Section 28 31 00 "Fire Detection And Alarm."

1. Attendees shall include fire protection sub-contractor, University's Code Officials (AHJ), University's Fire Technicians, University's Project Manager, and representatives of Architect and Engineer of Record.

2. Invite attendees no less than 14 calendar days in advance of scheduled meeting time.

3. Agenda shall include reviewing requirements for design, submittals, pre-testing/-inspection, and field quality control testing and inspection requirements, including participation of selected University personnel during inspection and testing operations.

1.4 SYSTEM DESCRIPTION

A. Design Requirements:

1. It shall be the Contractor's responsibility to design, layout, and size the systems from hydraulic calculations in accordance with the requirements of NFPA 13 - Installation of Sprinkler Systems.

2. It shall be the Contractor's responsibility to design the system so that no interference exists between the fire protection system and work of other trades, equipment and systems designed and installed by others. The latest issues of all architectural, structural, mechanical, and electrical drawings will be furnished for reference to assist the Contractor in preparing the design so as to avoid interference.
3. Submitted calculations shall include flow test data used. Flow test data obtained from local authorities may be used if test has been made within three months of project start date. Flow tests performed by this Contractor shall be verified by local authorities.
4. Hydraulic calculations shall be based on 90% of flow test pressure data.
5. The Contractor shall determine/verify hazard classifications for all areas and shall identify them on the plans. Specific hazard areas include:

    a. Light Hazard (all areas except as listed below)

B. Performance Requirements:

1. System shall provide coverage for remodel area shown on plans.
2. Provide a hydraulically designed wet-pipe sprinkler system to meet requirements of NFPA 13.
3. Interface system with building fire and smoke alarm system.

1.5 SUBMITTALS

A. Refer to Division 01 and Division 21 Section "Common Results for Fire Suppression Systems," for general requirements.

B. Delegated Design Submittal: Installer's responsibilities include designing, fabricating, and installing fire-suppression systems and providing professional engineering services needed to assume engineering responsibility. Base calculations on results of fire-hydrant flow test.

1. Engineering Responsibility: Preparation of working plans, calculations, and field test reports by a qualified professional engineer.
2. Sprinkler shop drawings and calculations shall be sealed and signed by a licensed professional engineer (P.E.) licensed in Colorado who shall certify that the sprinkler design and installation meets requirements of the local codes and applicable sections of NFPA. Sprinkler drawings and calculations shall be prepared by an NICET III or IV designer under the direct supervision of the licensed professional engineer in responsible charge.

C. Product Data:

1. Piping materials
2. Valves
3. Sprinkler heads
4. Fire protection specialties

D. Shop Drawings: Prepare shop drawings showing layout of fire protection system. Drawings shall reckon with all building components and show routing of piping to clear same. Drawings shall conform to requirements of NFPA 13 "Working Plans" and shall be accurately dimensioned to show proposed location of all fire protection system components. Shop drawings shall be prepared on AutoCAD and the drawing sizes shall be the same as the Engineer's drawings.

E. Quality Assurance/Control Submittals:

1. Drawings and hydraulic calculations shall be submitted to the regulatory agencies having jurisdiction for their approvals. After approvals are obtained, the drawings and hydraulic calculations shall be submitted to the Engineer for review.
2. Submit hydraulic calculation sheets in tabular form conforming to the requirements and recommendations of NFPA 13.

1.6 QUALITY ASSURANCE

A. Qualifications: The system shall be designed and installed by a firm regularly engaged in the design and installation of fire protection systems in accordance with the requirements of the National Fire Protection Association. The firm shall have had a minimum of five years of experience in fire protection system design and installation for projects of similar nature to this project. Engineer may require evidence to support the above qualifications and may reject any proposed installer who cannot show suitable experience.

B. Regulatory Requirements:

1. Refer to Division 21 Section "Common Results for Fire Suppression Systems" for general code, standard and regulatory requirements.
2. The fire protection system shall be in conformance with the requirements of the following regulatory agencies and codes wherever the requirements of such agencies and codes are applicable:

a. Local building department
b. Local fire department
c. Local water department

C. Certifications: All materials and equipment used in the installation of the fire protection system shall be as listed in the Underwriters' Laboratories (UL) Fire Protection Equipment Directory, or the Factory Mutual Laboratories Approval Guide and fire protection devices involving fire hazard, and shall be the latest product of the manufacturer.

PART 2 - PRODUCTS

2.1 PIPES AND TUBES

A. Aboveground Downstream of the Backflow Preventer:

1. Steel Pipe: ASTM A53, Schedule 40, in NPS 6 and smaller, and Schedule 30, in sizes NPS 8 and larger, carbon steel and galvanized. Schedule 30 and Schedule 40 "equivalent" or "replacement" having a wall thickness less than Schedule 30 or Schedule 40, respectively, is not allowed.

a. Acceptable fitting/joint types for use with this pipe:

1) Threaded
2) Welded
3) Cut-groove
4) Rolled-groove

2. Steel Pipe: ASTM A135, Schedule 10, through NPS 5 sizes and NFPA 13 specified wall thickness for NPS 6 through NPS 10, carbon steel and galvanized. Schedule 10 "equivalent" or "replacement" having a wall thickness less than Schedule 10 is not allowed.

    a. Acceptable fitting/joint types for use with this pipe:

        1) Welded
        2) Rolled-groove

3. Steel Pipe: ASTM A795, Standard and Light Weight Fire Protection Pipe.

    a. Standard Weight Fire Protection Pipe Schedule 40, sizes NPS 6 and smaller. Schedule 40 "equivalent" or "replacement" having a wall thickness less than Schedule 40 is not allowed.

        1) Acceptable fitting types for use with standard weight (Schedule 40), carbon steel and galvanized.

            a) Threaded
            b) Welded
            c) Cut-groove
            d) Rolled-groove

    b. Standard Weight Fire Protection Pipe, Schedule 30, only allowed in sizes NPS 8 and larger. Schedule 30 "equivalent" or "replacement" having a wall thickness less than Schedule 30 is not allowed.

        1) Acceptable fitting types for use with standard weight (Schedule 30), carbon steel and galvanized.

            a) Threaded
            b) Welded
            c) Cut-groove
            d) Rolled-groove

    c. Light Weight Fire Protection Pipe Schedule 10. Schedule 10 "equivalent" or "replacement" having wall thickness less than Schedule 10, respectively, are not allowed.

        1) Acceptable fitting/joint types for use with this pipe:

            a) Welded
            b) Rolled-groove

4. Pipe and fitting/joints not explicitly described above are not acceptable.

2.2 PIPE AND TUBE FITTINGS

A. Cast Iron Threaded Fittings: ANSI B16.4, Class 125, standard pattern, with threads according to ANSI B1.20.1.

B. Ductile Iron Threaded Fittings: ANSI B16.3, Class 150, standard pattern, with threads according to ANSI B1.20.1.

C. Malleable Iron Threaded Fittings: ANSI B16.3, Class 150, standard pattern, with threads according to ANSI B1.20.1.

D. Steel Fittings: ASTM A 234, seamless or welded; ANSI B16.9, buttwelding; or ANSI B16.11, socket-welding type for welded joints.

E. Steel Flanges and Flanged Fittings: Class 150, ANSI B16.5.

F. Grooved-End Fittings for Steel Pipe: UL-listed and FM-approved, ASTM A536, Grade 65-45-12 ductile iron or ASTM A47 Grade 32510 malleable iron, with grooves or shoulders designed to accept grooved couplings.

2.3 JOINING MATERIALS

A. Flanged Joints for Ductile Iron Pipe and Ductile Iron or Cast Iron Fittings: AWWA C115 ductile iron or gray iron pipe flanges, rubber gaskets, and high-strength steel bolts and nuts.

B. Couplings for Grooved-End Steel Pipe and Grooved-End Ferrous Fittings: UL 213, AWWA C606, ASTM A536 ductile iron or ASTM A47 malleable iron housing, with enamel finish. Include synthetic rubber gasket with central-cavity, pressure-responsive design; ASTM A183 carbon steel bolts and nuts; and locking pin, toggle, or logs to secure grooved pipe and fittings.

2.4 SPECIALTY SPRINKLER FITTINGS

A. Specialty Fittings: UL listed and FM approved, made of steel, ductile iron, or other materials compatible with system materials and applications where used.

B. Locking Lug Fittings: UL 213, ductile iron body with locking lug ends, for use with plain-end steel pipe.

C. Mechanical "T" Fittings: UL 213, ductile iron housing with pressure-responsive gaskets, bolts, and threaded or locking lug outlet.

D. Mechanical-Cross Fittings: UL 213, ductile iron housing with pressure-responsive gaskets, bolts, and threaded or locking lug outlets.

E. Drop-Nipple Fittings: UL 1474, with threaded inlet, threaded outlet, and seals; adjustable.

F. Sprinkler Alarm Test Fittings: Ductile iron housing with NPS 1-1/2 inlet and outlet, integral test valves, combination orifice and sight glass, and threaded or locking lug ends.

2.5 GENERAL DUTY VALVES

A. Bronze Two-Piece Ball Valves:

1. Manufacturer and Model:

a. Threaded Ends:

1) Apollo 77-100 Series
2) FNW 420

3) Nibco T-585-70

b. Grooved Joint:

1) Victaulic Series 721

2. 150 psig SWP, non-shock 600 psig WOG, MSS SP-110, cast bronze, full port, two-piece body design, chrome-plated solid bronze ball with reinforced Teflon seats. Stem packing adjustable for wear with adjusting screw.

B. Butterfly Valves:

1. Flangeless Ferrous Alloy Butterfly Valves

a. Manufacturer and Model:

1) Apollo 143
2) Centerline 200
3) NIBCO LD 2000

2. Flangeless, 200 psig CWP Rating through NPS 12, 150 psig CWP Rating NPS 14 and larger, MSSSP 67, cast or ductile iron body, wafer lug type, extended neck, aluminum bronze or nickel plated ductile iron disc, stainless steel shaft, EPDM seat and seal, 10-position lever locking handle through NPS 6, worm gear actuator for NPS 8 and larger valves.
3. Grooved Ferrous Alloy Butterfly Valves

a. Manufacturer and Model:

1) Nibco GD4765
2) Victaulic Series 700/709

b. Grooved, 200 psig CWP Rating, MSSSP 67, EPDM or polymer coated cast or ductile iron body, extended neck, aluminum bronze or nickel plated ductile iron disc, stainless steel shaft, EPDM seat and seal, 10-position lever locking handle through NPS 6, worm gear actuator for NPS 8 and larger valves.

4. Valves shall be capable for use as isolation valves and be recommended by the manufacturer for dead-end service at the full-rated operating pressure, without the need for downstream blind flanges.

2.6 FIRE PROTECTION SERVICE VALVES

A. Gate Valves:

1. NPS 2 and Smaller – UL-262, cast bronze, threaded ends, solid wedge disc, rising stem, OS&Y, screw-in bonnet. Ball valves of same construction may be used.
2. Indicating Valves, NPS 2-1/2 and Smaller: UL 1091; butterfly or ball-type, bronze body with threaded ends; and integral indicating device.
3. NPS 2-1/2 and Larger – UL-262, iron body, bronze trim, flanged ends, solid wedge disc, rising stem, OS&Y, flanged bonnet, 175 psig non shock working pressure.

B. Butterfly Valves: NPS 2-1/2 and Larger – Slow closing, outside indicating, ductile iron body and disk, for grooved piping, with gear operator 175 psig non shock working pressure.

C. Swing Check Valves: Iron body, horizontal swing check with renewable bronze or stainless steel seat and seat rings, flanged or grooved ends, 175 psig non shock working pressure.

2.7 AUTOMATIC FIRE SPRINKLER HEADS

A. Approved Manufacturers: Viking, Reliable, and Tyco.

B. Sprinkler heads shall have a temperature rating of 155°F except for heads in areas of high temperature and in close proximity to heat sources that are temperature rated in accordance with NFPA 13.

C. Sprinkler Heads in Suspended Ceilings: Pendent type, chrome plated with white escutcheon, semi-recessed style.

1. In the rooms with wood ceilings , provide concealed style, rough brass with painted bright white cover plate.

D. Sprinkler Heads in Exposed Areas: Upright type, standard brass.

E. Guards: Provide sprinkler head guards where the sprinkler deflector is located 7'-0" or less above finished floor, or is otherwise subject to injury. Head guard finish shall match applicable sprinkler head finish requirements.

F. Supply the Owner an extra stock of six sprinklers minimum, three of each type, and a special sprinkler wrench and a pair of sprinkler tongs. Heads shall be provided in suitable head cabinets for wall mounting next to fire service entry. Provide any additional heads that may be required by NFPA 13. Provide three extra escutcheon plates of each type installed on the project.

2.8 IDENTIFICATION SIGNS

A. Identification Signs: Provide identification signs at all control, drain, test and alarm valves. Signs shall be of the type, size and location as required by NFPA.

2.9 FIRE HOSE CONNECTION

A. Approved Manufacturers: Potter-Roemer or equivalent.

B. Coordinate fore hose connection with fire hose cabinet and fire extinguisher as specified in Division 10.

C. Provide an NPS 2-1/2 hose valve with NPS 2-1/2 x NPS 1-1/2 reducer with pin lug cap and chain equal to Potter-Roemer 4065.

2.10 FIRE HOSE CABINET

A. Approved Manufacturers: Potter-Roemer or equivalent.

B. Provide recessed 20-gauge, white, baked enamel steel box fire hose cabinet, 20-gauge tubular steel door with 18-gauge frame with a continuous steel hinge (brass pin), door and frame finished with a baked-on gray prime coat equal to Potter-Roemer 1500-A.

C. Provide NPS 2-1/2 hose valve with NPS 2-1/2 x NPS 1-1/2 reducer with pin lug cap and chain equal to Potter-Roemer 4065 and a multipurpose dry-chemical type fire extinguisher in brass container: UL-rated 10-lb nominal capacity, with monoammonium phosphate-based dry chemical in chrome-plated brass container.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General:

1. Entire installation shall be in accordance with approved shop drawings, local codes, and applicable NFPA requirements. When unforeseen job site conditions will not permit piping to be installed as shown on the drawings, necessary changes will be made to accomplish a coordinated system without additional cost to the Owner, even though pipe may have been delivered to the site cut to predetermined lengths. Pipe hanger spacing shall conform to the requirements of the NFPA.
2. Locate all valves where readily accessible. All main line valves shall be electrically monitored or secured with a chain and padlock that will lock the valve in an open position.
3. Provide valved test drains as required by NFPA. Pipe test drains, through drain risers where necessary, to the nearest adequate floor drain. Not all sprinkler drains or sprinkler system test drains are shown. Contractor shall be responsible for providing additional sprinkler drains as required. Contractor shall provide additional floor drains and associated waste and vent piping as required at each sprinkler drain location. "
4. Make provisions to drain all parts of the piping system.

B. Pipe installations comply with provisions of applicable sections in Division 2315 specification.

C. Automatic Fire Sprinkler Head Installation:

1. Pendent and upright heads shall be installed with the deflectors parallel to the ceiling; clearance between the deflectors and the ceilings, roof decking, roof joints, electric or heating equipment, or other obstructions shall be in accordance with the requirements of NFPA.
2. In those areas where lay-in acoustical tile ceilings are to be installed, install all sprinkler heads in the ceiling tiles centered within 6 inches of tile center.
3. Remove all sprinkler head frangible bulb protectors after sprinkler head installation. Protect all recessed and concealed sprinkler heads with factory-supplied caps and covers until ceiling installation is complete.

D. Fire Hose Cabinet Installation: Branch piping to valves must have rigid bracing independent of fire hose cabinet.

E. Fire Alarm Wiring: All fire alarm and monitor wiring shall be done under the Electrical Division but the proper operation shall be the fire protection contractor's responsibility.

3.2 FIELD QUALITY CONTROL PIPE TESTING

A. Site Tests/Inspection: The entire fire protection piping system including the underground service piping shall be tested hydrostatically at not less than 200 psig pressure for two hours, or at 50 psig in excess of the maximum static pressure when the maximum static pressure is in excess of 150 psig. The hydrostatic test pressure shall be measured at the low point of the individual system or zone being tested. Refer to NFPA 13, Chapter 8 for additional requirements.

3.3 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain specialty valves. Refer to Division 01 Section "Demonstration and Training."

END OF SECTION 21 10 00

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SECTION 22 05 00

COMMON WORK RESULTS FOR PLUMBING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. General requirements for all Division 22 sections
2. Piping materials and installation instructions common to most piping systems
3 Dielectric fittings
4. Escutcheons
5. Access Panels
6. Identification
7. Plumbing demolition
8. Equipment installation requirements common to equipment sections
9. Painting and finishing
10. Supports and anchorages

B. All electrical work installed under Division 22 shall be in compliance with Division 26.

1.3 DRAWINGS AND SPECIFICATIONS

A. The drawings are diagrammatic in character indicating design concept and do not indicate every required duct or piping offset, valve, fitting, etc.

B. All drawings relating to this structure, together with these specifications, shall be considered in bidding and construction. The drawings and specifications are complementary, and what is called for in either of these shall be as binding as though called for by both. Should any conflict or omissions arise between the drawings and specifications, such conflict shall be brought to the attention of the Architect/Engineer for resolution.

C. Unless otherwise indicated, all equipment and performance data listed is for job site conditions (elevation 5300 feet).

D. Drawings are not to be scaled.

1.4 DEFINITIONS

A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe chases, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.

B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.

C. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in chases.

D. The following are industry abbreviations for plastic materials:

1. ABS: Acrylonitrile-butadiene-styrene plastic.
2. CPVC: Chlorinated polyvinyl chloride plastic.
3. PE: Polyethylene plastic.
4. PVC: Polyvinyl chloride plastic.

E. The following are industry abbreviations for rubber materials:

1. EPDM – Ethylene propylene diene terpolymer rubber.
2. NBR – Acrylonitrile-butadiene rubber

1.5 SUBMITTALS

A. Division 22 Submittal Data and Shop Drawings:

1. Refer to Division 01, for general submittal requirements.
2. Contractor agrees that shop drawings and/or submittals processed by the Engineer are not change orders; that the purpose of shop drawings and/or submittals by the Contractor is to inform the Engineer which equipment and materials he intends to furnish and install.
3. Submittals and/or shop drawings are to be edited to show specific data and all options for the mechanical equipment that the Contractor intends to provide.
4. Submittals and/or shop drawings are to be identified with numbers or letters identical to those listed on the drawings and/or specifications.
5. All shop drawings for special systems (temperature controls, etc.) that will become permanent record documents shall be prepared on AutoCAD Version 2007 or later, using the same drawing size as the project construction documents.
6. Approved Manufacturers and Substitutions

a. Equipment and/or materials manufactured by any one of the Engineer-approved manufacturers listed in this specification or on the drawings shall be acceptable if the equipment and material is equivalent in performance, capacity, and configuration.
b. Substitution Requests prior to bid: Refer to Division 01. No prior approvals will be given by the Engineer unless specifically mentioned in these specifications.
c. Substitution Requests after Execution of Contract: If Contractor wishes to furnish or use a substitute item of material and/or equipment; he must submit a change order request to the Engineer. The request for change order shall itemize each of the proposed substitutions identified by applicable specification section, paragraph number, and/or drawing number. A price change (increase or decrease) shall be listed for each item along with complete data showing performance over entire range, physical dimensions, electrical characteristics, material construction, operating weight, and other applicable data. Justification of

substitution must be more than just cost justification. The Engineer will review the change order request for equality, suitability, and reasonableness of price differential. A single substitution change order listing the approved items will be issued with the net cost of the change order being the sum of the approved item costs. No subsequent substitution change orders will be considered. The Engineer's decision will be final.

d. It shall be the responsibility of the Contractor to assure that the substitute material and/or equipment fits into the space provided and the Contractor shall pay for all extra costs incurred by other trades for any and all changes necessitated by these substitutions. No time extension will be allowed due to substitution on equipment.

e. Equipment and/or materials manufactured by any one of the Engineer-approved manufacturers listed in this specification or on the drawings shall be acceptable if the equipment and material is equivalent in performance, capacity, and configuration.

7. Submittals Schedule: Comply with Division 01 construction progress documentation and submittal requirements and the additional submittal requirements specified below. Unless otherwise specified in Division 01, comply with the submittal periods specified below. Engineer will schedule submittal reviews based on the submittal schedule. Failure to submit schedule may result in inability to review submittals within the periods stated in the submittal schedule. These delays shall not be cause for extension of Contact completion date.

   a. Processing Time: Allow enough time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

   b. Submit schedule within 14 days of commencement of work. Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.

   c. Allow 15 days for review of each resubmittal.

   d. Submit a minimum of three copies of schedule. Arrange the following information in a tabular format:

      1) Scheduled date for first submittal.
      2) Specification Section number and title.
      3) Submittal category (action or informational).
      4) Name of subcontractor.
      5) Description of the Work covered.
      6) Scheduled date for Architect's final release of reviewed submittal.

8. Schedule of Deviations: Equipment and material submittals of approved manufacturers, including basis of design manufacture shall provide a written itemization of exceptions to the specification and deviations from the basis of design for all features, design, configuration, physical dimension, performance, and operation of the submitted product. Those elements not identified and itemized as exceptions in the submittal shall not be reviewed by the Engineer and shall be provided as specified.

B. Close-out Submittals:

1. Operating and Maintenance (O&M) Manual:

   a. Provide O&M manuals in accordance with Division 01.

   b. The Contractor shall prepare an operating and maintenance manual that shall cover all systems and equipment installed under this Division. Incorporate the standard technical literature into system-specific formats for this facility as designed and actually installed.

The resulting manual shall also serve as the training manual and shall be specific, concise, to the point, and tailored specifically for this facility.

c. Unless specified otherwise in Division 01, the maintenance manual shall be submitted to the Engineer in draft form for approval prior to preparation of two copies for final submission to the Architect for delivery to the Owner.

d. The maintenance manual shall be 8-1/2" x 11" size and assembled in loose-leaf three-ring or post binder. Provide manufacturers' original literature. Facsimiles are not acceptable. The manual shall be adequately indexed and contain the following information:

1) Contractors' names, addresses, and telephone numbers
2) Alphabetical list of all system components with the name and address and 24-hour phone number of the company responsible for servicing each item during the first year of operation
3) Guarantees and warranties of all equipment whenever applicable.
4) All manufacturers' data that is applicable to the installed equipment, with appropriate highlighting, such as the following:

a) Shop drawings (latest copy)
b) Installation instructions
c) Lubrication instructions
d) Wiring diagrams

5) A simplified description of the operation of all systems including the function of each piece of equipment within each system. Including both normal and emergency operation. These descriptions shall be supported with a schematic flow diagram when applicable.

2. Record Drawings:

a. Comply with record drawing requirements in Division 01.
b. Record Prints: All RFIs, change orders and other directives if not recorded on the contract drawings and amendments shall be red-lined on the record drawings. Record drawings simply tabulating the amendments onto the drawings shall be returned for clarification of installed conditions and red-line mark-up.

C. Non-Responsive Submittals: Submittals are intended to be reviewed in an initial submittal with comments corrected and submitted in a resubmittal. Non-responsiveness to the initial submittal comments in the resubmittal will result in return of the documents for correction and additional resubmittals. Any time charged by the Engineer in review of additional resubmittals due to non-responsiveness shall be deducted from the Contractor's billings.

D. Product Data:

1. Escutcheons
2. Identification: Submit product for each type of identification.

E. Schedules:

1. Equipment Label Schedule: Include a listing of all equipment to be labeled with the proposed content for each label.
2. Valve numbering scheme.
3. Valve Schedules: For each piping system to include in maintenance manuals.

1.6 QUALITY ASSURANCE

A. Electrical Characteristics for Plumbing Equipment: Equipment of lower or higher electrical characteristics may be furnished provided such proposed equipment variations are specifically identified as a deviation from contract documents and approved in writing and connecting electrical services, circuit breakers, and conduit sizes are appropriately modified at no cost to the Owner. If minimum energy ratings or efficiencies are specified, equipment shall comply with requirements.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.

B. Store plastic pipes protected from direct sunlight. Support piping to prevent sagging and bending.

1.8 COORDINATION

A. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction, to allow for plumbing installations.

B. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.

C. Coordinate requirements for access panels and doors for plumbing items requiring access that are concealed behind finished surfaces. Access panels and doors are specified in Division 8.

D. Identification:

1. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
2. Coordinate installation of identifying devices with locations of access panels and doors.
3. Install identifying devices before installing acoustical ceilings and similar concealment.

E. Coordinate with all trades to maintain clearances to access panels, equipment, control and electrical panels. Intrusions into access space shall be brought to the attention of other trades. Notify Engineer of conflicts shown on drawings prior to installation.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:

1. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

2.2 PIPE, TUBE, AND FITTINGS

A. Refer to individual Division 22 piping Sections for pipe, tube, and fitting materials and joining methods.

1. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

2.3 JOINING MATERIALS

A. Refer to individual Division 22 piping Sections for special joining materials not listed below.

B. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.

1. ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch maximum thickness unless thickness or specific material is indicated.

a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.

2. AWWA C110, rubber, flat face, 1/8 inch thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.

C. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.

D. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.

E. Solder Filler Metals: ASTM B32, lead-free alloys. Include water-flushable flux according to ASTM B813.

F. Brazing Filler Metals: AWS A5.8, BCuP Series, copper-phosphorus alloys for general-duty brazing, unless otherwise indicated; and AWS A5.8, BAg1, silver alloy for refrigerant piping, unless otherwise indicated.

2.4 DIELECTRIC FITTINGS

A. Description: Combination fitting of copper alloy and ferrous materials with threaded, solder-joint, plain, or weld-neck end connections that match piping system materials.

B. Insulating Material: Suitable for system fluid, pressure, and temperature.

C. Dielectric Unions: Use dielectric couplings.

D. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 150 or 300 psig minimum working pressure as required to suit system pressures.

1. Available Manufacturers:

a. Capitol Manufacturing Co.
b. Central Plastics Company
c. Epco Sales, Inc.
d. Watts Industries, Inc.; Water Products Div.

E. Dielectric-Flange Kits: Companion-flange assembly for field assembly. Include flanges, full-face- or ring-type neoprene or phenolic gasket, phenolic or polyethylene bolt sleeves, phenolic washers, and steel backing washers.

1. Available Manufacturers:

a. Advance Products & Systems, Inc.
b. Calpico, Inc.
c. Central Plastics Company
d. Pipeline Seal and Insulator, Inc.

2. Separate companion flanges and steel bolts and nuts shall have 150 or 300 psig minimum working pressure where required to suit system pressures.

F. Dielectric Couplings: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining; threaded ends; and 300 psig minimum working pressure at 225°F .

1. Available Manufacturers:

a. Calpico, Inc.
b. Lochinvar Corp.

2.5 ESCUTCHEONS

A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.

1. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass.

a. Finish: Polished chrome-plated.

2. One-Piece, Cast-Brass Type: With set screw.

a. Finish: Polished chrome plated.

3. Split-Casting, Cast-Brass Type: With concealed hinge and set screw.

a. Finish: Polished chrome plated.

4. One-Piece, Floor-Plate Type: Cast-iron floor plate.
5. Split-Casting, Floor-Plate Type: Cast brass with concealed hinge and set screw.

2.6 ACCESS PANELS OTHER THAN SHEET METAL

A. Refer to Division 8 for specification of access doors.

2.7 IDENTIFICATION

A. Equipment Labels:

1. Metal Labels for Equipment:

a. Material and Thickness: Brass, 0.032-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.
b. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2" x 3/4".
c. Minimum Letter Size: 1/4 inch for name of units. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
d. Fasteners: Stainless steel rivets or self-tapping screws.
e. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

2. Plastic Labels for Equipment:

a. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.
b. Letter Color: White.
c. Background Color: Black or blue.
d. Maximum Temperature: Able to withstand temperatures up to 160°F.
e. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2" x 3/4".
f. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
g. Fasteners: Stainless steel rivets or self-tapping screws.
h. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

3. Label Content: Include equipment's unique equipment number.
4. Equipment Label Schedule: For each item of equipment to be labeled, on 8-1/2-by-11-inch bond paper. Tabulate equipment identification number and identify Drawing numbers where equipment is indicated (plans, details, and schedules), plus the specification section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.

B. Pipe Labels:

1. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction.
2. Pretensioned Pipe Labels: Precoiled, semi-rigid plastic formed to cover full circumference of pipe and to attach to pipe without fasteners or adhesive.
3. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.
4. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.
5. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings, pipe size, and an arrow indicating flow direction.

a. Flow-Direction Arrows: Integral with piping system service lettering to accommodate both directions, or as separate unit on each pipe label to indicate flow direction.
b. Lettering Size: According to ASME A13.1.

C. Stencils:

1. Stencils: Prepared with letter sizes according to ASME A13.1 for piping; minimum letter height of 2 inches for ducts; and minimum letter height of 3/4 inch for access panel and door labels, equipment labels, and similar operational instructions.
2. Stencil Material: Fiberboard or metal.
3. Stencil Paint: Exterior, gloss enamel black unless otherwise indicated. Paint may be in pressurized spray-can form.
4. Identification Paint: Exterior enamel in colors according to ASME A13.1 unless otherwise indicated.

D. Valve Tags:

1. Valve Tags: Stamped or engraved with 1/4-inch letters for piping system abbreviation and 1/2-inch numbers.

    a. Tag Material: Brass, 0.032-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.
    b. Fasteners: Brass wire-link or beaded chain; or S-hook.

2. Valve Schedules: For each piping system, on 8-1/2" x 11" bond paper. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal-operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.

    a. Valve-tag schedule shall be included in operation and maintenance data.

PART 3 – EXECUTION

3.1 PLUMBING DEMOLITION

A. Refer to Division 01 and Division 02 for general demolition requirements and procedures.

B. Disconnect, demolish, and remove plumbing systems, equipment, and components indicated to be removed.

1. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
2. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.
3. Equipment to Be Removed: Disconnect and cap services and remove equipment.
4. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
5. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.

C. If pipe, insulation, or equipment to remain is damaged in appearance or is unserviceable, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.

3.2 PIPING SYSTEMS - COMMON REQUIREMENTS

A. Install piping according to the following requirements and Division 22 Sections specifying piping systems.

B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

C. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.

D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

F. Install piping to permit valve servicing.

G. Install piping at indicated slopes.

H. Install piping free of sags and bends.

I. Install fittings for changes in direction and branch connections.

J. Install piping to allow application of insulation.

K. Select system components with pressure rating equal to or greater than system operating pressure.

L. Install escutcheons for penetrations of walls, ceilings, and floors according to the following:

1. New Piping:

    a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.
    b. Chrome-Plated Piping: One-piece, cast-brass type with polished chrome-plated finish.
    c. Insulated Piping: Split, cast-brass type with spring clips.
    d. Bare Piping at Wall, Floor, and Ceiling Penetrations in Finished Spaces, Unfinished Service Spaces, and Equipment Rooms: One-piece or split, cast-brass type with polished chrome-plated finish.

2. Existing Piping: Use the following:

    a. Chrome-Plated Piping: Split-casting, cast-brass type with chrome-plated finish.
    b. Insulated Piping: Split, cast-brass type with spring clips.
    c. Bare Piping at Wall, Floor, and Ceiling Penetrations in Finished Spaces, Unfinished Service Spaces, and Equipment Rooms: Split, cast-brass type with polished chrome-plated finish.

M. Verify final equipment locations for roughing-in.

N. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

3.3 PIPING JOINT CONSTRUCTION

A. Join pipe and fittings according to the following requirements and Division 22 Sections specifying piping systems.

B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

D. Soldered Joints: Apply ASTM B813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B32.

E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.

F. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

3.4 ACCESS PANELS

A. Furnish access panels where required for access to concealed mechanical items such as dampers, valves, strainers, shock absorbers, cleanouts, control devices, and where required for equipment servicing.

B. Deliver all panels to General Contractor for installation. Provide instructions for their location in sufficient time so panels can be installed in the normal course of work.

3.5 IDENTIFICATION COMMON REQUIREMENTS

A. Provide pipe identification, valve tags, stencils, or engraved name plates to clearly identify all mechanical equipment, including motors, piping and controls of the various mechanical systems and direction of flow in piping.

B. Plastic Pipe Markers

1. On bare pipe when surface temperature exceeds 180 degree F provide a 1- inch thick insulation band under marker for protection from the hot pipe.

C. Piping, Ducts, and Equipment Identification:

1. Piping:

a. Identify all piping accessible for maintenance in crawl spaces, tunnels, above ceilings, and access spaces as well as exposed to view utilizing stenciled markings according to the following procedures:

1) Use an arrow marker for each pipe-content legend. The arrow shall always point away from the pipe legend and in the direction of flow. Color and height of arrow to be same as content legend lettering.
2) If flow can be in both directions, use a double-headed arrow indication.
3) Apply pipe legend and arrow indication at every point of pipe entry or exit where line goes through wall or ceiling cut.
4) Apply pipe legend and arrow indication within 3 inch of each valve to show proper identification of pipe contents and direction of flow.
5) Apply legend to the pipe so that lettering is in the most legible position. For overhead piping, apply legend on the lower half of the pipe where view is unobstructed, so that legend can be read at a glance from floor level.
6) Pipes under 3/4 inch O.D.: Fasten brass tags securely at specified legend locations.
7) Legend on steam piping, condensate return, compressed air, gas, and vacuum systems: Include working pressure or vacuum.

2. Valves:

a. System service valves located inside the building: Tag and identify as to type of service.
b. Valves or cocks controlling branch mains or risers to various portions of the building: Tag and identified as to service and location.

3. Access Doors:

a. Provide engraved nameplates or painted stencils to identify concealed valves, controls, dampers or other similar concealed mechanical equipment.
b. Identify the locations of fire dampers above accessible ceilings with a red circular dot at least 3/4 inch in diameter, or embossed tape, adhered to the nearest T-bar. Access door shall be painted red.
c. Obtain the university Project Manager’s approval before installation on all access doors in finished areas.

4. Lift-Out Ceilings:

a. Provide engraved nameplates on ceiling tee stem (screwed or riveted, adhesive not allowed) to identify concealed valves, VAV boxes, filters, fire/smoke dampers or similar concealed mechanical equipment that is directly above nameplate in ceiling space.
b. Obtain the University Project Manager’s approval of tag locations before installation.

D. Piping Label Tags:

Classification	Color of Field	Letter Colors	Code
Materials Inherently Hazardous:			
Flammable or Explosive:			
Natural Gas	Yellow	Black	NG
Lab Waste	Yellow	Black	AW
Extreme Temperatures or Pressures:	Yellow	Black	
Domestic Hot Water	Yellow	Black	Dom HW
Domestic Hot Water, Circulating	Yellow	Black	Dom HWC
Heating Water Supply	Yellow	Black	HWS
Heating Water Return	Yellow	Black	HWR
Low Pressure Steam	Yellow	Black	LPS
Low Pressure Steam Condensate	Yellow	Black	LPSC
High Pressure Steam	Yellow	Black	HPS
High Pressure Steam Condensate	Yellow	Black	HPSC
Boiler Feed Water	Yellow	Black	BFW
Refrigerant	Yellow	Black	REF
High Pressure Compressed Air (over 90 psig)	Yellow	Black	CA
Materials of Inherently Low Hazard:			
Liquid or Liquid Admixture:	Green	White	
Distilled Water	Green	White	DW
Domestic Cold Water	Green	White	Dom CW
Sanitary Sewer	Green	White	SAN
Waste Vent	Green	White	V
Chilled Water Supply	Green	White	CWS
Chilled Water Return	Green	White	CWR
Condenser Water Supply	Green	White	CS
Condenser Water Return	Green	White	CR
Gas or Gaseous Admixture:	Blue	White	
Medium Pressure Compressed Air (30 to 90 psig)	Blue	White	CA
Low Pressure Compressed Air (less than 30 psig)	Blue	White	CA
Vacuum	White	Black	VAC
Fire Quenching Materials:			
Fire Lines	Red	White	FL

E. Mechanical Equipment Naming Strategy:

1. Equipment identification numbers may be up to 32 characters. Equipment naming strategy is:

   System – Bld – Number
   ###-#####-##-###

2. The first three placeholders are reserved for the system designation (alpha characters)

3. The fourth character is a hyphen.
4. The fifth through ninth placeholders are reserved for the building designation (alpha and/or numeric)
5. The tenth character is a hyphen
6. The eleventh through sixteenth placeholders are a "smart number." It is composed of a two-digit, alpha or numeric, floor location designator followed by a hyphen and a three digit numeric sequential indicator.
7. The seventeenth character is a hyphen
8. In some instances the point name will be followed by a hyphen and a sub-point name
9. All device and point names will be assigned by the Facilities Operations, Building Operations Department.
10. All references to equipment and devices in drawings, labels, equipment tags, BAS system, etc., must use this naming convention.
11. Equipment designation, for prints may exclude the building designator.

3.6 PAINTING

A. Painting of plumbing systems, equipment, and components is specified in Division 9 for interior painting and exterior painting.

B. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

3.7 ERECTION OF METAL SUPPORTS AND ANCHORAGES

A. Refer to Division 5 for structural steel.

B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor plumbing materials and equipment.

END OF SECTION 22 05 00

SECTION 22 05 23

GENERAL DUTY VALVES FOR PLUMBING PIPING

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the bronze ball valves.

1.3 DEFINITIONS

A. The following are standard abbreviations for valves:

1. CWP: Cold working pressure
2. EPDM: Ethylene-propylene-diene terpolymer rubber
3. PTFE: Polytetrafluoroethylene plastic
4. SWP: Steam working pressure
5. TFE: Tetrafluoroethylene plastic

1.4 SUBMITTALS

A. Product Data: For each type of valve indicated. Include body, seating, and trim materials; valve design; pressure and temperature classifications; end connections; arrangement; dimensions; and required clearances. Include list indicating valve and its application. Include rated capacities; shipping, installed, and operating weights; furnished specialties; and accessories.

1.5 QUALITY ASSURANCE

A. ASME Compliance: ASME B31.9 for valves up to 125 psig and ASME B31.1 valves above 125 psig.

B. ASME Compliance for Ferrous Valves: ASME B16.10 and ASME B16.34 for dimension and design criteria.

C. NSF Compliance: NSF 61 for valve materials for potable-water service where required by Code.

D. Source Limitations: Obtain valves of a single type through one source from a single manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Prepare valves for shipping as follows:

1. Protect internal parts against rust and corrosion.
2. Protect threads, flange faces, grooves, and weld ends.
3. Set ball and plug valves open to minimize exposure of functional surfaces.

B. Use the following precautions during storage:

1. Maintain valve end protection.
2. Store valves indoors and maintain at higher than ambient dew-point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.

C. Use sling to handle large valves; rig sling to avoid damage to exposed parts. Do not use handwheels or stems as lifting or rigging points.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the manufacturers specified.

2.2 VALVES, GENERAL

A. Refer to Part 3 "Valve Applications" Article for applications of valves.

B. Bronze Valves: NPS 2 and smaller with threaded ends, unless otherwise indicated.

C. Valve Pressure and Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.

D. Valve Sizes: Same as upstream pipe, unless otherwise indicated.

E. Valve Actuators

1. Lever Handle: For quarter-turn valves NPS 6 and smaller, except plug valves.

F. Extended Valve Stems: On insulated valves.

G. Valve Ends.

1. Solder Joint: With sockets according to ASMEB16.18.

a. Caution: Use solder with melting point below 840°F for angle, check, gate, and globe valves; below 421°F for ball valves.
b. Threaded: With threads according to ASME B1.20.1.

H. Valve Bypass and Drain Connections: MSS SP-45

2.3 BALL VALVES

A. Bronze Two-Piece Ball Valves:

1. Manufacturer and Model:

a. Threaded Ends: Apollo 77CLF
b. Soldered Ends: Apollo 77CLF

2. 150 psig SWP, non-shock 600 psig WOG, MSS SP-110, cast bronze, full port, two-piece body design, chrome-plated solid bronze ball with reinforced Teflon seats. Stem packing adjustable for wear with adjusting screw, NSF-61.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine piping system for compliance with requirements for installation tolerances and other conditions affecting performance.

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

B. Examine valve interior for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.

C. Operate valves in positions from fully open to fully closed. Examine guides and seats made accessible by such operations.

D. Examine threads on valve and mating pipe for form and cleanliness.

E. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Verify that gasket is of proper size, that its material composition is suitable for service, and that it is free from defects and damage.

F. Do not attempt to repair defective valves; replace with new valves.

3.2 VALVE APPLICATIONS

A. Refer to piping Sections for specific valve applications. If valve applications are not indicated, use the following:

1. Shut-off Service:

a. Water and Glycol:

1) NPS 2 and Smaller: Ball valves.

2. Throttling Service:

a. NPS 2 and Smaller: Bronze, Class 150, threaded.

B. If valves with specified SWP classes or CWP ratings are not available, the same types of valves with higher SWP class or CWP ratings may be substituted.

C. Domestic Cold Water, Domestic Hot Water, Domestic Hot Water Circulating, Non-potable Water: Use the following types of valves:

1. Ball Valves, NPS 2 and Smaller: Bronze, two-piece, threaded or soldered.

3.3 VALVE INSTALLATION

A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. All equipment and materials shall be installed in accordance with the recommendations of the manufacturer.

C. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.

D. Locate valves for easy access and provide separate support where necessary.

E. Install valves in horizontal piping with stem at or above center of pipe.

F. All valves shall be installed so they are accessible and serviceable. Install valves in position to allow full stem movement.

G. All valves shall be installed so the stem position is not more than 90-degrees from the vertical up position.

H. Isolation valves shall be installed:

1. In piping at each and every piece of equipment
2. In piping whenever said pipe enters or leaves an equipment room
3. At all branch take-offs from mains
4. Where shown on drawings

I. Valve identification requirements are in other Division 22 sections.

3.4 JOINT CONSTRUCTION

A. Refer to Division 22 Section "Common Work Results for Plumbing" for basic piping joint construction.

B. Soldered Joints: Use ASTM B813, water-flushable, lead-free flux; ASTM B32, lead-free-alloy solder; and ASTM B828 procedure, unless otherwise indicated

3.5 ADJUSTING

A. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

END OF SECTION 22 05 23

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SECTION 22 07 00

PLUMBING INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This section includes the following insulation for plumbing systems.

1. Insulation materials
2. Fire-rated insulation systems
3. Mastics and adhesives
4. Jacketing

1.3 DEFINITIONS

A. The word "concealed" as used in this section refers to insulation in ceiling plenums, furred spaces, pipe and duct shafts, unheated spaces immediately below roof and crawl spaces. The word "exposed" refers to insulation in other areas.

1.4 SYSTEM DESCRIPTION

A. Systems to be Insulated: Insulate all portions of the following systems, equipment, and accessories, except where noted otherwise or furnished by OEM as part of equipment.

1. Cold Piping Systems:

a. Domestic cold water
b. Fittings, valves, strainers, and check valves

2. Hot Piping Systems:

a. Domestic hot water piping
b. Domestic hot water circulation piping
c. Fittings, valves, strainers, and check valves

3. Items that need not be insulated:

a. Exposed chrome-plated piping to sinks, toilets, etc.
b. Flexible connectors, air chambers, drain lines from water coolers, and condensate drains

1.5 SUBMITTALS

A. Product Data: For each type of product indicated. Include thermal conductivity, thickness, and jackets (both factory and field applied, if any).

B. Shop Drawings:

1. Detail application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger
2. Detail attachment and covering of heat tracing inside insulation
3. Detail insulation application at pipe expansion joints for each type of insulation
4. Detail insulation application at elbows, fittings, flanges, valves, and specialties for each type of insulation
5. Detail removable insulation at piping specialties, equipment connections, and access panels
6. Detail application of field-applied jackets
7. Detail application at linkages of control devices
8. Detail field application for each equipment type

C. Field quality-control reports.

1.6 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: Insulation and related materials shall have fire test response characteristics indicated, as determined by testing identical products per ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing and inspecting agency.

1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Storage and Protection: Protect insulation against dirt, water, chemical, or mechanical damage before, during, and after installation. Satisfactorily repair or replace such insulation or covering damaged prior to final acceptance of the work.

B. Packaging: Provide insulation material containers marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

1.8 COORDINATION

A. Coordinate size and location of supports, hangers, and insulation shields specified in Division 22, Section "Hangers and Supports for Plumbing Piping and Equipment."

B. Coordinate clearance requirements with piping Installer for piping insulation application duct Installer for duct insulation application, and equipment Installer for equipment insulation application. Before preparing piping and ductwork Shop Drawings, establish and maintain clearance requirements for

installation of insulation and field-applied jackets and finishes and for the required space for maintenance.

C. Coordinate installation and testing of heat tracing.

1.9 SCHEDULING

A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.

B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 PIPE INSULATION

A. Manufacturers:

1. Certainteed Crimpwrap
2. Knauf Insulation; 1000 Pipe Insulation
3. Rubatex
4. Owens Corning; Fiberglas Pipe Insulation
5. Johns Manville; Micro-Lok

B. Preformed fiberglass conforming to ASHRAE 90.1-2004, ASTM C547, Class I or II, and ASTM C585 with "K" factor of 0.23 Btu-in./h-sf-°F maximum at 75°F mean temperature. See schedule for thickness.

C. Provide factory-applied ASJ/SSL type, ASTM C921, or ASTM C1136, Type I jacket with vapor barrier for cold piping (below ambient), or Type II for hot piping (above ambient). Type I may be used for both at Contractor's option. Factory-applied flap adhesive (SSL) or conventional staple and tape seal at Contractor's option.

D. Pipe Insulation Thickness Schedule:

		Minimum Insulation Thickness for Pipe Sizes				
	From:		**NPS 1**	**NPS 1-1/2**	**NPS 4**	**Greater than NPS 8**
Piping System Type	**To less than:**	**NPS 1**	**NPS 1-1/2**	**NPS 4**	**NPS 8**	
1. Domestic cold water		1/2”	3/4”	1”	1”	1”
2. Domestic hot water with and including recirculating loop (140°F and less)		1”	1”	1”	1”	1”

Note: For piping exposed to outdoor ambient temperatures, increase thickness by 0.5 in.

E. Cover fittings and valves with premolded one-piece PVC-insulated covers. This product is not to be installed in locations where its use is prohibited by local codes.

F. Protect insulation on exterior piping exposed to the weather with weatherproof metal jacket. Provide jacket with 0.016-inch-thick aluminum with laminated vapor barrier. Provide "Z" groove in jacket to assure watertight seal. Seal each joint with snap straps containing permanently plastic sealing compound and secured by 1/2-inch-wide stainless steel bands.

2.2 ADHESIVES

A. Provide materials compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated unless otherwise indicated.

B. ASJ Adhesive, and FSK and PVDC Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.

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

a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Co.; CP-82.
b. Eagle Bridges - Marathon Industries; 225.
c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Co.; 85-50.
d. Mon-Eco Industries, Inc.; 22-25.

2. For indoor applications, use adhesive that has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

C. PVC Jacket Adhesive: Compatible with PVC jacket.

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

a. Dow Corning Corporation; 739, Dow Silicone
b. Johns Manville; Zeston Perma-Weld, CEEL-TITE Solvent Welding Adhesive
c. P.I.C. Plastics, Inc.; Welding Adhesive
d. Speedline Corporation; Polyco VP Adhesive

2. For indoor applications, use adhesive that has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.3 MASTICS

A. Provide materials compatible with insulation materials, jackets, and substrates; comply with MIL-PRF-19565C, Type II.

1. For indoor applications, use mastics that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Vapor-Barrier Mastic: Water based; suitable for indoor use on below ambient services.

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

a. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Co.; 30-80/30-90.
b. Vimasco Corporation; 749.

2. Water-Vapor Permeance: ASTM E 96/E 96M, Procedure B, 0.013 perm at 43-mil dry film thickness.
3. Service Temperature Range: Minus 20 to plus 180 deg F.
4. Solids Content: ASTM D 1644, 58 percent by volume and 70 percent by weight.
5. Color: White.

C. Vapor-Barrier Mastic: Solvent based; suitable for indoor use on below ambient services.

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

   a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Co.; CP-30.
   b. Eagle Bridges - Marathon Industries; 501.
   c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Co.; 30-35.
   d. Mon-Eco Industries, Inc.; 55-10.

2. Water-Vapor Permeance: ASTM F 1249, 0.05 perm at 35-mil dry film thickness.
3. Service Temperature Range: 0 to 180 deg F.
4. Solids Content: ASTM D 1644, 44 percent by volume and 62 percent by weight.
5. Color: White.

D. Vapor-Barrier Mastic: Solvent based; suitable for outdoor use on below ambient services.

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

   a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Co.; Encacel.
   b. Eagle Bridges - Marathon Industries; 570.
   c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Co.; 60-95/60-96.

2. Water-Vapor Permeance: ASTM F 1249, 0.05 perm at 30-mil dry film thickness.
3. Service Temperature Range: Minus 50 to plus 220 deg F.
4. Solids Content: ASTM D 1644, 33 percent by volume and 46 percent by weight.
5. Color: White.

E. Breather Mastic: Water based; suitable for indoor and outdoor use on above ambient services.

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

   a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Co.; CP-10.
   b. Eagle Bridges - Marathon Industries; 550.
   c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Co.; 46-50.
   d. Mon-Eco Industries, Inc.; 55-50.
   e. Vimasco Corporation; WC-1/WC-5.

2. Water-Vapor Permeance: ASTM F 1249, 1.8 perms at 0.0625-inch dry film thickness.
3. Service Temperature Range: Minus 20 to plus 180 deg F .
4. Solids Content: 60 percent by volume and 66 percent by weight.
5. Color: White.

2.4 SEALANTS

A. Joint Sealants:

1. Joint Sealants for Cellular-Glass Products:
2. Products: Subject to compliance with requirements, provide the following:

    a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-76.
    b. Eagle Bridges - Marathon Industries; 405.
    c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 30-45.
    d. Mon-Eco Industries, Inc.; 44-05.
    e. Pittsburgh Corning Corporation; Pittseal 444.

3. Provide material compatible with insulation materials, jackets, and substrates.
4. Permanently flexible, elastomeric sealant.
5. Service Temperature Range: Minus 100 to plus 300 deg F.
6. Color: White or gray.
7. For indoor applications, use sealants that have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. FSK and Metal Jacket Flashing Sealants:

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

    a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-76.
    b. Eagle Bridges - Marathon Industries; 405.
    c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 95-44.
    d. Mon-Eco Industries, Inc.; 44-05.

2. Provide materials compatible with insulation materials, jackets, and substrates.
3. Fire- and water-resistant, flexible, elastomeric sealant.
4. Service Temperature Range: Minus 40 to plus 250 deg F.
5. Color: Aluminum.
6. For indoor applications, use sealants that have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

C. ASJ Flashing Sealants, and Vinyl, PVDC, and PVC Jacket Flashing Sealants:

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

    a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-76.

2. Provide materials compatible with insulation materials, jackets, and substrates.
3. Fire- and water-resistant, flexible, elastomeric sealant.
4. Service Temperature Range: Minus 40 to plus 250 deg F.
5. Color: White.
6. For indoor applications, use sealants that have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

PART 3 - EXECUTION

3.1 INSTALLERS

A. Install insulation using workmen regularly engaged in this kind of work in strict accordance with the manufacturer's recommendations and recognized industry practices.

3.2 INSTALLATION

A. General:

1. Apply full-length units of insulation on clean, dry surfaces free of foreign matter. Apply only after tests and approvals required by the specifications have been completed.
2. Insulation on cold surfaces must be applied with a continuous, unbroken vapor seal. Supports, anchors, etc., that are secured directly to cold surfaces must be adequately insulated and vapor sealed to prevent condensation.
3. Finish raw edges with finishing cement.

B. Pipe Insulation:

1. Provide continuous pipe insulation through walls and floor openings except where walls and floors are required to be fire-stopped or required to have a fire-resistance rating. Where this occurs, fill the open space remaining between the sleeve and pipe with fire-stop.
2. Butt joints firmly together and smoothly, secure self-sealing jacket laps and joint strips with monel staples at 6-inch o.c. and cover with lap adhesive or factory (SSL) adhesive.
3. Seal ends of cold pipe insulation with a vapor barrier coating at fittings and valves and at intervals of 21 feet on continuous runs of pipe.
4. Insulate cold pipes continuously through hangers. Provide rigid insulation inserts at pipe hangers and supports per Division 22 Section "Hangers and Supports for Plumbing Systems." Butt pipe insulation to the rigid insulation insert. Apply a wet coat of vapor barrier lap cement on butt joints and seal the joints with 3-inch-wide vapor barrier tape or band. Coat staples with heavy coat of brushed on vapor barrier lap cement.

C. Insulation on Fittings and Valves:

1. Where the factory premolded one-piece PVC insulated fitting covers are to be used, apply the proper factory precut insulation to the fitting using two layers for pipe temperatures above 250°F or below 35°F. A single layer of insulation is suitable between 35°F and 250°F. Tuck the ends of the insulation snugly into the throat of the fitting with the edges adjacent to the pipe covering, tufted and tucked in, fully insulating the pipe fitting. Overlap the covers to the adjoining pipe insulation and jackets and seal all cold pipes at seam edges with vapor barrier adhesive. Seal the circumferential edges of covers with pressure sensitive tape. Overlap the tape on the jacket and the cover at least 1 inch.
2. At locations where the PVC covers are prohibited, use as an alternate one of the following methods: one-coat insulation cement, premolded fiberglass fitting covers, or mitered segments of pipe insulation. Provide glass fabric embedded in fire-retardant mastic finish. Use vapor barrier mastic for cold piping cold piping.
3. Valves may be insulated with sections of fiberglass pipe insulation complete with all service jacket. Coat raw ends with masticuse vapor barrier mastic for cold piping.

D. Other Requirements:

1. Do not insulate manholes, handholes, cleanouts, ASME stamp, and manufacturer's nameplate. Provide neatly beveled edge at interruptions of insulation.
2. Provide removable insulation sections to cover parts of equipment that must be opened periodically for maintenance; include metal vessel covers, fasteners, flanges, frames, and accessories.
3. Repair damaged sections of existing plumbing insulation, both previously damaged or damaged during this construction period. Use insulation of same thickness as existing insulation; install new jacket lapping and seal over existing.
4. Replace damaged insulation that cannot be repaired satisfactorily, including units with vapor barrier damage and moisture saturated units.

END OF SECTION 22 07 00

SECTION 22 10 00

PLUMBING PIPING SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes requirements for complete water, sanitary sewer, vent and distribution system.

1.3 SYSTEM DESCRIPTION

A. Water Service: Existing water service is to be utilized to serve the new plumbing system.

B. Sanitary Sewer: Existing sanitary sewer is to be extended or modified to serve the new plumbing fixtures.

1.4 SUBMITTALS

A. Product Data: Provide submittals on all items furnished under this section including product data on piping materials, fittings, methods, and specialties.

B. Quality Assurance/Control Submittals: Provide test reports required under “Field Quality Control” and “Start-Up Services.”

C. Operation and Maintenance Data: For equipment and specialties to include in emergency, operation, and maintenance manuals.

PART 2 - PRODUCTS

2.1 DOMESTIC WATER PIPE, TUBE, FITTINGS, AND JOINTS

A. Copper Pipe:

1. Above Grade Pipe: ASTM B88, Type L drawn temper seamless copper tube, NSF-61 certified.
2. Fittings: ASME B16.22 wrought copper or ASME B16.18 cast-copper alloy, NSF-61 certified.
3. Flanges: ASME B16.24, Class 150 cast bronze flanges with solder joint ends, NSF-61 certified.
4. Unions: ASME B16.18 cast-copper alloy, hexagonal stock body with ball-and-socket joint, metal-to-metal seating surfaces, and solder joint and/or threaded ends, NSF-61 certified.

5. Joints:

a. Solder Filler: ASTM B 32, Alloy Sn95, Sn94 or E; lead free, NSF 61 certified.
b. Brazing Filler Metal: AWS A5.8 BcuP, copper phosphorus or BAg, silver classification.

2.2 INTERIOR SANITARY SEWER PIPE, FITTINGS, AND JOINTS

A. Above Grade Cast Iron Gravity Waste and Vent Pipe and Fittings:

1. Manufacturers:

a. AB&I Foundry
b. Charlotte Pipe and Foundry
c. Tyler Pipe Company

2. NPS 10 and Smaller:

a. Pipe: ASTM A 888 and CISPI 301 hubless cast-iron pipe and be listed by NSF International.
b. Fittings: ASTM A-888 and CISPI 301, hubless fittings. Couplings, both at horizontal and vertical joints, shall be clamped and restrained where required and in accordance with CISPI 310-97.

B. Joining Methods:

1. Hubless cast-iron pipe joint coupling clamps and shields shall be heavy duty and fabricated from Type 304 stainless steel. Clamps shall be Husky 2000, Mission Heavyweight, or Clamp-All 125. Sealing sleeves shall conform to ASTM C 1540 requirements.
2. Hub and spigot gaskets shall meet ASTM C 564.
3. DWV copper tubing shall be joined using solder or by brazing per the CDA Copper Tube Handbook recommendations.

a. Solder Filler: ASTM B 32, Alloy Sn95, Sn94 or E; lead free.
b. Brazing Filler Metal: AWS A5.8 BcuP, copper phosphorus or BAg, silver classification.

2.3 TRAPS

A. Provide traps for each plumbing fixture, floor drain, and other equipment requiring connection to the sanitary sewer system. Place each trap as near to the fixture outlet as practical. Trap material and type of connections shall be compatible with the connecting drainage system and be suitable for the intended application.

2.4 CLEANOUTS AND CLEANOUT ACCESS COVERS

A. Approved manufacturers are Josam, Smith, Zurn, and Wade.

B. Locations:

1. Rough-In Piping: Josam 58900, coated cast-iron, ferrule and taper ABS plug with outlet type to match piping system.

2. Tile or Asphalt Floors: Josam 55000 coated cast-iron, recessed top, floor cleanout, internal gasketed taper thread ABS plug, and adjustable housing.
3. Carpet Areas: Josam 55000, coated cast-iron, adjustable collar with rolled thread and ABS countersunk plug, and scoriated secure round nikaloy cover.
4. Concrete Floors Without Finish in Mechanical Rooms and Garages: Josam 57000 less top with Josam, coated cast-iron, internal gasketed, taper thread ABS plug, and adjustable housing with heavy-duty scoriated loose-set round cast-iron tractor cover.
5. Exterior: Josam 56050-15-22, coated cast-iron, internal gasketed, taper ABS plug, and adjustable housing with heavy-duty scoriated loose-set round cast-iron tractor cover. Spigot or NO-HUB connection.
6. Wall: Josam 58910, round stainless steel smooth wall access cover, center screw, coated cast-iron cleanout ferrule with spigot connection, and recessed thread ABS plug.

PART 3 - EXECUTION

3.1 PREPARATION

A. General:

1. Verify existing grades, inverts, utilities, obstacles, and topographical conditions prior to installation.
2. Examine walls, floors, roofs, and plumbing chases for suitable conditions where piping and specialties are to be installed.
3. Do not proceed until unsatisfactory conditions have been corrected.

B. Domestic Water Service: Connect into the existing water piping as shown on the drawings. Coordinate with the Owner for shutdown of existing water service.

C. Sanitary Sewer: Connect into the existing sanitary sewer as shown on the drawings. Coordinate with Owner for shutdown of existing water service.

3.2 INSTALLATION

A. General:

1. Provide bedding, anchors, thrust restrains/anchors, and restraints as appropriate and in accordance with manufacturer's recommendations based on type of pipe, fittings, joints, and bury depth using final finished grading as the basis.
2. Examine rough-in requirements for plumbing fixtures and other equipment having to verify actual locations of piping connections prior to installation.
3. Examine walls, floors, roofs, and plumbing chases for suitable conditions where piping and specialties are to be installed.
4. Piping shall be run true, plumb, and straight, with all restraints adjusted to carry their proportional load and locked to prevent pipe "wag," misalignment, movement, shear, or sagging.
5. Use fittings for all changes in direction and all branch connections.
6. Install exposed piping at right angles or parallel to building walls. Diagonal runs are not permitted unless expressly indicated.
7. Install piping free of sags or bends and with ample space between piping to permit proper insulation applications. Piping hanger spacing and supports shall be per Code requirements

(minimum) or per Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment," whichever is more stringent.

8. Conceal all pipe installations in walls, pipe chases, utility spaces, above ceilings, below grade or floors unless indicated to be exposed to view.
9. Install piping tight to slabs, beams, joists, columns, walls, and other permanent elements of the building. Allow sufficient space above removable ceiling panels to allow for panel removal.
10. Exterior Wall Penetrations: Seal pipe penetrations through exterior walls using sleeves and mechanical sleeve seals.
11. Fire Barrier Penetrations: Where pipes pass through fire-rated walls partitions, ceilings, and floors, maintain the fire-rated integrity. Use fire-stop caulking materials at all fire-rated wall penetrations.
12. Provide for pipe expansion and seismic braces as required by the contract documents and/or jurisdictional authority.
13. All copper tube and fitting shall be reamed and buffed prior to soldering or brazing.
14. The use of solder containing lead is prohibited.
15. Refer and conform to the “Copper Development Association” instructions for proper preparation and actual installation practice for all soldered and brazed joints.
16. Provide 10 mil PVC tape (Scotchwrap No. 50 or equal) for all piping and fittings that are enclosed in concrete or masonry walls.

B. Cleanouts:

1. Provide cleanouts in locations required by Code and at locations shown on the drawings. Full size for pipe up to 4 inches at the base of all vertical stacks, ends of sewer mains, changes in direction of sewer mains, and in horizontal runs of piping not over 50 feet apart for interior sewers, and not over 100 feet apart for exterior sewers. Install cleanouts so they are accessible by extending them through walls or floors. Install floor and wall cleanout covers for concealed piping.
2. For exterior cleanouts, extend cast-iron inspection pipe up to exterior cleanout poured in place in 24" x 24" x 8" concrete block set flush with finished grade.

3.3 FIELD QUALITY CONTROL

A. General Testing Procedures:

1. All piping systems shall be tested and proven tight prior to concealment. The test shall be witnessed by the Architect/Engineer, plumbing inspector, or the Owner's representative.
2. Isolate fixtures to prevent damage from pressure tests.

B. Domestic Water Pipe Testing:

1. Open and close all system valves at least once while system is pressurized to test valve packing. Tighten as required.
2. Test procedures shall be as follows:

    a. Domestic Hot and Cold Water: 150 psig hydrostatic test. (200 psig on water service when serving a fire line).
    b. All hydrostatic tests shall be held for a minimum of eight hours without loss of pressure.

C. Drainage Systems Testing Procedure: Drainage systems (including sanitary sewers and sanitary vents,): Test piping systems in accordance with the test procedures required by the applicable Plumbing Code.

3.4 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain plumbing equipment and specialties. Video record the training sessions.

3.5 CLEANING

A. Sterilization:

1. Prior to placing the potable water system in operation, but after all testing has been completed, sterilize and flush the entire or sectionalized piping system per code. During this period of time, a pressure of not less than 40 psig shall be maintained on the section being opened and closed several times.
2. Water samples shall be taken and tested by an independent laboratory. The system must be free of all bacteriological contamination. If the system shows any contamination, it shall be re-chlorinated until it is free of bacteriological contamination.

END OF SECTION 22 10 00

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SECTION 22 30 00

PLUMBING FIXTURES, EQUIPMENT, AND SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUBMITTALS

A. Product Data:

1. Provide submittals on all items furnished under this section.
2. For equipment and tanks required to be ASME rated and stamped; submit product data indicating compliance with the ASME pressure vessel requirements.

B. Operating and Maintenance Manual: Submit operating and maintenance data and parts list for each item of equipment, control and accessory; including "troubleshooting" maintenance guide.

C. Field Quality Control Reports: Submit all test reports specified herein.

D. Warranty: Special warranty specified in this Section.

1.3 QUALITY ASSURANCE

A. Source Limitations: Obtain plumbing fixtures, faucets, and other components of each category through one source from a single manufacturer.

Exception: If fixtures, faucets, or other components are not available from a single manufacturer, obtain similar products from other manufacturers specified for that category.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. Regulatory Requirements:

1. Comply with requirements in Public Law 90-480, "Architectural Barriers Act"; and Public Law 101-336, "Americans with Disabilities Act"; for plumbing fixtures for people with disabilities.
2. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1,
3. NSF Standard: Pipe, pipe fittings, joints, valves, faucets, and fixture fittings utilized to supply water for drinking or cooking purposes shall comply with NSF 372 and shall have a weighted average lead content of 0.25% or less.

D. Select combinations of fixtures and trim, faucets, fittings, and other components that are compatible.

E. Comply with the following applicable standards and other requirements specified for plumbing fixtures:

1. Enameled, Cast-Iron Fixtures: ASME A112.19.1M.
2. Porcelain-Enameled, Formed-Steel Fixtures: ASME A112.19.4M.
3. Solid-Surface-Material Lavatories and Sinks: ANSI/ICPA SS-1.
4. Stainless Steel Commercial, Handwash Sinks: NSF 2 construction.

F. Comply with the following applicable standards and other requirements specified for lavatory and sink faucets:

1. Backflow Protection Devices for Faucets with Side Spray: ASME A112.18.3M.
2. Backflow Protection Devices for Faucets with Hose-Thread Outlet: ASME A112.18.3M.
3. Diverter Valves for Faucets with Hose Spray: ASSE 1025.
4. Faucets: ASME A112.18.1.
5. Hose-Connection Vacuum Breakers: ASSE 1011.
6. Hose-Coupling Threads: ASME B1.20.7.
7. Integral, Atmospheric Vacuum Breakers: ASSE 1001.
8. NSF Potable-Water Materials: NSF 372.
9. Pipe Threads: ASME B1.20.1.
10. Sensor-Actuated Faucets and Electrical Devices: UL 1951.
11. Supply Fittings: ASME A112.18.1.
12. Brass Waste Fittings: ASME A112.18.2.

G. Comply with the following applicable standards and other requirements specified for miscellaneous fixtures and fittings:

1. Dishwasher Air-Gap Fittings: ASSE 1021.
2. Flexible Water Connectors: ASME A112.18.6.
3. Floor Drains: ASME A112.6.3.
4. Hose-Coupling Threads: ASME B1.20.7.
5. Hot-Water Dispensers: ASSE 1023 and UL 499.
6. Off-Floor Fixture Supports: ASME A112.6.1M.
7. Pipe Threads: ASME B1.20.1.
8. Supply and Drain Protective Shielding Guards: ICC A117.1.

1.4 COORDINATION

A. Coordinate sizes and locations of concrete bases with actual equipment provided.

1.5 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of fuel-fired, domestic-water heaters that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures including storage tank and supports.
b. Faulty operation of controls.
c. Deterioration of metals, metal finishes, and other materials beyond normal use.

PART 2 - PRODUCTS

2.1 FIXTURE TRIM

A. Sink Faucets:

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

a. American Standard Companies, Inc.
b. Chicago Faucet
c. Delta
d. Moen
e. Zurn

2. Description: Style as scheduled on drawings. Individual handles to include hot and cold water indicators. Coordinate faucet inlets with supplies and fixture holes; coordinate outlet with spout and fixture receptor.

a. Body Material: Commercial, solid brass.
b. Finish: Polished chrome plate.
c. Maximum Flow Rate: 2.2 gpm or as otherwise scheduled.
d. Backflow Protection Device for Side Spray.

B. Protective Shielding Pipe Covers:

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

a. Engineered Brass Co.
b. Insul-Tect Products Co.; a Subsidiary of MVG Molded Products
c. McGuire Manufacturing Co., Inc.
d. Plumberex Specialty Products Inc.
e. TCI Products
f. TRUEBRO, Inc.
g. Zurn Plumbing Products Group; Tubular Brass Plumbing Products Operation.

2. Description: Manufactured plastic wraps for covering plumbing fixture hot-water supply and trap and drain piping. Comply with Americans with Disabilities Act (ADA) requirements.

C. Traps, Stops, Supplies, Drains:

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

a. American Standard
b. Brasscraft
c. Kohler
d. Zurn

D. Provide trim, supply, and waste connections for plumbing fixtures as scheduled on the drawings or as additionally required for a complete and operational fixture..

E. All exposed trim shall be chrome-plated brass unless otherwise specified in schedule.

2.2 FIXTURES

A. Sinks, Stainless Steel:

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

a. Bradley Corporation
b. Elkay Manufacturing Co.
c. Just Manufacturing Company

2. Description: Style and mounting as scheduled on drawings.

2.3 DISPOSERS

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

1. In-Sink-Erator
2. KitchenAid

B. Description: Continuous-feed household food-waste disposer. Include a reset button; wall switch; corrosion-resistant chamber with jam-resistant, cutlery or stainless steel grinder or shredder; an NPS 1-1/2 outlet; quick-mounting, stainless steel sink flange; anti-splash guard; and combination cover/stopper.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in of water supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before plumbing fixture installation.

B. Examine cabinets, counters, floors, and walls for suitable conditions where fixtures will be installed.

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

3.2 INSTALLATION

A. Plumbing Fixtures and Trim:

1. Assemble plumbing fixtures, trim, fittings, and other components according to manufacturers' written instructions.
2. Install off-floor supports, affixed to building substrate, for wall-mounting fixtures.

a. Use carrier supports with waste fitting and seal for back-outlet fixtures.
b. Use carrier supports without waste fitting for fixtures with tubular waste piping.
c. Use chair-type carrier supports with rectangular steel uprights for accessible fixtures.

3. Install back-outlet, wall-mounting fixtures onto waste fitting seals and attach to supports.
4. Install floor-mounting fixtures on closet flanges or other attachments to piping or building substrate.
5. Install wall-mounting fixtures with tubular waste piping attached to supports.

6. Install counter-mounting fixtures in and attached to casework.
7. Install fixtures level and plumb according to roughing-in drawings.
8. Install water-supply piping with stop on each supply to each fixture to be connected to water distribution piping. Attach supplies to supports or substrate within pipe spaces behind fixtures. Install stops in locations where they can be easily reached for operation.

   Exception: Use ball, gate, or globe valves if supply stops are not specified with fixture. Valves are specified in Division22 Section "General Duty Valves for Plumbing Piping."

9. Install trap and tubular waste piping on drain outlet of each fixture to be directly connected to sanitary drainage system.
10. Install tubular waste piping on drain outlet of each fixture to be indirectly connected to drainage system.
11. Install faucet-spout fittings with specified flow rates and patterns in faucet spouts if faucets are not available with required rates and patterns. Include adapters if required.
12. Install water-supply flow-control fittings with specified flow rates in fixture supplies at stop valves.
13. Install faucet flow-control fittings with specified flow rates and patterns in faucet spouts if faucets are not available with required rates and patterns. Include adapters if required.
14. Install traps on fixture outlets.

    Exception: Omit trap on fixtures with integral traps.
    Exception: Omit trap on indirect wastes, unless otherwise indicated.

15. Install chrome-plated escutcheons at piping wall ceiling penetrations in exposed, finished locations and within cabinets and millwork. Use deep-pattern escutcheons if required to conceal protruding fittings. Escutcheons are specified in Division 22 Section "Common Work Results for Plumbing"
16. Seal joints between fixtures and walls, floors, and countertops using sanitary-type, one-part, mildew-resistant silicone sealant. Match sealant color to fixture color. Sealants are specified in Division 07.

3.3 CONNECTIONS

A. Water piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Drawings indicate general arrangement of piping, fittings, and specialties.

C. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Connections to individual fixtures shall not be less than sizes scheduled on the drawings unless otherwise specifically noted.

D. Provide rigid bracing for all stub-outs.

E. Ground equipment according to Division 26.

F. Connect wiring according to Division 26.

3.4 FIELD QUALITY CONTROL

A. Plumbing Fixtures and Trim

1. Verify that installed plumbing fixtures are categories and types specified for locations where installed.
2. Check that plumbing fixtures are complete with trim, faucets, fittings, and other specified components.
3. Inspect installed plumbing fixtures for damage. Replace damaged fixtures and components.
4. Test installed fixtures after water systems are pressurized for proper operation. Replace malfunctioning fixtures and components, then retest. Repeat procedure until units operate properly.
5. Confirm correct connection of hot and cold water supplies to fixtures.
6. Install fresh batteries in sensor-operated mechanisms.
7. Prepare test and inspection reports.

B. Prepare test and inspection reports.

3.5 ADJUSTING

A. Operate and adjust faucets and controls. Replace damaged and malfunctioning fixtures, fittings, and controls.

B. Operate and adjust hot-water dispensers and controls. Replace damaged and malfunctioning units and controls.

C. Adjust water pressure at faucets to produce proper flow and stream.

D. Replace washers and seals of leaking and dripping faucets and stops.

E. Install fresh batteries in sensor-operated mechanisms.

3.6 CLEANING

A. Clean fixtures, faucets, and other fittings with manufacturers' recommended cleaning methods and materials. Do the following:

1. Remove faucet spouts and strainers, remove sediment and debris, and reinstall strainers and spouts.
2. Remove sediment and debris from drains.
3. Remove labels.

B. After completing installation of exposed, factory-finished fixtures, faucets, and fittings, inspect exposed finishes and repair damaged finishes.

3.7 PROTECTION

A. Provide protective covering for installed fixtures and fittings.

B. Do not allow use of plumbing fixtures for temporary facilities unless approved in writing by the Owner.

END OF SECTION 22 30 00

SECTION 22 05 00

COMMON WORK RESULTS FOR HVAC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. General requirements for all Division 23 sections
2. Piping materials and installation instructions common to most piping systems
3. Dielectric fittings
4. Sleeves
5. Escutcheons
6. Grout
7. Miscellaneous electrical equipment
8. Access Panels
9. Identification
10. HVAC demolition
11. Equipment installation requirements common to equipment sections
12. Painting and finishing
13. Supports and anchorages

B. All electrical work installed under Division 23 shall be in compliance with Division 26.

1.3 DRAWINGS AND SPECIFICATIONS

A. The drawings are diagrammatic in character indicating design concept and do not indicate every required duct or piping offset, valve, fitting, etc.

B. All drawings relating to this structure, together with these specifications, shall be considered in bidding and construction. The drawings and specifications are complementary, and what is called for in either of these shall be as binding as though called for by both. Should any conflict or omissions arise between the drawings and specifications, such conflict shall be brought to the attention of the Architect/ Engineer for resolution.

C. Unless otherwise indicated, all equipment and performance data listed is for job site conditions (elevation 5300 feet).

D. Drawings are not to be scaled.

1.4 DEFINITIONS

A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe chases, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.

B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.

C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in chases.

E. The following are industry abbreviations for plastic materials:

1. CPVC: Chlorinated polyvinyl chloride plastic
2. PE: Polyethylene plastic
3. PVC: Polyvinyl chloride plastic

F. The following are industry abbreviations for rubber materials:

1. EPDM – Ethylene propylene diene terpolymer rubber
2. NBR – Acrylonitrile-butadiene rubber

1.5 SUBMITTALS

A. Division 23 Submittal Data and Shop Drawings:

1. Refer to Division 01, for general submittal requirements.
2. Contractor agrees that shop drawings and/or submittals processed by the Engineer are not change orders; that the purpose of shop drawings and/or submittals by the Contractor is to inform the Engineer which equipment and materials he intends to furnish and install.
3. Submittals and/or shop drawings are to be edited to show specific data and all options for the HVAC equipment that the Contractor intends to provide.
4. Submittals and/or shop drawings are to be identified with numbers or letters identical to those listed on the drawings and/or specifications.
5. All shop drawings for special systems (temperature controls, etc.) that will become permanent record documents shall be prepared on AutoCAD Version 2007 or later, using the same drawing size as the project construction documents.
6. Approved Manufacturers and Substitutions

a. Equipment and/or materials manufactured by any one of the Engineer-approved manufacturers listed in this specification or on the drawings shall be acceptable if the equipment and material is equivalent in performance, capacity, and configuration.
b. Substitution Requests prior to bid: Refer to Division 01. No prior approvals will be given by the Engineer unless specifically mentioned in these specifications.
c. Substitution Requests after Execution of Contract: If Contractor wishes to furnish or use a substitute item of material and/or equipment, he must submit a change order request to the Engineer. The request for change order shall itemize each of the proposed substitutions identified by applicable specification section, paragraph number, and/or drawing number.

A price change (increase or decrease) shall be listed for each item along with complete data showing performance over entire range, physical dimensions, electrical characteristics, material construction, operating weight, and other applicable data. Justification of substitution must be more than just cost justification. The Engineer will review the change order request for equality, suitability, and reasonableness of price differential. A single substitution change order listing the approved items will be issued with the net cost of the change order being the sum of the approved item costs. No subsequent substitution change orders will be considered. The Engineer's decision will be final.

d. It shall be the responsibility of the Contractor to assure that the substitute material and/or equipment fits into the space provided and the Contractor shall pay for all extra costs incurred by other trades for any and all changes necessitated by these substitutions. No time extension will be allowed due to substitution on equipment.

e. Equipment and/or materials manufactured by any one of the Engineer-approved manufacturers listed in this specification or on the drawings shall be acceptable if the equipment and material is equivalent in performance, capacity, and configuration.

7. Submittals Schedule:

   a. Comply with Division 01 construction progress documentation and submittal requirements and the additional submittal requirements specified below. . Unless otherwise specified in Division 01, comply with the submittal periods specified below. Engineer will schedule submittal reviews based upon submittal schedule. Failure to submit schedule may result in inability to review submittals within the periods stated in the submittal schedule. These delays shall not be cause for extension of Contact completion date.

      1) Processing Time: Allow enough time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
      2) Submit schedule within 14 days of commencement of work. Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
      3) Allow 15 days for review of each resubmittal.
      4) Submit a minimum of three copies of schedule. Arrange the following information in a tabular format:

         a) Scheduled date for first submittal.
         b) Specification Section number and title.
         c) Submittal category (action or informational).
         d) Name of subcontractor.
         e) Description of the Work covered.
         f) Scheduled date for Architect's final release of reviewed submittal.

8. Schedule of Deviations: Equipment and material submittals of approved manufacturers, including basis of design manufacture shall provide a written itemization of exceptions to the specification and deviations from the basis of design for all features, design, configuration, physical dimension, performance, and operation of the submitted product. Those elements not identified and itemized as exceptions in the submittal shall not be reviewed by the Engineer and shall be provided as specified.

B. Close-out Submittals:

1. Operating and Maintenance (O&M) Manual:

a. Provide O&M manuals in accordance with Division 01.
b. The Contractor shall prepare an operating and maintenance manual that shall cover all systems and equipment installed under this Division. Incorporate the standard technical literature into system-specific formats for this facility as designed and actually installed. The resulting manual shall also serve as the training manual and shall be specific, concise, to the point, and tailored specifically for this facility.
c. Unless specified otherwise in Division 01, the maintenance manual shall be submitted to the Engineer in draft form for approval prior to preparation of two copies for final submission to the Architect for delivery to the Owner.
d. The maintenance manual shall be 8-1/2" x 11" size and assembled in loose-leaf three-ring or post binder. Provide manufacturers' original literature. Facsimiles are not acceptable. The manual shall be adequately indexed and contain the following information:

1) Contractors' names, addresses, and telephone numbers
2) Alphabetical list of all system components with the name and address and 24-hour phone number of the company responsible for servicing each item during the first year of operation
3) Guarantees and warranties of all equipment whenever applicable.
4) All manufacturers' data that is applicable to the installed equipment, with appropriate highlighting, such as the following:

a) Shop drawings (latest copy)
b) Installation instructions
c) Lubrication instructions
d) Wiring diagrams

5) A simplified description of the operation of all systems including the function of each piece of equipment within each system. including both normal and emergency operation. These descriptions shall be supported with a schematic flow diagram when applicable.

2. Record Drawings

a. Comply with record drawing requirements in Division 01.
b. Record Prints: All RFIs, change orders and other directives if not recorded on the contract drawings and amendments shall be red-lined on the record drawings. Record drawings simply tabulating the amendments onto the drawings shall be returned for clarification of installed conditions and red-line mark-up.

C. Non-Responsive Submittals: Submittals are intended to be reviewed in an initial submittal with comments corrected and submitted in a resubmittal. Non-responsiveness to the initial submittal comments in the resubmittal will result in return of the documents for correction and additional resubmittals. Any time charged by the Engineer in review of additional resubmittals due to non-responsiveness shall be deducted from the Contractor's billings.

D. Product Data: for the following:

1. Transition fittings
2. Dielectric fittings
3. Mechanical sleeve seals

4. Escutcheons
5. Motor Submittal Data: The following data shall be submitted for all motors:

    a. Full load current and service factor running current at operating voltage.
    b. Locked rotor current, starting power factor, and power factor at full load.
    c. Efficiency at full load.
    d. Data to substantiate Class F insulation with Class B rise at 100% load.
    e. Full load speeds (rpm).
    f. Enclosure type (ODP, TEFC, explosion proof, TENV, WPI, etc.)

    Note: All tests (except locked rotor current) shall be made at full voltage and rated frequency.

6. Motor Controllers:

    a. Torque, speed, and horsepower requirements of the load.
    b. Ratings and characteristics of supply circuit and required control sequence.
    c. Ambient and environmental conditions of installation location.

7. Capacitor size (KVAR) for maximum power factor correction at 95% lagging.
8. Identification: Submit product for each type of identification.

E. Certification:

1. Welding certificates
2. Certificates of Compliance for all Designated Seismic Systems.

F. Schedules:

1. Equipment Label Schedule: Include a listing of all equipment to be labeled with the proposed content for each label.
2. Valve numbering scheme.
3. Valve Schedules: For each piping system to include in maintenance manuals.

1.6 QUALITY ASSURANCE

A. Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code--Steel."

B. Steel Pipe Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."

1. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."
2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.

C. Electrical Characteristics for HVAC Equipment: Equipment of lower or higher electrical characteristics may be furnished provided such proposed equipment variations are specifically identified as a deviation from contract documents and approved in writing and connecting electrical services, circuit breakers, and conduit sizes are appropriately modified at no cost to the Owner. If minimum energy ratings or efficiencies are specified, equipment shall comply with requirements.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.

B. Store plastic pipes protected from direct sunlight. Support piping to prevent sagging and bending.

1.8 COORDINATION

A. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction, to allow for HVAC installations.

B. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.

C. Coordinate requirements for access panels and doors for HVAC items requiring access that are concealed behind finished surfaces. Access panels and doors are specified in Division 8.

D. Identification:

1. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
2. Coordinate installation of identifying devices with locations of access panels and doors.
3. Install identifying devices before installing acoustical ceilings and similar concealment.

E. Coordinate with all trades to maintain clearances to access panels, equipment, control and electrical panels. Intrusions into access space shall be brought to the attention of other trades. Notify Engineer of conflicts shown on drawings prior to installation.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:

1. Subject to compliance with requirements, provide products by the manufacturers specified.

2.2 PIPE, TUBE, AND FITTINGS

A. Refer to individual Division 23 HVAC piping Sections for pipe, tube, and fitting materials and joining methods.

1. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

2.3 JOINING MATERIALS

A. Refer to individual Division 23 HVAC piping Sections for special joining materials not listed below.

B. Solder Filler Metals: ASTM B32, lead-free alloys. Include water-flushable flux according to ASTM B813.

C. Brazing Filler Metals: AWS A5.8, BCuP Series, copper-phosphorus alloys for general-duty brazing, unless otherwise indicated; and AWS A5.8, BAg1, silver alloy for refrigerant piping, unless otherwise indicated.

D. Welding Filler Metals: Comply with AWS D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

2.4 DIELECTRIC FITTINGS

A. Description: Combination fitting of copper alloy and ferrous materials with threaded, solder-joint, plain, or weld-neck end connections that match piping system materials.

B. Insulating Material: Suitable for system fluid, pressure, and temperature.

C. Dielectric Unions: Use dielectric couplings.

D. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 150 or 300 psig (1035 or 2070 kPa) minimum working pressure as required to suit system pressures.

1. Available Manufacturers:

a. Capitol Manufacturing Co.
b. Central Plastics Company
c. Epco Sales, Inc.
d. Watts Industries, Inc.; Water Products Division

E. Dielectric-Flange Kits: Companion-flange assembly for field assembly. Include flanges, full-face- or ring-type neoprene or phenolic gasket, phenolic or polyethylene bolt sleeves, phenolic washers, and steel backing washers.

1. Available Manufacturers:

a. Advance Products & Systems, Inc.
b. Calpico, Inc.
c. Central Plastics Company
d. Pipeline Seal and Insulator, Inc.

2. Separate companion flanges and steel bolts and nuts shall have 150 or 300 psig (1035 or 2070 kPa) minimum working pressure where required to suit system pressures.

F. Dielectric Couplings: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining; threaded ends; and 300 psig (2070 kPa) minimum working pressure at 225°F (107°C).

1. Available Manufacturers:

a. Calpico, Inc.
b. Lochinvar Corp.

2.5 SLEEVES

A. Galvanized-Steel Sheet: 0.0239-inch (0.610 mm) minimum thickness; round tube closed with welded longitudinal joint.

B. Steel Pipe: ASTM A53, Type E, Grade B, Schedule 40, galvanized, plain ends.

C. Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.

D. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.

1. Underdeck Clamp: Clamping ring with set screws.

2.6 ESCUTCHEONS

A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.

1. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass.

a. Finish: Polished chrome-plated.

2. One-Piece, Cast-Brass Type: With set screw.

a. Finish: Polished chrome plated.

3. Split-Casting, Cast-Brass Type: With concealed hinge and set screw.

a. Finish: Polished chrome plated.

4. One-Piece, Floor-Plate Type: Cast-iron floor plate.
5. Split-Casting, Floor-Plate Type: Cast brass with concealed hinge and set screw.

2.7 MISCELLANEOUS ELECTRICAL DEVICES

A. Furnish all necessary control devices such as speed controls, transformers, and relays as required for proper operation of all equipment furnished under this Division.

B. Furnish all remote switches and/or pushbutton stations required for manually operated equipment complete with low energy pilot lights of an approved type.

C. Enclosures: NEMA Type 1, general purpose enclosures with padlock ears, except in wet locations shall be NEMA Type 4 with conduit hubs, or units in hazardous locations that shall have NEC proper class and division explosion proof enclosure.

D. Furnish circuit and purpose identification for each remote manual switch and/or pushbutton station furnished herein. Identification may be either engraved plastic sign for permanent mounting to wall below switch, or stamping on switch coverplate. All such identification signs and/or switch covers in finished areas shall match other hardware in the immediate area.

2.8 ACCESS PANELS OTHER THAN SHEET METAL

A. Access panels are to have Underwriters' Laboratories B label fire rating when installed in fire-rated walls or ceiling.

B. Access panels for installation in plaster are to be similar to Milcor style "K," all other access panels are to be similar to Milcor style "M."

C. Panels located in public areas are to have keyed locks.

2.9 IDENTIFICATION

A. Equipment Labels:

1. Metal Labels for Equipment:

    a. Material and Thickness: Brass, 0.032-inch (0.77 mm) minimum thickness, and having predrilled or stamped holes for attachment hardware.
    b. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch (65 by 20 mm).
    c. Minimum Letter Size: 1/4 inch (6 mm) for name of units. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
    d. Fasteners: Stainless steel rivets or self-tapping screws.
    e. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

2. Plastic Labels for Equipment:

    a. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch (3.2 mm) thick, and having predrilled holes for attachment hardware.
    b. Letter Color: White.
    c. Background Color: Black or blue.
    d. Maximum Temperature: Able to withstand temperatures up to 160°F (71°C).
    e. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 x 3/4 inch (65 x 20 mm).
    f. Minimum Letter Size: 1/4 inch (6 mm) for name of units if viewing distance is less than 24 inches (600 mm), 1/2 inch (15 mm) for viewing distances up to 72 inches (1830 mm), and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
    g. Fasteners: Stainless steel rivets or self-tapping screws.
    h. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

3. Label Content: Include equipment's unique equipment number.
4. Equipment Label Schedule: For each item of equipment to be labeled, on 8-1/2" x 11" (A4) bond paper. Tabulate equipment identification number and identify Drawing numbers where equipment is indicated (plans, details, and schedules), plus the specification section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.

B. Pipe Labels:

1. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction.

2. Pretensioned Pipe Labels: Precoiled, semi-rigid plastic formed to cover full circumference of pipe and to attach to pipe without fasteners or adhesive.
3. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.
4. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.
5. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings, pipe size, and an arrow indicating flow direction.

    a. Flow-Direction Arrows: Integral with piping system service lettering to accommodate both directions, or as separate unit on each pipe label to indicate flow direction.
    b. Lettering Size: At least 1-1/2 inches (40 mm) high.

C. Duct Labels:

1. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/16 inch (1.6 mm) thick, and having predrilled holes for attachment hardware.
2. Letter Color: Black.
3. Background Color: White.
4. Maximum Temperature: Able to withstand temperatures up to 160°F (71°C).
5. Minimum Label Size: Length and width vary for required label content, but not less than 4 x 12 inch (100 x 300 mm).
6. Minimum Letter Size: 2 inch (50 mm). Include secondary lettering two-thirds to three-fourths the size of principal lettering.
7. Fasteners: Stainless steel rivets or self-tapping screws.
8. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
9. Duct Label Contents: Include identification of duct service using same designations or abbreviations as used on Drawings, duct size, and an arrow indicating flow direction.

    a. Flow-Direction Arrows: Integral with duct system service lettering to accommodate both directions, or as separate unit on each duct label to indicate flow direction.
    b. Arrow Size: At least 6 inches (150 mm) high.

D. Stencils:

1. Stencils: Prepared with letter sizes according to ASME A13.1 for piping; minimum letter height of 2 inches (50 mm) for ducts; and minimum letter height of 3/4 inch (20 mm) for access panel and door labels, equipment labels, and similar operational instructions.
2. Stencil Material: Fiberboard or metal.
3. Stencil Paint: Exterior, gloss enamel black unless otherwise indicated. Paint may be in pressurized spray-can form.
4. Identification Paint: Exterior enamel in colors according to ASME A13.1 unless otherwise indicated.

E. Valve Tags:

1. Valve Tags: Stamped or engraved with 1/4-inch (6 mm) letters for piping system abbreviation and 1/2-inch (15 mm) numbers.

    a. Tag Material: Brass, 0.032-inch (0.77 mm) minimum thickness, and having predrilled or stamped holes for attachment hardware.
    b. Fasteners: Brass wire-link or beaded chain; or S-hook.

2. Valve Schedules: For each piping system, on 8-1/2" x 11" (A4) bond paper. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or

space), normal-operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.

a. Valve-tag schedule shall be included in operation and maintenance data.

PART 3 – EXECUTION

3.1 HVAC DEMOLITION

A. Refer to Division 01 and Division 02 for general demolition requirements and procedures.

B. Disconnect, demolish, and remove HVAC systems, equipment, and components indicated to be removed.

1. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
2. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.
3. Equipment to Be Removed: Disconnect and cap services and remove equipment.
4. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
5. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to the Owner.

C. If pipe, insulation, or equipment to remain is damaged in appearance or is unserviceable, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.

3.2 PIPING SYSTEMS - COMMON REQUIREMENTS

A. Install piping according to the following requirements and Division 23 Sections specifying HVAC piping systems.

B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

C. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.

D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

F. Install piping to permit valve servicing.

G. Install piping at indicated slopes.

H. Install piping free of sags and bends.

I. Install fittings for changes in direction and branch connections.

J. Install piping to allow application of insulation.

K. Select system components with pressure rating equal to or greater than system operating pressure.

L. Install escutcheons for penetrations of walls, ceilings, and floors according to the following:

1. New Piping:

a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.
b. Chrome-Plated Piping: One-piece, cast-brass type with polished chrome-plated finish.
c. Insulated Piping: Split, cast-brass type with spring clips.
d. Bare Piping at Wall, Floor, and Ceiling Penetrations in Finished Spaces, Unfinished Service Spaces, and Equipment Rooms: One-piece or split, cast-brass type with polished chrome-plated finish.

2. Existing Piping: Use the following:

a. Chrome-Plated Piping: Split-casting, cast-brass type with chrome-plated finish.
b. Insulated Piping: Split, cast-brass type with spring clips.
c. Bare Piping at Wall, Floor, and Ceiling Penetrations in Finished Spaces, Unfinished Service Spaces, and Equipment Rooms: Split, cast-brass type with polished chrome-plated finish.

M. Sleeves are not required for core-drilled holes.

N. Install sleeves for pipes passing through concrete and masonry walls, gypsum board partitions, and concrete floor and roof slabs.
1. Cut sleeves to length for mounting flush with both surfaces.

Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches (50 mm) above finished floor level. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.

2. Install sleeves in new walls and slabs as new walls and slabs are constructed.
3. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials:
a. Steel Pipe Sleeves: For pipes smaller than NPS 6.

O. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials listed for application. Penetrations in Fire-Resistance-Rated Walls: Penetration firestopping systems with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.

1. T-Rating: At least 1 hour, but not less than the fire-resistance rating of constructions penetrated except for floor penetrations within the cavity of a wall.
2. F-Rating: At least 1 hour, but not less than the fire-resistance rating of constructions penetrated
3. Penetrations in Smoke Barriers: Penetration firestopping systems with ratings determined per UL 1479, based on testing at a positive pressure differential of 0.30-inch wg.
4. Submit the firestopping systems proposed including the system number, ratings, testing laboratory, and installation detail.

P. Verify final equipment locations for roughing-in.

Q. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

R. Install dielectric fittings or approved adaptor fittings on all joints between different piping materials on steam, hot water, chilled water, condenser water, steam condensate, ground source heat pump loop systems and other hydronic mechanical piping systems.

S. Old Pipe Lines: If any old sewer, water, gas, or other pipes are encountered that interfere with the proper installation of new work and that will not be used in connections with the new work, close all openings in proper manner or, if necessary, relocate or remove the pipes as shown on plans. Should any old pipes and/or electrical lines not shown on plans be encountered, immediately notify Owner's representative before taking any action.

3.3 PIPING JOINT CONSTRUCTION

A. Join pipe and fittings according to the following requirements and Division 23 Sections specifying piping systems.

B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

D. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.

E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.

F. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

G. Welded Joints: Construct joints according to AWS D10.12, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.

H. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

I. Plastic Piping Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:

1. Comply with ASTM F402 for safe-handling practice of cleaners, primers, and solvent cements.
2. CPVC Piping: Join according to ASTM D2846 (D2846M) Appendix.

J. Plastic Pressure Piping Gasketed Joints: Join according to ASTM D3139.

3.4 ACCESS PANELS

A. Furnish access panels where required for access to concealed HVAC items such as dampers, valves, strainers, shock absorbers, cleanouts, control devices, and where required for equipment servicing.

B. Deliver all panels to General Contractor for installation. Provide instructions for their location in sufficient time so panels can be installed in the normal course of work.

3.5 IDENTIFICATION COMMON REQUIREMENTS

A. Provide pipe identification, valve tags, stencils, or engraved name plates to clearly identify all mechanical equipment, including motors, piping and controls of the various mechanical systems and direction of flow in piping.

B. Plastic Pipe Markers: On bare pipe when surface temperature exceeds 180 degree F provide a 1- inch thick insulation band under marker for protection from the hot pipe.

C. Piping, Ducts, and Equipment Identification:

1. Piping:

a. Identify all piping accessible for maintenance in crawl spaces, tunnels, above ceilings, and access spaces as well as exposed to view utilizing stenciled markings according to the following procedures:

1) Use an arrow marker for each pipe-content legend. The arrow shall always point away from the pipe legend and in the direction of flow. Color and height of arrow to be same as content legend lettering.
2) If flow can be in both directions, use a double-headed arrow indication.
3) Apply pipe legend and arrow indication at every point of pipe entry or exit where line goes through wall or ceiling cut.
4) Apply pipe legend and arrow indication within 3 inch of each valve to show proper identification of pipe contents and direction of flow.
5) Apply legend to the pipe so that lettering is in the most legible position. For overhead piping, apply legend on the lower half of the pipe where view is unobstructed, so that legend can be read at a glance from floor level.
6) Pipes under 3/4 inch O.D.: Fasten brass tags securely at specified legend locations.
7) Legend on steam piping, condensate return, compressed air, gas, and vacuum systems: Include working pressure or vacuum.

2. Valves:

a. System service valves located inside the building: Tag and identify as to type of service.
b. Valves or cocks controlling branch mains or risers to various portions of the building: Tag and identified as to service and location.

3. Controls:

a. Magnetic starters and relays: Install nameplates or stencil to identify connecting or controlled equipment.

b. Manual operating switches, fused disconnect switches and thermal over-load switches which have not been specified as furnished with indexed face plates: Install nameplates or be stencil as to controlled equipment.
c. Automatic controls, control panels, zone valves, pressure electric, electric pressure switches, relays, and starters: Clearly identified with unit served and function.
d. Identify all starters, disconnect switches, and manually operated controls, except integral equipment switches with nomenclature corresponding to operating instructions in the "Operation and Maintenance Manual". Coordinate with the university Facilities Operations personnel through the university Project Manager.

4. Access Doors:

a. Provide engraved nameplates or painted stencils to identify concealed valves, controls, dampers or other similar concealed mechanical equipment.
b. Identify the locations of fire dampers above accessible ceilings with a red circular dot at least 3/4 inch in diameter, or embossed tape, adhered to the nearest T-bar. Access door shall be painted red.
c. Obtain the university Project Manager's approval before installation on all access doors in finished areas.

5. Lift-Out Ceilings:

a. Provide engraved nameplates on ceiling tee stem (screwed or riveted, adhesive not allowed) to identify concealed valves, VAV boxes, filters, fire/smoke dampers or similar concealed mechanical equipment that is directly above nameplate in ceiling space.
b. Obtain the University Project Manager's approval of tag locations before installation.

6. Terminal Units:

a. Identify all units with unique numbers corresponding to the drawings, and indicate the space being served.
b. Use engraved plastic laminate labels affixed to each box by screws or rivets.

D. Piping Label Tags

Classification	Color of Field	Letter Colors	Code
Materials Inherently Hazardous:			
Flammable or Explosive:			
Natural Gas	Yellow	Black	NG
Lab Waste	Yellow	Black	AW
Extreme Temperatures or Pressures:	Yellow	Black	
Domestic Hot Water	Yellow	Black	Dom HW
Domestic Hot Water, Circulating	Yellow	Black	Dom HWC
Heating Water Supply	Yellow	Black	HWS
Heating Water Return	Yellow	Black	HWR
Low Pressure Steam	Yellow	Black	LPS
Low Pressure Steam Condensate	Yellow	Black	LPSC
High Pressure Steam	Yellow	Black	HPS
High Pressure Steam Condensate	Yellow	Black	HPSC
Boiler Feed Water	Yellow	Black	BFW

Classification	Color of Field	Letter Colors	Code
Refrigerant	Yellow	Black	REF
High Pressure Compressed Air (over 90 psig)	Yellow	Black	CA
Materials of Inherently Low Hazard:			
Liquid or Liquid Admixture:	Green	White	
Distilled Water	Green	White	DW
Domestic Cold Water	Green	White	Dom CW
Sanitary Sewer	Green	White	SAN
Waste Vent	Green	White	V
Chilled Water Supply	Green	White	CWS
Chilled Water Return	Green	White	CWR
Condenser Water Supply	Green	White	CS
Condenser Water Return	Green	White	CR
Gas or Gaseous Admixture:	Blue	White	
Medium Pressure Compressed Air (30 to 90 psig)	Blue	White	CA
Low Pressure Compressed Air (less than 30 psig)	Blue	White	CA
Vacuum	White	Black	VAC
Fire Quenching Materials:			
Fire Lines	Red	White	FL

E. Mechanical Equipment Naming Strategy:

1. Equipment identification numbers may be up to 32 characters. Equipment naming strategy is:

   System – Bld – Number
   ###-#####-##-###

2. The first three placeholders are reserved for the system designation (alpha characters)
3. The fourth character is a hyphen.
4. The fifth through ninth placeholders are reserved for the building designation (alpha and/or numeric)
5. The tenth character is a hyphen
6. The eleventh through sixteenth placeholders are a “smart number.” It is composed of a two-digit, alpha or numeric, floor location designator followed by a hyphen and a three digit numeric sequential indicator.
7. The seventeenth character is a hyphen
8. In some instances the point name will be followed by a hyphen and a sub-point name
9. All device and point names will be assigned by the Facilities Operations, Building Operations Department.
10. All references to equipment and devices in drawings, labels, equipment tags, BAS system, etc., must use this naming convention.
11. Equipment designation, for prints may exclude the building designator.

3.6 PAINTING

A. Painting of HVAC systems, equipment, and components is specified in Division 9 for interior painting and exterior painting.

B. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

3.7 ERECTION OF METAL SUPPORTS AND ANCHORAGES

A. Refer to Division 5 for structural steel

B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor fire-suppression materials and equipment.

C. Field Welding: Comply with AWS D1.1.

3.8 CLEANING

A. Cleaning and Flushing:

1. All water circulating systems for the project shall be thoroughly cleaned before placing in operation to rid the system of dirt, piping compound, mill scale, oil, and any and all other material foreign to the water being circulated.
2. Extreme care shall be exercised during construction to prevent all dirt and other foreign matter from entering the pipe or other parts of the system. Pipe stored on the project shall have the open ends capped, and equipment shall have all openings fully protected. Before erection, each piece of pipe, fitting, or valve shall be visually examined and all dirt removed.

    a. Heating Water Systems: Hot water heating systems, including converters, pumps, coils, and piping shall be cleaned with a solution of trisodium phosphate. This cleaning also applies to glycol systems prior to filling. Apply heat while circulating, slowly raising system to design temperature; maintain for a minimum of 24 hours. Remove heat and allow to cool; drain, and refill with clean water. Circulate for 6 hours at design temperature, then drain. Refill with clean water and repeat until system cleaner is removed.

3. After the system (or portion thereof) has been leak tested, thoroughly flush with clean water. During the clean water flush, all valves shall be full open, the flow rate for flush shall be at least 4 ft./sec., and the total flow shall equal at least five times the total piping system volume. Flushing shall continue until water runs clear.
4. After clear water flushing is complete, a chemical flushing solution, shall be utilized to remove oil, grease, piping compounds, etc. After the system is filled with this solution, the system shall be brought up to temperature and allowed to circulate for at least eight hours. The system shall then be drained completely and reflushed with fresh water.
5. After the system has been completely cleaned as specified herein, it shall be tested by litmus paper or other dependable method and shall be left on the slightly alkaline side (pH = 7.5+). If the system is found to be still on the acid side, the chemical flush shall be repeated as necessary.
6. The Owner's representative shall be given notice of this cleaning operation. If the Owner's representative deems it necessary, the cleaning operation shall be repeated.
7. "Stop-Leak" compounds shall not be added to the system at any time.

8. Immediately after clear water flushing is complete, a chemical corrosion inhibitor solution, as furnished by the Division 23 Section "Water Treatment," Vendor/Contractor, shall be utilized to initially treat the system.
9. Clean exterior of piping prior to application of coatings.

B. Cleanup:

1. Clean coils and plenums.
2. Clean under, in and around equipment.
3. Clean exposed surfaces of ducts, piping, and equipment.
4. Clean equipment cabinets and enclosures.
5. Provide all new filters for equipment.

END OF SECTION 23 05 00

SECTION 23 05 23

GENERAL DUTY VALVES FOR HVAC

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following general-duty valves:

1. Bronze ball valves
2. Check valves

1.3 DEFINITIONS

A. The following are standard abbreviations for valves:

1. CWP: Cold working pressure
2. EPDM: Ethylene-propylene-diene terpolymer rubber
3. PTFE: Polytetrafluoroethylene plastic
4. SWP: Steam working pressure
5. TFE: Tetrafluoroethylene plastic

1.4 SUBMITTALS

A. Product Data: For each type of valve indicated. Include body, seating, and trim materials; valve design; pressure and temperature classifications; end connections; arrangement; dimensions; and required clearances. Include list indicating valve and its application. Include rated capacities; shipping, installed, and operating weights; furnished specialties; and accessories.

1.5 QUALITY ASSURANCE

A. ASME Compliance: ASME B31.9 for valves up to 125 psig and ASME B31.1 valves above 125 psig.

B. ASME Compliance for Ferrous Valves: ASME B16.10 and ASME B16.34 for dimension and design criteria.

C. NSF Compliance: NSF 61 for valve materials for potable-water service.

D. Source Limitations: Obtain valves of a single type through one source from a single manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Prepare valves for shipping as follows:

1. Protect internal parts against rust and corrosion.
2. Protect threads, flange faces, grooves, and weld ends.
3. Set ball and plug valves open to minimize exposure of functional surfaces.

B. Use the following precautions during storage:

1. Maintain valve end protection.
2. Store valves indoors and maintain at higher than ambient dew-point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:

1. Subject to compliance with requirements, provide products by the manufacturers specified.

2.2 VALVES, GENERAL

A. Refer to Part 3 "Valve Applications" Article for applications of valves.

B. Bronze Valves: NPS 2 and smaller with threaded ends, unless otherwise indicated.

C. Valve Pressure and Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.

D. Valve Sizes: Same as upstream pipe, unless otherwise indicated.

E. Valve Actuators:

1. Lever Handle: For quarter-turn valves NPS 6 and smaller, except plug valves.

F. Extended Valve Stems: On insulated valves.

G. Valve Ends:

1. Flanges: ASME B16.1 for cast-iron valves, ASME B16.5 for steel valves, and ASME B16.24 for bronze valves.
2. Grooved: AWWAC606.
3. Solder Joint: With sockets according to ASMEB16.18.

a. Caution: Use solder with melting point below 840°F for angle, check, gate, and globe valves; below 421°F for ball valves.
b. Threaded: With threads according to ASME B1.20.1.

H. Valve Bypass and Drain Connections: MSSSP-45

2.3 BALL VALVES

A. Bronze Two-Piece Ball Valves:

1. Manufacturer and Model:

a. Threaded Ends:

1) Apollo 77-100 Series
2) Equivalent by Crane, Jamesbury or Jenkins

b. Soldered Ends:

1) Apollo 77-200 Series
2) Equivalent by Crane, Jamesbury or Jenkins

2. 150 psig SWP, non-shock 600 psig WOG, MSS SP-110, cast bronze, full port, two-piece body design, chrome-plated solid bronze ball with reinforced Teflon seats. Stem packing adjustable for wear with adjusting screw.

B. Hose End Valves:

1. Manufacturer and Model:

a. Threaded Ends:

1) Apollo 78-100 Series
2) Equivalent by Crane, Jamesbury or Jenkins

b. Soldered Ends:

1) Apollo 78-200 Series
2) Equivalent by Crane, Jamesbury or Jenkins

2.6 SWING CHECK VALVES

A. Bronze, 150 psig SWP, 300 psig non-shock WOG, MSS SP-80, class 150, renewable bronze disc.

1. Manufacturer and Model:

a. Threaded:

1) Milwaukee 510-T
2) Stockham B-321
3) Equivalent by Crane

b. Soldered:

1) Milwaukee 1510-T

2) Stockham B-321
3) Equivalent by Crane

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine piping system for compliance with requirements for installation tolerances and other conditions affecting performance.
   1. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Examine valve interior for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.

C. Operate valves in positions from fully open to fully closed. Examine guides and seats made accessible by such operations.

D. Examine threads on valve and mating pipe for form and cleanliness.

E. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Verify that gasket is of proper size, that its material composition is suitable for service, and that it is free from defects and damage.

F. Do not attempt to repair defective valves; replace with new valves.

3.2 VALVE APPLICATIONS

A. Refer to piping Sections for specific valve applications. If valve applications are not indicated, use the following:

   1. Shutoff Service:

      a. Water and Glycol:

         1) NPS 2 and Smaller: Ball valves.

   2. Throttling Service:

      a. NPS 2 and Smaller: bronze: Class 150, threaded.

B. If valves with specified SWP classes or CWP ratings are not available, the same types of valves with higher SWP class or CWP ratings may be substituted.

C. Heating Water Piping: Use the following types of valves:

   1. Ball Valves, NPS 2 and Smaller: Bronze two-piece, threaded or soldered.

2. Check Valves:

   a. Other than Pump Discharge: Bronze, Class 150.

      1) NPS 2 and Smaller: Bronze, Class 150, threaded.

3. Balancing Valves:

   a. NPS 2 and Smaller: Threaded, Class 125.

3.3 VALVE INSTALLATION

A. Piping installation requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. All equipment and materials shall be installed in accordance with the recommendations of the manufacturer.

C. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.

D. Locate valves for easy access and provide separate support where necessary.

E. Install valves in horizontal piping with stem at or above center of pipe.

F. All valves shall be installed so they are accessible and serviceable. Install valves in position to allow full stem movement.

G. All valves shall be installed so the stem position is not more than 90-degrees from the vertical up position.

H. Isolation valves shall be installed:

1. In piping at each and every piece of equipment
2. In piping whenever said pipe enters or leaves an equipment room
3. At all branch take-offs from mains
4. Where shown on drawings

I. Valve identification requirements are in other Division 23 sections.

3.4 JOINT CONSTRUCTION

A. Refer to Division 23 Section "Common Work Results for HVAC" for basic piping joint construction.

B. Grooved Joints: Assemble joints with keyed coupling housing, gasket, lubricant, and bolts according to coupling and fitting manufacturer's written instructions.

C. Soldered Joints: Use ASTM B813, water-flushable, lead-free flux; ASTM B32, lead-free-alloy solder; and ASTM B828 procedure, unless otherwise indicated

3.5 ADJUSTING

A. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

END OF SECTION 23 05 23

SECTION 23 05 29

HANGERS & SUPPORTS FOR HVAC SYSTEMS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following hangers and supports for HVAC system piping and equipment:

1. Steel pipe hangers and supports
2. Trapeze pipe hangers
3. Metal framing systems
4. Thermal-hanger shield inserts
5. Fastener systems
6. Pipe stands
7. Equipment supports

1.3 DEFINITIONS

A. MSS: Manufacturers Standardization Society for the Valve and Fittings Industry Inc.

B. Terminology: As defined in MSS SP-90, "Guidelines on Terminology for Pipe Hangers and Supports."

1.4 PERFORMANCE REQUIREMENTS

A. Hangers and supports for HVAC piping and equipment shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to **ASCE**.

1. Supports for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents, and test water.
2. Equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

1.5 SUBMITTALS

A. Product Data: Provide submittal data for:

1. Steel pipe hangers and supports
2. Fiberglass pipe hangers
3. Thermal-hanger shield inserts

B. Shop Drawings: Provide fabrication and installation details, calculations; and Product Data for the following systems:

1. Trapeze pipe hangers
2. Metal framing systems
3. Fiberglass strut systems
4. Pipe stands
5. Equipment supports

C. Welding Certificates.

1.6 QUALITY ASSURANCE

A. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Description: MSS SP-58, Types 1 through 58, factory-fabricated components. Refer to Part 3 "Hanger and Support Applications" Article for where to use specific hanger and support types.

B. Manufacturers:

1. B-Line Systems, Inc.; a division of Cooper Industries
2. ERICO/Michigan Hanger Co.; ERISTRUT Div.
3. GS Metals Corp.
4. National Pipe Hanger Corporation

C. Galvanized, Metallic Coatings: Pregalvanized or hot dipped

D. Nonmetallic Coatings: Plastic coating, jacket, or liner.

E. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion for support of bearing surface of piping.

2.2 TRAPEZE PIPE HANGERS

A. Description: MSS SP-69, Type 59, shop- or field-fabricated pipe-support assembly made from structural-steel shapes with MSS SP-58 hanger rods, nuts, saddles, and U-bolts.

2.3 METAL FRAMING SYSTEMS

A. Description: MFMA-3, shop- or field-fabricated pipe-support assembly made of steel channels and other components.

B. Manufacturers:

1. B-Line Systems, Inc.; a division of Cooper Industries
2. ERICO/Michigan Hanger Co.; ERISTRUT Div.
3. GS Metals Corp.
4. Power-Strut Div.; Tyco International, Ltd.
5. Thomas & Betts Corporation
6. Tolco Inc.
7. Unistrut Corp.; Tyco International, Ltd.

2.4 THERMAL-HANGER SHIELD INSERTS

A. Description: 100-psig minimum, compressive-strength insulation insert encased in sheet metal shield.

B. Manufacturers:

1. Carpenter & Paterson, Inc.
2. ERICO/Michigan Hanger Co.
3. PHS Industries, Inc.
4. Pipe Shields, Inc.
5. Rilco Manufacturing Company, Inc.
6. Value Engineered Products, Inc.

C. Insulation-Insert Material for Cold Piping: Water-repellent treated, ASTM C 533, Type I calcium silicate or ASTM C 552, Type II cellular glass.

D. Insulation-Insert Material for Hot Piping: Water-repellent treated, ASTM C 533, Type I calcium silicate or ASTM C 552, Type II cellular glass.

E. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.

F. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.

G. Insert Length: Extend 2 inches beyond sheet metal shield for piping operating below ambient air temperature.

2.5 FASTENER SYSTEMS

A. Mechanical-Expansion Anchors: Insert-wedge-type zinc-coated steel, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

1 Manufacturers:

a. Hilti, Inc.
b. ITW Ramset/Red Head
c. Masterset Fastening Systems, Inc.
d. MKT Fastening, LLC
e. Powers Fasteners

2.6 EQUIPMENT SUPPORTS

A. Description: Welded, shop- or field-fabricated equipment support made from structural-steel shapes.

2.7 MISCELLANEOUS MATERIALS

A. Structural Steel: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.

B. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.

1. Properties: Nonstaining, noncorrosive, and nongaseous.
2. Design Mix: 5000-psi, 28-day compressive strength.

PART 3 – EXECUTION

3.1 HANGER AND SUPPORT APPLICATIONS

A. Specific hanger and support requirements are specified in Sections specifying piping systems and equipment.

B. Comply with MSS SP-69 for pipe hanger selections and applications that are not specified in piping system Sections.

C. Use hangers and supports with galvanized, metallic coatings for piping and equipment that will not have field-applied finish.

D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.

3.2 HANGER AND SUPPORT INSTALLATION

A. Pipe Hanger and Support Installation: Comply with MSS SP-69 and MSS SP-89 for the installation of hangers, supports, clamps, and attachments to properly support piping from building structure.

B. Hanger Spacing:

1. Hanger spacing and sizing shall per MSS SP-69 or applicable codes, whichever is more stringent.
2. Hanger spacing must be reduced to compensate for any valves and/or fittings installed in the pipe run.
3. Alternate span calculations may be used with a maximum deflection of 0.1 inch between hangers.
4. Hanger spacing must be reduced if thermal hanger shield insert cannot support full span.

C. Channel Support or Steel Trapeze System Installation:

1. Channel Support System Installation: Arrange for grouping of parallel runs of piping and support together on field-assembled channel systems.

2. Multiple pipe runs may be supported on channel/steel trapeze support systems with rollers. Support systems shall be individually designed by a structural engineer with the exception of the following:

    a. For pipe configurations specified in Table 1, channel support system hangers shall be as described below. Channel support shall be Unistrut P-1000. Hanger rods shall be one size larger than MSS SP-69 requires for largest pipe on support. Where support length exceeds 42 inches, additional hanger rod shall be installed at mid-span and pipe quantities in Table 1 may be placed on each side. Rollers shall be Unistrut P2474 through 6 inches, or P2475 through 16 inches; equal by Anvil or B-Line. Maximum number of pipes on one 42-inch P-1000 channel support is:

Table 1	
Largest Pipe Size	Maximum No. Pipes
NPS 5 and larger	0
NPS 4	2
NPS 3	3
NPS 2-1/2	5
NPS 2	8
NPS 1-1/2	12
NPS 1-1/4 and smaller	16

D. Hanger and Support Installation:

1. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers, and other accessories.
2. Install hangers and supports to allow controlled thermal of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.
3. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.
4. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and so maximum pipe deflections allowed by ASME B31 is not exceeded.
5. Comply with the following for insulated piping:

    a. Attach clamps and spacers to piping.
    b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
    c. Generator exhaust piping: Use thermal-hanger shield insert with clamp sized to match OD of insert.
    d. Do not exceed pipe stress limits according to ASME B31.1.
    e. Provide protection shields at all pipe supports. Metal shield lengths shall be as required by MSS-SP58 for the compressive strength and support span. Manufactured units shall include certification of compliance with MSS-SP58 for intended use. Requirements shall be as follows:

        1) Insulated piping up to NPS 1-1/2 - MSS Type 40 insulation protection shields without high-density inserts.
        2) Insulated piping NPS 2 and larger - MSS Type 40 thermal-hanger shield assemblies with the high-density inserts having the same thickness as piping insulation.

E. Building Attachments:

1. Review structural drawings for details of methods of attachment. Coordinate support requirements with project structural engineer.
2. Install building attachments within concrete slabs or attach to structural steel. Space attachments within maximum piping span length specified herein or as indicated in MSS SP 69. Install additional attachments at concentrated loads, including valves, flanges, guides, strainers, and expansion joints, and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.
3. Install mechanical-anchor fasteners in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.
4. Attachments to bar joists shall be at panel points and shall comply with load limits and other requirements of the Structural Engineer.

3.3 EQUIPMENT SUPPORTS

A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.

B. Grouting: Place grout under supports for equipment and make smooth bearing surface.

C. Provide lateral bracing, to prevent swaying, for equipment supports.

3.4 METAL FABRICATION

A. Cut, drill, and fit miscellaneous metal fabrications for heavy-duty steel trapezes and equipment supports.

B. Fit exposed connections together to form hairline joints. Connections shall be welded.

3.5 ADJUSTING

A. Hanger Adjustment: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

3.6 PAINTING

A. Touching Up: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting.

1. Non-flat paints and coatings used within buildings shall have a VOC content of 150 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils.

C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.3.1.

END OF SECTION 23 05 29

SECTION 23 05 93

TESTING, ADJUSTING AND BALANCING FOR HVAC SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes testing, adjusting, and balancing to produce design objectives for the following:

1. Air Systems: Variable air volume systems
2. Hydronic Piping Systems: Constant flow systems

1.3 SUBMITTALS

A. Samples: Submit proposed test and balance forms and report formats to Owner or his representative for approval at least 120 days prior to commencing field work.

B. Quality Assurance/Control Submittals: Qualifications - Within 30 days after contract award, submit the name(s) of the professional engineer and/or the NEBB or AABC certified supervisor who will be supervising this work. Submit the name(s) of the test and balance technician(s) who will be performing the work.

C. Close-out Submittals:

1. Test and Balance Report: After all balancing is complete, and all coordination with the the Owner or his representative is complete, the balancing firm shall furnish four bound reports that shall contain the test data information as detailed in Part 3 and as follows:

a. Results of dynamic balance testing:

1) Baseline amplitude, velocity, and acceleration frequency spectrum printouts for all devices.
2) All test values exceeding manufacturer's standards shall be identified with recommendations for corrective action.
3) Retest results for rejected devices after corrective action.

b. A reduced set of drawings (11" x 17") shall be included in the report with all terminals (VAV boxes, air outlets, inlets, coils, unit heaters, fin tube loops, radiant panel loops, etc.) clearly marked, all equipment designated, and all referenced to the device test reports. The contract drawings may be reduced and used for this purpose, if they remain legible.

c. The test and balance Contractor shall submit bound copies of the final testing and balancing report to the Owner or his representative at least 15 days prior to the Mechanical Contractor's request for final inspection. All data shall be recorded on applicable reporting forms. The report shall include all operating data as required in Part 3, a list of all equipment used in the testing and balancing work, and shall be signed by the supervising registered engineer or certified test and balance supervisor and certified test and balance technician, and affixed with his certification seal. Final acceptance of this project will not take place until a satisfactory report is received.

2. Balance report shall not be submitted until all improperly configured or installed systems are corrected and improperly installed or missing balance devices are corrected and tested reports submitted with incomplete information will be returned unreviewed.

1.4 QUALITY ASSURANCE

A. Qualifications:

1. Pre-qualified test and balance and sound and vibration testing firms for this project are:

a.	Checkpoint Balance, LLC	303-670-3650
b.	Finn & Associates	303-353-8210
c.	Griffith Engineering	303-688-5054
d.	JPG Engineering	303-688-9044
e.	Rocky Mountain Balance	303-623-7648
f.	Tab Services	303-649-1213

2. Other qualified firms desiring to furnish services for this project shall submit for written approval, during bid time, a brochure listing the qualifications of personnel in the organization, instruments available to be used, an outline of system balancing procedures that is intended to be followed, and a list of projects successfully balanced within the last two years. Information regarding additional qualifications listed below must be in the office of the Engineer at least 14 calendar days prior to the date set for receiving bids.
3. The balancing work, including air and hydronic portions, shall be performed by the same firm having total professional responsibility for the final testing, adjusting, and balancing of the entire system.
4. Test and balance firm shall:

a. Have had previous experience with at least one project of similar type and size in the State of Colorado. Provide the project(s) name, owner, general contractor, mechanical contractor, and references with phone numbers for each.
b. Have a permanent place of business and phone number within a 200-mile radius of the job site.
c. Have been actively engaged in balancing work within the State of Colorado for at least three of the past five years. Provide at least three project references with phone numbers.
d. Have a minimum of two permanent employees who have been actively engaged in balancing work for a minimum of three (3) years. Provide names, certifications, and experience resumes.

5. The test and balance field work shall be performed under the direct supervision a NEBB or AABC certified test and balance supervisor. The certified supervisor shall:

a. Perform the test and balance work or be on-site at least 33% of the total time the test and balance work is in progress, or

b. Be on site a minimum of 10% of the total time the test and balance work is in progress with the work performed by a full-time certified NEBB or AABC test and balance Technician.

6. The vibration testing firm shall be an independent test and balance firm or vibration testing firm, not associated with equipment suppliers or installers, specializing in dynamic vibration measurement and balance. The agency shall be NEBB or AABC certified in sound and vibration testing and shall have been actively engaged in vibration testing and balancing work for a minimum of three years. Firms not certified by NEBB or AABC shall have been actively engaged in sound and vibration testing work for a minimum of five years and shall provide three references including project name, owner, general contractor, mechanical contractor, and references with phone numbers for each.

B. Certifications:

1. Testing, adjusting, and balancing shall be done by a firm using NEBB or AABC certified supervisors, or by an independent firm specializing in this work. A definition of independent shall mean the firm is not associated with the contractor performing work under Division 23; the firm derives its income solely from testing, adjusting, and balancing and/or commissioning mechanical systems, and the work is performed in a professional manner.
2. Test and balance firm shall own or rent and have available for this project all necessary balancing instruments as required to maintain NEBB or AABC certification. Instrument calibration shall have been checked and verified as per NEBB AABC requirements. Provide instrument list with calibration date for each instrument listed.

C. Regulatory Requirements:

1. Refer to Division 23 Section "Common Work Results for HVAC," for general code, standard and regulatory requirements.
2. Comply with procedural standards for testing, adjusting, and balancing of environmental systems as outlined in the latest edition of SMACNA, NEBB, and/or AABC procedural manuals.
3. ASHRAE Compliance:

a. Applicable sections and paragraphs as published in ASHRAE 2011 Applications Handbook, Chapter 38, Testing, Adjusting, and Balancing, and Standard 111.
b. Applicable requirements in ASHRAE 62.1, Section 7.2.2 - "Air Balancing."

4. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1-2007-, Section 6.7.2.3 - "System Balancing."

1.5 SCHEDULING

A. Coordinate scheduling of work with the General Contractor, the appropriate subcontractors.

1. Schedule test and balance work to coincide with testing and verification of control systems where practical.

B. Provide written notification (within 24 hours) to General Contractor, Engineer, and Owner or his representative of any component and/or system deficiencies.

PART 2 - PRODUCTS

2.1 EQUIPMENT

A. Provide all necessary tools, scaffolding, and ladders.

B. Provide all necessary instruments. Calibration and maintenance of instruments shall be in accordance with NEBB or AABC. Calibration histories for each instrument shall be available for examination.

C. When DDC terminal unit controls are used, appropriate temperature control application software and hardware shall be used for proper interface with the terminal unit DDC controls.

D. Provide all sheaves necessary to obtain design airflow from fans.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Air and water testing and balancing shall not begin until the system to be tested has been cleaned and flushed, and is in full working order. Where glycol is used, it shall be installed prior to hydronic balancing.

B. Preliminary test and balance requirements shall be ascertained prior to the commencement of work through a review of available plans and specifications for the project. In addition, visual observations at the site during construction shall have been made to determine the location of required balancing devices, that they are being installed properly, and that proper access is provided.

C. Prior to and during testing and balancing, the testing and balancing technician shall immediately notify the Contractor of all balancing devices not yet installed and those portions of the system unable to be balanced. The Contractor shall correct the deficiencies and shall notify the Engineer of situations requiring additional instruction.

D. Before any air balance work is done, the system shall be checked for:

1. Excessive duct, plenum, and equipment leakage
2. Dirt and debris in ducts and/or AHUs
3. Filters are installed (and changed if they are dirty)
4. Coil fins are clean and combed where needed
5. Correct motor rotation
6. Excessive vibration
7. Equipment lubrication
8. Proper operation of automatic control and smoke dampers
9. Manual control dampers, fire dampers, and air outlet dampers are wide open
10. Duct end caps installed and access doors closed
11. Grilles, registers, and diffusers are properly installed

E. Before any hydronic balancing work is done, the system shall be checked for:

1. Proper cleaning and flushing; glycol installed when specified
2. Dirty strainers

3. Correct pump rotation
4. Proper control valve installation and operation
5. Proper system static pressure to assure a completely filled system
6. Air in system eliminated
7. Proper flow meter and check valve installation
8. Manual balancing devices, control and shut-off valves are open at this time.

F. Put heating, ventilating, and air conditioning systems and equipment into full operation and continue operation of same during each working day of testing and balancing.

3.2 REQUIREMENTS OF WORK

A. Perform testing and balancing procedures on each system according to the procedures contained in NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems" and in this Section.

1. Comply with requirements in ASHRAE 62.1-2007, Section 7.2.2, "Air Balancing."
2. Comply with requirements in ASHRAE/IESNA 90.1-2007, Section 6.7.2.3, "System Balancing."

B. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary for TAB procedures.

1. After testing and balancing, install test ports and duct access doors that comply with requirements in Division 2315 Section "Air Duct Accessories."
2. Install and join new insulation that matches removed materials. Restore insulation, coverings, vapor barrier, and finish according to Division 23 Section "HVAC Insulation."

C. Mark equipment and balancing devices, including damper-control positions, valve position indicators, fan-speed-control levers, and similar controls and devices, with paint or other suitable, permanent identification material to show final settings.

D. Take and report testing and balancing measurements in [inch-pound (IP)] [and] [metric (SI)] units.

E. Air Balance, provide the following:

1. Air Outlet Test Data:

Item*	**Tabulate Design/Submittal Data**	**Confirm Actual Installation**	**Test**
Unit designation	X		
Type of service	X		
Area served	X		
Final velocity (when Ak ≠ 1.0)			X
Ak factor (when Ak ≠ 1.0)	X		
Final airflow			X
First test reading			X
Instrument used for testing			X

2. Variable Volume Terminal Test Data:

Item*	Tabulate Design/Submittal Data	Confirm Actual Installation	Test
VAV terminal designation	X		
Terminal type	X	X	
Size	X	X	
Maximum airflow	X		X*
Minimum cooling airflow	X		X*
Heating design airflow	X		X*
DDC flow correction/calibration factor(s)			X
DDC max / min flows			X
First test reading			X
Instrument used for testing			X
Include Coil Test Data			

**Include connected grille, register, and diffuser data for each VAV address.*

3. Duct Air Leakage Test Data

Item*	Tabulate Design/Submittal Data	Confirm Actual Installation	Test
System designation	X		
Service	X		
Location/zone	X		
Altitude	X		
Density	X		
Leakage class	X		
Design static pressure	X		
Pressure class	X		
Seal class	X		
Airflow volume	X		
Surface area	X		
Airflow per surface area factor	X		
Percent allowable leakage	X		
Test static pressure			X
Test section air leakage			X
Test section percent air leakage			X
Test witnesses			X

G. Hydronic Balance, provide the following:

1. Hydronic Balancing Valve Test Data, Manual:

Item*	Tabulate Design/Submittal Data	Confirm Actual Installation	Test
Unit designation	X		
Type of Service	X		
Manufacturer	X	X	
Model number	X	X	

Item*	Tabulate Design/Submittal Data	Confirm Actual Installation	Test
Size	X	X	
Flow	X		X
ΔP			X
Dial setting			X

H. Coil Balance, provide the following:

1. Hydronic Cooling Coil Test Data:

Item*	Tabulate Design/Submittal Data	Confirm Actual Installation	Test
Coil designation	X		
System served	X		
Coil location	X		
Design coil water flow	X		
Design waterside ΔP	X		
Design airflow	X		
Design airside ΔP	X		
Initial coil water flow			X
Initial waterside ΔP			X
Initial airflow			X
Initial airside ΔP			X
Final coil water flow			X
Final bypass water flow (3-way valves)			X
Final waterside ΔP			X
Balance valve reading (Valves with scale)			
Final airflow			X
Final airside ΔP			X
Entering dry bulb temperature*	X		X
Leaving dry bulb temperature*	X		X
Entering water temperature*	X		X
Leaving water temperature*	X		X
Balance Valve Test Data			

** Provide at request of Engineer.*

I. Adjust air handling systems to the following tolerances:

1. Compensating for Diversity: When the total airflow of all terminal units is more than the indicated airflow of the fan, place a selected number of terminal units at a minimum set-point airflow with the remainder at maximum-airflow condition until the total airflow of the terminal units equals the indicated airflow of the fan. Select the reduced-airflow terminal units so they are distributed evenly among the branch ducts.
2. Supply systems shall be balanced so that:

   a. The total quantity to each space is within -5% to +10% of design values.
   b. If two outlets in space, each outlet is within -10% to +10% of design value.
   c. If three or more outlets in space, each outlet is within -15% to +15% of design value.

3. Exhaust and return systems shall be balanced so the total quantity from each space is -10% to +10% of design values.
4. Air diffuser patterns shall be set to minimize objectionable drafts and noise.
5. The supply, return, and exhaust fan static pressure controls shall be set by the balancing firm (and the Controls Contractor if the systems have fan volume control).

    a. The pitot tube traverse method for determining main duct cfm shall be used and recorded wherever possible; flow hood measurements at registers and diffusers may be totalized for branch duct quantities.
    b. The supply air system shall be tested in all operating modes (full return air, full outside air, full cooling with the design diversity, and full cooling with no diversity).
    c. After balancing is completed, check fan motor amperage with the filters clean.
    d. System static pressure profiles and fan motor amperages shall be recorded in all modes.
    e. The lowest fan speed resulting in satisfactory system performance shall be determined at full design airflow. Any inlet or outlet fan volume (balancing) dampers shall be in the wide-open position and one path presenting the greatest resistance to flow shall be fully open and unobstructed.
    f. After balancing, all adjustable speed sheaves 7-1/2 hp and larger shall be replaced with fixed-speed sheaves by the test and balance Contractor.

6. Provide system static pressure profiles that identify pressure differences across all components of air handling units and built-up systems. Pressure drops shall be individually measured and recorded for intake and exhaust vents, hoods, louvers, manual and auto control dampers, filters, coils, evap. coolers, fans, terminal units, etc.

    a. On systems with OSA economizers, pressure drop values shall be recorded for both minimum and 100% OSA modes.
    b. On multi-zone air handlers, all zone dampers shall be checked for excessive leakage at both full heat and full cool positions. Manual zone balance dampers shall then be set. Correct location and operation of zone thermostats shall be verified.

7. Building static pressure adjacent to entries shall be measured and recorded. Adjust systems to maintain a positive pressure of 0.05-inch w.c. when possible. Note any discrepancies.
8. Final adjustments shall include but not be limited to the following:

    a. Terminal Boxes – VAV and Constant Volume:

        1) Inspect all manufacturer installed controls and determine if they are compatible with the controls installed in the field.
        2) Determine if the velocity pressure sensor is receiving the proper signal and then sending that signal to the regulator.
        3) Determine that the primary air damper controls will allow design flows without going to end point settings.
        4) Determine that the thermostat is calibrated in place on the job.
        5) Determine that the control signal range is compatible with the primary damper motor range, dead band range, and hot-water valve motor range.
        6) Determine that control power is available for the entire control distribution system.
        7) Determine that direct-acting or reverse-acting controls are properly installed.
        8) Determine that the static pressure transmitters are receiving the proper signal in their installed location and then transmitting it to the DDC.
        9) For VAV terminals with secondary fans, determine if the SCR or speed switch will allow the secondary fan to operate at design flow. If the secondary airflow rate is too high, make recommendations.

10) Determine if the primary air damper, when 100% opened, affects the performance of the secondary fan. With secondary fan off, check for reverse rotation induced by primary airflow.
11) Determine and record the airflow performance of all terminal boxes for both primary and secondary balance settings by flow hood measurements at the diffuser outlets and by total flow measurement at each terminal. Measure and record inlet static pressure and temperature at each box and secondary cfm flow at both full heat and full cooling positions.
12) Adjust maximum (and minimum air) flow settings to correspond to values as shown on plans and/or schedules, tolerances per the "Requirements of Work" paragraph in this specification.
13) Determine that fan-powered boxes do not "dump" air through the return openings and that a slightly negative or neutral pressure is created in the box return plenum.
14) Where DDC controls are provided on terminal boxes, verify access codes are correctly set and that all monitored and controlled flows, temperatures, etc., are properly calibrated and report correctly at the operator workstation.
15) Verify the above determinations with a written report itemizing test results for each terminal.

b. Registers and Diffusers: Registers, diffusers, etc., are to be adjusted to deliver design air quantities per the "Requirements of Work" paragraph in this specification.
c. Motor Starter – Overload Trip Devices:

1) VFD, Magnetic, and Manual Starters furnished by the Mechanical Contractor: Exchange or reset overload devices as required for proper motor protection.
2) Motor Control Center (MCC) Magnetic Starters furnished by the Electrical Contractor: Check overload devices for correct sizing and/or setting. Notify the Electrical Contractor of any discrepancies.

9. When air balancing is done and manual dampers are set, all test holes shall be plugged and all manual damper positions shall be marked. The following information shall be recorded in the final report: Design inlet or outlet size, actual inlet or outlet size, and design cfm (velocity) through the orifice for each terminal in the system.

J. Adjust hydronic systems to the following tolerances:

1. Heating System:

a. Supply water temperature above 160°F : -10% to +10% of design value.

K. Hydronic Balance:

1. Constant volume hydronic systems with flow measuring devices: Pumps shall be adjusted to design flow. Systems/devices shall be balanced proportionally using the flow-measuring devices.
2. Constant volume hydronic systems without flow measuring devices (thermal or terminal rated pressure drop method): Pumps shall be adjusted to design flow. The system shall be balanced proportionally to the terminal ratings.
3. When all hydronic balancing is done, all balancing valve positions shall be marked and the locking devices set. Control valve bypass loops (where used) shall be set with the balancing valve to provide equal flow in either mode. Confirm in report.

L. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.

3.3 FIELD QUALITY CONTROL

A. Upon request of the Engineer, a representative of the balancing firm performing the work shall demonstrate to him fluid flow quantities shown in the report by reading back outlets or terminals selected at random by the Engineer. It is understood that the operating mode of the system shall be the same for read back as it was during balancing, and the number of readings verified will not exceed 10% of the total in the report. If rechecks fail, test and balance report will be rejected.

B. Equipment non-performance not resolvable by the Contractor shall be reported to the Engineer. Balancer shall assist the Engineer, when requested, by providing field temperature, pressure and flow information at specific locations.

C. When deemed necessary by the Owner or Engineer, the balancing firm shall run temperature, pressure, and/or humidity recordings, and shall be prepared to verify any of the report test results in the presence of the Owner and/or Engineer.

D. When deemed necessary by the Engineer, a 24-hour space temperature recording shall be taken and any required partial rebalance of the system shall be performed without any additional cost.

END OF SECTION 25 05 93

SECTION 23 07 00

MECHANICAL INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This section includes the following insulation for HVAC systems:
   1. Insulation materials
   2. Fire-rated insulation systems
   3. Mastics and adhesives
   4. Jacketing

1.3 DEFINITIONS

A. The word "concealed" as used in this section refers to insulation in ceiling plenums, furred spaces, pipe and duct shafts, unheated spaces immediately below roof and crawl spaces. The word "exposed" refers to insulation in other areas.

1.4 SYSTEM DESCRIPTION

A. Systems to be Insulated: Insulate portions of the following systems, equipment, and accessories, except where noted otherwise or furnished by OEM as part of equipment.

   1. Hot Piping Systems:

      a. HVAC heating water piping
      b. Fittings, valves, strainers, and check valves

   2. Ductwork: Concealed and in mechanical rooms, HVAC supply, transfer, and return ductwork except as noted
   3. Items that need not be insulated: Exhaust ducts.

1.5 SUBMITTALS

A. Product Data: For each type of product indicated. Include thermal conductivity, thickness, and jackets (both factory and field applied, if any).

B. Shop Drawings:

1. Detail application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.
2. Detail attachment and covering of heat tracing inside insulation.
3. Detail insulation application at pipe expansion joints for each type of insulation.
4. Detail insulation application at elbows, fittings, flanges, valves, and specialties for each type of insulation.
5. Detail removable insulation at piping specialties, equipment connections, and access panels.
6. Detail application of field-applied jackets.
7. Detail application at linkages of control devices.
8. Detail field application for each equipment type.

C. Field quality-control reports.

1.6 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: Insulation and related materials shall have fire-test-response characteristics indicated, as determined by testing identical products per ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing and inspecting agency.

1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Storage and Protection: Protect insulation against dirt, water, chemical, or mechanical damage before, during, and after installation. Satisfactorily repair or replace any such insulation or covering damaged prior to final acceptance of the work.

B. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

1.8 COORDINATION

A. Coordinate size and location of supports, hangers, and insulation shields specified in Division 23 Section "Hangers and Supports for HVAC Piping and Equipment."

B. Coordinate clearance requirements with piping Installer for piping insulation application duct Installer for duct insulation application, and equipment Installer for equipment insulation application. Before preparing piping and ductwork Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.

C. Coordinate installation and testing of heat tracing.

1.9 SCHEDULING

A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.

B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 PIPE INSULATION

A. Manufacturers:

1. Certainteed Crimpwrap
2. Knauf Insulation; 1000 Pipe Insulation
3. Rubatex
4. Owens Corning; Fiberglas Pipe Insulation
5. Johns Manville; Micro-Lok

B. Preformed fiberglass conforming to ASHRAE 90.1-2004, ASTM C547, Class I or II, and ASTM C585 with "K" factor of 0.23 Btu-in./h-sf-°F maximum at 75°F mean temperature. See schedule for thickness.

C. Provide factory-applied ASJ/SSL type, ASTM C921, or ASTM C1136, Type I jacket with vapor barrier for cold piping (below ambient), or Type II for hot piping (above ambient). Type I may be used for both at Contractor's option. Factory-applied flap adhesive (SSL) or conventional staple and tape seal at Contractor's option.

D. Pipe Insulation Thickness Schedule:

		Minimum Insulation Thickness for Pipe Sizes				
	From:		**NPS 1**	**NPS 1-1/2**	**NPS 4**	**Greater than NPS 8**
Piping System Type	**To less than:**	**NPS 1**	**NPS 1-1/2**	**NPS 4**	**NPS 8**	
1. Heating water supply and return (up to 200°F)		1-1/2”	1-1/2”	2”	2”	2”

Note: For piping exposed to outdoor ambient temperatures, increase thickness by 0.5 in.

E. Cover fittings and valves with premolded one-piece PVC-insulated covers. This product is not to be installed in locations where its use is prohibited by local codes.

2.2 DUCT INSULATION

A. Specification “A”: 1-1/2-inch-thick fiberglass 3/4 lbs/ft^3. density blanket with factory-applied heavy duty FSK facing with a "K" value of 0.28 Btu-in./h-sf-°F maximum at 75°F mean temperature.

B. Specification “B”: 1-1/2-inch-thick, 3.0 lbs/ft^3 density fiberglass insulation board. Provide preformed, flat, rectangular, rigid insulation with "K" value of 0.22 Btu-in./h-sf-°F maximum at 75°F mean temperature.

C. Specification "C": 2-inch-thick, 3.0 lbs/ft^3 density fiberglass insulation board equal to CSG Group with factory-applied FSK vapor barrier facing. Provide preformed, flat, rectangular, rigid insulation with a "K" value of 0.22 Btu-in./h-sf-°F maximum at 75°F mean temperature.

D. Specification "E": 2-inch-thick (50-mm thick) foil-encapsulated, non-asbestos, high temperature, low biopersistence, flexible fireproofing wrap. Use in combination with 3M Fire Barrier 1000 N/S Silicone sealant. Provide 3M Fire Master Fast Wrap + to provide a two hour fire resistant rated enclosure or equal. Provide wrap rated to protect combustible construction at zero clearance at the overlap points. Comply with ASTM E84, UL 723, and NFPA 96.

E. Specification "L" and "R": See Duct Liner specification below for materials and required liner thickness.

F. Duct Insulation and Lining Schedule:

System	Insulation Spec	Thickness	Vapor Seal Required
1. HVAC supply – concealed and in mechanical room	A	1.5"	Yes
2. HVAC return – concealed and in mechanical room	A	1.5"	No
3. Medium-pressure supply ducts to CV or VAV terminal units	A	1.5"	Yes
4. Low-pressure round supply ducts downstream of CV or VAV terminal units.	A	1.5"	No
5. HVAC supply – concealed in exit passageways	E	2"	No

* *UL YYET listing not required on type II duct. Approval from Authority Having Jurisdiction must be obtained prior to application of specification "E" fireproofing wrap.*

** *Other than kitchen exhausts.*

2.4 ADHESIVES

A. Provide materials compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated unless otherwise indicated.

B. ASJ Adhesive, and FSK and PVDC Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.

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

a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-82.
b. Eagle Bridges - Marathon Industries; 225.
c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-50.
d. Mon-Eco Industries, Inc.; 22-25.

2. For indoor applications, use adhesive that has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

C. PVC Jacket Adhesive: Compatible with PVC jacket.

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

a. Dow Corning Corporation; 739, Dow Silicone.

b. Johns Manville; Zeston Perma-Weld, CEEL-TITE Solvent Welding Adhesive.
c. P.I.C. Plastics, Inc.; Welding Adhesive.
d. Speedline Corporation; Polyco VP Adhesive.

2. For indoor applications, use adhesive that has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.5 MASTICS

A. Provide materials compatible with insulation materials, jackets, and substrates; comply with MIL-PRF-19565C, Type II.

1. For indoor applications, use adhesive that has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Vapor-Barrier Mastic: Water based; suitable for indoor use on below ambient services.

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

a. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Co.; 30-80/30-90.
b. Vimasco Corporation; 749.

2. Water-Vapor Permeance: ASTM E 96/E 96M, Procedure B, 0.013 perm at 43-mil dry film thickness.
3. Service Temperature Range: Minus 20 to plus 180 deg F.
4. Solids Content: ASTM D 1644, 58 percent by volume and 70 percent by weight.
5. Color: White.

C. Vapor-Barrier Mastic: Solvent based; suitable for outdoor use on below ambient services.

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

a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Co.; Encacel.
b. Eagle Bridges - Marathon Industries; 570.
c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Co.; 60-95/60-96.

2. Water-Vapor Permeance: ASTM F 1249, 0.05 perm at 30-mil dry film thickness.
3. Service Temperature Range: Minus 50 to plus 220 deg F.
4. Solids Content: ASTM D 1644, 33 percent by volume and 46 percent by weight.
5. Color: White.

D. Breather Mastic: Water based; suitable for indoor and outdoor use on above ambient services.

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

a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Co.; CP-10.
b. Eagle Bridges - Marathon Industries; 550.
c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Co.; 46-50.
d. Mon-Eco Industries, Inc.; 55-50.
e. Vimasco Corporation; WC-1/WC-5.

2. Water-Vapor Permeance: ASTM F 1249, 1.8 perms at 0.0625-inch dry film thickness.
3. Service Temperature Range: Minus 20 to plus 180 deg F.
4. Solids Content: 60 percent by volume and 66 percent by weight.
5. Color: White.

2.6 SEALANTS

A. FSK and Metal Jacket Flashing Sealants:

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

a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Co.; CP-76.
b. Eagle Bridges - Marathon Industries; 405.
c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Co.; 95-44.
d. Mon-Eco Industries, Inc.; 44-05.

2. Materials shall be compatible with insulation materials, jackets, and substrates.
3. Fire- and water-resistant, flexible, elastomeric sealant.
4. Service Temperature Range: Minus 40 to plus 250 deg F.
5. Color: Aluminum.
6. For indoor applications, use sealants that have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. ASJ Flashing Sealants, and Vinyl and PVC Jacket Flashing Sealants:

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

a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Co.; CP-76.

2. Materials shall be compatible with insulation materials, jackets, and substrates.
3. Fire- and water-resistant, flexible, elastomeric sealant.
4. Service Temperature Range: Minus 40 to plus 250 deg F.
5. Color: White.
6. For indoor applications, use sealants that have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

PART 3 - EXECUTION

3.1 INSTALLERS

A. Install insulation with workmen regularly engaged in this kind of work in strict accordance with the manufacturer's recommendations and recognized industry practices.

3.2 INSTALLATION

A. General:

1. Apply full-length units of insulation on clean, dry surfaces free of foreign matter. Apply only after tests and approvals required by the specifications have been completed.
2. Apply insulation on cold surfaces with a continuous, unbroken vapor seal. Provide insulation and vapor seal at supports, anchors, etc., that are secured directly to cold surfaces to prevent condensation.
3. Finish raw edges with finishing cement.

B. Pipe Insulation:

1. Insulate pipe continuously through walls and floor openings except where walls and floors are required to be fire-stopped or required to have a fire-resistance rating. Where this occurs, fill the open space remaining between the sleeve and pipe with fire-stop.
2. Butt joints firmly together and smoothly, secure self-sealing jacket laps and joint strips with monel staples at 6-inch o.c. and cover with lap adhesive or factory (SSL) adhesive.
3. Seal ends of cold pipe insulation with a vapor barrier coating at fittings and valves and at intervals of 21 feet on continuous runs of pipe.
4. Insulate cold pipes continuously through hangers. Provide rigid insulation inserts at pipe hangers and supports per Division 23 Section "Hangers and Supports for HVAC Mechanical Systems." Abut pipe insulation to the rigid insulation insert. Apply a wet coat of vapor barrier lap cement on butt joints and seal the joints with 3-inch-wide vapor barrier tape or band. Coat staples with heavy coat of brushed on vapor barrier lap cement.
5. Insulate sections of piping where new control valves are to be installed.

C. Insulation on Fittings and Valves:

1. Where the factory premolded one-piece PVC insulated fitting covers are to be used, apply the proper factory precut insulation to the fitting using two layers for pipe temperatures above 250°F or below 35°F, single layer insulation is suitable between 35°F and 250°F. Tuck the ends of the insulation snugly into the throat of the fitting with the edges adjacent to the pipe covering, tufted and tucked in, fully insulating the pipe fitting. Overlap the covers to adjoining pipe insulation and jackets and seal all cold pipes at seam edges with vapor barrier adhesive. Seal the circumferential edges of covers with pressure sensitive tape. Overlap the tape on the jacket and the cover at least 1 inch.
2. At locations where the PVC covers are prohibited, use as an alternate one of the following methods: one-coat insulation cement, premolded fiberglass fitting covers, or mitered segments of pipe insulation. Provide glass fabric embedded in fire-retardant mastic finish. Use vapor barrier mastic for cold piping for cold piping.
3. Insulate valves with sections of fiberglass pipe insulation complete with all service jackets. Coat raw ends with vinyl acrylic mastic for hot piping or vapor barrier mastic for cold piping.

D. Duct Liner:

1. For velocities up to 2000 fpm, apply duct liner with 100% coverage of fire-retardant adhesive. Cut duct liner to assure snug corner joints. Face the coated or most dense surface of the liner to the airstream. Additionally secure the duct liner with mechanical fasteners that compress the duct liner sufficiently to hold it firmly in place. Start the fasteners within 3 inches of the leading edge of each duct section (and line transverse joints within the duct section) and space no more than 12-inch o.c. around the perimeter of the duct, except that they need to be no closer than 9 inches to a corner break. Elsewhere, secure at a maximum of 18-inch o.c., except place not more than 6 inches from a cut edge, nor 12 inches from a corner break. Coat exposed edges and the leading edge of cross joints of the liner with the same adhesive used to secure the duct liner to the metal surface.
2. Install round duct liner per manufacturer's recommendations:

    a. Install slip-in type (24-inch I.D. or less) in straight duct sections without use of pins or mastic. Insulate fittings with cut sections installed using mastic and/or pins per manufacturer's instructions.
    b. Pin snap-in type (24-inch I.D.) in straight duct sections and pin with mastic in fittings per manufacturer's instructions.

3. Install liner in both straight duct and fittings per manufacturer's recommendations. Fill gaps and tears or abrasions per manufacturer's recommendations. Coat edges exposed to the airstream with Superseal HV sealant or Engineer-approved equal.

E. Other Requirements:

1. Do not insulate boiler manholes, handholes, cleanouts, ASME stamp, and manufacturer's nameplate. Provide neatly beveled edge at interruptions of insulation.
2. Provide removable insulation sections to cover parts of equipment that must be opened periodically for maintenance; include metal vessel covers, fasteners, flanges, frames, and accessories.
3. Repair damaged sections of existing mechanical insulation, both previously damaged and/or damaged during this construction period. Use insulation of same thickness as existing insulation; install new jacket lapping and seal over existing.
4. Replace damaged insulation that cannot be repaired satisfactorily, including units with vapor barrier damage and moisture saturated units.

END OF SECTION 23 07 00

SECTION 23 08 00

COMMISSIONING OF HVAC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes the commissioning process requirements for HVAC systems, assemblies, and equipment.

B. Related Requirements:

1. Section 01 91 13 "General Commissioning Requirements" for general Cx process requirements and CxA responsibilities.
2. For Pre-Functional Checklists, comply with requirements in various Division 23 Sections specifying HVAC systems, system components, equipment, and products.

1.3 DEFINITIONS

A. BAS: Building automation system.

B. BoD: Basis-of-Design Document, as defined in Section 019113 "General Commissioning Requirements."

C. Cx: Commissioning, as defined in Section 019113 "General Commissioning Requirements."

D. CxA: Commissioning Authority, as defined in Section 019113 "General Commissioning Requirements."

E. DDC: Direct digital controls.

F. HVAC: Heating, ventilating, and air conditioning.

G. OPR: Owner's Project Requirements, as defined in Section 019113 "General Commissioning Requirements."

H. "Systems," "Assemblies," "Subsystems," "Equipment," and "Components": Where these terms are used together or separately, they shall mean "as-built" systems, assemblies, subsystems, equipment, and components.

I. TAB: Testing, Adjusting, and Balancing.

1.4 SYSTEMS TO BE COMMISSIONED

A. HVAC Systems: VAV Boxes.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For HVAC testing technician.

B. Submittals: Submittals associated with commissioned systems.

C. Pre-Functional Checklists: Draft Pre-Functional Checklists will be created by CxA for Contractor review after receiving submittals accepted by the Engineer of Record.

D. Functional Performance Tests: Material and installation checklists for equipment, and components to be part of the Cx process and according to requirements in Section 019113 "General Commissioning Requirements."

1.6 CLOSE-OUT SUBMITTALS

A. Operation and Maintenance Data: For HVAC systems and components to include operation and maintenance manuals linked in Revit model.

B. Record of Training of Owner’s operation and maintenance personnel of commissioned systems.

1.7 QUALITY ASSURANCE

A. BAS Testing Technician Qualifications: Technicians to perform BAS pre-functional checklists and Functional Performance Tests shall have the following minimum qualifications:

1. Journey level or equivalent skill level with knowledge of BAS, HVAC, electrical concepts, and building operations.
2. Minimum three years of experience installing, servicing, and operating systems manufactured by approved manufacturer.
3. International Society of Automation (ISA)-Certified Control Systems Technician (CCST) Level I.

B. HVAC Testing Technician Qualifications: Technicians to perform HVAC pre-functional checklists and Functional Performance Tests shall have the following minimum qualifications:

1. Journey level or equivalent skill level. Vocational school four-year-program graduate or an Associate's degree in mechanical systems, air conditioning, or similar field. Degree may be offset by three years' experience in servicing mechanical systems in the HVAC industry. Generally, required knowledge includes HVAC systems, electrical concepts, building operations, and application and use of tools and instrumentation to measure performance of HVAC equipment, assemblies, and systems.
2. Minimum three years of experience installing, servicing, and operating systems manufactured by approved manufacturer.

C. Testing Equipment and Instrumentation Quality and Calibration:

1. Capable of testing and measuring performance within the specified acceptance criteria.
2. Be calibrated at manufacturer's recommended intervals with current calibration tags permanently affixed to the instrument being used.
3. Be maintained in good repair and operating condition throughout duration of use on Project.
4. Be recalibrated/repaired if dropped or damaged in any way since last calibrated.

D. Proprietary Test Instrumentation and Tools:

1. Equipment Manufacturer's Proprietary Instrumentation and Tools: For installed equipment included in the Cx process, test instrumentation and tools manufactured or prescribed by equipment manufacturer to service, calibrate, adjust, repair, or otherwise work on its equipment or required as a condition of equipment warranty, shall comply with the following:

a. Be calibrated by manufacturer with current calibration tags permanently affixed.
b. Include a separate list of proprietary test instrumentation and tools in operation and maintenance manuals.
c. HVAC proprietary test instrumentation and tools become property of Owner at the time of Substantial Completion.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 MEETINGS

A. Commissioning Kick-Off Meeting: Within 90 days of selection of contractors or within 90 days of award of this contract, the CxA will provide a kick-off meeting to review roles and responsibilities of contractors during the construction process.

B. Controls Coordination Meeting: After acceptance of controls submittal by the Engineer of Record, and prior to implementation, the CxA will organize a meeting to review the control sequences with the Owner, the Engineer of Record, the Controls Contractor, and the CxA.

3.2 SUBMITTALS

A. The CxA will provide appropriate the general contractor with a list of HVAC submittals to be reviewed.

B. The General Contractor or Architect will facilitate the distribution of submittals to the CxA.

C. The CxA will review HVAC submittals within 10 business days

3.3 PRE-FUNCTIONAL CHECKLISTS

A. Review and provide written comments on draft Pre-Functional Checklists. CxA will create required draft Pre-Functional Checklists and provide them to Contractor.

B. Return draft pre-functional checklist review comments within 10 business days of receipt.

C. When review comments have been resolved, the CxA will provide final Pre-Functional Checklists.

D. Mechanical, Electrical, and Controls contractors will fill out their respective sections of the pre-functional checklists and note any outstanding deficiencies.

E. Comply with Pre-Functional Checklist requirements, including material verification, installation checks, startup, and performance tests requirements specified in Sections specifying plumbing systems and equipment.

3.4 FUNCTIONAL PERFORMANCE TESTING

A. Prior to functional testing, checks for the following conditions will be made:

1. Certify that HVAC systems, subsystems, and equipment have been installed, calibrated, and started and that they are operating per the Contract Documents and approved submittals. Contractors will document this information by filling out pre-functional checklists and providing start-up report.
2. Certify that HVAC instrumentation and control systems have been completed and calibrated, that they are operating according to the Contract Documents and approved submittals, and that pretest set points have been recorded.
3. Certify that TAB procedures have been completed and that TAB reports have been submitted, discrepancies corrected, and corrective work approved. A preliminary TAB report accepted by the CxA will serve as acceptable documentation.
4. Set systems, subsystems, and equipment into operating mode to be tested according to approved test procedures (for example, normal shutdown, normal auto position, normal manual position, unoccupied cycle, emergency power, and alarm conditions).

B. Functional Performance Test Conditions

1. Perform tests using design conditions, whenever possible.

    a. Simulated conditions may be imposed using an artificial load when it is impractical to test under design conditions. Before simulating conditions, calibrate testing instruments. Provide equipment to simulate loads. Set simulated conditions as directed by CxA and document simulated conditions and methods of simulation. After tests, return configurations and settings to normal operating conditions.
    b. Functional Performance Test procedures may direct that set points be altered when simulating conditions is impractical.
    c. Functional Performance Test procedures may direct that sensor values be altered with a signal generator when design or simulating conditions and altering set points are impractical.

2. If tests cannot be completed because of a deficiency outside the scope of the HVAC system, document the deficiency and report it to the building owner. After deficiencies are resolved, reschedule tests.

C. Functional Performance Tests Common to HVAC Systems

1. Measure capacities and effectiveness of systems, assemblies, subsystems, equipment, and components, including operational and control functions, to verify compliance with acceptance criteria.
2. Test systems, assemblies, subsystems, equipment, and components operating modes, interlocks, control responses, responses to abnormal or emergency conditions, and response according to acceptance criteria.
3. Coordinate schedule with, and perform Cx activities at the direction of, CxA.
4. Comply with pre-functional checklist requirements, including material verification, installation checks, startup, and performance tests requirements specified in Division 23 Sections specifying HVAC systems and equipment.

5. Contractor will provide technicians, instrumentation, tools, and equipment to perform and document the following:

    a. Pre-functional checklists.
    b. Functional Performance Tests.

D. Execution of Functional Performance Test Procedures

1. The CxA will provide functional test procedures
2. The controls contractor will execute functional test procedures. The CxA will witness and provide direction for execution of testing procedures.
3. The CxA will document the test process, document issues, and notify contractors of outstanding issues. Contractors will correct outstanding issues.
4. Acceptance Criteria: Operation of equipment according to OPR and BOD.

END OF SECTION 23 08 00

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SECTION 23 09 13

INSTRUMENTATION AND CONTROLS FOR HVAC

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Scope of work: Integrate the new fan coil unit into the building control system.

B. Related Sections: Drawings and general provisions of the contract, including General and Supplementary Conditions and Division 1 Specifications apply to this section.

1. Division 23 equipment and system sections with specific control requirements.
2. ”Division 23 Section "Testing, Balancing, and Adjusting," for responsibilities and procedures of the TAB contractor.
3. Division 26 sections for electrical equipment and wiring and conduit requirements and any electrical interface to the controls and instrumentation.

C. Products Supplied, But Not Installed Under This Section:

1. The automatic temperature control valves, separable wells for immersion sensors, shall be provided by the Controls Contractor for installation by the Mechanical Contractor under the Controls Contractor's supervision. Taps for flow and pressure instruments shall be located by the Controls Contractor for installation by the Mechanical Contractor.
2. The Controls Contractor shall provide all automatic temperature control dampers which are not part of packaged equipment, for installation by the Mechanical Contractor under the Control Contractor's supervision.

1.3 SYSTEM DESCRIPTION

A. Design Requirements:

1. The Direct Digital Control system shall utilize controllers and network protocol that matches the standard being used for the rest of the updated building controls as set forth by the UCD Controls Engineering Group.
2. Coordination: This Contractor shall interface with controls furnished with equipment. Provide additional control devices, interlock relays, and signal conditioners and gateways/routers when necessary to accomplish specified sequences and interoperability.
3. Electrical wiring in connection with the automatic temperature control system, where shown on the Division 26 drawings, shall be performed by the Electrical Contractor. All other wiring required for proper operation of the automatic temperature system shall be performed by this Contractor.

4. Adjustments of manual balancing devices, as required to obtain design air and/or water flows, shall be by the Balancing Contractor. The Controls Contractor shall provide assistance to the Balancing Contractor with control adjustments as required to obtain design flows by:

    a. Providing on-site instruction on the proper interfacing and operation of their equipment
    b. Providing the necessary software for use with the Balancing Contractor's personal computer for interfacing with their control equipment. Where proprietary software, equipment or gateways are required, this equipment shall be provided for the Balancing Contractor's use.

5. Commissioning of building systems shall be by the Commissioning Agent. This Contractor shall be responsible for startup, checkout, and debugging of all equipment installed and/or modified under this section. The Controls Contractor shall fully participate in the commissioning process and assist the Commissioning Agent with control demonstration and software adjustments, required for proper operation. This Contractor shall cooperate with the Commissioning Agent as to startup procedures, scheduling, performance verification, and system debugging. The Controls Contractor shall:

    a. Provide on-site instruction on the proper interfacing and operation of their equipment and provide a printout of all software code and all user interface screens.
    b. Provide the necessary software for use with the Commissioner's personal computer for interfacing with the control equipment. Where proprietary software, equipment or gateways are required, it shall be provided for the Commissioning Agent's use.
    c. Provide any portable hand held setup/calibration devices required to initialize the control system for the Commissioning Agent's use.
    d. Provide personnel to demonstrate the operation of the hardware and software during the commissioning process.
    e. Commissioning of controls will be done by UCD Controls engineering group.

6. All installation work and programming shall conform to the UCD Construction Standards for HVAC control systems. Web address: http://www.ucdenver.edu/about/departments/FacilitiesManagement/Documents/GuidelinesStandards/2012%20edition/Part%204/Part%204%20Anschutz%20Bookmarked.pdf

B. DDC Requirements:

1. DDC Controllers shall utilize peer-to-peer communications. Each DDC controller shall operate independently by performing its own specified control, alarm management, operator I/O, and data collection. The failure of any single component or network connection shall not disrupt the execution of control sequences at other operational devices.
2. System shall be fully user-programmable except as noted below for application-specific controllers. It shall be possible for the user to download all parameters and custom software from each DDC panel for backup with the software furnished as part of this project.
3. Provide a separate stand-alone DDC controller (not application specific) for each AHU or other HVAC system. Application specific controllers may be utilized on this project for the fan coil unit controller.
4. The software required to provide the initial operation routines shall not consume more than 70% of the programmable capability of the DDC controllers.
5. A stand-alone DDC controller shall perform all required local control functions without the need for communication with a remote supervisor or host computer, have a battery-backed clock, and shall contain the necessary resident firmware to provide peer-to-peer communications with other DDC panels. Stand-alone DDC controllers shall be fully custom programmable with all software functions and modules resident within the controller.

6. System shall be fully user-programmable.

    a. System shall incorporate a software editor that allows on-line viewing of the DDC programs as they are being executed.
    b. It shall be possible for the user to download all parameters and custom software from each DDC panel for backup without the use of special compilers or engineering software.
    c. It shall be possible for the user to up-load all parameters and custom software to each DDC panel from a local port at each panel, and/or from the operator's terminal, without the need for special engineering software and/or chip reconfiguration.
    d. The database parameters and custom software for each primary DDC panel shall be totally resident within the panel in the form of non-volatile read/write EEPROM, flash memory or battery-backed RAM. Use of EPROM for storage of database parameters and/or custom software is not acceptable.

7. Operator interface system shall be menu-driven and shall provide all system, point, and function identifications and status/alarm messages in the English language without the use of cryptic codes.

    a. The operator interface system shall be transparent, permitting the user to access any point for status display and/or to change any parameter (setpoint, etc.) without knowing the physical location of the local panel and/or terminal block connections for the point.
    b. All points of the system shall be accessible from any primary DDC panel location or from the operators' terminals using menus and/or system/point description techniques.

8. System shall be tolerant of power failures. Memories shall be non-volatile, or unit shall hold memory up to 48 hours minimum on back-up batteries. At least one battery-backed (48-hour minimum) real-time clock shall be furnished for each building stand-alone controller. Upon system or power failure, maintain all DDC control functions in their present position or a fail-safe condition. On power restoration, automatically and without operator intervention, execute these restart procedures:

    a. Come on-line.
    b. Update all monitored functions.
    c. Resume operation based on current time and status.

1.4 SUBSTITUTION APPROVALS

A. Where no specific manufacturer is listed, a first-class item of cataloged manufacture shall be furnished.

B. Prior Approvals: Refer to Division 1 Section “Product Substitution Procedures.”

C. Substitution Requests after Execution of Contract: If Contractor wishes to furnish or use a substitute item of material and/or equipment; he must submit a change order request to the Architect/Engineer. The request for change order shall itemize each of the proposed substitutions identified by applicable specification section, paragraph number and/or drawing number. A price change (increase or decrease) shall be listed for each item along with complete data showing performance over entire range, physical dimensions, electrical characteristics, material construction, operating weight and other applicable data. The change order request will be reviewed for equality, suitability and reasonableness of price differential. A single substitution change order listing the approved items will be issued with the net cost of the change order being the sum of the approved item costs. No subsequent substitution change orders will be considered. The Engineer's decision will be final.

D. It shall be the responsibility of the Contractor to assure that the substitute material and/or equipment fits into the space provided and the Contractor shall pay for all extra costs incurred by other trades for any and all changes necessitated by these substitutions.

1.5 SUBMITTALS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specifications, apply to this Section.

B. Schedule: Submittal data and control drawings for all equipment and systems shall be submitted to the Architect/Engineer for review prior to ordering or fabrication of the equipment. The following information shall be included in these submittals:

1. 30 Days or Less After Notice to Proceed:

a. Control valve and damper schedules.
b. The valve and damper schedules shall also be submitted to the mechanical contractor for review by the piping and sheet metal contractors.
c. Product data including all products used in conjunction with the control system.
d. Torque charts showing the butterfly valve actuators are oversized as required elsewhere in this specification.

2. 60 Days or Less After Notice to Proceed:

a. Control drawings
b. Software information
c. Test Plan and procedures

3. 60 Days or More Prior to Scheduled Startup of the First Controlled System:

a. Software programming data
b. Test plan and procedures

4. 10 Days or More Prior to Scheduled System Demonstration:

a. Operational trend studies (logs) as described in Part 3
b. Test plan with hardware and software testing results, calibration reports and technician certification

5. Upon Completion of Training Classes:

a. Videotaped record of all training
b. One copy of all training materials

C. Shop Drawings:

1. General:

a. Drawings shall be prepared using computer aided drafting which can produce files compatible with AutoCAD 2005 or later.
b. Product data shall be in a 3-ring binder. All product information shall be indexed and tabbed. The product data sheets shall be marked with the tag number as indicated by the

drawings. All options, ranges, and voltages that are to be provided shall be clearly indicated on each product data sheet.

2. Valve Schedules:

   a. Valve schedules may be included on the drawings or in the product data. The valve schedule shall include the following information:

      1) Valve tag number
      2) System and service
      3) Quantity, manufacturer and model number
      4) Type (2-way or 3-way)
      5) Fail Position
      6) Body Size
      7) Flow (gpm)
      8) Cv
      9) Rangeability
      10) Actual pressure drop
      11) Close-off rating
      12) Actuator model number
      13) Actuator type and signal
      14) Spring range

3. Drawings: The drawing package shall include:

   a. Cover sheet with a drawing index listing all included drawings.
   b. A network diagram showing the network architecture and the true relationships of the panels on the network. This drawing shall include all network devices including; surge suppressors, lightning arrestors, repeaters, modems, gateways and routers. The power source, panel address, and physical location (room number) shall be shown for each device. Where external batteries, UPS systems or other power supplies are used they shall be shown on this drawing.
   c. Control schematics and flow diagrams for each system monitored or controlled. These diagrams shall include:

      1) A ladder diagram showing all wiring and pneumatic tubing associated with the controller. The location of the electrical power panel with breaker number shall be shown for all power sources.
      2) Details showing the interconnection with motor starters, variable frequency drives and the associated bypass sections, chillers, boilers and other types of equipment. These details shall include wire numbers terminal designations and protocol and physical media (wire type). The mounting locations of all control equipment shall be included.
      3) A bill of materials shall be included with each control schematic. The bill of materials shall include the tag name used on the control drawing, description of the product, name of the manufacturer, complete model number, measurement range (if applicable) and quantity.
      4) A complete input/output schedule for each DDC controller shall be included with each control schematic. The point name (the same one used in the software), and a functional description of the point shall be included in the I/O summary.
      5) A sequence of operation shall be included with each control schematic. The sequence shall reflect actual programming, including all time delays and software interlocks. Copies of the sequence that appear in this specification are not acceptable.

6) Floor and roof plans showing the location of control panels, sensor, and mechanical equipment. The floor plans shall show the location of duct and space static pressure sample points.

D. Software: Software submittal shall include the following:

1. Point listings shall include all hardware and software points. Object lists for network interoperation with other equipment including VFDs and chillers. A description of the point shall be provided.
2. Program listings for each piece of controlled equipment. The program listing shall be complete with all data required for controller operation.
3. Color printout of each graphic. The graphic shall show temperature, status, position and all data points that will appear on the screen. Optionally, the graphics may be submitted on CD or disk provided that all required software for the display of the graphics is also furnished.
4. A listing of all alarms and the alarm limits and time delays.

E. Quality Assurance/Control Submittals:

1. Test Plan and Procedures: The test plan shall include the following:

a. Certification documentation for each hardware point. Certify that the point was verified, tested and cycled to prove functionality. Include the calibration data, initial and final readings and the required offset.
b. Test data form for testing pneumatic tubing.
c. Procedures for the seven-day test.
d. Certification documentation for software sequence of operation.
e. The test plan shall be coordinated with Division 23 Section “Testing, Adjusting, and Balancing” Contractor and Division 1 Section “General Commissioning Requirements”.

F. Close-out Submittals - Project Record Documents:

1. Upon completion of the installation, provide a complete set of record (as-built) drawings. The content and format of the drawings shall be as described previously.
2. Prior to final completion of the installation, prepare complete Operation and Maintenance (O&M) manuals. Refer to Division 01, Section “Submittals Procedures” for requirements. Also provide one CD ROM containing all CAD-prepared drawing files compatible with AutoCAD 2005 or later.
3. The temperature control diagrams shall be laminated and secured to the panel.
4. Control System Programmer's manual with complete description of the custom control language and associated editor, including sample-written programs. Provide complete sets of all programming forms, applications memorandums, and addenda to the programmer's manual. All software and firmware algorithms shall be completely described and documented.
5. Maintenance, installation, and engineering manual(s) that clearly explain how to debug hardware problems; how to repair or replace hardware; preventative maintenance guidelines and schedules; calibration procedures; and how to engineer and install new points, panels, and operator interfaces.
6. Documentation of all software: List separately all software parameters that may need updating by the Owner, such as, though not limited to, daily start/stop schedules; setpoints; alarm points; control loop cascade, and PID parameters, etc.
7. All programs, code, databases, graphic files, CAD drawings, and symbol libraries generated for operation of the system shall be included as part of the system documentation. This information shall be submitted both in hard copy bound format on CD-ROM.
8. Complete original issue documentation, installation, operation manuals, and supporting software for all third-party hardware and software furnished and installed as part of the system or required

for the operation of the system, including remote terminals, user's computer workstation, monitors, graphics and memory boards, network servers, printers, and modems.

9. All software licenses, warranty certificates and documentation for all hardware and software including third party hardware and software shall be provided.
10. All testing, startup, calibration and checkout reports and checklists.
11. A list of recommended spare parts with part numbers and supplier.
12. Recommended preventive maintenance procedures for all system components including a schedule of tasks (inspection, cleaning, calibration, etc.), time between tasks, and task descriptions.

1.6 QUALITY ASSURANCE

A. Qualifications:

1. Approved Controls Manufacturers and Installing Contractors:

Siemens Building Technologies	Local branch office

2. Controls on the UCD Campus are sole-sourced to Siemens.

B. This installation shall not be used as a test site for any new products unless explicitly approved by the Owner's representative in writing. This requirement is not intended to restrict the Contractor to the use of outdated equipment.

C. All products used in this installation shall be new and currently under manufacture. Spare parts shall be available for at least five years after completion of this contract.

D. All work, materials and equipment shall comply with the rules and regulations of all codes and ordinances of the local, state, and federal authorities. Such codes, when more restrictive, shall take precedence over these plans and specifications. As a minimum, the installation shall comply with the current editions in effect 30 days prior to receipt of bids of the following codes:

1. International Building Code (IBC)

   a. Chapter 7, Smoke Dampers
   b. Chapter 9, Duct Smoke Detectors
   c. Chapter 9, Refrigerant Detector

2. International Mechanical Code (IMC)

   a. Chapter 6, Wiring in Plenums
   b. Chapter 11, Refrigerant Detector
   c. Chapter 11, Refrigeration Machinery Room Ventilation
   d. Chapter 11, Refrigeration Machinery Room Remote Controls

3. American Society of Mechanical Engineers Controls and Safety Devices for Automatically Fired Boilers (ASME CSD-1a-2004) as adopted by the State of Colorado.

   a. CE-110.a Manual Remote Shutdown
   b. CW-210 Requirements for Flow Or Temperature Sensing Devices

4. International Fire Code (IFC)

5. National Electric Code (NEC)
6. Occupational Safety and Health Act (OSHA)
7. Applicable state and local codes

1.7 WARRANTY

A. Refer to the General Conditions of the Contract and Division 1 for general warranty requirements and duration.

B. Special Warranty:

1. The warranty period shall begin as authorized by the Owner's representative in writing. Completion shall not occur before the Contractor has performed the tests required in Article 3.
2. The Contractor shall receive calls during the warranty period for all problems or questions experienced in the operation of the installed equipment and shall take steps to correct any deficiencies that may exist. The response time to critical problems shall be four (4) hours maximum.
3. The Contractor shall maintain a backup of all software installed in the system. A backup shall be made whenever the contractor makes a change to the software.
4. The Contractor shall furnish and install all hardware, firmware, and software updates to operator workstations and controllers or web server software, project-specific software, graphic software, database software, and firmware that resolve identified software deficiencies at no charge during warranty period. Do not install updates or upgrades without Owner's written authorization. If available, Owner can purchase in-warranty service agreement to receive upgrades for functional enhancements associated with above-mentioned items.

1.8 DEMONSTRATION AND TRAINING

A. This Contractor shall provide a minimum of four hours of system and control demonstration time at the job site for the Owner's personnel.

1.9 OWNERSHIP OF PROPRIETARY MATERIAL

A. All project-developed software and documentation shall become the property of the Owner. The Owner shall retain the right to duplicate and/or modify such for use at this facility. These documents shall not be copyrighted. These include but are not limited to:

1. Project graphic images
2. Record drawings
3. Project database
4. Job-specific application programming code
5. All project specific documentation

1.10 START-UP AND TROUBLESHOOTING

A. This Contractor is responsible for the calibration, start-up, and trouble shooting of the control system. This includes programming modifications to the control sequences to account for unanticipated operating issues and system performance.

1. To reduce the number of changes, the contractor is encouraged to contact the Engineer prior to creating the job specific software to review the control sequence and other software requirements. Contractor is encouraged to suggest alternative methods and sequences that meet the project goals.
2. The intent of this specification is to provide the owner with a fully operational system. Sequence of operation changes may be required during startup and warranty period as noted above.
3. Contractor shall make the required modifications at no additional cost.

PART 2 – PRODUCTS

2.1 CONTROL WIRING

A. Cables shall be shielded when so recommended by manufacturer. Conductor size shall be in accordance with manufacturer's recommendations subject to specified minimum size. See Part 3 for allowable types.

B. All low-voltage cables in plenums, not in raceway, shall be UL listed for air plenum service.

C. All insulated wire to be copper conductors, UL labeled for 90°C minimum service.

D. Raceway for wiring shall be per Division 26.

2.2 TRANSIENT VOLTAGE PROTECTION

A. TVSS surge protectors, for incoming 120V AC power to controllers: Leviton 51020WM, or Engineer-approved equal. Surge protectors furnished shall be UL 1449 listed. The maximum single-pulse transient current shall be 26kA, noise rejection at 50 ohms -40 to -50 for 5K to 100mhz, the cat B3 combination wave peak clamping voltage shall be L-N 300 V, L-G 350 V, the UL 1499 ratings shall be L-N330V, L-G 400V, Fault current rating (AIC rating assigned per UL) shall be 5,000A.

1. Transient voltage protection for all twisted pair, telephone and coaxial data communication lines between controllers shall be per manufacturer recommendations. Provide all required repeaters to ensure signal integrity.
2. Lightning arrestors on all communications and other lines that exit the building shall be per manufacturer recommendations.

2.3 CONTROL VALVES

A. Shall be 2-way or 3-way type for two-position or modulating service as scheduled, shown on drawings, or as specified in Sequence of Operation.

B. Close-off (differential) Pressure Rating: Valve actuator and trim shall be furnished to provide the following minimum closeout pressure ratings:

1. Water Valves:

a. 2-way - 150% of total system (pump) head.
b. 3-way - 300% of pressure differential between ports A and B at design flow or 100% of total system (pump) head.

C. Water Valves:

1. Body and trim style and materials shall be per manufacturer's recommendations for design conditions and service shown, with equal percentage ports for modulating service.
2. Rangeability of control valves shall be as follows:

a. Valves NPS 1/2 through NPS 1, 25:1 minimum

3. Sizing and Selection Criteria:

a. Flow velocities shall not exceed the manufacturer’s recommendations.
b. Two-position service: Line size.
c. Two-way modulating service: Pressure drop shall be equal to twice the pressure drop through heat exchanger (load), 4 psi maximum, 2 psi minimum.
d. 3-way Modulating Service: Pressure drop equal to twice the pressure drop through the coil exchanger (load), 3 psi maximum, 2 psi minimum.
e. 2-way modulating valves NPS 2 and smaller may be ball type valves with factory installed actuators (in lieu of globe type) for water service.

4. Materials: Valves NPS 1/2 through NPS 2 shall be bronze body or cast brass ANSI Class 250, spring loaded, Teflon packing, quick opening for two-position service. Two-way valves to have replaceable composition disc.
5. Ball Valves (water service only): Valve body shall be forged brass or bronze, two-piece construction with stainless steel ball and stem, reinforced Teflon seat and two O-ring packing, 600 psi (NPS 1/2 to NPS 1-1/4) pressure rating at 254°F. The valve shall have a flow characterizing disk in the inlet of the valve to provide an equal percentage response. Provide with factory assembled actuators. The valve actuator assembly shall have a minimum 200 psi close off. Belimo or Engineer-approved equal.
6. Water valves shall fail normally open or closed as scheduled on plans or as follows:

a. Chilled water control valves - normally closed.

2.4 LOCAL CONTROL PANELS

A. All indoor control cabinets shall be fully enclosed NEMA 1 construction with hinged door, key-lock latch, baked enamel finish, removable subpanels, wall-mounted or freestanding. All temperature control panels on the project shall be keyed alike.

B. All outdoor control cabinets shall be fully enclosed NEMA 4 construction with hinged door, external key-lock latch, baked enamel finish, removable subpanels, wall-mounted or freestanding. All temperature control panels on the project shall be keyed alike.

C. Panels shall house the microprocessor, modem, communication interface, all controllers (except those

required at VAV boxes), relays, indicators, transmitters, switches, pilot lights, override timers, etc., to allow quick access for adjustment and troubleshooting.

D. Manual switches and indicating devices shall be flush-mounted on panel face. Provide engraved plastic or lithographed metal nameplates for all items on the panel face.

E. Interconnections between internal and face-mounted devices prewired with color-coded stranded conductors neatly installed in plastic troughs and/or tie-wrapped. Terminal blocks shall be provided for all field connections, and shall be UL listed for 300-volt service, individually identified per control/interlock drawings, with adequate clearance for field wiring.

1. Control terminations for field connection shall be individually identified per control drawings.
2. All internal wiring between panel mounted devices and field terminal blocks shall be marked on both ends with the appropriate identifying tag.

F. Provide on/off power switch with over-current protection and a 1-1/2 inch main air gauge for control pressure sources to each local panel. Provide a 120 volt duplex outlet inside each control panel that houses a DDC controller (except VAV controllers) if there is not an outlet within 5 feet of the enclosure.

2.5 SOLID-STATE SENSING DEVICES

A. Temperature sensors shall be thermistor (10K or 20K), or platinum RTD type (100-ohm wire wound, or 1,000-ohm, thin film. Accuracy shall be ±0.5°F with stability of 0.25°F over five years. Sensors used for BTU calculations shall be accurate to ±0.2°F or 1% of span, whichever is less.

1. Space (room) sensors shall be surface-mounted in a suitable protective enclosure. VAV terminal sensors shall have a network connection jack. Covers shall be blank, without any company logos. Omit thermometers and digital displays. Provide insulating mounting base on all sensors located on exterior walls. Provide metal guards with security screws for all sensors located in public areas such as lobbies, corridors, gyms, cafeterias, etc.

2.6 TRANSMITTERS - SOLID-STATE

A. Carbon Dioxide Sensor: Unit shall have a non-dispersive infrared (NDIR) detection cell, 0-2000 ppm measurement range, adjustable span, automatic electronic zero, ±75 ppm annual drift, ±20 ppm repeatability and 5% accuracy. Unit shall require calibration not more than annually and shall have 4-20 mA or 0-10 VDC analog output and duct sampling tubes for duct-mounted applications

1. ACI CO2-VDC-Rr, Veris Industries CWE SC, Telaire Ventostat 8001 or 8002. Other makes/models will not be accepted.

2.7 AUXILIARY DEVICES – ELECTRIC

A. Current-operated switches shall be self-powered, solid state split core with manually adjustable trip current. The switches shall be selected to match the current of the application and output requirements of the DDC system. The current switch shall have sufficient accuracy and hysteresis to detect drive belt failure. Where used in conjunction with variable frequency drives the current operated switch shall be recommended for such service by the manufacturer. Neilsen-Kuljian, Veris Industries or Engineer-approved equal.

B. Control relays shall be UL listed plug-in type with dust cover and LED "energized" indicator. Contact rating, configuration, and coil voltage suitable for application. Idec series RH-L, ULAC or Engineer-approved equal.

C. Control transformers shall be UL listed, Class 2 current-limiting type or shall be furnished with over-current protection in both primary and secondary circuits for Class 2 service.

2.8 ACTUATORS AND POSITIONERS - ELECTRIC

A. Valve actuators:

1. Electric actuators shall be either, direct coupled or rotary (gear-train) type for two-position or modulating service as required by application. All electric actuators shall be UL listed with NEMA 1 enclosures, unless otherwise specified.
2. Actuators shall be permanently lubricated; gear-train units shall be oil-immersed type or shall have permanently lubricated high-density polymer gears.
3. Ambient temperature range shall be at least 40° to 120°F, except actuators subjected to outdoor ambients shall have ambient range of -20° to 125°F minimum.
4. Input signal requirements and voltages compatible with controller output signals.
5. Actuator size and rating shall be suitable for intended application.
6. Valve actuators shall provide tight close-off at design system pressure. Modulating actuators shall provide smooth modulation at design flow and pressure conditions.
7. Actuators shall have a spring return to fail to the safe position as indicated on the drawings. Actuators relying on batteries are not acceptable.

2.9 SAFETY CONTROLS

A. All safeties shall be hard wired. Safety interlocks using software are not acceptable.

2.10 NETWORKING COMMUNICATIONS

A. The DDC system LAN (Local Area Network) shall match the standard protocol being used in the rest of the building for all upgraded Siemens controls.

2.11 APPLICATION-SPECIFIC CONTROLLERS (ASC)

A. Application-specific controllers are microprocessor-based DDC controllers that are dedicated to control a specific group of equipment. They are not fully user programmable, but are customizable for operation within the confines of the equipment they are designed to serve. For systems other than VAV box controllers, fully programmable stand-alone controllers (not ASC) are required on this project.

2.12 SOFTWARE LICENSES

A. Provide licenses for all software used in conjunction with this project directly to the owner. Include copies of each license agreement in the Operators and Maintenance Manual.

PART 3 – EXECUTION

3.1 DEMOLITION

A. Demolition: This Contractor shall remove all unused controls including devices, conduit, wire, and pneumatic tubing. Disposition of hardware shall be coordinated with the Owner. Selected material shall be returned to the Owner. Coordinate work with other trades.

3.2 CONTROL EXECUTION - GENERAL

A. This Contractor shall provide all required control interface relays, including control contactors for single-phase pumps and fans (1/2 hp or less) and any isolation relays required for interface to 3-phase magnetic starter control circuits. All power wiring to single-phase motors and 3-phase starters by Division 16; all control function (interlock) wiring by the Controls Contractor.

B. This Contractor shall be responsible for providing control power to all his controllers and devices requiring control power including installation of any required breakers, unless such wiring is shown on the Division 16 drawings.

C. This Contractor shall function as the Systems Integrator to establish interoperability with the controls system its LAN and controllers provided by other Sections including variable frequency drives (VFD), air handlers furnished with packaged controls, chillers and boilers, and other equipment designated to be connected on the LAN. This Contractor shall map all points indicated, connect wiring, provide any required converters, bridges or gateways and assure seamless bi-directional communication and interoperability and full functionality of the interface.

D. Hand-Off-Auto switches at the MCC shall energize equipment in both the 'hand' and 'auto' mode (when auto is commanded on for auto mode). Safeties shall protect equipment in the hand and auto modes. Where fans are interlocked with damper end switches, the hand and auto positions shall open the dampers and the damper end switch shall energize the fan.

3.3 CONTROL WIRING

A. All control and interlock wiring shall comply with the national and local electrical codes and Division 16 of these specifications. Where the requirements of this section differ with Division 16 the more restrictive requirements shall take precedence. Control wiring shall be concealed except in equipment rooms.

B. All Power (line voltage) and Class 1 wiring shall be UL listed in approved raceway per NEC and Division 16 requirements.

C. All Power limited circuits (Class 2 or Class 3) shall also be in metal raceway, except as follows:

1. Concealed and accessible locations including ceiling return air plenums: Approved cables not in raceway may be used provided that:

a. Circuits meet NEC Class 2 or Class 3 (current-limited) requirements. (Low-voltage power circuits shall be sub-fused when required to meet Class 2 or Class 3 current-limit.)
b. All cables shall be UL listed for application, i.e. Cables used in ceiling plenums shall be UL listed specifically for that purpose.

D. Approved Cables not installed in raceways shall be subject to the following:

1. Install wiring in a sleeve where wiring passes through walls and floors. Maintain the fire rating (if any) at all penetrations.
2. Cables shall be supported from or anchored to structural members. Cables shall not be supported by or anchored to ductwork, electrical conduits, or ceiling suspension systems. All plenum cable and installation shall comply with the requirements of the NEC.
3. Network data cables shall be identified with permanent labels installed every 12 feet.
4. Exposed splices shall not be permitted. Cable shall be installed without splices between terminal points.
5. Maintain a minimum of 6 inches from high temperature equipment (e.g., steam pipes, flues, etc.).
6. Wire inside walls should be in conduit.
7. Low voltage wire in ceilings should be run in the information system cable tray where available and should enter room along with other low voltage wiring through a 2” conduit from the cable tray to a point of penetration in the adjacent room and run on J Hooks or bridle rings in the ceiling space of a room.

E. Size wire in accordance with manufacturers recommendations and the NEC.

F. All wiring shall be installed as continuous lengths with no splices permitted between termination points.

G. All control wiring shall be installed in a neat and workmanlike manner parallel to building lines with adequate support.

H. This Contractor shall terminate all control and/or interlock wiring and maintain updated (as-built) wiring diagrams with terminations identified at the job site.

I. Flexible metal conduits and liquid-tight, flexible metal conduits shall not exceed 3 feet in length and shall be supported at each end. Flexible metal conduit less than 1/2-inch electrical trade size shall not be used. In areas exposed to moisture, including chiller and boiler rooms, liquid-tight, flexible metal conduits shall be used.

J. Provide conduit seal-offs where portions of an interior raceway system pass through walls, ceiling or floors which separate adjacent rooms having substantially different maintained temperatures or when a raceway goes from indoors to outdoors.

K. Wiring for analog inputs shall not be run in conduit containing 120V AC wiring or any wiring that carries switched signals or any noise-generating sources. Pneumatic tubing shall not be in the same conduit with wiring.

L. Follow manufacturer's installation recommendations for all communication and network cabling. Network or communication cabling shall be run separately from other wiring. When plenum cable is not allowed, LAN or communication wire shall be installed in a dedicated raceway. Other wiring in communications raceway is not allowed.

3.4 TRANSIENT VOLTAGE PROTECTION

A. This Contractor shall provide and install:

1. Transient voltage protection and backup power supply, on all incoming 120V AC power to all controllers (except VAV controllers).

2. Transient voltage protection for all twisted pair, and coaxial data communication lines between controllers. Provide all required repeaters to ensure signal integrity.
3. Transient voltage protection on all phone lines.
4. Lightning arrestors on all communications and other wiring that exit the building. Locate the arrestor at the point of building entrance.
5. Provide ground connection sized and installed in accordance with the manufacturers instructions.

3.5 CONTROL DEVICE LOCATIONS

A. Room thermostats and sensors shall be mounted 44 inches from the finished floor to the center of the device for ADA Compliance. Seal the wall opening and wire penetration of all wall mounted temperature sensors to prevent airflow from the wall cavity, from affecting the sensor reading.

B. Provide thermal conducting compound for all sensors in thermowells.

C. All analog pressure and differential pressure transmitters for air service shall be located in the DDC control panels. Mounting air pressure transducers at the ductwork is not acceptable.

3.6 CONTROL PANELS

A. Field wiring to panels shall be enclosed in metal raceway.

B. Panels shall be mounted at eye level for accessibility and service.

C. Local control panels shall be located within 50 feet of the system served unless otherwise shown on plans.

D. Mount panels on solid non-vibrating surfaces in areas free from moisture or water accumulation. Where such surfaces are not readily accessible, mount the panel on a rigid unistrut stand attached to the floor. The sides of ducts and air handling units are not acceptable mounting surfaces.

3.7 IDENTIFICATION

A. All control equipment shall be clearly identified by control shop drawing designation as follows:

1. Control valves - brass tags.
2. Other remote control devices and sensors: metal tags; plastic laminate labels; or, on non-porous surfaces only, permanent label tape as produced by the Brother “Easy Touch” label maker. Do not attach tag or label to removable covers, etc. Rivet or stick to device or adjacent surface.
3. Control panel doors - engraved nameplate with panel number and systems served.
4. Devices in control panels: engraved plastic tags; metal tags; or, on non-porous surfaces only, permanent label tape as above, mounted to panel adjacent to control device. 1/4-inch-high letters minimum
5. All wiring, including wiring within factory-fabricated panels, shall be labeled within 2 inches of termination with DDC point number/controller number or other descriptive information.
6. All metal and plastic engraved labels shall be secured with chains, nylon tie-wraps, or rivets. Screws with exposed threads are not acceptable. Permanent adhesive is acceptable only when mechanical fasteners would damage the labeled equipment.
7. All switches, relays, and panel components shall be labeled. Relays shall be labeled such that removal of the relay does not move the label.

8. Raceway identification: For ease of identification, junction and pull box covers shall be color coded. Coordinate the color of the junction box covers with Division 16 and the Owner.

3.8 TESTING

A. Prior to substantial completion, the control system shall undergo a series of tests to verify operation and compliance with this specification. These tests shall occur after the Contractor has completed the installation, started up the system, and performed their own performance tests.

B. The tests described in this section are to be performed in addition to the tests that the Contractor performs as a necessary part of the installation, startup, and debugging process. Control system testing shall be coordinated with the Commissioning Contractor and scheduled with the Owner's representative.

C. The Contractor shall provide at least two men equipped with two-way communication, and shall test actual field operation of each control and sensing point for all modes of operation including day, night, summer, winter, occupied, unoccupied, fire/smoke alarm, and power failure modes. The purpose is to test the calibration, response, and action of every point. Any test equipment required to prove the proper operation shall be provided by and operated by the Contractor. The Commissioning agent and the Owner's Representative (at their discretion) may observe and review these tests.

1. The system software shall be complete such that each control loop shall function as specified in the Sequence of Operation. This contractor shall be required to furnish the software program and test the operation of every program branch and control loop.
2. This Contractor shall be responsible for all necessary revisions to the software as required to provide a complete and workable system consistent with the letter and intent of the specification.

D. A point-to-point verification shall be made for each input and each output to the system. The check shall include the operator workstation such that the correct point assignment at the workstation is also verified. The calibration of all input and output points shall be tested, documented and calibrated as needed.

E. The operation of each hardwired safety and interlock shall be tested. This testing shall verify the correct operation of the safety or interlock in the hand and automatic modes of operation.

F. Each alarm shall be tested. The receipt of the correct alarm message shall be verified for each alarm and device receiving the alarms. Dial out and email alarms shall be verified.

G. Power failure restart and software backup during power failure shall be tested.

H. Demand limiting (where used): The contractor shall supply trend data output showing the action of the demand limiting algorithm. The interval selected shall cover a time period when load shed is active. The data shall document the action on a minute-by-minute basis over at least a one hour period. Included in the trend shall be building kW, demand limiting setpoint, and the status of sheddable equipment outputs.

I. Operational trend studies (logs) for each system that indicate all setpoints, operating points, valve/damper positions, mode, and equipment status shall be submitted to the Architect/Engineer. These logs shall cover a 48-hour period and have a sample frequency of not more than ten minutes. The data collection start time and sample frequency shall be the same for each point on a given system. Outdoor air temperature and humidity shall be included with each trend study (log.) Digital points shall indicate the on condition as 100% and the off condition as 0%. The logs shall be provided in graphical format with sufficient resolution to see the ten minute data intervals. All points associated with a system

including start and status points shall be included on the same graph. The logs shall also be submitted in text format on disk.

J. The contractor shall supply trend data output in a graphical form showing the step response of each DDC loop. The test shall show the loop's response to a change in set point that represents a change of actuator position of at least 25 percent of its full range. The sampling rate of the trend shall be from one second to three minutes depending on the speed of the loop. The trend data shall show for each sample the setpoint, actuator position, and the controlled variable values. Any loop that yields unreasonably under or over damped control values shall require further tuning by the contractor.

K. Control loops shall maintain setpoint within the tolerances described in Part 1. Control loops that do not meet these tolerances shall be re-tuned or otherwise corrected to meet the required tolerance.

L. There shall be a seven day demonstration test. During a seven-consecutive-day period, the system shall function in automatic mode without any overrides or operator intervention. Failure of any components, control sequences or the inability to deliver uninterrupted services shall be deemed a failure of the test. This contractor shall submit system logs demonstrating a successful test.

M. The control systems will not be accepted as meeting the requirements of Completion until all tests described in this section have been performed to the satisfaction of both the Engineer and Owner and all required documentation has been submitted and successfully reviewed. Any tests that cannot be performed due to circumstances beyond the control of the Contractor may be exempt from the Completion requirements if stated as such in writing by the Owner's representative. Such tests shall then be performed as part of the warranty.

N. After the system has operated properly for 90 days following startup of the final component of the heating and air conditioning systems, an as-built copy of the software shall be transmitted to the Owner for permanent record purposes.

END OF SECTION 23 09 13

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SECTION 23 21 13

HYDRONIC PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes: Work under this section shall include furnishing and installing HVAC piping systems as shown on the drawings and as specified hereinafter. Systems shall include HVAC chilled water piping.

1.3 SUBMITTALS

A. Product Data: Submit product data on piping materials, methods, and specialties.

1.4 QUALITY ASSURANCE

A. Certifications: All safety valves and pressure vessels shall bear the appropriate ASME label and stamp.

PART 2 – PRODUCTS

2.1 PIPING

A. Specification A:

1. Pipe: ASTM B88, Type L drawn temper seamless copper tube.
2. Fittings: ASME B16.22, wrought copper or ASME B16.18 cast-copper alloy, or wrought-copper Viega ProPress fittings with EPDM-rubber O-ring seal in each end.
3. Flanges: ASME B16.24, Class 150 cast bronze flanges with solder joint ends
4. Unions: ASME B16.18, cast-copper alloy, hexagonal stock body with ball-and-socket joint, metal-to-metal seating surfaces, and solder joint and/or threaded ends
5. Solder Filler: ASTM B 32, Alloy Sn95, Sn94 or E; lead- free
6. Brazing Filler Metal: AWS A5.8 BcuP, copper phosphorus or BAg, silver classification
4. Flanges: ASME B16.5, Class 300, ASTM 181 Grade. II, carbon steel, raised face

PART 3 - EXECUTION

3.1 PREPARATION SURVEYS

A. Surveys – Measurements, Lines, and Levels:

1. Check dimensions at the building site and establish lines and levels for the work specified in this section.
2. Establish all inverts, slopes, and elevations by instrument, working from an established datum point. Provide elevation markers and lines for the Owner's use to determine that slopes and elevations are in accordance with drawings and specifications.

B. Pipe Cleaning:

1. Clean interior of all piping before installation. Remove any fugitive dust, dirt, and/or threading debris.
2. Flush sediment out of all completed piping systems. Refer to Division 2315 Section "Common Work Results for HVAC," for cleaning and flushing requirements.

3.2 PIPING APPLICATIONS

A. Heating/Hot Water:

1. NPS 2 and Smaller: Pipe specification A

3.3 INSTALLATION

A. Piping Installation - General:

1. Locations and Arrangements: Drawings (plans, schematics, and diagrams) indicate the general location and arrangement of piping systems. Locations and arrangements of piping take into consideration pipe sizing and friction loss, expansion, pump sizing, other design considerations. So far as practical, install piping as indicated. Ductwork shall take precedence over piping when coordinating work with other trades.
2. Provide a complete piping installation, including connections to equipment and installation of automatic control valves furnished by the Temperature Control Contractor. Install control valves with a minimum length equivalent to four pipe diameters of straight pipe entering valve and with the stem upright.
3. Support piping at connections to pumps so there is no strain on pump flanges.
4. Pitch piping to obtain required air relief and drainage.
5. Make an allowance for expansion in the installation of piping so the variation in temperature will not cause undue stress at any point. Securely anchor pipes where necessary to properly distribute expansion stresses. Support branch mains and risers in a way that will permit expansion and contraction of risers and to relieve runouts of all weight.
6. Provide unions or flanges at each control valve and at each piece of equipment.
7. Conceal all pipe installations in walls, pipe chases, utility spaces, above ceilings, below Grade or floors, unless indicated to be exposed to view.
8. Refer to Division 2315 Section "Hangers and Supports for HVAC Piping and Equipment," for additional installation requirements.

3.4 FIELD QUALITY CONTROL

A. Pipe Testing:

1. All piping systems shall be tested and proven tight prior to insulation or concealment. The tests shall be witnessed by the Owner's Representative or his designee.
2. Ensure that the test pressure, which might damage equipment, does not reach such units by valving them off or otherwise isolating them during the test.
3. Open and close all system valves at least once while system is pressurized to test valve packing. Tighten as required.
4. All hydrostatic tests shall be held for a minimum of four hours without loss of system pressure.
5. Test pressures shall be as follows:

    a. Hot Water/Chilled Water: 100 psig hydrostatic or 1.5 times operating pressure, whichever is greater

END OF SECTION 23 21 13

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SECTION 23 21 16

HYDRONIC PIPING SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes: This section covers general requirements for valves and specialties that are used with piping systems as specified elsewhere in Division 23.

1.3 SUBMITTALS

A. Product Data:

1. Strainers
2. P&T test plugs and accessories
3. Flow measuring devices
4. Hydronic Specialties

1.4 QUALITY ASSURANCE

A. Regulatory Requirements:

1. Refer to Division 23 Section "Common Work Results for HVAC" for general code, standard and regulatory requirements.
2. Chemical and physical properties of materials, performance characteristics, and methods of construction shall be in accordance with applicable sections of the following references and standards of current editions in effect 90 days prior to receipt of bids:

    a. American Welding Society (AWS)
    b. Commercial Standards, National Bureau of Standards (CS)
    c. Compressed Gas Association (CGA)
    d. Copper Development Association (CDA)
    e. Federal Specifications (FS)
    f. Manufacturers Standardization Society (MSS)

PART 2 - PRODUCTS

2.1 STRAINERS

A. Water: Bronze Y-type strainers with stainless steel screens. 2 inches or smaller shall be screwed or sweat (water only), 400 psi WOG/300 psi SWP with 20 mesh screen, equal to Armstrong, A W Cash, Boylston, Hoffman, ITT, Keckley, Mueller or Plenty.

2.2 PRESSURE TEMPERATURE TEST PLUGS AND ACCESSORIES

A. Approved manufacturers are as follows:

1. Test plugs - Peterson Equipment No. 710 or 710-XL, Fairfax, or Trerice.
2. Pressure gauge - Duro Instrument Corp. No. 105 with adapter.
3. Pocket Thermometers - Peterson Series 600, or Tel-Tru Manufacturing Co. No. 39R.

B. Pressure temperature test plugs (P & Ts) shall have brass body with Nordel valve core, gasketed cap with retaining strap, 1/4-inch or 1/2-inch male pipe thread and insulation extension where required. Rated 250 psi at 275°F.

2.3 FLOW-MEASURING DEVICES

A. Line sizes and design flow rates are shown on the drawings.

B. Flow-measuring devices shall be a combination measuring device and balancing valve assembly or a separate Venturi with a remote balancing valve. Contractor options are:

1. One-piece combination orifice (1 inch and smaller) or Venturi (2 inches and smaller) and ball type balancing/shutoff valve as follows:

a. Bronze or forged brass construction with sweat or threaded ends, rated at 250 psi SWP at 250°F.
b. Full-port, ball valve with chrome-plated ball and blowout-proof stem with Teflon seals and packing, 100% shutoff at rated pressure.
c. Quick-connect type color-coded fittings for flow measurement connection.
d. Tamper-resistant adjustable "memory" device for valve setting stop.
e. Metal tag with orifice/Venturi size, station designation, and gpm/meter reading.
f. Readout ports and valve handles shall have 2 inches or greater extensions when pipes are to be insulated.
g. Selected for meter readout of 7 inches to 50 inches w.g. to maximum at rated flow.
h. Acceptable manufacturers are Flow Design "AccuSetter," Gerand Series 200, and HCI “Terminator B.”

2.4 HYDRONIC SPECIALTIES

A. Air Vents:

1. Manual air vents: Use ball valve with hose end and cap.
2. AutomaticAir Vent: Spirotop air vent only.

B. ASME Pressure Relief Valves: Bronze or iron body, ASME safety type labeled for 125 psi maximum pressure, relief pressure selectable from 30 to 100 psi. (See plans for relief pressure settings.) B&G Models 790, 1170, 3301, or 4100; equal by Kunkle, Taco, or Watts.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General:

1. Unless otherwise specifically indicated on the plans or specifications, all equipment and materials shall be installed in accordance with the recommendations of the manufacturer. Maintain maximum headroom and space conditions at all points.
2. Fire Barrier Penetrations: Where pipes pass through fire-rated walls, partitions, ceilings, and floors, maintain the fire-rated integrity. Use fire stop caulking materials at all fire-rated wall penetrations.

B. Strainers:

1. Install strainers at suction side of all HVAC pumps, ahead of all solenoid and automatic control valves, and where shown on plans.
2. Install strainers ahead of all steam traps and steam control valves and where shown on plans.
3. Install a ball valve with hose end and cap for blow-off on strainers.
4. All strainer screens shall be removed, cleaned, and reinstalled after system pressure tests, cleanup, and startup is complete and before final acceptance. The strainers shall be marked for verification purposes after final cleaning and reinstallation.

C. Air Vents:

1. Install manual air vents at high points of all piping consisting of a line size nipple – 6 inches long for an air collection chamber, pipe cap on top of nipple with 1/4-inch tap, 1/4-inch copper tubing with gauge cock. Locate gauge cock at accessible location and anchor to adjacent pipe or wall. Provide access panels as required for access.
2. Install manual air vents at all heat transfer devices, coils, etc.

D. Hydronic Specialties: Install hydronic specialties of types and sizes as shown and/or scheduled on the plans.

E. Other Devices:

1. Install a pressure-temperature tap on each side of each boiler, chiller, pump, and heat transfer device such as coils, heat exchangers, radiation, and radiant panel loops.
2. Install thermometers and gauges where shown on drawings. Locate them so they are easily visible from the floor level without use of ladders, etc. Provide a P&T tap at each thermometer, sensor, and gauge location.
3. Provide heat transfer grease in each thermometer well and a pressure snubber and shutoff valve for each pressure gauge.
4. Install one flow-measuring device in the return water from (to) each heat transfer or generation device (such as boilers, chillers, pumps, coils, heat exchangers, radiation circuits, etc.). The balancing valve may also serve as an isolation valve provided it has adjustable memory stops.

G. Accessibility: Locate all equipment that must be serviced, operated, or maintained in fully accessible positions. Equipment shall include, but not be limited to, valves, traps, cleanouts, motors, controllers, switchgear, and drain points. If required for better accessibility, furnish access doors for this purpose. Minor deviations from drawings may be made to allow for better accessibility.

END OF SECTION 23 21 16

SECTION 23 31 00

DUCTS AND ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUBMITTALS

A. Product Data for all items in this section.

1. Performance data including leakage, pressure drop, chemical resistance, and temperature range as appropriate.
2. Duct Liner may be submitted under this section or under 23 0700 Mechanical Insulation.
3. Include acoustical data for flexible duct, attenuators, and double wall duct

B. Shop Drawings: Shop Fabrication Standards listing system type, pressure class, seal class, material, sheet metal gage, reinforcement, seam and joint construction, and type and spacing of hangers and supports including methods for duct and building attachment for all duct systems of this project.

C. Delegated-Design Submittal:

1. Custom Supports: Details, signed and sealed by the qualified professional engineer responsible for their preparation for hangers and supports not addressed in SMACNA standards or cataloged, pre-engineered product data.

D. Clean Duct Protocol Procedures: Submit written procedures confirming compliance with the clean duct protocol in PART 3.

E. Field quality-control reports.

1. Duct System Cleanliness Test Report
2. Duct Leakage Test Report
3. Photographs described in PART 3

F. Operation and Maintenance Manuals: For duct silencers, include pressure drop and dynamic insertion loss data. Include breakout noise calculations for high transmission loss casings.

G. Close-out Submittals: Operating test of Fire, smoke, and combination fire/smoke dampers

1.3 QUALITY ASSURANCE

A. Comply with AMCA 500-D testing for damper rating.

B. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1, "Structural Welding Code - Steel," for hangers and supports
2. AWS D1.2, "Structural Welding Code - Aluminum," for aluminum supports
3. AWS D9.1, "Sheet Metal Welding Code," for duct joint and seam welding

C. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1.

D. SMACNA Compliance: Applicable requirements of the current edition of:

1. HVAC Duct Construction Standards - Metal and Flexible
2. Rectangular Industrial Duct Construction Standards
3. Round Industrial Duct Construction Standards
4. System Air Leakage Test Standard

1.4 PERFORMANCE REQUIREMENTS

A. Duct Dimensions: Unless otherwise indicated, all duct dimensions indicated on Drawings are inside clear dimensions and do not include insulation or duct wall thickness.

B. Contractor shall furnish and install ductwork and accessories, including offsets and size transitions, which may become evident during the course of construction, to avoid building construction and other considerations, to provide a complete and operational system. Make any adjustments in dimensions required to maintain the interior free area shown on the drawings where such adjustments are made or where duct is lined.

C. Duct construction, including sheet metal thicknesses, seam and joint construction, reinforcements, and hangers and supports, shall comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" and performance requirements specified design criteria.

D. Airstream Surfaces: Surfaces in contact with the air stream shall comply with requirements in ASHRAE 62.1.

PART 2 - PRODUCTS

2.1 SHEET METAL MATERIALS

A. General Material Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.

B. Galvanized Sheet Steel: Comply with ASTM A 653.

1. Galvanized Coating Designation: G90.
2. Finishes for Surfaces Exposed to View or Weather: Mill phosphatized.

C. Reinforcement Shapes and Plates: ASTM A 36, steel plates, shapes, and bars; black and galvanized.

1. Where black- and galvanized-steel shapes and plates are used to reinforce aluminum ducts, isolate the different metals with butyl rubber, neoprene, or EPDM gasket materials.

D. Tie Rods: Same materials as duct, size per the appropriate SMACNA standard.

E. Intermediate Reinforcement: Match duct material

2.2 SINGLE-WALL RECTANGULAR DUCTS AND FITTINGS

A. Rectangular Ducts: Fabricate ducts with indicated dimensions for the duct airway size. Allowance for liner thickness must be added to airway size to determine sheet metal size.

B. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 2, "Rectangular Duct Construction" based on indicated static-pressure class unless otherwise indicated.

1. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-1, "Rectangular Duct/Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

a. Where specified for specific applications, all joints shall be welded.

2. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-2, "Rectangular Duct/Longitudinal Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible." Button punch lock, detail L-2, is not acceptable.

a. Where specified for specific applications, all joints shall be welded.

3. Elbows, Transitions, Offsets, Branch Connections, and Other Duct Construction: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 4, "Fittings and Other Construction," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
4. Reinforcement Comply with SMACNA "HVAC Duct Construction Standards - Metal and Flexible," based on indicated static-pressure class unless otherwise indicated.

a. Internal reinforcement is prohibited in duct with design velocity over 2250 fpm, or on any grease exhaust duct, or any material handling duct.

2.3 SINGLE-WALL ROUND DUCTS AND FITTINGS

A. Round Ducts: Fabricate ducts with indicated dimensions for the inner duct airway size. Allowance for liner thickness must be added to airway size to determine sheet metal size.

B. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 3, "Round, Oval, and Flexible Duct," based on indicated static-pressure class unless otherwise indicated.

1. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-1, "Round Duct Transverse Joints" for static pressure class, applicable sealing requirements, materials involved, duct support intervals and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

   a. Transverse joints in ducts larger than 60 inches in diameter shall be flanged.
   b. Where specified for specific applications, all joints shall be welded.

2. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-2, "Round Duct Longitudinal Seams" for static pressure class, applicable sealing requirements, materials involved, duct support intervals and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible." Snap lock seams, RL-6A, RL-6B, RL-7, and RL-8 and lap rivets, RL-3 and RL-4 are not acceptable.

   a. Fabricate round ducts larger than 90 inches in diameter with butt-welded longitudinal seams.
   b. Where specified for specific applications, all joints shall be welded.

3. Laterals and Tees Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals" and SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-6, "Conical Tees" for static pressure class, applicable sealing requirements, materials involved, duct support intervals and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

   a. Saddle Taps are not allowed, except where specifically shown on drawings as connections to existing duct.

2.4 DUCT LINER

A. Refer to Division 23 Section "Mechanical Insulation."

2.5 SEALANT AND GASKETS

A. General Sealant and Gasket Requirements: Surface-burning characteristics for sealants and gaskets shall be a maximum flame-spread index of 25 and a maximum smoke-developed index of 50 when tested according to UL 723certified by a nationally recognized testing laboratory.

B. Tape Sealing System:

1. Tape: Woven cotton fiber impregnated with mineral gypsum and modified acrylic/silicone activator to react exothermically with tape to form hard, durable, airtight seal, 2-inch .
2. Manufacturer: Carlisle Hardcast DT-5300-Tape with RTA-50 coating or approved equal.
3. Sealant: Modified styrene acrylic.
4. Water resistant.
5. Mold and mildew resistant.
6. Maximum Static-Pressure Class: 10" w.g., positive and negative.
7. Service: Indoor and outdoor.
8. Service Temperature: Minus 40 to 200°F.

9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum.
10. For indoor applications, use sealant that has a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

C. Water-Based Joint and Seam Sealant:

1. Manufacturer: Carlisle Hardcast DS-321 coating or approved equal.
2. Application Method: Brush on.
3. Solids Content: Minimum 65%.
4. Shore A Hardness: Minimum 20.
5. Water resistant.
6. Mold and mildew resistant.
7. VOC: Maximum 75 g/L (less water).
8. Maximum Static-Pressure Class: 10" w.g., positive and negative.
9. Service: Indoor or outdoor.
10. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.
11. For indoor applications, use sealant that has a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
12. Solvent cement and adhesive primer shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

D. Flanged Joint Sealant: Comply with ASTM C 920.

1. Description: Extruded butyl/EPDM proprietary copolymer sealant on a siliconized release paper.
2. Manufacturer: Carlisle Hardcast GT-1902, or approved equal.
3. Dimensions: 3/16 inch x 5/8 inch
4. Resistant to mold, mildew, and water:
5. Service temperature: Minus 65 to plus 200°F
6. VOC: 0 g/l.
7. Maximum Static-Pressure Class: 10" w.g., positive and negative.
8. For indoor applications, use sealant that has a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
9. Solvent cement and adhesive primer shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

E. Flange Gaskets: Butyl rubber, neoprene, or EPDM polymer with polyisobutylene plasticizer.

F. Round Duct Joint O-Ring Seals: Seal shall provide maximum leakage class of 3 cfm/100 sq ft at 1" w.g. and shall be rated for 10" w.g. static-pressure class, positive or negative.

1. EPDM O-ring to seal in concave bead in coupling or fitting spigot.
2. Double-lipped, EPDM O-ring seal, mechanically fastened to factory-fabricated couplings and fitting spigots.

2.6 FABRICATED HANGERS AND SUPPORTS

A. Hanger Rods for Noncorrosive Environments: Cadmium-plated steel rods and nuts.

B. Hanger Rods for Corrosive Environments: Electrogalvanized, all-thread rods or galvanized rods with threads painted with zinc-chromate primer after installation.

C. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct."

D. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.

E. Trapeze and Riser Supports:

1. Supports for Galvanized-Steel Ducts: Galvanized-steel shapes and plates.
2. Supports for Stainless steel Ducts: Stainless steel shapes and plates.
3. Supports for Aluminum Ducts: Aluminum or galvanized steel coated with zinc chromate.

2.7 STEEL CABLE SYSTEMS FOR DUCT SUPPORT

A. Manufacturer: Gripple.

B. Manufactured and engineered specifically for duct supports.

C. Cables for Galvanized Duct: Galvanized steel complying with ASTM A 603.

D. Cables for Stainless steel Ducts: Stainless steel complying with ASTM A 492.

E. Steel Cable End Connections: Cadmium-plated steel assemblies with brackets, swivel, and bolts designed for duct hanger service; with an automatic-locking and clamping device.

F. Contractor shall select, apply, and install hanging and support components in complete compliance with manufacturer’s requirements and recommendations.

2.8 DUCT TAKE OFF WITH MANUAL VOLUME DAMPERS

A. Conical Spin In Fitting With Damper

1. Type: Single blade up to 20-inch diameter.
2. Maximum Velocity: (2,000 fpm) or less.
3. Sleeve: 20-gauge galvanized steel or stainless steel.
4. Blades: 20-gauge galvanized steel or stainless steel.
5. Shafts: 0.375-inch square.
6. Bearings: Synthetic, on each side of damper shaft.
7. Insulation Stand Off To Accommodate Insulation Thickness.
8. Locking quadrant with locking wing nut on each side of damper shaft.

B. Rectangular To Round 45 Degree Shoe Tap Fitting With Damper

1. Type: Single blade up to 20-inch diameter.
2. Maximum Velocity: (2,000 fpm) or less.
3. Sleeve: 20-gauge galvanized steel or stainless steel.
4. Blades: 20-gauge galvanized steel or stainless steel.

5. Shafts: 0.375-inch square.
6. Bearings: Synthetic, on each side of damper shaft.
7. Insulation Stand Off To Accommodate Insulation Thickness.
8. Locking quadrant with locking wing nut on each side of damper shaft.

C. Damper Actuators: Provide locking quadrant operators on all dampers unless otherwise noted on plans

2.9 REMOTE DAMPER OPERATORS

A. Manufacturers:

1. Pottorff; a division of PCI Industries, Inc.
2. Ventfabrics, Inc.
3. Young Regulator Company.

B. Description: Cable system designed for remote manual damper adjustment.

C. Tubing: Brass.

D. Cable: Stainless steel.

E. Wall-Box: Stainless Steel, Recessed or surface as appropriate.

F. Insulation Stand Off To Accommodate Insulation Thickness.

2.10 MANUAL VOLUME DAMPERS

A. Manufacturers:

1. Air Balance
2. American Warming and Ventilating
3. Arrow
4. Greenheck
5. Louvers & Dampers
6. Nailor
7. Pottorff
8. Ruskin
9. Vent Products
10. Venco

B. Rectangular, Steel, Low Velocity

1. Manufacturer: Ruskin MD35, Greenheck MBD-15 or equal
2. Type: Parallel blade or opposed blade with concealed or exposed linkage, all galvanized steel or all stainless steel
3. Maximum Velocity: (1,500 fpm) or less
4. Frame: 16-gauge, roll formed channel
5. Blades: 16-gauge
6. Maximum Blade Width: 8 inches, exception: single blade up to 12 inches
7. Blades 36 inchesand longer and driven blade shall be furnished with reinforcing cone. Maximum blade length is 48 inches

8. Shafts: 1/2-inch
9. Bearings: Synthetic
10. Insulation Stand Off To Accommodate Insulation Thickness.

C. Rectangular, Steel, Medium Velocity

1. Manufacturer: Ruskin CD60 or equal
2. Type: Parallel blade or opposed blade with concealed or exposed linkage, all galvanized steel or all stainless steel
3. Maximum Velocity: (4000 fpm) or less
4. Frame: 16-gauge l, roll formed channel
5. Blades: 16-gauge
6. Maximum Blade Width: 8 inches (*Exception: Single blade up to 12 inches*)
7. Blades 36 inches and longer and driven blade shall be furnished with reinforcing cone. Maximum blade length is 48 inches
8. Shafts: 1/2-inch
9. Bearings: Synthetic or stainless steel sleeve
10. Insulation Stand Off To Accommodate Insulation Thickness.

D. Round, Steel

1. Manufacturer: Ruskin MDRS25, Greenheck MBDR-50 or equal.
2. Type: Single blade up to 20-inch diameter; use rectangular steel with round adapter above 20-inch diameter.
3. Maximum Velocity: (2,000 fpm) or less.
4. Frame: 20-gauge galvanized steel or stainless steel.
5. Blades: 20-gauge galvanized steel or stainless steel.
6. Shafts: 0.375-inch square.
7. Bearings: Synthetic.
8. Insulation Stand Off To Accommodate Insulation Thickness.

E. Damper Actuators: Provide locking quadrant operators on all dampers unless otherwise noted on plans

2.11 DUCT-MOUNTED ACCESS DOORS

A. Manufacturers:

1. American Warming and Ventilating; a division of Mestek, Inc.
2. Cesco Products; a division of Mestek, Inc.
3. Ductmate Industries, Inc.
4. Flexmaster U.S.A., Inc.
5. Greenheck Fan Corporation
6. McGill AirFlow LLC
7. Nailor Industries Inc.
8. Pottorff; a division of PCI Industries, Inc.
9. Ventfabrics, Inc.
10. Ward Industries, Inc.; a division of Hart & Cooley, Inc.

B. Duct-Mounted Access Doors. Fabricate and install access panels according to the duct pressure classifications requirement's for each system, and to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible".

1. Low pressure duct-mounted access doors, for rectangular ducts, with a pressure classification below 3"wc:

a. Doors shall have minimal to no leakage while tested below 3"wc:
b. Door: Double wall galvanized steel panels.
c. Frame: Galvanized steel, dovetail, spin, or press on frames is acceptable.
d. Insulation: High density insulation fill, with UL classification FHC25/50.
e. Vision panel at humidifiers or as otherwise noted.
f. Hinge: Full length galvanized steel piano hinge secured to both frame and door.
g. Cam and Latches: The cam shall be manufactured from no less than 16 gauge galvanized steel, secured to the door. The latches shall be manufactured from no less than 20 gauge galvanized steel, secured to the frame.
h. Gasket: Service temperature range of -20 ° F to 150 ° F.

2. Low pressure duct-mounted access doors, for round ducts, with a pressure classification below 3"wc.

a. Minimal to no leakage while tested bellow 3"wc:
b. Door: Galvanized steel panels.
c. Insulation: High density insulation fill, with UL classification FHC25/50.
d. Vision panel at humidifiers or as otherwise noted.
e. Hinged Type: Full length galvanized steel piano hinge, with no less than 2 latches secured to both panel, and duct on all hinged doors.
f. Sandwich Type: Door consists of multiple layers of stamped steel. With molded knobs that have threaded metal inserts to eliminate thread stripping, carriage bolts are secured to inner door with springs to allow for the panel to be easily removed.
g. Gasket: Service temperature range of -20 ° F to 150 ° F.

2.12 FLEXIBLE CONNECTORS

A. Manufacturers

1. Ductmate Industries, Inc.
2. Duro Dyne Inc.
3. Ventfabrics, Inc.
4. Ward Industries, Inc.; a division of Hart & Cooley, Inc.

B. Materials: Flame-retardant or noncombustible fabrics.

C. Coatings and Adhesives: Comply with UL 181, Class 1.

D. Metal-Edged Connectors: Factory fabricated with a fabric strip 3-1/2 inches (89 mm) wide attached to two strips of 2-3/4"-wide x 0.028"-thick, galvanized sheet steel or 0.032-inch-thick aluminum sheets. Provide metal compatible with connected ducts.

E. Indoor System, Flexible Connector Fabric: Glass fabric double coated with neoprene.

1. Minimum Weight: 26 oz./sq. yd..

2. Tensile Strength: 480 lbf/inch in the warp and 360 lbf/inch in the filling.
3. Service Temperature: Minus 40 to plus 200°F.

2.13 FLEXIBLE DUCTS

A. Manufacturers:

1. Flexmaster Type M1
2. ThermaFlex M-KE
3. Alternate Manufactures - Submit sample for review.

B. Flexible Ducts:

1. Flexible air ducts shall be listed under UL-181 standards as Class I Air Duct. Material and shall comply with NFPA Standards 90A and 90B. Minimum operating pressure rating shall be 10" W.C. positive, 1" negative for sizes up to 12" through a temperature range of -20°F to 150°F; minimum working velocity rating shall be 4000 fpm.
2. Inner core shall be black CPE supported by a galvanized steel helix, with minimum R-5 insulation and metalized reinforced outer jacket. Non-insulated flexible ducts shall be the same as insulated less the insulation and other jacket.
3. All flexible duct shall be rated for sound attenuation. Sound attenuation shall be as scheduled below:

INSERTION LOSS dB (6-foot Section, less than 2,500 FPM Air Velocity						
Octave Band	125	250	500	1000	2000	4000
8" Diameter	5	16	17	18	16	11
12" Diameter	8	17	14	18	14	11

4. Flexible Duct Connectors: Clamps: Stainless steel band with cadmium-plated hex screw to tighten band with a worm-gear action.

2.14 MANUFACTURED DUCT CONNECTORS

A. For rectangular duct, Ductmate WDCI J & H or Ductmate 25/35/45 duct connection systems. Connectors shall be installed in strict accordance with the manufacturer's instructions. Connector material shall be the same as the ductwork material. Or Engineer-approved equivalent.

B. For spiral ductwork, Ductmate Spiralmate. Connectors shall be installed in strict accordance with the manufacturer's instructions. Connector material shall be the same as the ductwork material. Or Engineer-approved equivalent.

2.15 LIFE SAFETY DAMPERS

A. Approved Manufacturers (Note: Not all manufacturers listed have products listed in all categories specified.):

1. Greenheck
2. Nailor
3. National Control Air

4. Pottorff
5. Prefco
6. Ruskin

B. Combination Fire and Smoke Dampers:

1. Type: Dynamic; rated and labeled according to UL 555 and UL 555S by a nationally recognized testing laboratory.
2. Rating: UL 555, 555S, Class II, 250°, except 350°F where used in an engineered smoke control system.
3. Rectangular Fire/Smoke Dampers: 16 gauge galvanized steel frame, type 304 stainless steel side seals, combination silicone/galvanized steel edge seals, bronze oilite or stainless steel sleeve bearings, airfoil shaped galvanized steel parallel acting blades, square or horizontal plated steel axles, out of airstream in-jamb linkage with stainless steel pivots, factory sleeve, caulked and attached to damper in accordance with UL fire damper requirements.

    a. Ruskin FSD-60 or approved equivalent.
    b. Ruskin FSD-60V or approved equivalent where axles must be vertical.

4. Round Fire/Smoke Dampers 18" Diameter and Smaller: 20 gauge galvanized steel frame/integral sleeve, 2 layer galvanized steel butterfly blade equivalent to 14 gauge, silicone rubber seal sandwiched between blade layers, stainless steel sleeve bearings pressed into frame, retaining plates in accordance with the UL listing.

    a. Ruskin FSDR-25 or approved equivalent.
    b. Use rectangular damper with smooth square/round transitions for dampers over 18".

5. Provide dampers specifically listed for out of wall installation where field conditions do not allow a perpendicular penetration or where the plane of the damper will not be within the plane of the wall. Ruskin FSD60OW or equivalent.
6. Mounting Orientation: Vertical or horizontal as indicated.
7. Sleeve: Thickness as required by the Listed installation instructions for the connections used.
8. Electric Damper Actuators: Actuator shall fail close upon loss of power unless otherwise required by a smoke management sequence of operation. Microprocessor based motor controller providing:

    a. Electronic cut off at full stroke so that no noise can be generated while holding. Holding noise level shall be inaudible.
    b. Shall be incapable of burning out if stalled before full rotation is reached.
    c. Housing shall be steel and gears shall be permanently lubricated.
    d. The actuators shall be direct coupled and employ a steel toothed clamp for connecting to damper shafts. Aluminum clamps or set-screw attachment are not acceptable.
    e. Actuator shall have UL555S Listing by the damper manufacturer for a temperature equal to the damper. Actuators shall draw no more than .23A at 120V or 24V running, or .1A holding at 120V or 24V (27 VA and 10 VA respectively for 24V power) for 70 in-#of torque. Actuator shall carry a manufacturer’s 5-year warranty
    f. Damper actuators shall be Belimo Aircontrols FSLF (30 in-#) or FSNF (70 in-#).

9. Temperature Release Devices: Electric manual reset type temperature switch set at 165°F. Where required by the Smoke Management Sequence of Operation, provide a remote resettable low temperature switch set at 165°F, plus a manual reset high temperature switch set for the rating of the damper.
10. Damper Position Indication: Each damper shall be equipped with an indication device that shall include (two) position indicator switches linked directly to the damper to remotely indicate damper full-open and full-closed blade positions.

2.16 SOUND BOOTS

A. Plenum ceiling return grille sound boots shall be fabricated from sheet metal with 1-inch liner or fibrous glass duct board. Sound boots shall be a 90-degree elbow with the vertical leg sized to the grille and the horizontal leg cross-section 50% of the grille face area and extending horizontally from the vertical leg the length of the grille long dimension.

B. At contractor's option, provide pre-engineered, acoustically rated, factory fabricated sound and light blocking boot. Provide acoustical data as part of product data submittal.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Duct Installation:

1. Drawing plans, schematics, and diagrams indicate general location and arrangement of duct system. Indicated duct locations, configurations, and arrangements were used to size ducts and calculate friction loss for Air Handling equipment sizing and for other design considerations. Install ductwork systems including field identified offsets and adjustments required to avoid conflict with building construction and other conditions. Install duct systems as indicated unless deviations to layout are approved on Shop Drawings, Coordination Drawings, or Requests for Information.
2. Install ducts according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" unless otherwise indicated.
3. Install duct accessories according to applicable details in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible".
4. Install duct accessories of materials suited to duct materials; use galvanized-steel accessories in galvanized-steel and fibrous-glass ducts, stainless steel accessories in stainless steel ducts, and aluminum accessories in aluminum ducts.
5. Unless otherwise indicated, install ducts vertically and horizontally, and parallel and perpendicular to building lines.
6. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.
7. Install ducts with a clearance of 1 inch, plus allowance for insulation thickness.
8. Route ducts to avoid passing through transformer vaults and electrical equipment rooms and enclosures.
9. Where ducts pass through non-fire-rated interior partitions and exterior walls and are exposed to view, cover the opening between the partition and duct or duct insulation with sheet metal flanges of same metal thickness as the duct. Overlap openings on four sides by at least 1-1/2 inches.
10. Where ducts pass through fire-rated interior partitions and exterior walls in unsprinkled buildings, install fire dampers.
11. All ductwork shall be fabricated and installed so that no undue vibration or noise results. Joints per seal class shall be sealed airtight with additional taping and caulking provided if necessary.
12. Provide all necessary manual, backdraft, and relief dampers as required for proper adjustment and control of air distribution.

    a. Install volume dampers at points on supply, return, and exhaust systems where branches extend from larger ducts. Where dampers are installed in ducts having duct liner, install dampers with hat channels of same depth as liner, and terminate liner with nosing at hat channel.
    b. Install steel volume dampers in steel ducts.
    c. Install aluminum volume dampers in aluminum ducts.

d. Set dampers to fully open position before testing, adjusting, and balancing.
e. Install fire and smoke dampers according to listing and manufacturer's recommendations.
f. Backdraft and relief dampers shall be installed per the manufacturer's recommendations.

13. At all places where inside of duct will be visible through grilles, louvers, etc., paint visible inside portion of duct flat black.
14. Install duct access doors in the most practical location to gain access to the interior of the duct to allow for inspecting, adjusting, and maintaining accessories and equipment. Duct access doors shall be no less than 1/3 of the duct width/height dimension and no smaller than 12" x 12". If ductwork dimension is smaller than 12" provide access door the same size as duct. Duct access doors are required at the following locations:

    a. Upstream of duct coils.
    b. Upstream from duct filters.
    c. At outdoor-air intakes and mixed-air plenums.
    d. At intake and exhaust louvers.
    e. At drain pans and seals.
    f. Upstream from backdraft dampers.
    g. Upstream from equipment.
    h. Upstream of control dampers.
    i. Adjacent to and close enough to fire or smoke dampers, to reset or reinstall fusible links. Paint access doors red. Provide min 12" x 12" door.
    j. Upstream from turning vanes in ducts 3" pressure class and over
    k. Control devices requiring inspection.
    l. Elsewhere as indicated.

15. Install flexible connectors to connect ducts to equipment.
16. Install thrust limits at centerline of thrust, symmetrical on both sides of equipment. Attach thrust limits at centerline of thrust and adjust to a maximum of 1/4-inch movement during start and stop of fans.
17. Transitions in ductwork, in changing shapes and sizes, shall be made with angles not exceeding 15 degrees (diverging) or 30 degrees (converging) wherever possible.
18. Flexible duct shall be used on supply diffuser run outs only, and only where indicated. Flexible ducts shall be installed using lengths not exceeding 5 feet to make the connection. Flexible duct shall be suspended at the manufacturer's recommended intervals, but not exceeding 4 feet, with a minimum 1 ½" wide 26-gauge steel band to support flex. Maximum allowable sag is ½" per foot of spacing between supports.
19. Flexible duct shall be installed such that obstructions do not crush, distort or otherwise intrude on the flexible duct.
20. Contractor shall not provide holes in the duct systems for the installation of hangers for other equipment. Work of all other trades shall be so coordinated as to render this unnecessary.
21. At ends of ducts that are not connected to equipment, ductwork, or air distribution devices at time of ductwork installation, provide a temporary closure of plywood or corrugated cardboard backed polyethylene film or other covering that will prevent entrance of moisture, dust, and debris and duct leakage until time connections are to be completed.
22. Manufactured duct connectors shall be installed in strict accordance with the manufacturer's instructions. Material of duct connector shall match ductwork material.

B. Duct Penetrations through Wall and Floors:

1. Provide 1-inch angle collars for all exposed ducts passing through walls, ceilings, or floors. Anchor collars in position after installation is complete.

2. Where vertical ducts pass through floors, supporting angles shall be rigidly attached to ducts and to the floor. Angles shall be galvanized and of approved sizes to properly support the ductwork. The supporting angles shall be placed on at least two sides of the duct.

3. Where horizontal ducts pass through walls and vertical ducts pass through floors, opening shall be tightly sealed off so as to provide a tight seal between duct and opening. Refer to Division 07 for approved fire stop materials to be used at all rated walls and floors.

3.2 DUCT PROTECTION

A. Protect duct interiors from moisture, construction debris and dust, and other foreign materials. Comply with SMACNA's "IAQ Guidelines for Occupied Buildings Under Construction."

B. Store duct sections on jobsite in clean, dry area, on pallets or otherwise elevated from floor or grade. Duct ends and openings shall be covered and protected from dirt and moisture.

C. Cover and protect duct openings from dirt and moisture during and after erection.

D. Cover return ducts openings with MERV 8 filters whenever air handlers are operated during construction.

E. Clean Duct Protocol: Contractor shall take every precaution to prevent contamination of all/supply duct. Develop procedures similar or more substantial than the following:

1. In the shop: The inside of ductwork shall be wiped down after fabrication with an oil cutting solvent to remove fabrication oils. All ductwork 96” and less in any single dimension shall be assembled in the shop, with plastic film placed over the open ends.
2. In transport: Ductwork shall be shipped in closed trucks or trailers on pallets. End covers shall be maintained at all times.
3. At the site: Minimize ductwork in storage – “just in time” delivery is encouraged. Ductwork shall be stored on pallets in weather-tight enclosures. Ductwork may be stored on pallets in the building if the building is weather-tight, in a dedicated location separated from the rest of the construction area by dust tight partitions. End covers shall be maintained at all times.
4. During installation: Duct sections shall be staged at the installation location only as needed for installation within 4 hours. Any field assembly of ducts over 96” shall be made only in dedicated dust-free areas, or where other construction activities in the vicinity have ceased to produce dust, dirt or debris. End caps shall be maintained on all openings except one being actively joined. Provide weekly, dated photographs of protected stored material, protected installed material, and installed filters. Submit statement and photographs documenting duct protection.

3.3 SEALING OF HVAC DUCTS

A. Seal ducts to the Seal Class described in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible." as follows:

1. Exterior, Supply, Return, or Exhaust Air Ducts, all pressure classes: Seal Class A.
2. Interior, Supply, Return, Outside, or Exhaust Air Ducts 2” w.g. and Lower: Seal Class B.
3. Interior, Supply, Return, Outside, or Exhaust Air Ducts. greater than 2” w.g.: Seal Class A.
4. Other environmental air and comfort conditioning ductwork: Seal Class C.

3.4 HANGER AND SUPPORT INSTALLATION

A. Install hangers and supports for metal ducts and fittings to comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 5, "Hangers and Supports."

B. Attachments and Spacing:

1. Building Attachments: Verify attachment methods with structural drawings. Use concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.
2. Where practical, install concrete inserts before placing concrete.
3. Hanger Spacing: Comply with SMACNA for maximum hanger spacing; install hangers and supports within 24 inches of each elbow and within 48 inches of each branch intersection unless more restrictive by SMACNA.
4. Hangers Exposed to View: Threaded rod and angle or channel supports.
5. Support vertical ducts with steel angles or channel secured to the sides of the duct with welds, bolts, sheet metal screws, or blind rivets; support at each floor and at a maximum intervals of 16 feet.
6. Install upper attachments to structures. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

3.5 CONNECTIONS

A. Provide flexible and fabric connections at inlet and discharge duct connections to in-line fans, fan coil units and air handling equipment, except when fans are internally isolated. Flexible connections shall be securely fastened to the duct and equipment per SMACNA's "HVAC Duct Construction Standards - Metal and Flexible." Allow at least 1 inch of slack.

B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.

3.6 PAINTING

A. Paint interior of metal ducts that are visible through registers and grilles and that do not have duct liner. Apply one coat of flat, black, latex paint over a compatible galvanized-steel primer.

B. Paint access doors to life safety dampers red.

C. Paint materials and application requirements are specified in Division 09 painting sections.

3.7 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections:

1. Operate dampers to verify full range of movement.
2. Inspect locations of access doors and verify that purpose of access door can be performed.
3. Inspect turning vanes for proper and secure installation.
4. Operate remote damper operators to verify full range of movement of operator and damper.

C. Leakage Tests

1. Comply with SMACNA's "HVAC Air Duct Leakage Test Manual." Submit a test report for each test.
2. Exterior Supply, Return, or Exhaust Air Ducts for any Pressure Class: Test 100% of total installed duct area to achieve a Leakage Class = CL3 with a test pressure equal to the pressure class of the duct.
3. Test for leaks before applying external insulation.
4. Give 7 days' advance notice for testing.

3.10 DUCT CLEANING

A. Clean ductwork internally, unit by unit as it is installed, of dust and debris. Clean external surfaces of foreign substances. Where ductwork is to be painted clean and prepare surface for painting.

B. Ductwork contaminated or damaged above "shop" or "mill" conditions shall be cleaned, repaired or replaced to the Engineer's satisfaction.

1. Duct liner pre-installed in stored duct which has become wet may be installed if first allowed to completely dry out.
2. Duct liner in installed ductwork which has become wet must be completely removed and replaced.
3. Torn duct liner may be repaired by coating with adhesive if damage is minor and isolated. Extensively damaged liner shall be replaced back to a straight cut joint.

C. Strip protective paper from stainless ductwork surfaces, and repair finish wherever it has been damaged.

3.11 INSPECTION

A. After completion of the ductwork installation, and after the Test and Balancing work, a minimum of 10% of the installed length of the supply duct system shall be inspected by an independent company specializing in such work. Inspection shall be performed using fiber optic video equipment and other appropriate techniques.

3.12 DUCT SCHEDULE

A. Fabricate ducts with galvanized sheet steel except as otherwise indicated and as follows:

B. Supply Ducts:

1. Ducts connected to fan coil units, furnaces, heat pumps, and terminal units: Pressure Class: Positive 1” w.g.
2. Ducts connected to single zone air handling and rooftop units: Pressure Class: Positive 2” w.g.
3. Ducts between variable-air-volume air handling units and air terminals in mechanical rooms, between ahu and a fire rated shaft, and within a fire rated shaft: Pressure Class: Positive 4” w.g.
4. Ducts between variable-air-volume air handling units and air terminals, downstream of or with no fire rated shafts: Pressure Class: Positive 3” w.g.
5. Ducts connected to equipment not listed above: Pressure Class: Positive 2” w.g.

C. Return and Outdoor Air Ducts:

1. Ducts connected to fan coil units, furnaces, heat pumps, and terminal units: Pressure Class: Negative 1" w.g.
2. Ducts connected to air handling units and rooftop units: Pressure Class: Negative 2" w.g.
3. Ducts downstream of a return or relief fan: Pressure Class: Positive 2" w.g.
4. Ducts connected to equipment not listed above: Pressure Class: negative 2" w.g.

D. Intermediate Reinforcement:

1. Galvanized-Steel Ducts: Galvanized steel
2. PVC-Coated Ducts: Match duct material
3. Stainless steel Ducts: Match duct material
4. Aluminum Ducts: Aluminum
5. Internal reinforcement is prohibited in duct with design velocity over 2250 fpm, or on any grease exhaust duct, or any material handling duct.

E. Elbow Configuration:

1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-2, "Rectangular Elbows." Use radius elbows unless specifically shown otherwise. Offsets shall be radius ogee fittings unless shown otherwise, mitered offsets shall not exceed 30 deg, and shall be without vanes.

    a. Radius Type RE 1 with minimum 1.5 radius-to-width ratio.
    b. Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," with 1-1/2-inch spaced and 2-inch radius, small single width vanes and Figure 2-4, "Vane Support in Elbows."

2. Round Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-4, "Round Duct Elbows."

    a. Minimum radius-to-diameter ratio shall be 1.5 and elbow segments shall be 5: Elbows with less than 90-degree change of direction have proportionately fewer segments.
    b. Radius-to Diameter Ratio: 1.5.
    c. Round Elbows, 12 inches and Smaller in Diameter: Stamped or pleated.
    d. Round Elbows, 14 inches and Larger in Diameter: Standing seam or Welded.

F. Branch Configuration:

1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-6, "Branch Connections."

    a. Rectangular Main to Rectangular Branch: 45-degree entry, or pyramidal where flow is from/to more than one direction.
    b. Rectangular Main to Round Branch: Conical spin-in.
    c. Branch to Run Out: Conical spin-in with damper.

        1) No dampers on air terminal inlet duct.

2. Round: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "Conical Tees." Saddle taps are permitted in existing duct.

    a. Velocity to 1500 fpm: Conical tap.
    b. Velocity 1500 fpm or Higher: 45-degree lateral.

3.13 LIFE SAFETY DAMPERS

A. Install all fire, smoke, and combination fire/smoke dampers in strict accordance with UL listing, IMC, and manufacturer's requirements. Sleeves and methods of support shall be as detailed in manufacturer's UL instructions, in NFPA documents, or per local codes if more stringent. Apply firestopping material only if specified in manufacturer's installation instructions.

B. Provide access doors (labeled per the applicable codes and painted red) located to provide access to all fire, smoke, and combination fire/smoke dampers, except fire dampers located behind removable grilles and diffusers will not require duct access doors unless access through removable device is not practical.

END OF SECTION 23 31 00

SECTION 23 36 00

AIR TERMINAL UNITS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes: This section covers the general requirements for air terminal units including variable air units.

1.3 SUBMITTALS

A. Product Data: Submit manufacturer's technical and performance data for all air terminal units:

1. Submittal data for each air terminal unit shall include:

a. Primary air inlet size
b. Primary air design cfm as scheduled
c. Primary air maximum airflow without exceeding specified sound levels
d. Primary air minimum cfm as scheduled
e. Primary air minimum controllable airflow

B. Wiring Diagrams: Submit wiring and control diagrams for air terminal units.

1.4 QUALITY ASSURANCE

A. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1-2007, Section 5 - "Systems and Equipment" and Section 7 - "Construction and System Start-Up."

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Approved Manufacturers: ETI, Nailor, Price, and Titus.

2.2 VARIABLE AIR VOLUME

A. Casing: 0.034-inch steel sheet metal.

1. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1-2007.
2. Lining: 1-inch-thick, coated, fibrous-glass or cotton duct liner complying with ASTM C 1071; secured with adhesive.

B. Volume Damper: Galvanized steel with peripheral gasket and self-lubricating bearings.

1. Maximum Damper Leakage: ARI 880 rated, 2 percent of nominal airflow at 3-inch wg inlet static pressure.

C. Hot-Water Heating Coil: Copper tube, mechanically expanded into aluminum-plate fins; leak tested underwater to 200 psig; and factory installed.

D. All terminal units shall be pressure independent type. Terminal unit capacities and configuration shall be as scheduled on the drawings. Units shall have factory catalog performance ratings that match or exceed those indicated on the drawing schedules.

E. Terminal units shall have flow taps with calibration chart on unit for airflow measuring and balancing.

F. Provide quick-opening gasketed-type access door(s) as required to permit access to all internally mounted devices which may require adjustment, lubrication, and/or replacement, such as volume controllers, damper actuators, fans and motors, etc.

G. Air terminals shall be selected so required dB sound levels are not exceeded at 1.5-inch w.g. inlet pressure. Both unit casing radiated sound levels and discharge sound levels shall be considered in terminal unit selection.

H. Variable Air Volume Terminal Units:

1. Configuration: Volume-damper assembly inside unit casing with control components located inside a protective metal shroud.
2. Maximum wide-open static pressure requirement for box shall be 0.35-inch w.g.
3. Maximum flow (and minimum flow rates on VAV units) shall be field-adjustable.
4. Shall have cross type averaging flow element in primary air inlet for air volume control.
5. Provide access doors upstream and downstream of all reheat coils.

2.3 TEMPERATURE CONTROLS

A. The building DDC system Contractor to furnish DDC controls including all actuators and controllers. When requested by the DDC system contractor, terminal unit controls shall be factory mounted and wired at his expense.

B. Refer to the Section 23 09 93 for Sequence of Operation descriptions.

2.4 SOURCE QUALITY CONTROL

A. Terminal units shall be tested and rated in accordance with ARI 880 "Industry Standard for Air Terminals" and shall bear the ARI certification seal.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Support terminal units from structure using threaded rod and brackets. Install terminal unit to allow complete access to controls. Mount fan powered boxes with Specification “D” isolators in Division 23 Section “Common Work Results for HVAC.”

B. Inlet branch duct(s) shall be rigid medium-pressure duct with a minimum of 3 feet of straight duct ahead of unit inlet(s).
   1. Arrange medium-pressure ducts and takeoffs so there are no more than two elbows or bends up to 90-degrees in branch duct to inlet(s); "U" bends will not be allowed.

C. Water Coil Piping Connections: Provide shut-off valves, P & Ts, flow measurement and balancing valve, drain and air vent, and as further detailed on drawings.

D. Provide a minimum of 5 feet of lined low-pressure ductwork prior to first spin-in fitting or supply air outlet branch duct takeoff.

E. Coordinate terminal unit installation with the building DDC system contractor.

END OF SECTION 23 32 00

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SECTION 23 37 00

AIR OUTLETS AND INLETS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes: This section covers the general requirements for grilles, registers, and diffusers, louvers and intake and relief hoods.

1.3 DEFINITIONS

A. Diffuser: Circular, square, or rectangular air distribution outlet, generally located in the ceiling and comprised of deflecting members discharging supply air in various directions and planes and arranged to promote mixing of primary air with secondary room air.

B. Grille: A louvered or perforated covering for an opening in an air passage, which can be located in a sidewall, ceiling, or floor.

C. Register: A combination grille and damper assembly over an air opening.

1.4 SUBMITTALS

A. Product Data:

1. For each model indicated, include the following:

a. Data Sheet: For each type of air outlet and inlet, and accessory furnished; indicate construction, finish, and mounting details.
b. Performance Data: Include throw and drop, static-pressure drop, and noise ratings for each type of air outlet and inlet.
c. Schedule of diffusers, registers, and grilles indicating drawing designation, room location, quantity, model number, size, and accessories furnished.
d. Assembly Drawing: For each type of air outlet and inlet; indicate materials and methods of assembly of components.

2. Provide sufficient submittal data for air distribution devices to verify that required space sound levels will not be exceeded.

1.5 SYSTEM DESCRIPTION

A. Performance Criteria: All equipment and material furnished under this section shall be selected so required RC sound levels in various spaces are not exceeded. Attenuation by ceilings, duct liner, and room absorption may be taken into account when making fan, terminal unit, and air distribution selections. Refer to the latest edition of the ASHRAE Applications Handbook for further information

PART 2 – PRODUCTS

2.1 GRILLES, REGISTERS, AND DIFFUSERS

A. Approved Manufacturers: Metalaire, Nailor, Price, and Titus.

B. Air outlets and inlets shall be performance tested and rated in accordance with ADC Test Code 1062 and ASHRAE Standard 70.

C. Provide grilles, registers, diffusers, slots, and accessories of size and type as indicated and/or scheduled on the drawings. Select devices so required space RC sound levels are not exceeded.

D. All grilles, registers, and diffusers shall have white baked-on enamel finish.

E. Provide ceiling grilles, registers, and diffusers with border styles that are compatible with adjacent ceiling systems, and that are specifically manufactured to fit into ceiling module with accurate fit and adequate support. (Refer to general construction drawings and specifications for types of ceiling systems which will contain each type of ceiling diffuser.)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas where diffusers, registers, and grilles are to be installed for compliance with requirements for installation tolerances and other conditions affecting performance of equipment. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Grilles, Registers, and Diffusers:

1. Grilles, registers, and diffusers shall be installed level and plumb and supported per manufacturer's recommendations and per the International Building Code.

a. Ceiling-mounted air devices (supply diffusers and/or return and exhaust grilles and registers) or services weighing less than 20 pounds shall be positively attached to the ceiling suspension main runners or to cross runners with the same carrying capacity as the main runners.

b. Devices or services weighing 20 pounds, but not more than 56 pounds, in addition to the above, shall have two 12-gauge hangers connected from the device or service to the ceiling system hangers or to the structure above. These wires may be slack.
c. Air devices or services weighing more than 56 pounds shall be supported directly from the structure above by approved hangers.

2. Ductwork visible behind grilles, registers, and diffusers shall be painted flat black.
3. Install diffusers, registers, and grilles with airtight connection to ducts and to allow service and maintenance of dampers, air extractors, and fire dampers.
4. Refer to architectural reflected ceiling plan for locations of grilles, registers and diffusers.

3.3 ADJUSTING

A. Grilles, Registers, and Diffusers: Throw patterns (directions) shall be furnished and/or adjusted to match those shown and/or scheduled on the drawings.

END OF SECTION 23 37 00

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SECTION 26 05 00

COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DEFINITIONS

A. Refer to Article 100 of the currently adopted National Electrical Code for definitions as applicable to this project.

B. Other definitions:

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

1.3 SUBMITTALS

A. Submittals shall be made in accordance with General Conditions of Contract and the requirements of Section 0l 33 00.

B. Shop drawings shall include equipment catalog cuts or manufacturer's printed data identifying: dimensions, weights, recess openings, equipment arrangements, electrical characteristics with bus size, electrical rating, material, wiring diagrams indicating circuit arrangement and NEMA rating for, but not limited to the following:

1. Network Lighting Controls
2. Contactors
3. Wiring Devices
4. Interior and Exterior Lighting
5. Hangers and Supports for Electrical

6. Grounding and Bonding
7. Multi-Outlet Assemblies
8. Electrical Systems

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.

1. ANSI/NFPA 70 - National Electrical Code
2. ANSI/IEEE C2 - National Electrical Safety Code
3. NECA - Standard of Installation
4. NFPA – National Fire Protection Association
5. IEEE – The Institute of Electrical and Electronics Engineers
6. NEMA – National Electrical Manufacturer Association
7. The University/Anschutz Medical Campus Project Guidelines and Standards
8. International Building Code in accordance with the Campus Building Official
9. ASTM - American Society of Testing Materials
10. IPCEA - Insulated Power Cable Engineers Associate
11. Underwriter's Laboratories (UL)
12. American National Standards Institute (ANSI)
13. 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: Maintain a separate set of contract electrical drawings at the site in accordance with Section 0l 74 00 to show the following:

1. Major raceway systems, size and location, for both exterior and interior; locations of control devices; distribution and branch electrical circuitry; and fuse and circuit breaker size and arrangements.
2. All branch circuits, feeders, communications conduits embedded in concrete, dimensioned from prominent building lines.
3. Equipment locations (exposed and concealed) dimensioned from prominent building lines.
4. Approved substitutions, Contract Modifications, and actual equipment and materials installed.

D. Operations and Maintenance Data: O&M Data shall be provided in accordance with Section 0l 78 23, including the following information:

1. Description of function, normal operating characteristics and limitations, fuse curves, engineering data and tests, and complete nomenclature and commercial numbers of all replaceable parts.

2. 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.
3. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions.
4. Servicing instructions and lubrication charts and schedules.
5. Complete list of parts and wiring diagrams.
6. Names, addresses and telephone numbers of the Contractor, Sub-contractors and local company responsible for maintenance of each system or piece of equipment.
7. 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.
8. 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 0l l0 00.

1.6 WARRANTY

A. All electrical equipment, materials and workmanship warranties shall be provided in accordance with the requirements of Section 0l 78 36 and the following:

1. Contractor warranties 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, l00% intumescent, have code approval under BOCA, ICBO, SSBC, NFPA l0l, 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 8l4 or UL l479. Rating periods shall conform to the following:

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Construct Work in sequence under provisions of Division 01 where applicable.

B. Electrical Contractor shall coordinate Divisions 26 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 Architect and Structural engineer before proceeding with drilling.

J. Sleeve Seals: Provide sleeve seals for penetrations located in foundation walls below grade, or in exterior walls, of one of the following:

1. Caulk between sleeve and raceway with approved Caulk material.
2. Mechanical Sleeve Seals: Modular mechanical type, as manufactured by Thunder line Corp., consisting of interlocking synthetic rubber links shaped to continuously fill annular space between raceway and sleeve, connected with bolts and pressure plates which cause rubber sealing elements to expand when tightened, providing watertight seal.

K. Install equipment and materials to provide required Code clearances and access for servicing and maintenance. Coordinate the final location with piping, ducts, and equipment of other trades to insure

proper access for all trades. Coordinate locations of concealed equipment, disconnects, and boxes with access panels and doors. Allow ample space for removal of parts, fuses, lamps, etc., that require replacement or servicing according to the National Electric code and the AHJ.

L. Extend all conduits so that junction and pull boxes are in accessible locations.

M. Install access panel or doors where equipment or boxes are concealed behind finished surfaces in areas such as restrooms. These access doors shall be a minimum of twenty by twenty inches or as required to accommodate full pull box or equipment access.

N. Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be connected.

O. Electrical system layouts indicated on drawings are generally diagrammatic but shall be followed as closely as actual construction and work of other trades will permit. Govern exact routing of raceways and locations of outlets by structure and equipment served. Take all dimensions from engineering drawings.

P. Consult all other drawings. Verify all scales and report any dimensional discrepancies or other conflicts to Engineer before submitting bid.

Q. All home runs to panel boards are indicated as starting from outlet nearest panel and continuing in general direction of that panel. Continue such circuits to panel as though routes were completely indicated.

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

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

T. Provide GFCI type receptacles for all "above counter" receptacles located within 6' of any sink or basin.

U. Clean all luminaries, lamps and lenses prior to final acceptance. Replace all inoperative lamps.

V. Provide all power feeds and final connections to motors and other electric equipment furnished under Divisions 21, 22, and 23.

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

3.2 TESTING, CLEANING AND CERTIFICATION

A. 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.
2. For a 1-day period after the remodeled area has been placed into normal service, record the full load current in each phase or each line at the panel bus and submit to the Engineer.

B. Test Reports:

1. Test Reports: Submit three (3) copies of test results.
2. The final University inspection of the project will not be made until a satisfactory report is received and approved by the University Project Manager.
3. Results shall include insulation resistance readings for all motors and motor feeders 5 hp or greater.

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

3.3 COMMISSIONING (DEMONSTRATION)

A. Acceptance Demonstration: Upon completion of the work, at a time to be designated, the Contractor shall demonstrate for the University the operation of the entire installation, including all systems provided under this contract.

B. The Contractor shall furnish the services of a qualified representative of the supplier of each item or system who shall instruct specific personnel, as designated by the University, in the operation and maintenance of that item or system.

1. Instruction shall be given when the particular system is complete, and shall be of the number of hours indicated. A representative of the Contractor shall be present for all demonstrations.

END OF SECTION 26 05 00

SECTION 26 05 19

LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUBMITTALS

A. Product data shall be submitted for in accordance with the requirements of Section 26 05 00 each of the following:

1. Wires
2. Cables
3. Connectors

1.3 QUALITY ASSURANCE

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

B. Installer Qualifications and Certifications: Firms with at least 3 years of successful installation experience with projects utilizing electrical wiring cabling work similar to that required for this project.

C. Regulatory Requirements: Conform to applicable code relations regarding toxicity of combustion products of insulating materials

D. Manufacturers: Firms regularly engaged in manufacture of electrical wire and cable products of types, sizes, and ratings required, whose products have been in satisfactory use in similar service for not less than 5 years.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Wire and cable shall be delivered, stored and handled in accordance with Section 26 05 00.

B. Deliver wire and cable properly packaged in factory-fabricated type containers, or wound on NEMA- specified type wire and cable reels.

C. Store wire and cable in clean dry space in original containers. Protect products from weather, damaging fumes, construction debris and traffic.

D. Handle wire and cable carefully to avoid abrading, puncturing and tearing wire and cable insulation and sheathing. Ensure that dielectric resistance integrity of wires/cables is maintained.

1.5 WARRANTY

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

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Wire and cable:

a. Triangle - PWC
b. American Wire and Cable Co.
c. Anaconda-Ericsson Inc; Wire and Cable Div.
d. Belden Div; Cooper Industries
e. General Cable Corporation
f. General Electric
g. Okonite

2. Connectors:

a. O-Z/Gedney Co.
b. AMP, Inc.
c. Burndy Corporation
d. Ideal Industries, Inc.
e. 3M Company
f. Thomas and Betts Corp.

2.2 MATERIALS, GENERAL

A. Wires and Cables:

1. Provide new wire and cable suitable for the temperature, conditions, and location where installed. All cable shall be new and shall conform to or exceed IPCEA requirements. Building wire shall be insulated with THHN/THWN/THW or XHHW insulation, rated 600 volt.
2. Conductors: Provide solid conductors for power and lighting circuits l2 AWG and smaller. Provide stranded conductors for l0 AWG THHN/THWN and larger. In sizes 250 MCM and larger use type THW or THWN. In sizes #l AWG and smaller all conductors shall have heat/moisture resistant thermoplastic insulation type THW or THWN (75 degree C), except as follows:

a. Where conduit temperature will exceed l00 degree F, use type THHN (90 degree C). Type XHHW (90 degree C) permissible in dry locations.
b. In l20-volt incandescent fixtures, type AF (l50 degree C).
c. In wire ways of fluorescent lighting fixtures types THW-MTW, THHN (90 degree C).

3. Conductor Material: Provide copper for all wires and cables.
4. Metal Clad cable is acceptable.

5. Use colors of wires as specified in paragraph 3.5 of this section.
6. For general applications, other than special use, use THHN insulated wire.
7. Type NM, NMC, NMS cable are not acceptable for any application.
8. Use copper wire only.
9. No wire splices shall be allowed in the conduit or conduit fittings. All splices shall be done in an approved box.
10. Grounding conductors shall be copper type THHN with green integrally-colored insulation, sized to meet NEC.
11. Plenum rated cable when required by Plenum conditions.

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

C. Wiring to Light Fixtures:

1. Type THHN to fluorescent light fixtures, l2-gauge minimum.
2. Type THHN to incandescent fixtures, l2-gauge minimum.

D. Wire Connectors:

1. For wires size #8 AWG and smaller, insulated pressure type (with live spring) rated l05 degree C, 600 volt, for building wiring and l000 volt in signs or fixtures. 3M or Ideal.
2. For wires size #6 AWG and larger, T & B or equivalent compression type with 3M #33 or #88 tape insulation.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 INSTALLATION, GENERAL

A. Install electrical cables, wires and connectors in compliance with applicable requirements of NEC, NEMA, UL, and NECA's "Standard of Installation", and in accordance with recognized industry practices.

B. Coordinate wire/cable installation work, including electrical raceway and equipment connection work, with other work. Pull no wire into any portion of conduit system until all construction work, which might damage the wire, has been completed.

C. BAS Conductor installation: (see Section 23 09 l3)

D. Wires and Cables:

1. On systems greater than 600V thoroughly swab raceway before installing wire. Pull conductors simultaneously where more than one is being installed in same raceway. Use pulling

compound or lubricant on all cable installations. compound used shall not deteriorate conductor or insulation.

2. Use pulling means including, fish tape, cable, rope and basket weave wire/cable grips which will not damage cables or raceway. Do not use rope hitches for pulling l attachment to wire or cable. Do not exceed manufacturer's tension requirements.
3. Keep conductor splices to minimum. Install all wire continuous from outlet to outlet or terminal to terminal. Splices in cables when required shall be made in hand holes, pull boxes, or junction boxes and shall be in strict accordance with cable manufacturer's recommendations utilizing solder less connectors NEMA/UL approved for the use. Splice only in accessible junction boxes. Use splices and tap connectors which are compatible with conductor material.
4. Install splices and tapes, which possess equivalent or better mechanical strength and insulation ratings than conductors being spliced.
5. Tighten electrical connectors and terminals, including screws and bolts, in accordance with manufacturer's published torque tightening values. Where manufacturer's torque requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL Standard 486 for copper.
6. Support cables above accessible ceilings, do not rest on ceiling tiles. Use spring clips and hanger rods, bridle rings or 'J' hooks, independent from the ceiling suspension system to support cables from structure.
7. Provide adequate length of conductors within electrical enclosures and form the conductors to terminal points with no excess. Bundle multiple conductors, with conductors larger than l0 AWG cables to individual circuits. Make terminations so there is no bare conductor at the terminal.
8. Make up splices in outlet boxes with 8-inch minimum of correctly color-coded tails left in box. Splices in wires size #8 AWG and smaller shall be made with insulated spring type wire connectors, "Scotchlok" or equivalent. Splices in larger wire and cables shall be made with indent connectors NEMA/UL approved for the purpose.
9. Use split bolt connectors for copper wire splices and taps, 6 AWG through l AWG. Tape un-insulated conductors and connectors with electrical tape to l50% of the insulation value of conductor. Rubber, friction and 3M-33 or 88 or better. Two (2) layers minimum each.
10. Use copper compression connectors for copper wire splices and taps, l/O AWG and larger. Tape un-insulated conductors and connectors with electrical tape to l50% of the insulation value of the conductor. Rubber, friction and 3M-33 or 88.
11. Make splices, taps and terminations to carry full ampacity of conductors without perceptible temperature rise.
12. Thoroughly tape the ends of spare conductors in boxes and cabinets.
13. Install exposed cable, parallel and perpendicular to surfaces, or exposed structural member, and follow surface contours, where possible.
14. Make all ground, neutral and line connections to receptacle and wiring device terminals as recommended by manufacturer. Provide ground jumper from outlet box to individual ground terminal of devices.
15. Parallel conductors shall be cut to the same length and be the same type of wire.
16. All splices in control panels, terminal junction boxes, low voltage control circuits and fire alarm conductors shall be on numbered terminal strip.
17. When routed in a wall, install all thermostat wire, fire alarm, computer cable, low voltage cable, and other communication cable in conduit.
18. All junction boxes shall be fully accessible.
19. All wiring shall be routed through an acceptable raceway regardless of voltage application, unless specified otherwise under other sections of these standards.

3.3 TESTING, CLEANING AND CERTIFICATION

1. Refer to Section 26 05 00 for testing, cleaning, and certification requirements.

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

3.4 COMMISSIONING (DEMONSTRATION)

3.5 SCHEDULES

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

l20/208 Volts	Phase	277/480 Volts
Black	A	Brown
Red	B	Orange
Blue	C	Yellow
White	Neutral	Gray
Green	Ground	Green

B. Conductors shall be solid color for entire length.

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

END OF SECTION 26 05 19

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SECTION 26 05 29

HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DESIGN REQUIREMENTS

A. Provide equipment supports rated for the supported loads.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Conduit Hangers: Galvanized steel with special accessories for purpose and adequate to support load imposed.

B. Coatings: Supports, support hardware, and fasteners shall be protected with zinc coating or with treatment of equivalent corrosion resistance-using NEMA/UL approved alternative treatment, finish, or inherent material characteristic. Products for use outdoors shall be hot-dip galvanized.

C. Raceway Supports: Clevis hangers, riser clamps, conduit straps, threaded C-clamps with retainers, ceiling trapeze hangers, and wall brackets.

D. Fasteners: Types, materials, and construction features as follows:

1. Expansion Anchors: Carbon steel wedge or sleeve type.
2. Toggle Bolts: All steel springhead type.

E. Conduit Sealing Bushings: Factory-fabricated watertight conduit sealing bushing assemblies suitable for sealing around conduit, or tubing passing through concrete floors and walls. Construct seals with steel sleeve, malleable iron body, neoprene sealing grommets or rings, metal pressure rings, pressure clamps, and cap screws.

F. Cable Supports for Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug for no armored electrical cables in riser conduits. Provide plugs with number and size of conductor gripping holes as required to suit individual risers. Construct body of malleable-iron casting with hot-dip galvanized finish.

G. U-Channel Systems: l6-gauge steel channels, with 9/l6-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.

H. 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-l/8 inch between center of screw holes.

I. Fabricated Supporting Devices:

1. General: Shop- or field-fabricated supports or manufactured supports assembled from U-channel components.
2. Steel Brackets: Fabricated of angles, channels, and other standard structural shapes. Connect with welds and machine bolts to form rigid supports.
3. Pipe Sleeves: Provide pipe sleeves of one of the following:
   a. Sheet Metal: Fabricate from galvanized sheet metal; round tube closed with snap lock joint, welded spiral seams, or welded longitudinal joint.
   b. Fabricate sleeves from the following gauge metal for sleeve diameter noted:
      1) 3-inch and Smaller: 20 gauge
      2) 4-inch to 6-inch: l6 gauge
      3) Over 6-inch: l5 gauge
   c. Steel Pipe: Fabricate from Schedule 40 galvanized steel pipe.
   d. EMT, IMC, or Rigid Conduit.

J. J-Hooks and Bridle Rings: J-hooks and bridle rings may be used to support low voltage wiring systems.

K. The following are prohibited:

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

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

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

B. Supports and Hangers:

1. Support and align all raceways, cabinets, boxes, fixtures, etc., in an accepted manner and as herein specified. Support raceways on accepted types of wall brackets, specialty steel clips or hangers, ceiling trapeze hangers or malleable iron straps. Provide lead expansion shields in concrete, machine screws, bolts or welding on metal surfaces, and wood screws on wood construction. Use of powder-driven studs is prohibited without express permission from the University Project Manager.

a. Mount all conduits to structure a minimum of 7 inches above any accessible type ceiling, or with spacing as required to permit relocation of recessed fixtures to any location.

2. Structural and post tensioned concrete members shall not be drilled or pierced without prior approval from the University Project Manager.
3. Where outlets are installed in steel stud type systems, provide additional cross bracing, bridging and/or straps as required to make outlet completely rigid prior to application of wall facing material.
4. Design hangers and wall brackets so that maximum deflection will be no greater than l/8 inch.
5. Install supporting devices to fasten electrical components securely and permanently in accordance with NEC requirements.
6. Coordinate with the building structural system and with other electrical installation.

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

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

D. Miscellaneous Supports: Support miscellaneous electrical components separately and as required to produce the same structural safety factors as specified for raceway supports. Install metal channel racks for mounting cabinets, panel boards, disconnects, control enclosures, pull boxes, junction boxes, transformers, and other devices.

E. 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.

F. 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.

G. 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 l-l/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.

H. Telecommunications Systems Cable Supports: Use cable tray or telecommunications approved cable supports.

END OF SECTION 26 05 29

SECTION 26 05 33

RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - PRODUCTS

1.1 RELATED DOCUMENTS

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

1.2 MANUFACTURERS

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

1. Conduit:

a. Allied
b. Republic
c. Carlon

2. Fittings and Bodies:

a. O/Z Gedney
b. Regal was purchased by Bridgeport
c. Bridgeport
d. Raco
e. Appleton

3. Conduit Seals: Chase-Foam CTC PR-855, or approved equal.
4. Wire ways: Hinged cover or screw cover complete with all necessary fittings which shall be of one manufacturer.

1.3 MATERIALS, GENERAL

A. Metal Conduit and Tubing:

1. Galvanized Steel Rigid Conduit (GRC):

a. Conduit: Provide rigid steel conduit, hot-dipped galvanized with threaded ends
b. Fittings: Threaded galvanized steel, bushings shall have nylon-insulated throat.

2. Electrical Metallic Tubing (EMT):

a. Conduit: Galvanized steel tubing, galvanized on the outside and coated on the inside with a hard smooth lacquer finish.

b. Fittings: Steel compression fittings for rain-tight and concrete- tight applications. Steel set-screw for interior connections. Set-screw quick fit type for 2- l/2 inch and larger may be used. Bushings shall be threaded and have nylon insulated throat or nylon bushing.

3. Intermediate metal conduit (IMC): Conduit: Provide intermediate steel conduit hot-dipped galvanized Fittings: Threaded galvanized steel, bushings shall have nylon-insulated throat.
4. Rigid Aluminum Conduit: Not allowed unless otherwise noted.
5. 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 l/2 inch.

6. 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.

7. Non-metallic Rigid Conduit: PVC plastic schedule 40.

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.
3. Telephone EL's are not acceptable.

1.4 MATERIALS, GENERAL

A. Sheet Steel: Flat rolled, code-gage, galvanized steel.

B. Fasteners for General Use: Corrosion resistant screws and hardware including cadmium and zinc plated items.

C. Fasteners for damp or wet locations: Stainless steel screws and hardware.

D. Exterior Finish: Gray baked enamel for items exposed in finished locations except as otherwise indicated.

E. Metal outlet, device, and small wiring boxes:

1. General: Boxes shall be of type, shape, size, and depth to suit each location and application.
2. Steel Boxes: Boxes shall be sheet steel with stamped knockouts, threaded screw holes and accessories suitable for each location including mounting brackets and straps, cable clamps, exterior rings and fixture studs.

F. Outlet Boxes, Pull and Junction Boxes (J-Boxes):

1. General: Boxes shall have screwed or bolted-on covers of material same as box and shall be of size and shape to suit application.
2. Steel Boxes: Sheet steel with welded seams. Where necessary to provide a rigid assembly, construct with internal structural steel bracing.
3. Hot dipped galvanized steel boxes: Sheet steel with welded seams. Where necessary to provide a rigid assembly, construct with internal structural steel bracing. Hot-dip galvanized after fabrication. Cover shall be gasketed.
4. Outlet Boxes: Hot-dipped galvanized of required size, 4 inch square, 2" depth minimum or octagonal and of depth required for flush mounted devices and lighting fixtures. Cast-type with gasketed covers for surface-mounted devices. All outlets for exterior application shall be cast, weatherproof type with gasket and cast cover plate.
5. Junction and Pull Boxes: Use outlet boxes as J-boxes wherever possible. Larger J-boxes pull boxes shall be accessible and shall be fabricated from sheet steel, sized according to code.

G. Non-metallic boxes are not permitted.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Conduit Sizes:

1. The conduit shall be sized in accordance with NEC.

a. For power and lighting circuits, the minimum conduit size shall be 3/4"
b. Flexible and Liquid-tight Flexible Conduit: l/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 l0 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 l0 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.
4. Non-metallic Rigid Conduit:

a. In concrete and underground.
b. Not permitted for interior use.

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.
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 l/2 inch to l inch. l-l/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 pull wires in empty raceways. Use #l4 AWG zinc-coated steel or monofilament plastic line having not less than 200-pound tensile strength. Leave not less than l2 inches of slack at each end
14. 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.

15. 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.
16. Conduit Seals: Conduit passing through concrete walls shall be sealed.
17. 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.
18. Ream the ends of all cut and/or threaded conduit. Ends shall be cut square.
19. Use of running threads for rigid metallic conduit are not permitted. When threaded couplings cannot be used, provide 3-piece union or solid coupling.
20 Conduits shall not cross pipe shafts or ventilation duct openings "access panel".
21. 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.
22. Install an insulated ground conductor in all conduits.
23. 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.
24. Where conduit sleeves penetrate fire rated floors or walls for installation of system cables, AC or MC cables, or modular wiring cables, pack void around cables or empty sleeve with fire rated insulation and fill ends with fire-resistive compound. Seal opening around sleeve with UL Listed foam silicone elastomer compound.
25. 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 & communications, EQ alarm, security, fire alarm.
    e. Audio/Visual

27. Provide for waterproofing of all raceways, fittings, etc., which penetrate the roof to preserve the weatherproof integrity of the building. Installation of materials shall conform to the following:

    a. General:

        1) Install all raceways concealed except at surface cabinets, for motor and equipment connections and in mechanical equipment rooms. Install a minimum of 6 inch from flues, steam pipes or other heated pockets for water-flashing and counter-flashing or pitch pockets for waterproofing of all raceways, outlets, fittings, etc., which penetrate roof. Route exposed raceways parallel or perpendicular to building lines with right angle turns and symmetrical bends. Concealed raceways shall be run in a direct line, and where possible, with long sweep bends and offsets.
        2) Provide raceway expansion joints with necessary bonding conductor at building expansion joints and where required to compensate for raceway or building thermal expansion and contraction. Terminate raceways l-l/4 inch and larger with insulated bushing or rain tight connections with insulated throats.

28. 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.
29. If type MC or AC cable is used for branch circuits, the home run conduit will be EMT and must run from the panel to within l0 feet horizontally of the first device served.
30. All underground raceways, not under the building footprint, shall be installed so it slopes away from the building.

D. Raceway Installation:

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

3.2 INSTALLATION, GENERAL

A. Boxes:

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

B. Outlet Boxes:

1. Exact location of outlets and equipment shall be governed by structural conditions and obstructions or other equipment items. When necessary, relocate outlets so that when fixtures or equipment are installed, they will be symmetrically located according to room layout and will not interfere with other work or equipment. Verify final location of all outlets, panels, equipment, etc., with the University Project Manager.
2. Switch Outlet and Panel board height dimensions to meet ADA requirements.
3. Above counters, benches, special equipment, baseboards, fin tube radiators, etc., or at wainscoting, outlets shall be mounted minimum 6 inches above to prevent interferences to service equipment, or as noted on drawings.
4. Fire rated poke-through shall be installed in areas to miss beams and ductwork in ceiling below. Floors shall be X-rayed before core drilling.
5. Outlets at windows and doors: Locate close to window trim in an accessible location. For outlets indicated above doors center outlets above the door opening except as otherwise indicated.
6. Column and pilaster locations: Locate outlet boxes for switches and receptacles on columns or pilasters so the centers of the columns are clear for future installation of partitions. Locate in an accessible location.
7. Locations in special finish materials: For outlet boxes for receptacles and switches mounted in desks or furniture cabinets or in glazed tile, concrete block marble, brick, stone or wood walls, use rectangular shaped boxes with square corners and straight sides. Install such boxes without plaster rings. Saw cut all recesses for outlet boxes in exposed masonry walls.
8. Mounting: Mount outlet boxes for switches and receptacles with the long axis vertical or as indicated. Three or more gang boxes shall be mounted with the long axis horizontal. Locate box covers or device plates so they will not span different types of building finishes either vertically or horizontally. Locate boxes for switches near doors on the strike side, close to door trim. Provide far side box supports for electrical boxes installed on metal studs.
9. Ceiling outlets: For fixtures, where wiring is concealed, use outlet boxes 4-inches square by l-l/2 inches deep, minimum.
10. Protect outlet boxes to prevent entrance of plaster, and/or debris. Thoroughly clean foreign material from boxes before conductors are installed.
11. Concrete boxes: Use extra deep boxes to permit side conduit entrance without interfering with reinforcing, but do not use such boxes with over 6-inch depth.
12. Existing outlet boxes: Where extension rings are required to be installed, drill new mounting holes on the existing boxes where existing holes are not aligned.
13. Back to back outlet boxes are not permitted. Separate boxes a minimum of 6 inches in standard walls and 24 inches in acoustical walls.

C. Installation of Pull and J-Boxes:

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

6. Box covers shall be marked so as to indicate the voltage, panel numbers, and circuit number of the enclosed conductors. Use pre-printed labels, marking cover with permanent marker is not acceptable.

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

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

F. Pull and J-Boxes and Cabinets:

1. Construct J-boxes or pull boxes not over l50 cubic inches in size as standard outlet boxes, and those over l50 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 inches 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 l - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DESIGN REQUIREMENTS

A. All electrical equipment and systems shall be properly labeled in accordance with this section. It includes requirements for electrical identification components including but not limited to the following:

1. Identification labeling for raceways, cables, and conductors.
2. Equipment labels and signs.

1.3 SUBMITTALS

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

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

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

2.2 MATERIALS, GENERAL

A. Nameplates: Engraved plastic laminate, black letters on white background for normal systems and white letters on red background for emergency systems.

B. Electronic Labels: 9mm self-adhesive tape, black letters on clear for normal systems and red letters on clear for emergency systems. Embossed DymoType labels are not accepted.

C. Wires and Cable Markers: Cloth markers, split sleeve and tubing

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.
3. Fire Alarm Systems: Red with Red Cable.
4. Audio/Visual Systems: Violet.
5. Building Automation System (BAS): Blue and Green.
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. Power Circuit Identification: Tag or label conductors as follows:

1. Multiple Circuits: Where multiple branch circuits or control wiring or communications/signal conductors are present in the same box or enclosure label each conductor or cable including neutrals. Provide legend indicating source, voltage, circuit number, and phase for branch circuit wiring. Phase and voltage of branch circuit wiring may be indicated by means of coded color of conductor insulation. For control and communications/signal wiring, use color coding or wire/cable marking tape at terminations and at intermediate locations where conductors appear in wiring boxes, troughs, and control cabinets. Use consistent letter/number conductor designations throughout on wire/cable marking tapes.

2. Match identification markings with designations used in panel boards shop drawings, Contract Documents, and similar previously established identification schemes for the facility's electrical installations.

G. Install equipment/system circuit/device identification as follows:

H. Apply equipment identification labels of engraved plastic-laminate on each major unit of electrical equipment in building, including central or master unit of each electrical system. This includes communication/signal/alarm systems, unless the unit is specified with its own self-explanatory identification. Text shall match terminology and numbering of the Contract Documents and shop drawings. Identification must include equipment name, voltage, phase, amperage, and fed from.. Apply labels for each unit of the following categories of electrical equipment.

1. Switchboards, switchgear, panelboards and enclosures, l/2" high lettering.
2. Access doors and panels for concealed electrical items, l/4" letters.
3. Transformers l/2" high letters.

I. Apply circuit/control/item designation labels of engraved plastic laminate for disconnect switches, breakers, pushbuttons, pilot lights, motor control centers, and similar items for power distribution and control components above, except panel boards and alarm/signal components, where labeling is specified elsewhere.

J. For panel boards, provide framed, typed circuit schedules (label all spares and spaces in pencil) with explicit description and identification of items controlled by each individual breaker.

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

L. 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

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SECTION 26 09 43

NETWORK LIGHTING CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DESIGN REQUIREMENTS

A. Provide distributed network lighting control system. Define the lighting control zones to individual rooms, areas or individual fixtures as coordinated with the university Facilities Group.

B. Interface lighting control zones with the Building Automation System (BAS) control zones. Provide all hardware, cabling and devices as needed for required hardwired interface.

C. Provide minimum 25% spare capacity including equipment ratings, housing capacities, spare relays, terminals and controls.

D. Provide a graphic user interface with a graphic display for programming lighting control zones.

E. Complete coordination drawings for occupancy zones to interface with mechanical zones for HVAC operation

F. Coordinate the location of the components on the shop drawings using the reflected ceiling plans. Do not mount devices over fixtures, diffusers, or sprinkler heads. Do not mount occupancy sensors in ceiling tiles with sprinkler heads.

G. Network Backbone devices to be install on UPS system, if UPS is unavailable install on generator power.

H. All areas with A/V equipment shall have coordination with controls to initiate shutdown sequence when area goes unoccupied.

1.3 PERFORMANCE REQUIREMENTS

A. Provide lighting control software capable of linking switch inputs to relay outputs, retrieving links, viewing relay output status, controlling relay outputs, simulating switch inputs, setting device addresses and assigning switch inputs and relay outputs modes.

B. Provide automatic time controls with automatic adjustment of dawn to dusk switching. System shall automatically adjust for leap year and daylight savings time.

C. System shall include daylight harvesting control capabilities.

D. Provide system with energy usage reporting which can be downloaded to the BAS.

E. Provide automatic notification means of reporting of problem areas

F. The vendor shall input all of the fixture wattage information into the lighting software.

G. All devices be identified in the software with a software label per the naming convention tables

H. Demonstrate the operation of the emergency lighting during generator operation and signal from the fire alarm.

1.4 SUBMITTALS

A. Provide shop drawings with complete layout of all lighting control equipment including but not limited to programmable controllers, network cable, relays, switches, occupancy sensors and photocell sensors.

B. Provide one-line diagrams showing the relative placement of all equipment and interconnections to equipment supplied by other manufactures.

C. Provide complete wiring details showing connections to relays, switches, occupancy sensors, photocell sensors, etc.

D. Clearly identify lighting zones which are coordinated and interface with the BAS control zones. Coordinate with Division 23.

E. Naming Convention:

1. See table Naming-Encelium for Encelium Devices.
2. Submit naming convention for any devices not cover in Encelium tables .

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Manufacturers: subject to compliance with requirements, provide programmable lighting control equipment of one of the following (for each type and rating of equipment).

1. Controls: Encelium Technologies Inc.
2. Sensors: Sensor Switch, Inc., Greengate. Hubbell Building Automation, Inc., PLC Multipoint Inc., The Watt Stopper, Inc., or equivalent.

2.2 SYSTEM REQUIREMENTS

A. Provide windows graphic user interface for programming and status of lighting control system.

B. Reports: Energy performance reports shall be printable in a printer friendly format and downloadable for use in spreadsheet applications, etc.

C. Interoperability: Control module shall be configured to connect to a BACnet-compliant network, resulting in extending control to any network-compliant devices such as occupancy switches.

D. Emergency Mode: There shall be a mode, when activated through the System, that will immediately adjust lights to full light output and retain that level until the mode is deactivated. This setting shall override all other inputs. The System shall interface with the building emergency monitoring system at a convenient point and not require multiple connections.

E. Addressing: I/O Modules shall be centrally addressable, on a per fixture basis, through the software. To simplify installation and maintenance, the System shall not require manual recording of addresses for commissioning or reconfiguration.

F. LAN Operations: System shall operate independently of building's existing network infrastructure and shall not rely on tenant supplied PCs for operation. Network infrastructure shall only be utilized for software. Manufacturer must provide software to facilitate communications. Manufacturer shall provide connection from the PC running energy management and lighting control software to the System communication bus.

G. Firewall Security: System firewall technology shall maintain network security.

H. Re-configurability: The assignment of individual fixtures to zones shall be centrally configurable by software such that physical rewiring will not be necessary when workspace reconfiguration is performed. Removal of covers, faceplates, ceiling tiles, etc. shall not be required.

2.3 I/O MODULE

A. General:

1. Addressing: All I/O modules shall be individually addressable via software.
2. Memory: Retains all system settings in non-volatile memory.
3. Coordinate installation of I/O modules on mechanical equipment with Controls Contractor for zone occupancy status. Relays to be mounted on enclosure of mechanical equipment. Dry contacts wired by the Controls Contractor to mechanical equipment. Relay to be provided by the Electrical Contractor.

2.4 WALL CONTROLLERS

A. General:

1. Addressing: All wall modules shall be individually addressable via software.
2. Memory: Retains all system settings in non-volatile memory.
3. Ratings: Shall be low voltage input.

2.5 PHOTO SENSOR

A. General:

1. Addressing: All photo sensors modules shall be individually addressable via software.
2. Memory: Retains all system settings in non-volatile memory.
3. A sensor that measures ambient light in a finite area shall be available.
4. Mounting: The sensor shall be flush mounted on or recessed inside ceiling tile

2.6 OCCUPANCY SENSORS

A. General:

1. Addressing: All I/O modules shall be individually addressable via software.
2. Memory: Retains all system settings in non-volatile memory.
3. Technology: Provide dual technology sensors where the sensitivity adjustment for each technology is configured through the System software
4. Provide sensor with minimum timeout of 30 seconds..
5. Sensor timeouts shall be configurable by system software. Above the minimum sensor timeout setting.
6. Mounting: Sensors for mounting on ceilings and walls, including corners, must be available.
7. Self-learning sensors will not be allowed.

2.7 LIGHTING CONTROL PANELS

A. General:

1. Addressing: All relays shall be individually addressable via software.
2. Memory: Retains all system settings in non-volatile memory.
3. Wiring: Relay control panels shall be interconnected with any other devices on the same wiring loop.
4. Provide phenolic labeling on the ceiling grid for any network communication devices, such as routers, bridges, or gateways

2.8 EMERGENCY SHUNT DEVICES

A. General:

1. Operation: Normally-closed electrically-held relay to be wired in parallel with control switch/relay. Relay automatically turns lamp on when power supply circuit voltage drops to 80 percent of nominal voltage or below.
2. Test Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
3. LED Indicator Light: Indicates status of normal and emergency power.
4. All emergency lighting shall be ‘on’ upon activation of the fire alarm system.
5. Emergency lighting shall be controlled with a shunt to keep off based upon occupancy and emergency operation.
6. Relays will indicate off, on, and shunt status in the system software

PART 3 - EXECUTION

3.1 ENCLOSED OFFICES

A. Provide occupancy sensor control in all offices with manual override controls. Configure office with manual on and auto off controls. Provide manual dimming controls.

B. Provide daylight harvesting controls for all perimeter offices by dim to minimum 10% before switching off fixture(s) when adequate daylight is detected by photocell.

C. Provide hardwired I/O module interface with BAS controls

3.2 LOBBIES AND CORRIDORS

A. Provide occupancy sensors configured for automatic on/off. Provide daylight harvesting dimming to minimum 10% before turning off fixtures where possible.

B. Coordinate occupancy time delay with university project manager.

C. Egress lighting may be controlled under certain conditions. Coordinate with the University Project Manager.

D. Provide hardwired I/O module interface with BAS controls.

3.3 SPECIALTY AREAS

A. Coordinate lighting control requirements with the university project manager for all specialty areas such as but not limited to laboratories, conference centers, animal facilities and clinical facilities.

B. Provide hardwired I/O module interface with BAS controls.

PART 4 - PROJECT DOCUMENTATION

4.1 PROJECT RECORD DOCUMENTATION

A. At least 3 working days before final acceptance demonstration, the contractor shall submit project record drawings of the network lighting for approval by the university. If more than three errors or omissions are found during the university review or during the acceptance procedure the acceptance procedure will be cancelled and rescheduled when accurate and complete drawings are received.

B. Project Record Documents shall include all the information in the submittal drawings plus:

1. All communication wiring shall have the exact route shown on a floor plan.
2. Include the working construction drawings set from the installation sub-contractor.
3. Exact locations of all devices including panels, communication devices, IO devices, etc. shall be shown. .Any room numbers changes during construction will be incorporated into the record documentation
4. All changes made during installation shall be shown, update the devices to where they are actually installed.
5. The electrical circuits used by the network lighting should be clearly indicated as panel and circuit number.
6. Unit communication address identifiers shall be shown.
7. Conductor and network identifier numbers shall be shown.
8. Update the bill of material to show the installed device quantities.
9. The electric circuiting layer needs to be turned on for the drawing.
10. Update drawings and remove any notes, clouds, x’s and removed devices.
11. Include the X-ref(s) to the AutoCAD drawings.
12. Update the Title Block on the drawings.

C. After receiving final approval, supply six (or as specified in Division 01) complete project record drawing sets together with an electronic copy, PDF and AutoCAD, to the university. The project is not

considered complete until record documents have been received and certified complete and accurate by the university

D. O&M manuals shall be provided that detail any maintenance required for any device in the system.

PART 5 – WARRANTY

A. The lighting controls shall be warranted to be free from defects in both material and workmanship for a period of one (1) year of normal use and service. This warranty shall become effective the date the university accepts the system. The warranty shall include 24 hour per day, 7 day per week emergency problem response and all standard service contract preventative maintenance items (i.e. I/O calibration, sensor adjustment, etc.). An emergency service number shall be provided to the university. Response shall be within twenty-four (24) hours to the phone call. Provide a phone number for the factory service for 24 hour response to the owner.

B. Provide factory trained technicians familiar with the installation for emergency warranty service. An electrician will be available to support the activities of the technician, as needed.

C. Upgrades: Include all controller firmware and software updates for the installed system version at no additional cost to the system the owner during the warranty period. The controller firmware and software will be installed by a factory trained technician.

D. Tuning: Include 4 site visits by a factory trained technician for lighting system analysis for efficiency and effectiveness of energy savings. Provide operation and seasonal fine-tuning of parameters to provide an optimized control system to the university by a factory trained technicians. The visits will be to be completed at the 3rd, 6th, 9th, and 11th months of the warranty period.

E. Provide a professional service report for any of the warranty work, system analysis, and changes to parameters

PART 6 – QUALITY ASSURANCE

A. Installation: All installers will have the required training from the controls manufacture on installation of the network lighting before installation of the system. If certification is available from the vendor, the installer shall complete the certification. Provide a list of trained installers to the general contractor for record keeping.

	Upper Case Text	Upper Case Test			Lower Case				
	Building	Room	Device name	Instance #	Switch Leg	Example	Device Designator	Description	Note:
Backbone Devices	???	2000	ECU	1-999	N*f*A	???-2000-ECU1	ECU-8PORT-GB2	Energy Control Network Port,120-240VAC*f*50-60Hz*f*200W	
	???	2000	GWY	1-999	N*f*A	???-2000-GWY1	EN-GW-RFENO-GB2	Wireless Gateway to EnOcean Products	

Wall Stations	Building	Room	Device name	Instance #	Switch Leg	Example	Device Designator	Device Description	Note:
	???	2000	WS	1-999	N*f*A	???-2000-WS1	EN-WS-ZC3-GB2-WT	Wall Station - 3 Zone Controller - White	
	???	2000	WS	1-999	N*f*A	???-2000-WS1	EN-WS-SC3D-GB2-WT	Dimming Scene Controller - White	
	???	2000	WS	1-999	N*f*A	???-2000-WS1	EN-WS-INDPB-GB2	Wall Station - Industrial Controller (Stainless)	
	???	2000	WS	1-999	N*f*A	???-2000-WS1	EN-WS-INDPB-GB2-DR	Wall Station - Industrial Controller - (Stainless) Damp Rated	
	???	2000	WS	1-999	N*f*A	???-2000-WS1	EN-WS-KEYSW-GB2	Wall Station - Keyswitch Controller (Stainless)	
	???	2000	WS	1-999	N*f*A	???-2000-WS1	EN-WS-R-GB2-WT	Wall Station - Rocker Switch	
	???	2000	WS	1-999	N*f*A	???-2000-WS1	EN-WS-KEYSW-GB2-DR	Wall Station - Keyswitch Controller (Stainless) - Damp Rated	
	???	2000	GFX	1-999	N*f*A	???-2000-GFX1	RTI-K4	6.4 inch Touch Screen - Wall Mounted	
	???	2000	WS	1-999	N*f*A	???-2000-WS1	ILC-300 (GB1)	Wall Station - Industrial Controller (Stainless)	
	???	2000	WS	1-999	N*f*A	???-2000-WS1	KSW-300 (GB1)	Wall Station - Keyswitch Controller (Stainless)	
	???	2000	WS	1-999	N*f*A	???-2000-WS1	ZC3 -500 (GB1)	Wall Station - 3 Zone Controller - White	
	???	2000	WS	1-999	N*f*A	???-2000-WS1	DSC -500 (GB1)	Dimming Scene Controller - White	
	???	2000	WS	1-999	N*f*A	???-2000-WS1	MYC-500 (GB1)	Mycon Personal Lighting Controller	

Modules for Sensors	Building	Room	Device name	Instance #	Switch Leg	Example	Device Designator	Device Description	Note:
	???	2000	PC	1-999	N*f*A	???-2000-PC1	EN-SIM-AI/SPS-GB2-BK	Sensor Interface Module (Used for Photo Cells)	
	???	2000	PC	1-999	N*f*A	???-2000-PC1	EN-SIM-AI/SPS-GB2-BK/DR	Sensor Interface Module - Damp Rated (Used for Photo Cells)	
	???	2000	OS	1-999	N*f*A	???-2000-OS1	EN-SIM-AI/SPS-GB2-BK	Sensor Interface Module (Used for Occupancy Sensors)	
	???	2000	OS	1-999	N*f*A	???-2000-OS1	EN-SIM-AI/SPS-GB2-BK/DR	Sensor Interface Module - (Used for Occupancy Sensors)	
	???	2000	IO	1-999	N*f*A	???-2000-OS1	EN-SIM-AI/SPS-GB2-BK	Sensor Interface Module (Used for Dry Input)	
	???	2000	IO	1-999	N*f*A	???-2000-OS1	EN-SIM-AI/SPS-GB2-BK/DR	Sensor Interface Module - (Used for Dry input)	
	???	2000	PC	1-999	N*f*A	???-2000-PC1	IOM-302 (GB1)	Universal Input/Output Module (Used for Photo Cells)	
	???	2000	OS	1-999	N*f*A	???-2000-OS1	IOM-302 (GB1)	Universal Input/Output Module (Used for Occupancy Sensors)	
	???	2000	IO	1-999	N*f*A	???-2000-OS1	IOM-302 (GB1)	Universal Input/Output Module (Used for Dry Input)	

Modules for BAS	Building	Device name	Floor	Number	Switch Leg	Example	Device Designator	Device Description	Note:
	???	VAV	01	001	N*f*A	???-VAV-01-001	EN-ALC-1R10V-GB2-BK	Area Lighting Controller (Used for Siemens VAV)	Siemens name for Box is VAV-???-01-001
	???	FVAV	01	001	N*f*A	???-FVAV-01-001	EN-ALC-1R10V-GB2-BK	Area Lighting Controller (Used for Siemens FVAV)	Siemens name for Box is FVAV-???-01-001
	???	SAV	01	001	N*f*A	???-SAV-01-001	EN-ALC-1R10V-GB2-BK	Area Lighting Controller (Used for Siemens SAV)	Siemens name for Box is SAV-???-01-001
	???	VAV	01	001	N*f*A	???-VAV-01-001	EN-ALC-1R10V-GB2-BK-DR	Area Lighting Controller-Damp Rated (Used for Siemens VAV)	Siemens name for Box is VAV-???-01-001
	???	FVAV	01	001	N*f*A	???-FVAV-01-001	EN-ALC-1R10V-GB2-BK-DR	Area Lighting Controller-Damp Rated (Used for Siemens FVAV)	Siemens name for Box is FVAV-???-01-001
	???	SAV	01	001	N*f*A	???-SAV-01-001	EN-ALC-1R10V-GB2-BK-DR	Area Lighting Controller-Damp Rated (Used for Siemens SAV)	Siemens name for Box is SAV-???-01-001
	???	VAV	01	001	N*f*A	???-VAV-01-001	EN-LCM-1R10V-GB2-BK	Luminaire Control Module (Used for Siemens VAV)	Siemens name for Box is VAV-???-01-001
	???	FVAV	01	001	N*f*A	???-FVAV-01-001	EN-LCM-1R10V-GB2-BK	Luminaire Control Module (Used for Siemens FVAV)	Siemens name for Box is FVAV-???-01-001
	???	SAV	01	001	N*f*A	???-SAV-01-001	EN-LCM-1R10V-GB2-BK	Luminaire Control Module (Used for Siemens SAV)	Siemens name for Box is SAV-???-01-001
	???	VAV	01	001	N*f*A	???-VAV-01-001	EN-LCM-1R10V-GB2-BK/DR	Luminaire Control Module (Used for Siemens VAV)	Siemens name for Box is VAV-???-01-001
	???	FVAV	01	001	N*f*A	???-FVAV-01-001	EN-LCM-1R10V-GB2-BK/DR	Luminaire Control Module (Used for Siemens FVAV)	Siemens name for Box is FVAV-???-01-001
	???	SAV	01	001	N*f*A	???-SAV-01-001	EN-LCM-1R10V-GB2-BK/DR	Luminaire Control Module (Used for Siemens SAV)	Siemens name for Box is SAV-???-01-001
	???	VAV	01	001	N*f*A	???-VAV-01-001	IOM-302 (GB1)	Universal Input/Output Module (Used for Siemens VAV)	Siemens name for Box is VAV-???-01-001
	???	FVAV	01	001	N*f*A	???-FVAV-01-001	IOM-302 (GB1)	Universal Input/Output Module (Used for Siemens FVAV)	Siemens name for Box is FVAV-???-01-001
	???	SAV	01	001	N*f*A	???-SAV-01-001	IOM-302 (GB1)	Universal Input/Output Module (Used for Siemens SAV)	Siemens name for Box is SAV-???-01-001

Modules for Fixture Control	Building	Room	Device name	Instance #	Switch Leg	Example	Device Designator	Device Description	Note:
	???	2000	LF	1-999	a-z	???-2000-LF1-a	EN-LCM-1R10V-GB2-BK	Luminaire Control Module	
	???	2000	LF	1-999	a-z	???-2000-LF1-a	EN-LCM-1R10V-GB2-BK/DR	Luminaire Control Module - Damp Rated	
	???	2000	LF	1-999	a-z	???-2000-LF1-a	EN-ACM-1R10VS-GB2-BK/DR	Accessory Control Module for Dimming Control - Damp Rated	
	???	2000	LF	1-999	a-z	???-2000-LF-a	EN-ACM-1R10VS-GB2-BK	Accessory Control Module for Dimming Control	
	???	2000	LF	1-999	a-z	???-2000-LF-a	EN-ALC-1R10V-GB2-BK	Area Lighting Controller	
	???	2000	LF	1-999	a-z	???-2000-LF-a	EN-ALC-1R10V-GB2-BK-DR	Area Lighting Controller - Damp Rated	
	???	2000	LF	1-999	a-z	???-2000-LF-a	D4DMX-MD5	DMX Dimming Module	
	???	2000	LF	1-999	a-z	???-2000-LF-a	EN-PCDM-GB2	Phase Cut Dimming Module	

Modules for Fixture Control	Building	Room	Device name	Instance #	Switch Leg	Example	Device Designator	Device Description	Note:
	???	2000	LF	1-999	a-z	???-2000-LF1-a	IOM-302 (GB1)	Universal Input/Output Module (Used for Power/Relay Packs)	
	???	2000	LF	1-999	a-z	???-2000-LF1-a	IOM-302 (GB1)	Universal Input/Output Module (Used for Power Relay)	
	???	2000	LF	1-999	a-z	???-2000-LF-a	IOM-302 (GB1)	Universal Input/Output Module (Used directly for Luminaire)	
	???	2000	LF	1-999	a-z	???-2000-LF-a	DMX-100 (GB1)	DMX Input/Output Module	

Modules for Emergency Fixture Control	Building	Room	Device name	Instance #	Switch Leg	Example	Device Designator	Device Description	Note:
	???	2000	ELF	1-999	a-z	???-2000-ELF1-a	EN-LCM-1R10V-GB2-BK	Luminaire Control Module	
	???	2000	ELF	1-999	a-z	???-2000-ELF1-a	EN-LCM-1R10V-GB2-BK/DR	Luminaire Control Module - Damp Rated	
	???	2000	ELF	1-999	a-z	???-2000-ELF1-a	EN-ACM-1R10VS-GB2-BK/DR	Accessory Control Module for Dimming Control - Damp Rated	
	???	2000	ELF	1-999	a-z	???-2000-ELF-a	EN-ACM-1R10VS-GB2-BK	Accessory Control Module for Dimming Control	
	???	2000	ELF	1-999	a-z	???-2000-ELF-a	EN-ALC-1R10V-GB2-BK	Area Lighting Controller	
	???	2000	ELF	1-999	a-z	???-2000-ELF-a	EN-ALC-1R10V-GB2-BK-DR	Area Lighting Controller - Damp Rated	
	???	2000	ELF	1-999	a-z	???-2000-ELF-a	D4DMX-MD5	DMX Dimming Module	
	???	2000	ELF	1-999	a-z	???-2000-ELF-a	EN-PCDM-GB2	Phase Cut Dimming Module	
	???	2000	ELF	1-999	a-z	???-2000-ELF1-a	IOM-302 (GB1)	Universal Input/Output Module (Used for Power/Relay Packs)	
	???	2000	ELF	1-999	a-z	???-2000-ELF1-a	IOM-302 (GB1)	Universal Input/Output Module (Used for Power Relay)	
	???	2000	ELF	1-999	a-z	???-2000-ELF-a	IOM-302 (GB1)	Universal Input/Output Module (Used directly for Luminaire)	
	???	2000	ELF	1-999	a-z	???-2000-ELF-a	DMX-100 (GB1)	DMX Input/Output Module	

Special Use Modules	Building	Room	Device name	Instance #	Switch Leg	Example	Device Designator	Device Description	Note:
	???	2000	BRG	1-999	N*f*A	???-2000-BRG1	EN-DB-1L-GB2	DALI Bridge	
	???	2000	BRG	1-999	N*f*A	???-2000-BRG1	6EP1331-1SH03	DALI Power Supply	

Relay Panels	Building	Room	Device name	Instance #	Switch Leg	Example	Device Designator	Device Description	Note:
	???	2000	PNL	1-999	a-z	???-2000-PNL1-a	EN-RP-24C-GB2-120/277V	Relay Panel - 24 Circuit - 120/277V (Includes Relay Module)	
	???	2000	PNL	1-999	a-z	???-2000-PNL1-a	EN-RP-24C-GB2-347V	Relay Panel - 24 Circuit - 347V (Includes Relay Module)	

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SECTION 26 27 26

WIRING DEVICES

PART l - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DESIGN REQUIREMENTS

A. Plug-in type devices are not acceptable.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Devices:

a. Harvey Hubbell Inc.
b. Leviton Mfg. Co.
c. Pass and Seymour Inc.
d. Bryant Electric Co.
e. General Electric Co.

2. Wall (Local) Switches: Numbers used below are those of Hubbell. Equivalent Cooper, P & S, or Leviton.
3. Fire Rated Poke-through Receptacle: Hubbell systems or approved equal.
4. Multi-Outlet Assembly (MOA): Hubbell or Wiremold.

2.2 MATERIALS, GENERAL

A. Receptacles:

1. Duplex receptacles shall be of the heavy-duty type, NEMA 5-20R configurations. They shall be capable of being side or back wired, with clamp type terminals for back wiring. The grounding blades shall be aligned in such a manner that they are parallel to the longitudinal plane of the receptacle. Plus type receptacles are not permitted.
2. All duplex, single, and special receptacles shall be heavy duty, standard grade listed by Underwriter's Laboratories, and have a single brass mounting strap with self-grounding and

have a hex-head green grounding screw and be side and back wired. Each device shall bear the UL/FS Label.

3. Convenience Receptacle Configuration: NEMA WD l; Type 5-20R.. All receptacles connected to emergency circuits shall have a red face. Color selection for normal devices shall be verified with Engineer prior to ordering.
4. Standby Receptacles: Single or duplex minimum 20-amp, color red.
5. Isolated Ground Circuit: Single or duplex minimum 20-amp, color orange, with isolated ground.
6. House Keeping Receptacles: Duplex 20-amp, color blue.
7. Telephone or CRT Receptacles: 4 inch square box with one gang plaster ring and 5/8 inch diameter grommet hole split plate.
8. Special Purpose Receptacles: Provide where shown on drawings. Standard grade, standard color, and of the appropriate code and NEMA configuration to match the supply circuit and load involved. Provide proper grounding through receptacle for equipment.
9. Fire Rated Poke-through: Provide where shown on drawings. Poke-through shall provide services as shown on drawings and have a carpet saver feature.

Duplex	20A	l25V	HBL5362
Duplex – Isolated Ground Fault	20A	l25V	GFR5362
Duplex – Isolated Ground	20A	l25V	IG5362
Single	20A	l25V	HBL536l
Single	30A	l25V	HBL9308
Single	20A	250V	HBL5652
Single	30A	250V	HBL9330
Single	30A	l25/250V	HBL9430A

B. Switches:

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

Single-Pole Switches	#l22l	20 amps	277 volts
Three-Way Switches	#l223	20 amps	277 volts
Four-Way Switches	#l224	20 amps	277 volts
Switch with Pilot		Series l200	

C. Wiring Device Accessories: Wall Plates: Provide Wall plates for single and combination wiring devices, of types, sizes, and with ganging and cutouts as indicated. Select plates which mate and match wiring devices to which attached. Construct with metal screws for securing plates to devices; screw heads colored to match finish of plates. Identify all wall plates used for receptacles with branch circuit number. Provide blank wall plates for all cable, data, telephone and junction and outlet boxes. Where cables are routed through the wall plate, provide grommets in wall plate openings to protect cables.

1. Material and Finish: Stainless steel smooth or match existing.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify boxes are installed at proper height and openings are neatly cut and will be completely covered by wall plates.

B. Verify branch circuiting wiring installation is completed, tested, and ready for connection to wiring devices.

3.2 INSTALLATION, GENERAL

A. Install wiring devices of type as indicated on drawings. All connections shall be made up tight and device set plumb. Use care in installing device in order to prevent damage to device and wire in outlet box. Install wiring devices as indicated, in accordance with manufacturer's written instruction, applicable requirements of NEC and in accordance with recognized industry practices to fulfill project requirements.

B. Coordinate with other work, including painting, electrical boxes and wiring work, as necessary to interface installation of wiring devices with other work.

C. Install wiring devices only in electrical boxes that are clean; free from excess building materials, dirt, and debris.

D. Install wiring devices after wiring work has been installed and wall finishes have been completed. Install wall plates plumb and level, after painting work is completed. Provide a device plate for each outlet to suit device installed and install blank plates or covers for J-boxes and empty outlets.

E. Tighten connectors and terminals, including screws & bolts, in accordance with the equipment manufacturer's published torque tightening values for wiring devices or as required per UL Standards 486A.

F. Upon installation of wall plates and receptacles, advise Contractor regarding proper and cautious use of convenience outlets. At time of Final Completion, replace those items that have been damaged, including those burned and scored by faulty plugs.

G. Provide equipment grounding connections for wiring devices, unless otherwise indicated.

3.3 TESTING, CLEANING, AND CERTIFICATION

A. Refer to Standard Section 26 05 00 for testing, cleaning, and certification requirements.

B. Prior to energizing circuitry, test wiring for electrical continuity, and for short-circuits. Ensure proper polarity of connections is maintained. Subsequent to energization, test wiring devices to demonstrate compliance with requirements.

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

END OF SECTION 26 27 26

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SECTION 28 31 00

FIRE DETECTION AND ALARM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 FIRE PROTECTION MEETINGS

A. Predesign/Presubmittal Conference: Conduct a conference at Project site prior to commencing preparation of delegated design and other submittals specified in this Section. (Similar to Preconstruction Conference specified under Section 01 31 00 "Project Management And Coordination" but at a separate time.) Meeting may be conducted at same time as fire protection meeting specified in Section 21 10 00 "Automatic Fire Sprinkler Systems."

1. Attendees shall include fire protection sub-contractor, University's Code Officials (AHJ), University's Fire Technicians, University's Project Manager, and representatives of Architect and Engineer of Record.
2. Invite attendees no less than 14 calendar days in advance of scheduled meeting time.
3. Agenda shall include reviewing requirements for design, submittals, pre-testing/-inspection, and field quality control testing and inspection requirements, including participation of selected University personnel during inspection and testing operations.

1.3 DESIGN REQUIREMENTS

A. Provide a microcomputer based system using multiplex techniques for alarm reporting, central monitoring, signaling, and selection of audible and visual signal circuits. The fire alarm system should be capable of making reverse 911 messages and emergency announcements. The fire alarm subcontractor should work closely with the campus Information technology department working through the University Project Manager to make this work.

B. Provide individually identified fire alarm sensors; pull stations, indicating devices, and compatible monitor and control devices. Provide a unique address for each device, with operator-assigned English language descriptor.

1. The system shall include the following major components

a. Fire Alarm Control Panel (FACP)
b. Fire Alarm Annunciator Panel (FAAP) and LCD Display.
c. Fire Alarm Voice/Evacuation Panel (FVEP)
d. Fire Alarm Computer Terminal (FACT) – FACE refers to the individual building and University Police Building FACT.
e. Fire Alarm System Printer (FAP) – If building type requires a Fire Command Center.
f. Fireman Two Way Telephone Panel (FTP) – If required by the building type.

2. Conventional fire alarm initiating devices (smoke detectors, heat detectors, manual stations, water flow and tamper switches, pressure switches) shall each be individually addressable via, and shall report to the FACP.
3. Control relays shall be individually commanded by the system to respond automatically in case of an alarm by related sensors or other devices. Manual control of fans, dampers and required relays shall be provided, as well as automatic control where required by code. Control sequences shall be as indicated on related mechanical systems control drawings.

C. The system shall operate as a low voltage, zone-annunciated Fire Management System and shall include the following subsystems:

1. FACP to monitor addressable initiating and control devices, annunciate the alarm device exact location, initiate alarm and evacuation signals, and capture and recall elevators.
2. FACP and Associated Auxiliary panels shall be provided with Class "A" wiring.
3. Interconnection of FACP, including supervision, shall be via fiber optic (FO) cable between buildings and via copper cable in the buildings. Coordinate FO cable requirements with Campus IT Group.
4. All FO transmit and receive modules and required hardware shall be integral with associated fire alarm equipment.

D. Provide UL listed system. If required as a condition requisite to establishing UL listing of the entire installation as a system, the Contractor shall arrange for, and pay all costs associated with, any required off-site or on-site review, supervision, and/or inspection which may be required for gaining such UL listing.

E. Conform to the following NFPA requirements:

1. Initiating Device Circuits (IDC) shall be Class B
2. The Signaling Line Circuits (SLC) shall be configured as follows:

    a. Class A for signaling line circuits connecting intelligent devices to the FACP.
    b. Loss of connectivity between FACP and the facility's Central Control FACP shall not hamper functions of the fire alarm system within the building.

3. The Notification Appliance Circuit (NAC) shall be Class B

F. Anschutz Medical Campus System Layout

1. General:

    a. All campus buildings will be equipped with a FACP. Locate near the main entry and a FVEP located near the FACP per the building design, for all non-high-rise buildings.
    b. Each FACP shall be networked into the campus network and accessible from the Campus FACT. Any FVEP shall be accessed from the Campus FCC FVEP microphone and/or the Campus Police Station FVEP microphone.
    c. One FACP and FACT in one University high-rise building FCC and one University high-rise building FCC will be designated alternate locations for the Campus FCC FACP. All information residing in the FACP/FACT of the Campus will be duplicated at these two locations.
    d. A FACT with FAP or a FAAP with LCD indicating building in alarm shall be located at the University Police Building. The Police Station shall be capable of accessing any FVEP via local microphone.

e. Every building will be equipped with a weatherproof speaker/strobe located at each exterior door.
f. Include the Following Front Panel Controls:

1) Each floor shall have a disable button
2) Disable all
3) Elevator disable
4) Fan/shut-down disable
5) Pager disable
6) Door disable
7) Separate speaker and strobe disable
8) Manual page by floor
9) Amplifier test tone button

G. Provide interface with the Building Automation System to report all "alarm" and "supervisory" actions. Refer to Division 23.

1.4 PERFORMANCE REQUIREMENTS

A. General: Normal operator interface, through the FACP located in each individual building where required, and at the designated FACT located in the Anschutz Medical Campus University Police Building in the Police Dispatch. All system early-warning pre-alarm, alarm, and trouble messages shall be annunciated on the FACT in a color-graphic format with English language descriptors.

B. High-Rise Buildings.

1. The fire alarm sequence of operation shall be in accordance with the requirements for high-rise buildings, including but not limited to the following:

a. The alarm and activate the strobes for the floor in alarm and the floors above and below.
b. Initiate stair pressurization and pressurization of the floors above and below the floor in alarm.
c. Release of stair, held-open doors, and re-entry doors.
d. Upon activation of the elevator, elevator shafts, or elevator lobby detectors, recall the elevators to the main exit level or alternate floor.
e. Activate refuge area communications link.
f. Annunciate the alarm to the building FACP, and FAAP, and to University Police FACT.
g. Annunciate the alarm condition and location to the building FAAP and local floor FAAP.

2. The Command Center of the High Rise Buildings shall also be equipped, under another contract, with the following remote status/control panels:

a. Buildings electrical distribution system.
b. Building fire pump.
c. Elevator status and control panel.
d. Building voice paging system and/or voice evacuation system (i.e., Office Building) via zone interface panel and microphone.
e. CCTV system monitors and keyboard.
f. Smoke control panel.
g. Generator control panel.

3. The FD will use these panels for viewing or controlling each of the above systems.

C. The FD will respond to the FACP of the building in alarm and to the Campus Police. The Campus Police FACT shall be automatically activated into the graphics mode to show the current status of all devices in alarm. The FD will take command of the Building's FACT to monitor the current response to the fire alarm condition. Using a "mouse driven" graphic menu, the FD shall be able to "zoom in" or "zoom out" of the graphic screens to view the current alarm condition.

1. The FD will use the building's FCC PC graphic system to view and control the response of the fire alarm system by viewing special graphic screens such as:

    a. A smoke control system status and control screen.
    b. Any building within the complex connected to the fire alarm system.
    c. Any preprogrammed screen existing within the fire alarm system.
    d. Or other specialty screens that may be created at the request of the University Facilities Operations.

2. Using the assigned FD Identification Code (ID password), the FD may use the FCC PC to alter the preprogrammed firefighting response to the present alarm condition. A printer will provide hard copy documentation of all alarm conditions, ID password log on commands, and the system response to the specific fire alarm condition.

D. The Campus Control Center fire alarm computer will provide monitoring and secondary back up of the fire alarm computers located in the various fire command centers. If an equipment trouble alarm is initiated from a fire alarm device, it shall be reported at the FCC FACP of the building in alarm and the Campus Control Center PC.

E. If a fire alarm condition is received and the FD cannot initiate an appropriate response from the building's FCC PC (i.e., fire in the Buildings' FCC room, or a failure of the FCC PC), then an override ID password command can be used by the FD to make any system PC the primary PC for the manual firefighting override response. The selected PC shall be able to alter a building's preprogrammed response to the alarm condition. The selected PC shall be able to access and control all PC graphic screens that reside within the system.

F. It shall be possible for all authorized personnel, using the proper ID password, to place the facility into smoke control operation through the graphic screens from the University Police (FACT), or the Building's FCC FACP.

G. Automatic Actions:

1. Activation of an alarm-initiating device, as specified herein shall cause the following:

    a. Annunciation of the alarm condition, type, and device address at the FACP, FACT and FAAP in a LCD format at the building FAAP. An audible signal shall sound and the alarm condition shall flash until acknowledged. The alarm condition and its location shall also be displayed at the University Police FACP, FACT, and FAAP per building design.
    b. The appropriate audio and visual alarms shall be transmitted throughout the building in alarm or to predetermined zones of the building in alarm.
    c. Disable the elevator call system and recall the elevators to the level of discharge exit or to the alternate floor.
    d. Initiate smoke control procedures and functions automatically (position dampers and control fans) from the building FACP.
    e. Release self-closing fire and smoke doors in specified control zone when the system goes into alarm.

f. Provide control relay at each access control panel to unlock all secured doors in activated control zone. Guidelines and Design Standards
g. Provide digital paging notification to select University personnel as determined by the University Project Manager.

2. Provide smoke detector circuits with alarm verification with field-adjustable time from 0 to 60 seconds. Only verified alarms shall initiate the specified sequences.
3. Activation of a sprinkler valve supervisory switch shall initiate supervisory alarm at the corresponding building FACP, FAAP, FACT, and FAP and initiate a supervisory alarm signal at the University Police FACT. Supervisory alarms shall be differentiated from a trouble condition on the circuit.
4. A break in the initiating circuit or detector power wiring shall be annunciated as a trouble condition on the building FACP and the University Police FACT.
5. A break in the audio/visual circuit wiring shall be annunciated as a trouble condition on the building FACP and the University Police FACT.

H. Failsafe Operation: To increase the system's ability to survive damage from fire, malicious or accidental damage, premature component failure, etc., the fire alarm system shall provide the following functionality:

1. Each building FACP shall operate in a stand-alone manner, independent of any other FACP or FACT. The building FACP shall contain the complete data file for all connected devices, regardless of the building, and shall operate the same way whether connected to any other FACP or FACT. This includes:

a. Annunciation of device address and condition. One hundred percent of all connected devices shall be capable of operating for alarm simultaneously.
b. Logical Point Grouping annunciation and control. Each Logical Point Group shall contain up to l5 physical points and shall be capable of initiating a sequence of control actions.
c. Event-initiated control, signaling and/or annunciation sequences. One hundred percent of all connected devices shall be capable of being operated simultaneously.
d. Priority display of multiple alarms.
e. Complete supervision of all connected devices with no degraded operation.
f. Complete reset capabilities at FACP and FACT.

2. Standby batteries capable of operating the FACP, FACT (except those supported by non-interruptible power supply systems), FAAP, FVEP, smoke detectors and alarm horns, strobes, secondary PC terminals, video display units and printers, shall be provided to automatically back up the emergency power source. The system shall have the capacity to operate FACP, as required per NFPA PCs for two hours, and then operate the fire alarm indicating devices for at least l5 minutes, per NFPA requirements. When commercial power is restored, the system shall transfer automatically to primary power. System power supply shall be equipped with battery charging circuits sufficient to recharge fully depleted batteries to within 70 percent of their maximum capacity within l2 hours.
3. System operating software and data file shall be resident in nonvolatile memory. Loss of power, momentary or for a sustained period shall not require reloading of the software.
4. All plug-in circuit boards shall be electrically supervised to assure that the proper board is in the proper position. Systems that use electrical continuity to supervise the presence of plug-in boards, but that do not assure that board positions have not been exchanged, shall provide additional means for the specified supervision, beyond that provided by locking covers.
5. The FACT shall be provided with battery backup or individual dedicated UPS.

I. Color code and minimum wire sizes for the fire alarm system as follows:

1. All wire is solid copper:
2. All insulation colors shall be continuous for the full length of the wire.
3. Wire Jackets shall be stamped with the "Circuit Type" designation or shall have an affixed label designating the "Circuit Type" every twenty lineal feet at a minimum.

Circuit Type	Colors Wire	# Conductors	Size
Initiating Circuits	(+) Red (-) Black	2	l8 (THHN)
Signaling Circuits	(+) Red (-) White	2	l6 Twisted
Speaker Circuits	(+) Orange (-) Brown	2	l4 Twisted
Strobe Circuits	(+) Yellow (-) Blue	2	l4 Twisted
Fire Fighter Phone Circuit	(+) Red (-) White	2	l4 Twisted/ Shielded
Fire Fighter Phone Riser Circuit	(+) Red (-) White	2	l4 Twisted/ Shielded
RS-485 Circuit	(+) Blue (-) Gray	2	l6 Twisted
Damper Control	(+) Red (-) Black	2	l4 THHN
AHU Shutdown Circuit	(+) Red (-) Black	2	l4 THHN
24VDC Power Circuit	(+) White (-) Black	2	l4 THHN
Fire Alarm Remote Light Circuit	(+) Red (-) Black	2	l8 THHN
Speaker Phone Cut Out Circuit	(+) Orange (-) Brown	2	l4 Twisted
Low Level Audio Riser Circuit	(+) Red (-) Black	2	l4 Twisted/ Shielded
High Level Audio Riser Circuit	(+) Red (-) Black	2	l4 Twisted
Door Holder Circuit	(+) Red (-) Black	2	l4 Twisted

J. Intelligent Features:

1. The following additional features shall be provided:

   a. The fire alarm detector cleaning shall be annunciated at the FACP as a trouble condition by the device.
   b. Dual Alarm threshold for day or night settings.

K. Interface With Other Systems:

1. Interface design of fire alarm system with closed circuit television (CCTV) system and FO signal transmission system.
2. The Electronic Security Department (ESD) will provide software to interface with the CCTV and fire alarm systems. CCTV and fire alarm manufacturers shall provide software protocol, for their systems, to ESD.
3. Consultant may purchase copy of specifications for interfacing systems from the University for the purpose of determining interfacing requirements.
4. Interface voice notification with the campus RAV system.

1.5 SUBMITTAL

A. Delegated-Design Submittal: For fire detection and alarm systems indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

B. 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.

C. CADD generated layouts for FACT screen graphics.

D. Operating and Maintenance Manuals.

E. Project Record Documents:

1. Prior to submittal of the as-built documents, submit a complete package of shop drawings to the University Facilities Operations Fire and Safety office for review. Drawings shall include floor plans and graphic maps for each building and/or floors.
2. Submit record documents in accordance with the requirements of Section 0l 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.

1.6 QUALITY ASSURANCE

A. Manufacturer: Company specializing in Intelligent Fire Management Systems.

B. Installer: Company with certified personnel specializing in smoke detection and fire alarm systems with five years' documented experience as a fire alarm installing contractor.

C. Fire Management system installer shall keep all smoke heads in the building covered until final building turn over. Failure to comply will mandate a complete cleaning of the individual heads on the system.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Edwards System Technology (Sole Sourced)

2.2 APPROVED INSTALLERS

A. Metroplex Control System (MCS) – 6950 South Tucson Way, Unit D, Centennial, CO 80ll2, (720) 875-0303.

B. Advanced Electronic System – 80l 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 – 7l73 S. Havana St Ste 400 Centennial CO, 80ll2 (303) 790-2520

E. Other Edward System Technology installers will be considered if they have successfully completed three 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 days prior to Bidding on the project. Installers should be NICET certified.

2.3 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design fire detection and alarm systems.

2.4 MATERIALS, GENERAL

A. All equipment and materials used shall be standard components, regularly manufactured, and regularly utilized in the manufacturer's system.

B. All systems and components shall have been thoroughly tested and proven in actual use.

C. All equipment shall be listed and labeled by Underwriters Laboratories.

D. All sensors shall be of the intelligent type and shall mount on a common base. This base shall be incompatible with conventional detectors.

E. Where equipment of different manufacturers is used, such equipment shall be included under the required over-all UL system listing as a component of the integrated fire alarm system.

F. The system shall be designed to operate with unshielded wire, to the maximum practicable extent. Shielded wire may be used. FO cable shall be utilized, as required or as indicated by the design documents.

G. FACPs shall be provided with tamper switches on cabinet doors to protect against unauthorized access to internal devices. The panel shall provide commandable outputs, which can operate relays or logic level devices.

H. Memory data shall be contained in EEPROM non-volatile memory. If non-volatile battery-backed RAM provides memory, removal of the board shall not cause loss of memory contents.

I. The Fire Alarm annunciator panels shall be LCD types.

J. Site Specific Customizing Software:

1. General:

a. Provide software and Programs with technical support and training for the University's Facilities Operations staff during installation of system and completion.
b. Alarm display shall include, as a minimum:

l) Indication of alarm condition, i.e. ABNORMAL OFF, HI ALARM/ LO ALARM, analog value or status, and English group and point identification such as "SMOKE DETECTOR BUILDING "A" - 2ND FLOOR- ROOM 202".
2) A discrete per point alarm action taking message, such as "CALL MAINTENANCE DEPT. EXT 556l", of up to 480 characters.

c. System shall automatically transmit alarm and troubles to selectable University pagers via a commercial carrier such as "AT&T Wireless".
d. The network routing properties for a panel's common controls determine which panels will respond when an operator presses the corresponding control command switch (Reset, Alarm Silence, Panel/Trouble Silence, Drill, Alternate Sensitivity) on the 3-LCD module.

Only the panels defined in the selected network routing group will respond to the command. Any building connected by a bridge or other structure shall annunciate to its opposite number(s) alarm, supervisory, and trouble conditions via single LEDs on its front panel.

2. Point summary reports:

a. Point summary reports shall include the current value/status and condition.
b. Trend reports shall allow the operator to randomly select logical arrays of points.
c. Dynamic trends shall provide up to six points and show real time activity of the associated points.
d. Alarm reports shall be automatically issued.
e. A custom report capability shall be provided to allow the user to format reports of any mix of text, points with status/value and descriptors, and points with status/value only.

K. Fire Alarm System Devices:

1. General:

   a. Each device shall be assigned a unique address. Address selection by jumpers is not acceptable. Devices which take their address from their position in the circuit are unacceptable. It is preferred that the address of the intelligent device be part of the device base rather than the device itself.
   b. Devices shall receive power and communication from the same pair of wires. For fault-tolerant circuits, any separate power wiring shall also be made fault-tolerant.

2. Analog Sensors (Photoelectric and Thermal):

   a. Each sensor shall contain an LED, which blinks each time it is scanned by the FACP. The sensor LED is to remain illuminated to indicate alarm. All sensors not visible from the corridor shall have a remote light mounted in the corridor as shown on the drawings.
   b. Each sensor shall be capable of being tested for alarm via command from the FACP or FACT. The values of the sensor shall be displayed at building FACP and FACT, and the University Police FACT.

3. 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.

4. 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.

5. Fault Isolator Module (only if approved by the University Project Manager):

   a. The Fault Isolator Module shall detect and isolate a short-circuited segment of a fire-alarm loop.
   b. Modules shall be placed on every floor to limit the number lost addressable devices in case of a short-circuit on the intelligent circuit.

6. Intelligent manual pull stations shall be single action, mounted on standard electrical box.

   a. For public places, use single action pull stations with "Stopper II" cover.

7. Magnetic door holders shall be wall- or floor-mount on a standard electrical box.
8. Linear beam smoke detectors shall have cross-zone capabilities and be provided where shown on the drawings. Detectors shall consist of a transmitter and receiver unit utilizing infrared light to detect smoke between the units. These detectors shall have discriminating circuitry to differentiate between actual smoke, momentary blockage of the beam, and long-term blockage.

a. Contractor shall provide a weatherproof enclosure for each pair of devices, utilizing transparent panels to allow light transmission. Ensure range of detector is adequate to compensate for passage through this glass.

L. Other Devices:

1. Speaker/Strobes:

a. Strobes shall be synchronized.
b. The speaker shall provide for minimum sound level of 95 dBA at l0 feet.

2. Analog Air Duct Detectors:

a. Duct detectors shall be mounted exterior of duct with air sampling tube. Program duct detectors for supervisory indication only.
b. Provide fire alarm remote light red LED, mounted on a standard plate fitted to a standard electrical box. When device is not visible, labeled plate with the name of the device served.
c. Fire alarm remote light/test switch combination shall be utilized for each duct detector. The device shall have a red LED and two positions test switch mounted on a standard plate fitted to a standard electrical box. Plates shall be labeled with the name of the equipment served.

3. Tamper Switches: Installed under Division 2l.
4. Flow Switches: Installed under Division 2l.
5. Sprinkler Pre-action Solenoid and Deluge Valves: Installed under Division 2l
6. Differential Pressure Switch: Installed under Division 23.
7. Damper End Switches: for damper position indication. Installed, under Division 23.
8. 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.
9. Provide control relays as required to accomplish functions such as fan shutdown, damper positioning, door release, etc.
10. Fire/Smoke dampers and smoke dampers will be provided under Division 23. The 24V wiring, including low voltage transformer P.E. switch, will be provided under Division 23. The l20V AC wiring will be provided under this section..
11. Voice Evacuation Speaker/Strobe units shall be UL listed for use in voice evacuation systems.
12. Audible and visual indications shall operate independently or in unison.
13. Animal Care Facilities

a. Provide “Silentone” horns or approved equal throughout all animal care facilities. Provide red lensed strobe in animal holding rooms.
b. Provide speakers in the office areas of the animal facility.

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

N. FO Jumper Cable:

1. Provide plenum-rated FO cable, tight buffer type, with attenuation less than 3.5 dB/Km at 850 nm.
2. Jumper shall consist of two type ST connectors and the required length of 50/l25 or 62.5/l25 micron FO cables. Jumper cable to match trunk system cable to which the FACP is to be connected to.

3. Connectors shall meet or exceed the following requirements:

   a. Attenuation: < l.0 dB at 850 nm per mated pair.
   b. Durability: < 0.2 dB increase in attenuation per l000 mattings.
   c. Operating temperature: -40°to +60°C.
   d. Connector construction shall incorporate ceramic ferrule, nickel-plated zinc housing and estane boot.

O. Voice Evacuation System:

l. Contractor shall provide all work required for installation of a Voice Evacuation System for the buildings indicated by the drawings. Scope of this Contractor's work will be as described by this section of the specifications and as shown on the drawings.
2. Buildings that are defined as high rise shall have the following: An Audible Alarm on the floor where that event is detected and a general message to all other floors stating, " A fire Alarm has been detected on (indicate floor number). Remain alert and evacuate if there are indications of fire. If no danger is noted, you may await further instruction. Elevators have been recalled to level l(or alternate floor if the fire alarm is on level l) until the fire alarm is over."
3. Fire Alarm Voice Evacuation Panel (FVEP):

   a. The FVEP shall be located in conjunction with the FACP and shall provide evacuation signals, pre-recorded fire alarm messages, and one-way communication (paging) on a selective.

   b. FVEP equipment shall include the following:

      l) Voice paging, hand-held, push-to-talk microphone with dynamic noise canceling. Frequency response shall be flat within + 3 dB from 200 to 5,000 Hz.
      2) Zone paging selector switches and LED's, with one selector switch and two LED's provided for each speaker zone.
      3) "Manual Fire Evacuation Tone" switch and LED.
      4) "Silencing" fire evacuation tones (self-restoring switch) and LED.
      5) "Pre-recorded Message" switch and LED.
      6) "All Call", switch and LED, with the switch enabling the operator to simultaneously page all speaker zones on both risers.
      7) Reset switch.
      8) Lamp test switch.
      9) "Page" LED, which will light when the paging microphone is used.
      l0) The FVEP shall also be equipped with LED's to indicate trouble conditions for the following:

         a) Each individual speaker zone.
         b) Amplifier, preamplifier, fire tone, pre-recorded messages, and voices paging

      ll) All switches and LED's shall be clearly identified with engraved labels.
      l2) Each group of LED's shall have distinctive colors, such as:

         a) Fire Tone - Red
         b) Silence - Yellow
         c) Page - Green
         d) Trouble - Yellow
         e) Pre-recorded Message - Red

c. The fire evacuation signal shall be applied to any specific zone automatically from the FACP or FACT, or shall be selected manually by the speaker zone switch.

4. FVEP Audio Cabinet:

a. l00% redundant tone generators, preamplifiers, and amplifiers shall be provided.
b. The audio trunk shall be electronically supervised and shall be automatic switchover from one audio signal path to the other.
c. Each amplifier module shall be provided with two 40-watt amplifiers, and shall power a minimum of 8 speaker zones.
d. Pre-recorded message shall be programmed and recorded in a memory chip. Tape cassette players are not acceptable.
e. The FVEP audio cabinet shall be capable of remote "All Page" activation via local microphone from the University Police Station. The system shall allow the selection of individual building or "All" buildings for "Disaster Messages".
f. Provide capability of testing and adjusting audio amplifier outputs. Provide test switch at the FACP.

P. Spare Parts: Refer to Section 0l 78 46 – Extra Stock Materials.

PART 3 - EXECUTION

3.1 INSTALLATION – FIRE ALARM

A. Fire Alarm Layouts:

1. General:

a. Provide a fire alarm system for each building. Actual detection required per building shall be determined by National codes, Local codes and the University CBO, whichever is more stringent.
b. Provide shunt trip circuit breaker for connection to elevators with sprinkle red shafts.

2. Regardless of building occupancy rating, the following areas shall be provided with detection:

a. Laboratories
b. Electrical Rooms
c. Mechanical Rooms
d. Telecommunications Rooms
e. Data Centers
f. Dedicated Storage Rooms
g. Kitchens

3. In general, the following type of detection shall be provided in each type of room:

a. Photoelectric Smoke Detection:

l) Electrical/Telecommunication Rooms
2) Office Corridors (except where sprinkled)
3) Offices (except where sprinkled)
4) Laboratories

5) Mechanical Ducts
6) Elevator Shafts/Machine Rooms
7) Dedicated Storage Rooms
8) Linear Equipment Rooms

b. Thermal Detection:

l) Restrooms
2) Mechanical Rooms
3) Kitchens/Break rooms
4) Environmental Services (Janitor) Rooms
5) Elevator Shafts/Machine Rooms
6) Generator Rooms
7) Autoclaves

c. Flame Detection: Generator Rooms

4. Provide control module at each access control panel for interface with access control system.

B. Installation shall be supervised and tested by the manufacturer of the system equipment.

C. 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.

D. 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.

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

F. Devices: Locate devices per ADA standards

G. 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.

H. 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.

I. If room numbers are changed or new room numbers established, the University Project Manager must be notified before implementation so that the system can be re-programmed and is accurate in the event of an alarm.

J. All devices mounted in ceiling tile to be supported by T-bar hanger bracket and appropriate box. Plaster ring is not acceptable.

K. Labeling:

1. Observe the University fire alarm color code guide.
2. Label each splice with correct information.
3. Label each initiating device with correct device address. Use Kroy labeler or equal.
4. Final, correct University room numbers (not design/construction room numbers) must be provided for correct programming.
5. All detectors to have factory dust covers installed until after the final inspection and clean up is complete.
6. All duct detectors to have individual remote LED/test stations installed. Mount at 6'-0" AFF in main corridor adjacent to area served. Label as directed by the University Project Manager.
7. All shielded wiring to be bonded together at each device and insulated from contact with the conduit or box.
8. All equipment and associated wiring removed from service will be returned to the University Project Manager for proper disposal.
9. Avoid locating detectors above countertops and/or shelving.
10. Locate detectors at least eight feet from supply or return air diffusers.
11. Use fixed heat detectors near autoclaves and steam sterilizers.
12. Mount remote lights for room detectors above door to corridor, centered.

L. 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.

M. Prior to start of construction, disable existing fire alarm devices, as necessary. A minimum of 2 working days' notice, prior to construction, shall be coordinated through the University Project Manager.

3.2 TESTING, CLEANING AND CERTIFICATION

A. When installation is complete, system shall be tested in accordance with NFPA72 requirements. A representative of the system manufacturer shall submit a written report of the findings to the A/E with copy of to the FD. System testing shall include, at the least, verifying the following:

1. The functional operation of each re-settable initiating device (manual stations, detectors, etc.) and circuit.
2. All notification appliances shall be tested for a minimum of ten minutes under normal alarm conditions.
3. The functional operation of each and every alarm device and circuit.
4. The functional operation of each monitored device circuit.
5. The functional operation of each control circuit, including fan controls.

6. The supervision functions of each initiating, indicating, monitoring, control and supply circuit.
7. Control station automatic signaling.
8. That all software protocol, access codes and operation instructions have been supplied.
9. All installed or modified fire alarm systems for remodels or new projects shall be tested and certified by a Factory Representative. Upon a system test completion a "Letter of Certification" shall be issued to the University.

B. All testing and verifications shall be conducted in the presence of the University Facilities Operations Fire and Safety personnel.

C. There shall be an operational test by the FD.

3.3 COMMISSIONING (DEMONSTRATION)

A. The equipment supplier shall provide a minimum of 8 hours of system training for the University Facilities Operations personnel training for each new system.

END OF SECTION 28 31 00