# Table of Contents

**Division 1 - General Requirements**

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>No. of Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>01000</td>
<td>General</td>
<td>2</td>
</tr>
<tr>
<td>01010</td>
<td>Summary of Work</td>
<td>5</td>
</tr>
<tr>
<td>01020</td>
<td>Administration and Supervision</td>
<td>2</td>
</tr>
<tr>
<td>01021</td>
<td>Allowances</td>
<td>1</td>
</tr>
<tr>
<td>01025</td>
<td>Unit Prices</td>
<td>1</td>
</tr>
<tr>
<td>01030</td>
<td>Alternates</td>
<td>1</td>
</tr>
<tr>
<td>01041</td>
<td>Project Coordination</td>
<td>3</td>
</tr>
<tr>
<td>01042</td>
<td>Mechanical and Electrical Coordination</td>
<td>4</td>
</tr>
<tr>
<td>01045</td>
<td>Cutting and Patching</td>
<td>3</td>
</tr>
<tr>
<td>01060</td>
<td>Regulatory Requirements</td>
<td></td>
</tr>
<tr>
<td>01075</td>
<td>Specification System</td>
<td>1</td>
</tr>
</tbody>
</table>

**Division 2 - Procedural Documents**

<table>
<thead>
<tr>
<th>Procedural Document</th>
<th>No. of Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advertisement for Bids</td>
<td>2</td>
</tr>
<tr>
<td>Information for Bidders</td>
<td>4</td>
</tr>
<tr>
<td>Contractors Working on Government Projects</td>
<td>1</td>
</tr>
<tr>
<td>University of Colorado Contractor's Qualification Statement</td>
<td>15</td>
</tr>
<tr>
<td>Location Map</td>
<td>1</td>
</tr>
<tr>
<td>Bid Form</td>
<td>1</td>
</tr>
<tr>
<td>Bid Appendix A</td>
<td>1</td>
</tr>
<tr>
<td>Minority &amp; Women Business Enterprise Participation Report</td>
<td>2</td>
</tr>
<tr>
<td>Bid Bond</td>
<td>1</td>
</tr>
<tr>
<td>Notice of Award</td>
<td>1</td>
</tr>
<tr>
<td>Contractor's Agreement</td>
<td>4</td>
</tr>
<tr>
<td>Performance Bond</td>
<td>2</td>
</tr>
<tr>
<td>Labor and Material Payment Bond</td>
<td>2</td>
</tr>
<tr>
<td>General Conditions of the Contract</td>
<td>50</td>
</tr>
<tr>
<td>Supplemental General Conditions</td>
<td>5</td>
</tr>
<tr>
<td>Change Order Bulletin</td>
<td>1</td>
</tr>
<tr>
<td>Change Order Proposal</td>
<td>2</td>
</tr>
<tr>
<td>Change Order</td>
<td>1</td>
</tr>
<tr>
<td>Request for Information</td>
<td>1</td>
</tr>
<tr>
<td>Environmental Site Assessment Form</td>
<td>1</td>
</tr>
<tr>
<td>Notice to Proceed</td>
<td>1</td>
</tr>
<tr>
<td>Certification and Affidavit Regarding Unauthorized Immigrants</td>
<td>1</td>
</tr>
<tr>
<td>Notice of Substantial Completion</td>
<td>2</td>
</tr>
<tr>
<td>Notice of Final Acceptance</td>
<td>1</td>
</tr>
<tr>
<td>Notice of Contractor's Settlement</td>
<td>1</td>
</tr>
<tr>
<td>Notice of Approval of Beneficial Occupancy</td>
<td>2</td>
</tr>
<tr>
<td>Pre-Acceptance Checklist</td>
<td>1</td>
</tr>
<tr>
<td>Closing-out Checklist</td>
<td>1</td>
</tr>
<tr>
<td>Contract Close-out Final Punch List</td>
<td>1</td>
</tr>
<tr>
<td>Post Construction Warranty Report</td>
<td>1</td>
</tr>
<tr>
<td>Notice to Contractors: Environmental Responsibilities Environmental &amp; Safety Reminders</td>
<td>2</td>
</tr>
<tr>
<td>Certificate for Contractor's Payment</td>
<td>2</td>
</tr>
<tr>
<td>Submittal Log</td>
<td>1</td>
</tr>
</tbody>
</table>

**Division 3 - Procedural Documents (Continued)**

<table>
<thead>
<tr>
<th>Procedural Document</th>
<th>No. of Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Acceptance Checklist</td>
<td>1</td>
</tr>
<tr>
<td>Closing-out Checklist</td>
<td>1</td>
</tr>
<tr>
<td>Contract Close-out Final Punch List</td>
<td>1</td>
</tr>
<tr>
<td>Post Construction Warranty Report</td>
<td>1</td>
</tr>
<tr>
<td>Notice to Contractors: Environmental Responsibilities Environmental &amp; Safety Reminders</td>
<td>2</td>
</tr>
<tr>
<td>Certificate for Contractor's Payment</td>
<td>2</td>
</tr>
<tr>
<td>Submittal Log</td>
<td>1</td>
</tr>
</tbody>
</table>

**Division 4 - Procedural Documents (Continued)**

<table>
<thead>
<tr>
<th>Procedural Document</th>
<th>No. of Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Acceptance Checklist</td>
<td>1</td>
</tr>
<tr>
<td>Closing-out Checklist</td>
<td>1</td>
</tr>
<tr>
<td>Contract Close-out Final Punch List</td>
<td>1</td>
</tr>
<tr>
<td>Post Construction Warranty Report</td>
<td>1</td>
</tr>
<tr>
<td>Notice to Contractors: Environmental Responsibilities Environmental &amp; Safety Reminders</td>
<td>2</td>
</tr>
<tr>
<td>Certificate for Contractor's Payment</td>
<td>2</td>
</tr>
<tr>
<td>Submittal Log</td>
<td>1</td>
</tr>
</tbody>
</table>
Section 01100 Special Project Procedure ................................................................. 2
Section 01121 Hazardous Material Procedures ....................................................... 4
Section 01200 Project Meetings ............................................................................... 2
Section 01300 Submittals, Shop Drawings, Product Data and Samples .................. 4
Section 01400 Quality Control ............................................................................... 2
Section 01500 Temporary Facilities ......................................................................... 3
Section 01580 Project Identification Sign .................................................................. 2
Section 01600 Material and Equipment ................................................................... 2
Section 01700 Contract Closeout ............................................................................. 2
Section 01710 Cleaning ............................................................................................. 3
Section 01720 Project Record Documents ............................................................... 1
Section 01730 Operating and Maintenance ............................................................. 4
Section 01740 Commissioning Requirements .......................................................... 1
Section 02050 Basic Site Materials & Methods ....................................................... 3

Division 2 - Site Work

Division 3 - Concrete (Not Used)

Division 4 - Masonry
Section 04100 Mortar and Grout
Section 04150 Masonry Accessories
Section 04200 Unit Masonry

Division 5 – Metals
Section 05400 Metal Framing

Division 6 - Wood and Plastics

Division 7 - Thermal and Moisture Protection
Section 07210 Building Insulation
Section 07900 Joint Sealants

Division 8 - Doors and Windows
Section 08710 Door Hardware

Division 9 – Finishes
Section 09260 Gypsum Board Systems
Section 09510 Acoustical Ceilings
Section 09650 Resilient Flooring
Section 09900 Painting

Division 15 - Mechanical
Section 15010 Mechanical General
Section 15050 Basic materials & methods
Section 15170 Variable frequency drives
Section 15190 Mechanical identification
Section 15240 Mechanical sound & vibration control
Section 15250 Mechanical insulation
Section 15300 Fire protection
Section 15400 Mechanical plumbing
Section 15510 Hydronic pipe & specialties
Section 15540  Pumps
Section 15850  Mechanical air handling
Section 15880  Mechanical air distribution
Section 15950  Controls
Section 15990  Testing, adjusting, & balancing

DIVISION 16 – ELECTRICAL SPECIFICATION INDEX

Section 16010 - Electrical General Provisions
Section 16110 - Raceways
Section 16120 - Conductors
Section 16130 - Boxes and Fittings
Section 16140 - Wiring Devices and Plates
Section 16450 - Grounding
Section 16510 - Lighting Fixtures

END
ADVERTISEMENT FOR BIDS

State of Colorado
University of Colorado
Notice Number: 10-22

Project No: PR 004792

Project Title: DUAN – RM C123/123A/123B/ & 123C Remodel

Estimated Construction Cost: $289,000

Project Description
The University of Colorado at Boulder is upgrading three laboratory rooms at the Duane Physics Building. The work will include all demolition of existing RCP ceiling, block wall door units, and selected mechanical and electrical items. Install a new mechanical system and electrical lighting, and infill existing door location. Upgrade existing doors with ADA hardware, new floor tile and paint.

Project Information
1. The Principal Representative has determined that the entire project shall be substantially complete within 45 calendar days, from the date of the Notice to Proceed, and the project shall be finally complete, including the delivery of any or all guarantees and warranties, the submittal of sales and use tax payment forms, the completion of the final punch list and the calling for final inspection, within 10 calendar days, if applicable, from the date of substantial completion. In accordance with Article 46 of the General Conditions of the Contract, Time of Completion and Liquidated Damages, failure to complete the work within the agreed number of calendar days shall be considered breach of contract and subject the bidder to liquidated damages to the extent specified in Article 54D of the General Conditions of the Contract.

2. The right is reserved to waive informalities or irregularities and to reject any and all Bids.

3. Bidders may procure Bidding Documents at the mandatory prebid meeting July 21, 2010 at 10:00 AM. in Department of Facilities Management, Research Laboratory No. 2, 1540 30th Street, Room 321, Boulder, CO 80309

4. A $50.00 is required for each complete set of Contract Documents. Make check payable to Pahl Architecture. This deposit shall be a guaranty that the documents will be returned in good condition. Such deposits will be returned to (1) Actual Bidders who return the documents before the termination of five (5) business days after the opening of the Bids, (2) Other interested parties who return the documents within five (5) business days after checking them out. Additional copies of any documents, drawings, or specifications will be supplied at the actual cost of reproduction. Bidders desiring the Architect/Engineer to mail bid documents will be required to pay the full cost of mailing. Such expenses will be non-refundable.

5. Each Bid shall be submitted on the required Bid Form and must be accompanied by a Bid Bond on State Buildings Programs Bid Bond Form Sc-6.14 in an amount not less than 5% of the total Bid. The Bid Bond may also be (1) a cashier\'s check or (2) a certified check made payable to the Treasurer of the State of Colorado in an amount not less than 5% of the total Bid. The Bid Bond is submitted as a guaranty that the Bid will be maintained in full force and effect for a period of thirty (30) days after the opening of the Bids for the project.
6. The Bidder promises, in submitting his Bid, that if issued a Notice of Award, he will, within the prescribed time, execute the required Agreement, furnish the required Performance Bond, Labor and Material Payment Bond, Insurance Policy and Certificates of Insurance, or forfeit his Bid Guaranty as Liquidated Damages.

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

Pre-Bid Meeting

A mandatory Pre-Bid Meeting will be held on 07/21/10 at 10:30 AM. at the Department of Facilities Management, Research Laboratory No. 2, 1540 30th Street, Room 321, Boulder, CO 80309.

Sealed Bids will be received from qualified contractors until this date and time at this location:
Date & Time: 07/29/10 10:00 AM.

Address: Department of Facilities Management, Research Laboratory No. 2, 1540 30th Street, Room 321, Boulder, CO 80309

Point of Contact

Name: Gil Fike, Project Manager
Agency: University of Colorado at Boulder
Phone: 303-735-0346
Fax: 303-492-4082
Email: gilfike@colorado.edu

This Notice is also available on the web at www.colorado.gov/dpa/dfp/sbrep

Media of Publication(s): The Daily Journal
Publication Dates: July 13, 2010
Note to Editor: Transmit one copy of the Affidavit of Publication, and invoice to:

University of Colorado at Boulder
Department of Facilities Management
Campus Box 453 UCB
Boulder, CO 80309-0453
STATE OF COLORADO  
OFFICE OF THE STATE ARCHITECT  
STATE BUILDINGS PROGRAMS  

INFORMATION FOR BIDDERS

Institution or Agency: University of Colorado at Boulder  
Project No./Name: PR004792 - DUAN – Rm C123/123A/123B/ & 123C Remodel

1. **BID FORM:** Bidders are required to use the Bid form attached to the bidding documents. Each bidder is required to bid on all alternates and indicate the time to substantial completion in calendar days, and if applicable because designated in the Advertisement For Bids, the bidder is required to indicate the period of time agreed to finally complete the project after the date of substantial completion, also in calendar days. Bids indicating times for substantial completion or final acceptance in excess of the number of days indicated in the Advertisement for Bids may be found non-responsive and may be rejected. The bid shall not be modified or conditioned in any manner. Bids shall be submitted in sealed envelopes bearing the address and information shown below. If a bid is submitted by mail, this aforementioned sealed envelope should be enclosed in an outer envelope and sent to the following addressee:

**INSERT NAME OF AGENCY AND ADDRESS WHERE BID SHOULD BE DELIVERED**

The outside of the sealed inner envelope should bear the following information:

- **Project #**    PR004792
- **Project Name**     DUAN Rm C123/123A/123B/ & 123C Remodel
- **Name and Address of Bidder** __________________________________________________________________________________________
- **Date of Opening** July 30, 2010  
- **Time of Opening** 10:00 AM

A bid with missing or inconsistent information may be considered non-responsive and may not be evaluated. The University will be the sole judge in determining the acceptability of an offer. The University also reserves the right to reject any or all bids in part or in whole and to waive technicalities. Any decision shall be considered final.

2. **INCONSISTENCIES AND OMISSIONS:** Bidders may request clarification of any seeming inconsistencies, or matters seeming to require explanation, in the bidding documents at least three (3) business days prior to the time set for the opening of Bids. Decisions of major importance on such matters will be issued in the form of addendum.

3. **APPLICABLE LAWS AND REGULATIONS:** The bidder’s attention is called to the fact that all work under this Contract shall comply with the provisions of all state and local laws, approved state building codes, ordinances and regulations which might in any manner affect the work to be done or those to be employed in or about the work. Attention is also called to the fact that the use of labor for work shall be governed by the provisions of Colorado law which are hereinafter set forth in Articles 27 and 52E of the GENERAL CONDITIONS.

4. Note that the Special Provisions of the General Conditions of the Contract includes the following language: **UNAUTHORIZED IMMIGRANTS – PUBLIC CONTRACTS FOR SERVICES - CRS 8-17.5-101 and 24-76.5-101.** The Contractor certifies that the Contractor shall comply with the provisions of CRS 8-17.5-101 et seq. The Contractor 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 the Contractor that the subcontractor shall not knowingly employ or contract with an illegal alien to perform work under this contract. The Contractor represents, warrants, and agrees that it (i) has verified that it does not employ any illegal aliens, through participation in the Basic Pilot Employment Verification Program administered by the Social Security Administration and Department of Homeland Security, and (ii) otherwise will comply with the requirements of CRS 8-17.5-102(2)(b). The Contractor shall comply with all reasonable requests made in the course of an investigation under CRS 8-17.5-102 by the Colorado Department of Labor and...
A Contractor that operates as a sole proprietor hereby swears or affirms under penalty of perjury that the Contractor (i) is a citizen of the United States or otherwise lawfully present in the United States pursuant to federal law, (ii) shall comply with the provisions of CRS 24-76.5-101 et seq, and (iii) shall produce one of the forms of identification required by CRS 24-76.5-103 prior to the effective date of this Contract. Except where exempted by federal law and except as provided in CRS 24-76.5-103(3), a Contractor that receives federal or state funds under this contract must confirm that any individual natural person eighteen years of age or older is lawfully present in the United States pursuant to CRS 24-76.5-103(4) if such individual applies for public benefits provided under this contract.

5. **TAXES:** The bidder’s attention is called to the fact that the Bid submitted shall exclude all applicable federal excise or manufacturers’ taxes and all state sales and use taxes as hereinafter set forth in Article 9C of the GENERAL CONDITIONS.

6. **OR EQUAL:** The words “OR EQUAL” are applicable to all specifications and drawings relating to materials or equipment specified. Any material or equipment that will fully perform the duties specified, will be considered “equal”, provided the bid submits proof that such material or equipment is of equivalent substance and function and is approved, in writing. Requests for the approval of “or equal” shall be made in writing at least five (5) business days prior to bid opening. During the bidding period, all approvals shall be issued by the Architect/Engineer in the form of addenda at least two (2) business days prior to the bid opening date.

7. **ADDENDA:** Owner/architect initiated addenda shall not be issued later than two (2) business days prior to bid opening date. All addenda shall become part of the Contract Documents and receipt must be acknowledged on the Bid form.

8. **METHOD OF AWARD - LOWEST RESPONSIBLE BIDDER:** If the bidding documents for this project require alternate prices, additive and/or deductible alternates shall be listed on the alternates bid form provided by the Principal Representative. Bidders should note the Method of Award is applicable to this Bid as stated below.

   A. **DEDUCTIBLE ALTERNATES:** The lowest responsible Bid, taking into account the Colorado resident bidder preference provision of Colorado law, will be determined by and the contract will be awarded on the base bid combined with deductible alternates, deducted in numerical order in which they are listed in the alternates bid form provided by the Principal Representative. The subtraction of alternates shall result in a sum total within available funds. If this bid exceeds such amount, the right is reserved to reject all bids. An equal number of alternates shall be subtracted from the base bid of each bidder within funds available for purposes of determining the lowest responsible bidder.

   B. **ADDITIVE ALTERNATES:** The lowest responsible Bid, taking into account the Colorado resident bidder preference provision of Colorado law, will be determined by and the contract will be awarded on the base bid plus all additive alternates added in the numerical order in which they are listed in the alternates bid form provided by the Principal Representative. The addition of alternates shall result in a sum total within available funds. If this bid exceeds such amount, the right is reserved to reject all bids. An equal number of alternates shall be added to the base bid of each bidder within funds available for purposes of determining the lowest responsible bidder.

   C. **DEDUCTIBLE AND ADDITIVE ALTERNATES:** Additive alternates will not be used if deductible alternates are used and deductible alternates will not be used if additive alternates are used.

The Advertisement for Bids can be located at the web site: [www.colorado.gov/dpa/dfp/sbrep/constructdesign.htm](http://www.colorado.gov/dpa/dfp/sbrep/constructdesign.htm) (Click on the link below the second paragraph Colorado Construction and Design Notices)

9. **CONTRACTOR QUALIFICATIONS:**
A. Prime Contractors:
   a. Prime Contractors bidding this project must complete “University of Colorado (UCB) Contractor Statement of Experience,” and submit it with their Bid.
   b. The Prime Contractor must meet the following minimum requirements and provide written information substantiating their qualifications for evaluation. A Bidder may be found to be non-responsive and their bid rejected if the minimum requirements are not met.
      (1) The Prime Contractor must have successfully completed three (3) projects of $250,000.00 (or larger) in the last five (5) years which were similar in complexity and type to this project. For each project list:
         Name and location of project, along with a brief description of the project (include size & function).
         Name, address and phone number of client/owner and their representative.
         Contract value and type of contract (prime or subcontract).
         Year in which work was completed.
      (2) The Contractor must have successfully completed an aggregate of $750,000.00 of projects in the last five (5) years which were similar in complexity and type on which he acted as the prime contractor (may be the same projects listed in item (1), if applicable).
      (3) The firm must have been in business as a Contractor for the last five (5) years.

B. Subcontractors
   a. The Prime Contractor is required to provide subcontractors which meet minimum qualifications for the trades listed below.
      The right is reserved to reject subcontractors that do not meet the minimum requirements. The Prime Contractor will be required to replace rejected subcontractor(s) with one(s) that meet the minimum requirements with no increase in the Bid Amount prior to the Award of Contract.
      Prime Contractor and Subcontractor(s) are advised that there are conditions within the Contract Documents requiring special knowledge and experience to properly execute. The University will require verification of experience to adequately provide materials and perform labor required for the following:
      - Electrical
      - Mechanical
   b. For the trades listed (subcontractors) above, the apparent low bidder must submit, within 72 hours of receipt of bids except for holidays and weekends, the “University of Colorado Contractor's Statement of Experience.
   c. In addition to the information requested in Item (1), the Subcontractor must meet the following minimum requirements and provide written information substantiating their qualifications for evaluation. A Bidder may be found to be non-responsive and their bid rejected if the minimum requirements are not met.
      (1) The firm must have been in business for the last five (5) years as trade proposed for this work.
      (2) The firm must have successfully completed at least two (2) projects of similar size, type, and complexity in the last five (5) years. The information must include the following:
         (a) Building type description (function use)
         (b) Building gross square footage
         (c) Subcontract description (be specific)
         (d) Subcontract amount
         (e) Subcontract change orders
         (f) Building owner representative and current telephone number
(g) Building architect name and current telephone number
(h) General contract name and current telephone number

(3) This firm shall give evidence of being able to be bonded up to the value of his work for this project. A letter shall be provided by the bonding agency assuring capability of bonding this subcontract amount.

10. **SITE ACCESS:** Contractors / Bidders may schedule a time subsequent to the Site Inspection / Pre-bid Conference to take measurements or further observe existing conditions by contacting:

   Gil Fike, Project Manager  
   University of Colorado at Boulder  
   Department of Facilities Management  
   (303) 735-0346

11. **BID SCHEDULE:**
   
   Publication date: July 13, 2010  
   Plans specification available: July 21, 2010 10:30 AM at pre-bid meeting  
   Mandatory pre-bid conference: July 21, 2010 10:30  
   Last day for questions: July 23, 2010 4:00 PM  
   Last day for addenda issue: July 27, 2010 4:00 PM  
   Bid date: July 30, 2010 2:00 PM

END
CONTRACTORS WORKING ON NON-CITY PERMITTED PROJECTS

To all Contractors working within the City of Boulder:

Under Boulder’s Revised Code, the contractor is deemed to be the consumer of materials used in the construction project. Contractors may not avoid payment of the City of Boulder sales or use tax by placing provisions in a construction agreement or by using the name of a tax-exempt entity on an invoice or purchase order, regardless that the contractor is indicated thereon as the agent of a tax-exempt entity. **No exemption certificate issued by the Colorado Department of Revenue or any other taxing authority shall be recognized as a basis for exemption from sales or use taxes.**

Estimated use tax must be remitted to the City of Boulder prior to the start of the project. The tax is computed on the full contract price of the project. Follow these steps to compute and remit the sales/use tax to the City:

1. Multiply the full contract price by 0.5 and then multiply the resulting product by the tax rate of 3.41% (0.0341). This is the tax that is due to the City prior to the start of the project.
2. Remit the tax to the Sales Tax Department at 1777 Broadway, P.O. Box 791, Boulder, CO 80306-0791 along with a copy of this completed form.
3. At the completion of the project the construction company has two options for closing out the project with the city.
   - Use the formula in (1.) above to compute the final tax due based on the final contract price (including all change orders). Remit the additional tax due or file a request for refund with the City; or
   - Request that the city perform a full audit. Contact Ed Kaiser at 303-441-3921 or kaisere@bouldercolorado.gov to inform the City of which option you have chosen.

Contractor Name: ____________________________
Address: ____________________________
Phone #: ____________________________ Contact Person: ____________________________
Project Name: PR004792 - DUAN - Rm C 123/123A/123B/123C Remodel
Project Address: ____________________________

Full Contract price ____________________________
Multiply ‘A’ by 0.5 ____________________________
Multiply ‘B’ by 0.0341 ____________________________

“C” is the amount of tax due to the City of Boulder. If you have any questions regarding sales/use tax or this process, contact Ed Kaiser at the above phone number or address.

Date received: ____________________________ City Authority Signature: ____________________________

1777 BROADWAY P.O. BOX 791 BOULDER, CO 80306 303/441-3921
University of Colorado at Boulder

CONTRACTOR’S STATEMENT OF EXPERIENCE

Project Name: DUAN – Rm C123/123A/123B/ & 123C Remodel

Project No. PR 004792

Project Manager: Gil Fike
Phone: 303-735-0346
Email: gilfike@colorado.edu

Architect/Engineer: Pahl Architecture
303-861-7147

This is a project specific qualification form. Contractor must fill this out on each project.
UNIVERSITY OF COLORADO AT BOULDER
CONTRACTOR’S QUALIFICATION STATEMENT

INFORMATION FORM

STATEMENT OF ________________________________
(Contractor)

ADDRESS ______________________________________
(Street or PO Box)    (City)    (State)    (Zip)

TELEPHONE/FAX NO. ____________________________
(telephone)    (fax)

DATE OF EXPERIENCE STATEMENT ____________________________

PRINCIPLE OWNER/OFFICER __________________________
(Names(s) and Official Title(s))

Please indicate below if your company qualifies as one of the following:

Minority Business Enterprise (MBE)    YES__    NO__
Justification: ________________________________________________

______________________________________________________

Woman-Owned Business Enterprise (WBE)    YES__    NO__
Justification: ________________________________________________

______________________________________________________

Small Business Enterprise (SBE)    YES__    NO__
Justification: ________________________________________________

______________________________________________________

Disadvantaged Business Enterprise (DBE)    YES__    NO__
Justification: ________________________________________________

______________________________________________________
UNIVERSITY OF COLORADO AT BOULDER
CONTRACTOR’S QUALIFICATION STATEMENT

TYPES OF WORK

(1) If you are a General Contractor interested in bidding on all types of construction, mark “All Classes of Construction” only.
(2) If you are interested in contracting directly with the University for certain types of work only, mark in the column provided after the particular types of work on which you wish to bid.

<table>
<thead>
<tr>
<th>TYPES OF WORK</th>
<th>MARK WITH (X)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. All Classes of Construction</td>
<td></td>
</tr>
<tr>
<td>2. General</td>
<td></td>
</tr>
<tr>
<td>3. Mechanical</td>
<td></td>
</tr>
<tr>
<td>4. Electrical</td>
<td></td>
</tr>
<tr>
<td>5. Excavating and Grading</td>
<td></td>
</tr>
<tr>
<td>6. Concrete</td>
<td></td>
</tr>
<tr>
<td>7. Structural Steel</td>
<td></td>
</tr>
<tr>
<td>8. Steel and Miscellaneous Iron</td>
<td></td>
</tr>
<tr>
<td>9. Painting and Decorating</td>
<td></td>
</tr>
<tr>
<td>10. Laboratory Equipment</td>
<td></td>
</tr>
<tr>
<td>11. Elevator Installation</td>
<td></td>
</tr>
<tr>
<td>12. Plumbing</td>
<td></td>
</tr>
<tr>
<td>13. Heating and Ventilating</td>
<td></td>
</tr>
<tr>
<td>14. Air Conditioning</td>
<td></td>
</tr>
<tr>
<td>15. Boiler and Equipment</td>
<td></td>
</tr>
<tr>
<td>16. Environmental (Describe)</td>
<td></td>
</tr>
<tr>
<td>17. Other (Describe)</td>
<td></td>
</tr>
<tr>
<td>18. Other (Describe)</td>
<td></td>
</tr>
<tr>
<td>19. Other (Describe)</td>
<td></td>
</tr>
<tr>
<td>20. Other (Describe)</td>
<td></td>
</tr>
</tbody>
</table>
UNIVERSITY OF COLORADO AT BOULDER
CONTRACTOR’S QUALIFICATION STATEMENT

IDENTIFICATION

(The signatory of this questionnaire guarantees the truth and accuracy of all statements and of all answers to questions hereinafter made.)

LEGAL NAME ________________________________

PRINCIPAL OFFICE __________________________

(Street or PO Box) (City) (State) (Zip)

____ A Corporation ______ A Copartnership ______ An Individual ___ Combination

GENERAL INFORMATION

A. Are you licensed as a contractor? Yes ( ) No ( )

Licensed in the name of Location License No.

(City or State) & Type

B. How many years has your organization been in business as a contractor under your present business name? __________

C. How many years experience in construction work has your organization had? ________ (Type)

(a) As a prime contractor? ____________ (b) As a subcontractor?

D. Have you or your organization, or any officer or partner thereof, failed to complete a contract? __________

If so, give details ________________________________

E. If you have a controlling interest in any firms presently qualified with the University, show names thereof:

______________________________________________________________________________

F. We normally perform ______ % of the work with our own forces.

List trades: ________________________________

Where qualification is based on a combination of several organizations, show the experience and equipment of the combined organizations.
G. Has your firm been involved in any litigation in the past five (5) years? Yes (  ) No (  )
   If yes, explain (listing type, kind, plaintiff, defendant, etc. and state the current status).

H. Are there any activities or interests of officers, principle stockholders, or employees of
   your firm or other factors which would place your firm and the University of Colorado
   at Boulder in a position of “Conflict of Interests”?

   Yes (  ) No (  ) If yes, or in doubt, explain.

I. Has your firm ever been involved in any bankruptcy action as a bankrupt?

   Yes (  ) No (  ) If yes, explain.
1. Name the persons with whom you have been associated in business as partners or business associates in each of the last five (5) years.

2. Show the construction experience of the principal individuals of your present organization in the following tabulation:

<table>
<thead>
<tr>
<th>Individual’s Name</th>
<th>Present Position or Office in Your Organization</th>
<th>Years of Construction Experience</th>
<th>Magnitudes and Type of Work</th>
<th>In What Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
PROJECT EXPERIENCE

Show the projects your organization has completed during the last five years in the following tabulation:

<table>
<thead>
<tr>
<th>Year Completed</th>
<th>Project</th>
<th>Type of Work (See Page 2)</th>
<th>Location</th>
<th>Contract Value</th>
<th>Contracting Authority</th>
<th>In what Capacity</th>
</tr>
</thead>
</table>
## UNIVERSITY OF COLORADO AT BOULDER
### CONTRACTOR’S QUALIFICATION STATEMENT

## WORK CURRENTLY UNDER CONTRACT

<table>
<thead>
<tr>
<th>Expected Completion Date</th>
<th>Project</th>
<th>Type of Work (See Page 1)</th>
<th>Location</th>
<th>Contract Value</th>
<th>Contracting Authority</th>
<th>Architect or Engineer</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
SURETIES

List the Surety Companies that have bonded your work for the past five (5) years:

<table>
<thead>
<tr>
<th>Name of Surety and Name and Address of Agent</th>
<th>Project and Location</th>
<th>Period of Bond From</th>
<th>Period of Bond To</th>
<th>General Comments</th>
</tr>
</thead>
</table>


UNIVERSITY OF COLORADO AT BOULDER
CONTRACTOR’S QUALIFICATION STATEMENT

CORPORATION / CO-PARTNERSHIP

CORPORATION:
(If a corporation, answer this:)

When Incorporated

In What State

President’s Name

Vice President’s Name

Secretary’s Name

Treasurer’s Name

CO-PARTNERSHIP:
(If a co-partnership, answer this:)

Date of Organization

State whether partnership is general, limited, or association

Name and address of each partner:

__________________________     __________________________
(name)                        (name)

__________________________     __________________________
(address)                     (address)

WHERE QUALIFICATION IS BASED ON A COMBINATION OF ORGANIZATIONS, THE
APPROPRIATE (ATTACHED) AFFIDAVITS MUST BE EXECUTED FOR EACH
MEMBER OF SUCH COMBINATION.
UNIVERSITY OF COLORADO AT BOULDER
CONTRACTOR’S QUALIFICATION STATEMENT

AFFIDAVIT FOR CORPORATION

___________________________________________certifies and says: That he is

(Name of officer)

___________________________________________of the _______________________________________

(Oficial capacity)

corporation submitting this statement of experience: that he/she has read the same, and that the same is true of his/her own knowledge: that the statement is for the purpose of inducing the University of Colorado to supply the submittor with plans and specifications, and that any vendor, or other agency therein named is hereby authorized to supply the University of Colorado with any information necessary to verify the statement: and that furthermore, should this statement at any time cease to properly and truly represent his/her condition in any substantial respect, it will refrain from further bidding on University work until it shall have submitted a revised and corrected statement.

I certify and declare under penalty of perjury that the foregoing is true and correct:

Subscribed on ____________ at __________, __________, State of ____________

(date) (city) (county)

NOTE: Use full corporate name and attach corporate seal here. __________________________________________

(Oficer must sign here)

NOTE: Statement will be returned unless affidavit is completed in EVERY respect.
UNIVERSITY OF COLORADO AT BOULDER
CONTRACTOR’S QUALIFICATION STATEMENT

AFFIDAVIT FOR CO-PARTNERSHIP

_________________________________________ certifies and says: That he/she is a partner of ____________________________
(Name of partner)

the partnership of ____________________________ : That said partnership (Name of Firm)

submitted this statement of experience: that he/she has read the same, and that the same is true of his/her own knowledge: that the statement is for the purpose of inducing the University of Colorado to supply the submittor with plans and specifications, and that any vendor, or other agency therein named is hereby authorized to supply the University of Colorado with any information necessary to verify the statement: and that furthermore, should this statement at any time cease to properly and truly represent the condition of said firm in any substantial respect, it will refrain from further bidding on University work until they shall have submitted a revised and corrected statement.

I certify and declare under penalty of perjury that the foregoing is true and correct:

Subscribed on ____________ at ____________, ____________, State of ______________
(date) (city) (county)

The foregoing statement and affidavit are hereby offered.

_________________________________________ (Member of Firm must sign here)

_________________________________________ (Title)

_________________________________________ (Name of Firm)

(Remaining members of Firm sign here)

NOTE: Statement will be returned unless affidavit is completed in EVERY respect.
UNIVERSITY OF COLORADO AT BOULDER
CONTRACTOR’S QUALIFICATION STATEMENT

AFFIDAVIT FOR INDIVIDUAL

_________________________________________ doing business ________________________

(Name of individual) (Name of Firm)
certifies and says: That he/she is the person submitting this statement of experience: that he/she has read the same, and that the same is true of his/her own knowledge: that the statement is for the purpose of inducing the University of Colorado to supply the submittor with plans and specifications, and that any vendor, or other agency therein named is hereby authorized to supply the University of Colorado with any information necessary to verify the statement: and that furthermore, should this statement at any time cease to properly and truly represent his/her condition in any substantial respect, it will refrain from further bidding on University work until it shall have submitted a revised and corrected statement.

I certify and declare under penalty of perjury that the foregoing is true and correct:

Subscribed on ___________ at __________, __________, State of _________________
(date) (city) (county)

NOTE: Statement will be returned unless affidavit is completed in EVERY respect. ______________________________________

(Applicant must sign here)
BIDDING INFORMATION

QUALIFICATION

The University of Colorado will qualify or disqualify a Contractor on the basis of:

(1) The information contained in this statement and
(2) Past contract experience with the University.

NOTIFICATION

The University of Colorado will, in writing, notify Contractors of their qualification or disqualification.
STATE OF COLORADO
OFFICE OF THE STATE ARCHITECT
STATE BUILDINGS PROGRAMS

BID

Institution/Agency: University of Colorado at Boulder
Project No./Name: PR004792 / DUAN – Rm C123/123A/123B/ & 123C Remodel

Bidder Acknowledges Receipt of Addenda No.s:

Base Bid
(Refer to Bid Alternate Form SC-6.13.1 Attached, If Applicable)

Bidder’s Time of Completion
a. Time Period from Notice to Proceed to Substantial Completion: 45 calendar days
b. Time Period from Substantial completion to Final Acceptance: 10 calendar days
c. Time of Completion of Entire Project (a + b): 55 calendar days

1. BID: Pursuant to the advertisement by the State of Colorado dated July 13, 1010 the undersigned bidder hereby proposes to furnish all the labor and materials and to perform all the work required for the complete and prompt execution of everything described or shown in or reasonably implied from the Bidding Documents, including the Drawings and Specifications, for the work and for the base bid indicated above. Bidders should include all taxes that are applicable.

2. EXAMINATION OF DOCUMENTS AND SITE: The bidder has carefully examined the Bidding Documents, including the Drawings and Specifications, and has examined the site of the work, so as to make certain of the conditions at the site and to gain a clear understanding of the work to be done.

3. PARTIES INTERESTED IN BID: The bidder hereby certifies that the only persons or parties interested in this Bid are those named herein, and that no other bidder or prospective bidder has given any information concerning this Bid.

4. BID GUARANTEE: This Bid is accompanied by the required Bid Guarantee. You are authorized to hold said Bid Guarantee for a period of not more than thirty (30) days after the opening of the Bids for the work above indicated, unless the undersigned bidder is awarded the Contract, within said period, in which event the Director, State Buildings and Real Estate Programs, may retain said Bid Guarantee, until the undersigned bidder has executed the required Agreement and furnished the required Performance Bond, Labor and Material Payment Bond, Insurance Policy and Certificates of Insurance.

5. TIME OF COMPLETION: The bidder agrees to achieve substantial completion of the entire project within the number of calendar days entered above, and if applicable, further agrees that the period between the date of substantial completion and the date of final acceptance of the entire project will not exceed the number of calendar days noted above. If awarded this work, the bidder agrees to begin work within ten (10) days from the date of the Notice to Proceed subject to Article 46, Time of Completion and Liquidated Damages of The General Conditions of the Contract, and agrees to prosecute the work with due diligence to completion. The bidder represents that Article 54D has been reviewed to determine the type and amount of any liquidated damages that may be specified for this contract.
6. **EXECUTION OF DOCUMENTS:** The bidder understands that if this Bid is accepted, he must execute the required Agreement and furnish the required Performance Bond, Labor and Material Payment Bond, Insurance Policy and Certificates of Insurance within ten (10) days from the date of the Notice of Award, and that the bidder will be required to sign to acknowledge and accept the Contract Documents, including the Drawings and Specifications.

7. **ALTERNATES:** Refer to the Information for Bidders (SC-6.12) for Method of Award for Alternates and use State Form SBO-6.13.1 Bid Alternates form to be submitted with this bid form if alternates are requested by the institution/agency in the solicitation documents.

Submit wage rates (direct labor costs) for prime contractor and subcontractor as requested by the institution/agency in the solicitation documents.

The right is reserved to waive informalities and to reject any and all Bids.

Dated this ______ Day of ___________________ , 2010.

(Corporate Seal)

THE BIDDER:

________________________

ATTEST

Company Name

Address (including city, state and zip)

Phone number: ______________________

Signature

Name (Print) and Title

Print Email address: ____________________

SIGNATURES: If the Bid is being submitted by a Corporation, the Bid should be signed by an officer, i.e., President or Vice-President. The signature of the officer shall be attested to by the Secretary and properly sealed. If a sole proprietorship or a partnership is submitting the Bid, the Bid shall so indicate and be properly signed.
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 01030 for descriptions of add alternates. If the add alternates are accepted, the base bid would be modified by the amount entered by the bidder.

<table>
<thead>
<tr>
<th>A.A. No.</th>
<th>Description</th>
<th>Add $</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.A. No. 1</td>
<td>Demo &amp; installation of new doors (C123 &amp; C127)</td>
<td></td>
</tr>
<tr>
<td>A.A. No. 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A.A. No. 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A.A. No. 4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A.A. No. 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A.A. No. 6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A.A. No. 7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A.A. No. 8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A.A. No. 9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A.A. No. 10</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 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.

<table>
<thead>
<tr>
<th>D.A. No.</th>
<th>Deduct $</th>
</tr>
</thead>
<tbody>
<tr>
<td>D.A. No. 1</td>
<td></td>
</tr>
<tr>
<td>D.A. No. 2</td>
<td></td>
</tr>
<tr>
<td>D.A. No. 3</td>
<td></td>
</tr>
<tr>
<td>D.A. No. 4</td>
<td></td>
</tr>
<tr>
<td>D.A. No. 5</td>
<td></td>
</tr>
<tr>
<td>D.A. No. 6</td>
<td></td>
</tr>
<tr>
<td>D.A. No. 7</td>
<td></td>
</tr>
<tr>
<td>D.A. No. 8</td>
<td></td>
</tr>
<tr>
<td>D.A. No. 9</td>
<td></td>
</tr>
<tr>
<td>D.A. No. 10</td>
<td></td>
</tr>
</tbody>
</table>

Bidder Date
STATE OF COLORADO
OFFICE OF THE STATE ARCHITECT
STATE BUILDINGS PROGRAMS

BID BOND

Institution/Agency: University of Colorado at Boulder
Project No./Name: PR004792 / DUAN – Rm C123/123A/123B/ & 123C Remodel

KNOW ALL MEN BY THESE PRESENTS:

WHEREAS, hereinafter called the “PRINCIPAL”, is submitting a PROPOSAL for the above described project, to the STATE OF COLORADO, hereinafter called the “OBLIGEE”.

WHEREAS, the Advertisement for Bids has required as a condition of receiving the Proposals that the Principal submit with the PROPOSAL GUARANTY in an amount not less than five per cent (5%) of the Proposal, which sum it is specifically agreed is to be forfeited as Liquidated Damages in the event that the Principal defaults in his obligation as hereinafter specified, and, in pursuance of which Requirement, this Bid is made, executed and delivered.

NOW THEREFORE, the Principal and a corporation of the State of __________, duly authorized to transact business in Colorado, as Surety, are held and firmly bound unto the Obligee, in the sum of five per cent (5%) of the Principal’s total bid price, lawful money of the United States for the payment of which sum, well and truly to be made to the Obligee, we bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

FURTHER THAT, a condition of the obligation that the Principal shall maintain his Proposal in full force and effect for thirty (30) days after the opening of the proposals for the project, or, if the Principal’s Proposal is accepted, the Principal shall, within the prescribed time, execute the required Agreement, furnish the required Performance Bond, Labor and Material Payment Bond, Insurance Policy, and Certificates of Insurance, then this obligation shall be null and void, otherwise it shall remain in full force and effect, and subject to forfeiture upon demand as Liquidated Damages.

IN WITNESS WHEREOF said Principal and Surety have executed this Bond, this ______ day of __________, A.D., 2010.

(Corporate Seal)
THE PRINCIPAL

ATTEST

Company Name

Address (including city, state and zip)

Phone number:

Secretary

Signature

Name (Print) and Title

SIGNATURES

If the “Principal” is doing business as a Corporation, the Bid Bond shall be signed by an officer, i.e., President or Vice President. The signature of the officer shall be attested to by the Secretary and properly sealed.

If the “Principal” is an individual or a partnership, the Bid Bond shall so indicate and be properly signed.

(Corporate Seal)
THE SURETY

By _____________________________

Attorney-in-Fact

Secretary

_________________________________

By _____________________________

Attorney-in-Fact

THIS BOND MUST BE ACCOMPANIED BY POWER OF ATTORNEY, EFFECTIVELY DATED. FAILURE TO PROVIDE A PROPERLY EXECUTED BID BOND WITH A PROPERLY EXECUTED POWER OF ATTORNEY WILL RESULT IN THE BIDDER’S PROPOSAL BEING DEEMED NON-RESPONSIVE.
STATE OF COLORADO  
OFFICE OF THE STATE ARCHITECT  
STATE BUILDINGS PROGRAMS  

NOTICE OF AWARD  

<table>
<thead>
<tr>
<th>Date of Notice:</th>
<th>Date to be inserted by the Principal Representative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Institution/Agency:</td>
<td>University of Colorado at Boulder</td>
</tr>
<tr>
<td>Project No./Name:</td>
<td>PR004792 / DUAN – Rm C123/123A/123B/ &amp; 123C Remodel</td>
</tr>
</tbody>
</table>

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 **and no/100 Dollars ($ .00**) is hereby accepted, pending final execution of the Agreement.  

<table>
<thead>
<tr>
<th>Base Bid</th>
<th>$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Contract Amount</td>
<td>$ *</td>
</tr>
</tbody>
</table>

You are required to execute the approved Agreement and to furnish the Performance Bond, Labor and Material Payment Bond, Insurance Policy and Certificates of Insurance within ten (10) days from the date of this Notice.  

If you fail to execute said Agreement and to furnish said Performance Bond, Labor and Material Payment Bond, Insurance Policy and Certificates of Insurance within ten (10) days from the date of this Notice, the State Controller will be 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 work, or otherwise dispose thereof.  

By ________________________________________  
By ________________________________________  
Paul M. Leef, AIA, LEED™ AP / Date  
Ronald L. Ried, Director / Date  
Campus Architect  
Director, Planning, Design & Construction  
State Buildings Programs  
(of Authorized Delegate)  
Facilities Management Business Services  
Principal Representative  
(Institution or Agency)  

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

State Form SBP-6.15  
Rev. 9/2006
STATE OF COLORADO
OFFICE OF THE STATE ARCHITECT
STATE BUILDINGS PROGRAMS
University of Colorado at Boulder

CONTRACTOR’S AGREEMENT
DESIGN/BID/BUILD STANDARD FORMAT
(STATE FORM SC-6.21)

CONTRACT ROUTING NO.

AGENCY IDENTIFICATION NO.

PROJECT NO. PR004792

PROJECT NAME: DUAN – Rm C123/123A/123B/ & 123C Remodel

PROJECT MANAGER: Gil Fike

CONTRACTOR:

DATE: August 2010
STATE OF COLORADO
OFFICE OF THE STATE ARCHITECT
STATE BUILDINGS PROGRAMS

CONTRACTOR'S AGREEMENT
DESIGN/BID/BUILD STANDARD FORMAT
(STATE FORM SC-6.21 Rev. 1/2009)

DUAN – Rm C123/123A/123B/ & 123C Remodel

TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>RECITALS</td>
<td>1</td>
</tr>
<tr>
<td>ARTICLE 1. Performance of the Work</td>
<td>1</td>
</tr>
<tr>
<td>ARTICLE 2. Provisions of the Contract Documents</td>
<td>1</td>
</tr>
<tr>
<td>ARTICLE 3. Time of Completion</td>
<td>1</td>
</tr>
<tr>
<td>ARTICLE 4. Essential Condition</td>
<td>1</td>
</tr>
<tr>
<td>ARTICLE 5. Contract Sum</td>
<td>1</td>
</tr>
<tr>
<td>ARTICLE 6. Contract Documents</td>
<td>1</td>
</tr>
<tr>
<td>ARTICLE 7. Safety and Security</td>
<td>1</td>
</tr>
<tr>
<td>SIGNATURE APPROVALS</td>
<td>2</td>
</tr>
</tbody>
</table>

Signed Notice of Award
GC Agreement

Exhibits:
A Contractor's Bid (Form SC-6.13)
B Performance Bond (Form SC-6.22)
C Labor and Material Payment Bond (Form SC-6.221)
D Insurance Certificates
E Minority and Women Business Enterprises Participation Report (MWBE-1)
F Certification and Affidavit Regarding Unauthorized Immigrants (required at contract signing prior to commencing work)
G Sole Source Government Contracts (if applicable)
H Contract Management Information Construction Contractor – Performance Evaluation Report (if applicable)
1. PARTIES. THIS AGREEMENT is entered into by and between the STATE OF COLORADO, acting by and through the Regents of the University of Colorado, a body corporate, hereinafter called the Principal Representative, and (vendor name) having its offices at (vendor address) hereinafter referred to as the Contractor.

2. EFFECTIVE DATE AND NOTICE OF NONLIABILITY. This Agreement 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 Construction Manager for any performance hereunder or be bound by any provision hereof prior to the Effective Date.

WHEREAS, the Principal Representative intends to upgrade three laboratory rooms at the Duane Physics building hereinafter called the Project; and

WHEREAS, authority exists in Law and Funds have been budgeted, appropriated, and otherwise made available, and a sufficient unencumbered balance thereof remains available for payment in Fund Number 410, Speed Type / Account Number 110-63878/16138/17349/66322-515192; Contract Encumbrance Number TBD,

WITNESSETH, that the State of Colorado and the Contractor agree as follows:

ARTICLE 1. PERFORMANCE OF THE WORK
The Contractor shall furnish all the work, labor and materials, and shall perform, to the satisfaction of the Principal Representative and its Architect/Engineer, all of the work required for the complete and prompt execution of everything described or shown in, or reasonably implied from the Contract Documents, including The General Conditions of the Contract and the Drawings and Specifications for the above Project.

ARTICLE 2. PROVISIONS OF THE CONTRACT DOCUMENTS
The Contractor agrees to do the work in a first class, substantial and workmanlike manner to the satisfaction of the State of Colorado and its Architect/Engineer in strict accordance with the provisions of the Contract Documents, including The General Conditions of the Contract and the Drawings and Specifications.

ARTICLE 3. TIME OF COMPLETION
The Contractor agrees to substantially complete the entire Project within 45 calendar days from the date of the Notice to Proceed, and, if applicable, the Contractor agrees to complete the final punch list and finally complete the Project within 10 calendar days. The Contractor shall prosecute the work with due diligence to completion.

ARTICLE 4. ESSENTIAL CONDITION
Timely completion of the project is an essential condition of this Agreement. The Contractor shall be subject to any liquidated damages described in Article 54D of The General Conditions of the Contract for failure to satisfactorily complete the work within the time periods in Article 3 above.

ARTICLE 5. CONTRACT SUM
The Contractor shall be paid for the performance of this Agreement, subject to any additions and deductions as provided for in Articles 32, 34 and 35 of The General Conditions of the Contract, the sum of Thousand, Hundred and no/100 Dollars ($ ).

Base Bid
Add Alternate
Total Contract Amount

ARTICLE 6. CONTRACT DOCUMENTS
The Contract Documents, as enumerated in Article 1 of The General Conditions of the Contract, are all essential parts of this Agreement and are fully incorporated herein.
ARTICLE 7. SAFETY and SECURITY - Contractor understands that concern for the safety and well-being of University students and staff is of particular importance to the University. Contractor expressly acknowledges that it is Contractor’s duty to take reasonable precautions to protect the University’s students and staff. The extent of such precautions will depend on the particular circumstances of the work to be performed. However, to the extent that work to be performed involves security-sensitive functions or security-sensitive areas (e.g. unsupervised access to minors or work involving access to security-sensitive data), such precautions may include, but are not limited to, conducting criminal history checks on employees or agents assigned to such work at the University."

THE PARTIES HERETO HAVE EXECUTED THIS CONTRACT
*Persons signing for Contractor 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.

THE CONTRACTOR
Legal Name of Contracting Entity

*Signature
By
Name (print)  Title

Date:

STATE OF COLORADO, acting by and through:
The Regents of the University of Colorado
A Body Corporate
Ronald L. Ried, Director
Facilities Management Business Services

By:  
Date:

APPROVED
DEPARTMENT OF PERSONNEL & ADMINISTRATION
STATE BUILDINGS PROGRAMS
State Architect (or authorized Delegate)
Paul M. Leef, AIA, LEED TM AP
Campus Architect & Director, Planning, Design & Construction

By:  
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 Contractor 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)
Steve McNally, Associate Vice Chancellor & Controller

By:  
Date:

APPROVED:
STATE OF COLORADO
ATTORNEY GENERAL (or authorized Delegate)

By:  
Date:

Approved by ___
Rev. 1/2009
State of Colorado
Office of the State Architect
State Buildings Programs

Performance Bond

Institution/Agency: University of Colorado at Boulder
Project No./Name: PR004792 / DUAN – Rm C123/123A/123B/ & 123C Remodel

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 the Regents of the University of Colorado, a body corporate, 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 ______________________, 2010, for the construction of a Project described as

which Contract is hereby by reference made a part hereof;
Performance Payment Bond

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. 2010.

(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.
LABOR AND MATERIAL BOND

Institution/Agency: University of Colorado at Boulder
Project No./Name: PR004792 / DUAN – Rm C123/123A/123B/ & 123C Remodel

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 The Regents of the University of Colorado, a body corporate, 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 ___________________________ for the construction of a PROJECT described as DUAN – Rm C123/123A/123B/ & 123C Remodel

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 forbearance 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., 2010.

(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.
THE GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT
DESIGN/BID/BUILD STANDARD FORMAT
(STATE FORM SC-6.23)

Project Name: DUAN – Rm C123/123A/123B/ & 123C Remodel
Project No. PR004792
Project Manager Gil Fike
Date July 2010
# TABLE OF CONTENTS

## THE CONTRACT

**ARTICLE 1. DEFINITIONS**
- A. CONTRACT DOCUMENTS
- B. PROCEDURAL DOCUMENTS
- C. DEFINITIONS OF WORDS AND TERMS USED

**ARTICLE 2. EXECUTION, CORRELATIONS, INTENT OF DOCUMENTS, COMMUNICATIONS AND COOPERATION**
- A. EXECUTION
- B. CORRELATION
- C. INTENT OF DOCUMENTS
- D. PARTNERING, COMMUNICATIONS AND COOPERATION

**ARTICLE 3. COPIES FURNISHED**

**ARTICLE 4. OWNERSHIP OF DRAWINGS**

## THE ARCHITECT

**ARTICLE 5. ARCHITECT/ENGINEER’S STATUS**

**ARTICLE 6. ARCHITECT/ENGINEER DECISIONS AND JUDGMENTS**
- A. DECISIONS
- B. JUDGMENTS
- C. ACCESS TO WORK
- D. INSPECTION

## THE CONTRACTOR

**ARTICLE 7. CONTRACTOR’S SUPERINTENDENCE AND SUPERVISION**

**ARTICLE 8. MATERIALS AND EMPLOYEES**

**ARTICLE 9. SURVEYS, PERMITS, LAWS, TAXES AND REGULATIONS**
- A. SURVEYS
- B. PERMITS AND LICENSES
- C. TAXES
- D. LAWS AND REGULATIONS

**ARTICLE 10. PROTECTION OF WORK AND PROPERTY**
- A. GENERAL PROVISIONS
- B. SAFETY PRECAUTIONS
- C. EMERGENCIES

**ARTICLE 11. DRAWINGS AND SPECIFICATIONS ON THE WORK**

**ARTICLE 12. REQUESTS FOR INFORMATION AND SCHEDULES**
- A. REQUESTS FOR INFORMATION
- B. SCHEDULES

**ARTICLE 13. SHOP DRAWINGS, PRODUCT DATA AND SAMPLES**
- A. SUBMITTAL PROCESS
- B. FABRICATION AND ORDERING
- C. DEVIATIONS FROM DRAWINGS OR SPECIFICATIONS
- D. CONTRACTOR REPRESENTATIONS

**ARTICLE 14. SAMPLES AND TESTING**
- A. SAMPLES
- B. TESTING – GENERAL
- C. TESTING – CONCRETE AND SOILS
- D. TESTING – OTHER

**ARTICLE 15. SUBCONTRACTS**

**ARTICLE 16. RELATIONS OF CONTRACTOR AND SUBCONTRACTOR**

**ARTICLE 17. MUTUAL RESPONSIBILITY OF CONTRACTORS**

**ARTICLE 18. SEPARATE CONTRACTS**

**ARTICLE 19. USE OF PREMISES**

**ARTICLE 20. CUTTING, FITTING OR PATCHING**
ARTICLE 21. UTILITIES
A. TEMPORARY UTILITIES
B. PROTECTION OF EXISTING UTILITIES
C. CROSSING OF UTILITIES
ARTICLE 22. UNSUITABLE CONDITIONS
ARTICLE 23. TEMPORARY FACILITIES
A. OFFICE FACILITIES
B. TEMPORARY HEAT
C. WEATHER PROTECTION
D. DUST PARTITIONS
E. BENCH MARKS
F. SIGN
G. SANITARY PROVISION
ARTICLE 24. CLEANING UP
ARTICLE 25. INSURANCE
A. GENERAL LIABILITY, PROPERTY DAMAGE AND AUTOMOBILE
B. WORKERS’ COMPENSATION INSURANCE
C. BUILDER’S RISK INSURANCE
D. ADDITIONAL MISCELLANEOUS INSURANCE PROVISIONS
ARTICLE 26. CONTRACTOR’S PERFORMANCE AND PAYMENT BONDS
ARTICLE 27. LABOR AND WAGES
ARTICLE 28. ROYALTIES AND PATENTS
ARTICLE 29. ASSIGNMENT
ARTICLE 30. CORRECTION OF WORK BEFORE ACCEPTANCE
PAYMENT AND COMPENSATION
ARTICLE 31. APPLICATIONS FOR PAYMENTS
A. CONTRACTOR’S SUBMITTALS
B. ARCHITECT/ENGINEER CERTIFICATION
C. RETAINAGE WITHHELD
D. RELEASE OF RETAINAGE
ARTICLE 32. CERTIFICATES FOR PAYMENTS
ARTICLE 33. PAYMENTS WITHHELD
ARTICLE 34. DEDUCTIONS FOR UNCORRECTED WORK
ARTICLE 35. CHANGES IN THE WORK
A. THE VALUE OF CHANGED WORK
B. DETAILED BREAKDOWN
C. EMERGENCY FIELD CHANGE ORDERED WORK
D. APPROPRIATION LIMITATIONS – § 24-91-103.6, C.R.S., as amended
ARTICLE 36. CLAIMS
ARTICLE 37. DIFFERING SITE CONDITIONS
A. NOTICE IN WRITING
B. LIMITATIONS
ARTICLE 38. DELAYS AND EXTENSIONS OF TIME
ARTICLE 39. NON-BINDING DISPUTE RESOLUTION – FACILITATED NEGOTIATIONS
COMPLETION
ARTICLE 40. RIGHT OF OCCUPANCY
ARTICLE 41. COMPLETION, FINAL INSPECTION, ACCEPTANCE AND SETTLEMENT
A. NOTICE OF COMPLETION
B. FINAL INSPECTION
C. NOTICE OF SUBSTANTIAL COMPLETION
D. NOTICE OF ACCEPTANCE
E. SETTLEMENT
ARTICLE 42. GENERAL WARRANTY AND CORRECTION OF WORK AFTER ACCEPTANCE
ARTICLE 43. LIENS
ARTICLE 44. ONE-YEAR GUARANTEE AND SPECIAL GUARANTEES AND WARRANTIES.........................................................38
A. ONE-YEAR GUARANTEE OF THE WORK.................................................................38
B. SPECIAL GUARANTEES AND WARRANTIES.........................................................38
ARTICLE 45. GUARANTEE INSPECTIONS AFTER COMPLETION..........................................................38
ARTICLE 46. TIME OF COMPLETION AND LIQUIDATED DAMAGES.........................................................39
ARTICLE 47. DAMAGES.................................................................................................40
ARTICLE 48. STATE’S RIGHT TO DO THE WORK; TEMPORARY SUSPENSION OF WORK; DELAY DAMAGES.................................................................41
A. STATE’S RIGHT TO DO THE WORK.................................................................41
B. TEMPORARY SUSPENSION OF WORK.................................................................41
C. DELAY DAMAGES.................................................................................................42
ARTICLE 49. STATE’S RIGHT TO TERMINATE CONTRACT.................................................................42
A. GENERAL.................................................................................................................42
B. CONDITIONS AND PROCEDURES............................................................................42
C. ADDITIONAL CONDITIONS....................................................................................43
ARTICLE 50. TERMINATION FOR CONVENIENCE OF STATE.................................................................43
A. NOTICE OF TERMINATION....................................................................................43
B. PROCEDURES.........................................................................................................43
ARTICLE 51. CONTRACTOR’S RIGHT TO STOP WORK AND/OR TERMINATE CONTRACT..............44
ARTICLE 52. SPECIAL PROVISIONS..................................................................................45
A. CONTROLLER’S APPROVAL....................................................................................45
B. FUND AVAILABILITY...............................................................................................45
C. GOVERNMENTAL IMMUNITY.................................................................................45
D. INDEPENDENT CONTRACTOR...............................................................................45
E. COMPLIANCE WITH LAW......................................................................................45
F. CHOICE OF LAW.....................................................................................................45
G. BINDING ARBITRATION PROHIBITED.......................................................................45
H. SOFTWARE PIRACY PROHIBITION..........................................................................46
I. EMPLOYEE FINANCIAL INTEREST/CONFLICT OF INTEREST.................................46
J. VENDOR OFFSET....................................................................................................46
K. PUBLIC CONTRACTS FOR SERVICES......................................................................46
L. PUBLIC CONTRACTS WITH NATURAL PERSONS......................................................46
ARTICLE 53. MISCELLANEOUS PROVISIONS..................................................................................46
A. CONSTRUCTION OF LANGUAGE............................................................................46
B. SEVERABILITY.........................................................................................................46
C. SECTION HEADINGS..............................................................................................47
D. AUTHORITY.............................................................................................................47
E. INTEGRATION OF UNDERSTANDING....................................................................47
F. VENUE.....................................................................................................................47
G. NO THIRD PARTY BENEFICIARIES........................................................................47
H. WAIVER..................................................................................................................47
I. INDEMNIFICATION..................................................................................................47
J. STATEWIDE CONTRACT MANAGEMENT SYSTEM..................................................47
ARTICLE 54. OPTIONAL PROVISIONS AND ELECTIONS.................................................................47
A. MODIFICATION OF ARTICLE 45. GUARANTEE INSPECTIONS AFTER COMPLETION.............47
B. MODIFICATION OF ARTICLE 27. LABOR AND WAGES..............................................47
C. MODIFICATION OF ARTICLE 39. NON-BINDING DISPUTE RESOLUTION – FACILITATED NEGOTIATIONS.................................................................................................47
D. MODIFICATION OF ARTICLE 46. TIME OF COMPLETION AND LIQUIDATED DAMAGES........48
E. NOTICE IDENTIFICATION.......................................................................................48
INDEX.........................................................................................................................50

Note: The sections of the General Conditions indicated in italics (Articles 35 General and 35A, 35B, 37, 38, 46, 48B, 49 and 50) are regulatory and cannot be modified except through appropriate rule making procedures through the Division of Finance and Procurement, Department of Personnel & Administration.
General Conditions of Contract

ARTICLE 1. DEFINITIONS

A. CONTRACT DOCUMENTS

The Contract Documents consist of:

1. Agreement (SC-6.21);
2. Performance Bond (SC-6.22) and Labor and Material Payment Bond (SC-6.221);
3. General and Supplementary General Conditions of the Contract (SC-6.23);
4. Detailed Specification Requirements, including all addenda issued prior to the opening of the bids; and,
5. Drawings, including all addenda issued prior to the opening of the bids.
6. Change Orders (SC-6.31) and Amendments (SC-6.0), if any, when properly executed.

B. PROCEDURAL DOCUMENTS

The Procedural Documents used in the administration and performance of the Agreement consist of:

1. Authorization to Bid (SBP-6.10)
2. Information for Bidders (SBP-6.12);
3. Bid (SBP-6.13);
4. Bid Bond (SBP-6.14);
5. Notice of Award (SBP-6.15);
6. Builder’s risk insurance certificates of insurance (ACORD 25-S);
7. Liability and workers’ compensation certificates of insurance;
8. Notice to Proceed (Design/Bid/Build) (SBP-6.26);
9. Notice of Approval of Occupancy/Use (SBP-01); Notice of Partial Substantial Completion (SBP-071);
10. Notice of Substantial Completion (SBP-07);
11. Notice of Substantial Completion (SBP-07);
12. Notice of Partial Final Acceptance (SC-6.27);
13. Notice of Final Acceptance (SC-6.271);
14. Notice of Partial Contractor’s Settlement (SC-7.3);
15. Notice of Contractor’s Settlement (SC-7.31);
16. Application and Certificate for Contractor’s Payment (SBP-7.2);
17. Other procedural and reporting documents or forms referred to in the General Conditions, the Supplementary General Conditions, the Specifications or required by the State Buildings Programs or the Principal Representative, including but not necessarily limited to Pre-Acceptance Check List (SBP-05) and Pre-Acceptance Punch List (SBP-06), and the Building Inspection Record (SBP-BIR). A list of the current standard State Buildings Programs forms applicable to this Contract may be obtained from the Principal Representative on request.

C. 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 Contractor for the performance of the Work and payment therefore, on State Form SC-6.21. The term Agreement when used without reference to State Form SC-6.21 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. 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.

3. 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.

4. CHANGE ORDER. The term “Change Order” means a written order, signed by a Procurement Officer, directing the Contractor to make changes in the Work, in accordance with Article 35A, The Value of Changed Work.

5. COLORADO LABOR. The term “Colorado labor” shall be defined, as provided in § 8-17-101, C.R.S., as any person who is a resident of the state of Colorado, at the time of employment, without discrimination as to race, color, creed, sex, age, or religion except when sex or age is a bona fide occupational qualification, or shall have such other meaning as the term may otherwise be given in § 8-17-101, C.R.S., as amended.

6. CONTRACTOR. The word “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

7. 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.

8. 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.

9. 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 35C 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 35C.

10. 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.

11. 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 54E, 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 54E. 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.
12. OWNER. The term “Owner” shall mean the Principal Representative.

13. PRINCIPAL REPRESENTATIVE. The term “Principal Representative” shall be defined, as provided in § 24-30-1301(11), C.R.S., 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 § 24-30-1301(11), C.R.S., as amended. The Principal Representative may delegate authority. The Contractor 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.

14. PROCUREMENT OFFICER. The term “Procurement Officer” means any person duly authorized to enter into and administer contracts and make written determinations with respect thereto. “Procurement Officer” includes an authorized representative of the Principal Representative acting within the limits of his or her authority.

15. PRODUCT DATA. The term “Product Data” shall mean all submittals in the form of printed manufacturer’s literature, manufacturer’s specifications, and catalog cuts.

16. 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 Contractor 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. The phrase shall not, however, be construed to make the Contractor, rather than the Architect/Engineer, responsible for producing the Drawings and Specifications.

17. SAMPLES. The term “Samples” shall mean examples of materials or work provided to establish the standard by which the Work will be judged.

18. 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 Contract).

19. 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).

20. SHOP DRAWINGS. The term “Shop Drawings” shall mean any and all detailed drawings prepared and submitted by Contractor, Subcontractor at any tier, vendors or manufacturers providing the products and equipment specified on the Drawings or called for in the Specifications.

21. SPECIFICATIONS. The term “Specifications” shall mean the requirements of divisions 1 through 17 of the project manual prepared by the Architect/Engineer describing the work to be accomplished.

22. STATE BUILDINGS PROGRAMS. The term “State Buildings Programs” is the shortened name of the division of State Buildings Programs. It shall refer to the division of the executive department of 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 § 24-30-1301, et seq, C.R.S. The term State Buildings Programs 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 Programs.

23. SUBMITTALS. The term “submittals” means drawings, lists, tables, documents and samples prepared by the Contractor 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 required by the Contract Documents, but except to the extent expressly specified otherwise are not themselves a part of the Contract Documents.
24. **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.

25. **SURETY.** The term “Surety” shall mean the company providing the labor and material payment and performance bonds for the Contractor as obligor.

26. **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 Contractor to meet the Contractor’s obligations under the Contract.

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

**A. EXECUTION**

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

1. Execute the Agreement, State Form SC-6.21;
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.

**B. CORRELATION**

By execution of the Agreement the Contractor represents that the Contractor 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 Contractor shall have the same explained or adjusted by the Architect/Engineer before proceeding with the work in question. In the event of the Contractor’s failure to give prior written Notice of any such errors or disagreements of which the Contractor or the Subcontractors at any tier are aware, the Contractor 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 Architect/Engineer 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 Agreement (SC-6.21);
2. The Supplementary General Conditions, if any;
3. The General Conditions (SC-6.23); and
4. 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 Contractor 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 Contractor 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 Contractor 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 Contractor 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 Contractor shall endeavor to return all Drawings and Specifications.

The Contractor may retain the Contractor’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 Contractor 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 Contractor to timely interpret and make decisions with respect to questions relating to the design or concerning the Contract Documents.

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 Contractor'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 Contractor, 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 Contractor 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 Contractor 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 Contractor shall proceed with the ordered work. Disagreement with the decision of the Architect/Engineer shall not be grounds for the Contractor 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 Programs shall at all times have access to the work. The Contractor 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 Contractor, the Architect/Engineer has agreed to observe, among other aspects of the Work, the following for compliance with the Contract Documents:

1. Bearing surfaces of excavations before concrete is placed based upon the findings and recommendations of the Principal Representative's soils engineering consultant;
2. Reinforcing steel after installation and before concrete is poured;
3. Structural concrete;
4. Laboratory reports on all concrete testing based upon the findings and recommendations of the Principal Representative's testing consultant;
5. Structural steel during and after erection and prior to its being covered or enclosed;
6. Steel welding; Principal Representative will furnish steel welding inspection consultant/agency if required or necessary for the project;
7. Mechanical and plumbing work following its installation and prior to its being covered or enclosed;
8. Electrical work following its installation and prior to its being covered or enclosed;
9. Compaction testing reports based upon the findings and recommendations of the Principal Representative’s testing consultant; 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 Contractor shall give the Architect/Engineer 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 Contractor. The Contractor 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 Contractor 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 such work is covered up without approval or consent of the Architect/Engineer or prior to any building code inspection, it must, if required by the Architect/Engineer, the Principal Representative or the State Buildings Programs, be uncovered for examination, at the Contractor’s expense. If such work is found to be not in accordance with the Contract Documents, the Contractor shall pay such costs, unless he or she shall show that the defect in the work was caused by another contractor engaged by the Principal Representative. In that event, the Principal Representative shall pay such cost. In addition, examination of questioned work may be ordered, and if so ordered, the work must be uncovered by the Contractor. If such work be found in accordance with the Contract Documents, the Contractor shall be reimbursed the cost of examination and replacement.

ARTICLE 7. CONTRACTOR’S SUPERINTENDENCE AND SUPERVISION
The Contractor 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 Contractor and ceases to be in his or her employ. The superintendent shall represent the Contractor in his or her absence and all directions given to the superintendent shall be as binding as if given to the Contractor. Directions received by the superintendent shall be documented by the superintendent and confirmed in writing with the Contractor.

The Contractor 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 Contractor 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 Contractor knew or had reason to know, that damage would result by proceeding and the Contractor 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 Contractor’s superintendent shall establish all lines, levels, and marks necessary to facilitate the operations of all concerned in the Contractor’s Work. The Contractor 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 Contractor 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 Contractor shall, if required, furnish satisfactory evidence as to the kind and quality of materials.

The Contractor is fully responsible for all acts and omissions of the Contractor’s employees and shall at all times enforce strict discipline and good order among employees on the site. The Contractor 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 Contractor. Unless otherwise specified in the Specifications, no local municipal or county building permit shall be required. However, State Buildings Programs 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 Contractors’ 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 Contractor 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 Contractor 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 Contractor shall maintain records of such payments in respect to the Work, which shall be separate and distinct from all other records maintained by the Contractor, and the Contractor 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 Contractor 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 Contractor 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 Contractor or to a Subcontractor at any tier, a certificate or certificates of exemption per § 39-26-114(1)(d), C.R.S., and § 39-26-203, C.R.S.

   2. FEDERAL TAXES
      The Contractor shall exclude the amount of any applicable federal excise or manufacturers' taxes from the proposal. The Principal Representative will furnish the Contractor, on request exemption certificates.

D. LAWS AND REGULATIONS
   The Contractor 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 Contractor observes that the Drawings or Specifications require work which is at variance therewith, the Contractor 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 Contractor shall bear all costs arising from the performance of work required by the Drawings or Specifications that the Contractor 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 Contractor 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 Contractor 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 Contractor’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 Contractor;

B. SAFETY PRECAUTIONS
The Contractor 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 Contractor.

The Contractor 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 Contractor shall not permit open fires within the building enclosure. The Contractor 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 Contractor 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 Contractor 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 Contractor 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 Contractor has no responsibilities for the emergency, if the Contractor 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 Contractor 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 Contractor and Subcontractors to reflect actual constructed conditions including dimensioned locations of underground work.
and the Contractor'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 Contractor shall keep on the job site one copy of all approved addenda, Change Orders and requests for information issued for the Work.

The Contractor 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. REQUESTS FOR INFORMATION

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 Contractor shall do no work without proper drawings, specifications or instructions. If the Contractor believes additional instructions, specifications or drawings are needed for the performance of any portion of the Work, the Contractor 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 Contractor shall maintain a log of the requests for information and the responses provided.

B. SCHEDULES

1. SUBMITTAL SCHEDULES

Prior to filing the Contractor’s first application for payment, 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. 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 Contractor, 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 Contractor 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 Contractor 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 Contractor 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 Contractor’s schedules and shall inform the Contractor and the Principal Representative of the basis of any refusal to agree to the Contractor’s schedules. The Principal Representative shall attempt to resolve any disagreements.

2. SCHEDULE OF VALUES

Within twenty-one (21) calendar days after the date of the Notice to Proceed, the Contractor shall submit to the Architect/Engineer and Principal Representative, for approval, and to the State Buildings Programs when specifically requested, a complete itemized schedule of the values of the various parts of the Work, as estimated by the Contractor, 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 Contractor 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 of:

a. Material, which shall include the cost of material actually built into the Project plus any local sales or use tax paid thereon; and,

b. Labor and other costs.

The cost of subcontracts shall be incorporated in the Contractor’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 Contractor 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 Contractor 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 Contractor, further breakdown of subcontracts, including breakdown by labor and materials, may be directed.

This schedule of values, when approved, will be used in preparing Contractor’s applications for payment on State Form SC-7.2, Application for Payment.

3. CONSTRUCTION SCHEDULES

Within twenty-one (21) calendar days after the date of the Notice to Proceed, the Contractor shall submit to the Architect/Engineer and the Principal Representative, and to the State Buildings Programs 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 Contractor’s schedule shall be a critical-path method (CPM) construction schedule. The CPM schedule shall start with the date of the Notice to Proceed 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 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 Contractor shall submit monthly updates of the construction schedule. These updates shall
reflect the Contractor’s “work in place” progress.

When requested by the Architect/Engineer, the Principal Representative or the State Buildings
Programs, the Contractor shall revise the construction schedule to reflect changes in the
schedule of values.

When the testing of materials is required by the Specifications, the Contractor 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 Contractor shall check and field verify all dimensions. The Contractor 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 Contractor 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 Contractor 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 Contractor 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 Contractor 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 Contractor 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 Contractor 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 Contractor 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 Contractor 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 bringing 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. **CONTRACTOR REPRESENTATIONS**

By preparing, approving, and/or submitting Shop Drawings, Product Data and Samples, the Contractor represents that the Contractor has determined and verified all materials, field measurements, and field construction criteria related thereto, and has checked and co-ordinated 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 Contractor shall furnish for approval, with such promptness as to cause no delay in his or her work or in that of any other Contractor, 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 Contractor 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 Contractor 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 Contractor 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 Contractor.

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 Contractor shall assume the responsibility of arranging, scheduling and coordinating the concrete sample collection efforts and soils compaction efforts. Testing shall be performed in accordance with the requirements of the Specifications, and if no requirements are specified, the Contractor 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 Contractor 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 Contractor 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
The Contractor shall, within twenty one (21) days after the date of the Notice of Award, submit to the Architect/Engineer, the Principal Representative and State Buildings Programs a preliminary list of Subcontractors. It shall be as complete as possible at the time, showing all known Subcontractors planned for the work. The list shall be supplemented as other Subcontractors are determined by the Contractor and any such supplemental list shall be submitted to the Architect/Engineer, the Principal Representative and State Buildings Programs not less than ten (10) days before the Subcontractor commences work.

The Contractor's list shall include those Subcontractors, if any, which the Contractor indicated in its bid would be employed for specific portions of the Work if such indication was requested in the bid documents issued by the State. The substitution of any Subcontractor listed in the Contractor’s bid shall be justified in writing not less than ten (10) days after the date of the Notice of Award, 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 Contractor shall bear any additional cost incurred by such substitutions.

The Contractor shall not employ any Subcontractor that the Architect/Engineer, within seven (7) days after the date of receipt of the Contractor'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 Programs. If a Subcontractor is deemed unacceptable, the Contractor 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 Contractor 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 Contractor.

ARTICLE 16. RELATIONS OF CONTRACTOR AND SUBCONTRACTOR
The Contractor 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 Contractor 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 Contractor cause damage to any separate contractor on the work, the Contractor 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 Contractor, who shall defend such proceedings if requested to do so by Principal Representative. If any judgment against the Principal Representative arises there from, the Contractor shall pay or satisfy it and pay all costs and reasonable attorney fees incurred by the Principal Representative, in accordance with Article 52C, Indemnification, provided the Contractor 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 Contractor 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 Contractor’s work depends, for proper execution or results, upon the work of any other contractor, the Contractor 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 Contractor 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 Contractor’s work after the execution of the Contractor's work.

To insure the proper execution of subsequent work, the Contractor 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 Contractor 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 Contractor shall not unreasonably encumber the premises with materials.

The Contractor shall enforce all of the Architect/Engineer’s instructions and prohibitions regarding, without limitation, such matters as signs, advertisements, fires and smoking.

ARTICLE 20. CUTTING, FITTING OR PATCHING
The Contractor 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 Contractor 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 Contractor's compliance with all statutory or regulatory requirements to call for utility locates. When actual conditions deviate from those shown the Contractor shall comply with the requirements of Article 37, Differing Site Conditions. The Contractor 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 Contractor 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 Contractor 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 Contractor shall secure proper written permission before executing such new construction. The Contractor will be required to furnish a proper release before final acceptance of the Work.

ARTICLE 22. UNSUITABLE CONDITIONS
The Contractor 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 Contractor 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 Contractor provided Notice of any additional cost.

ARTICLE 23. TEMPORARY FACILITIES
A. OFFICE FACILITIES
The Contractor shall provide and maintain without additional expense for the duration of the Project temporary office facilities, as required and as specified, for his or her own use and the use of the Architect/Engineer, representatives of the Principal Representative and State Buildings Programs.

B. TEMPORARY HEAT
The Contractor 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 Contractor desires to put the permanent system into use, in whole or in part, the Contractor 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 Contractor 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 Contractor shall provide manufacturers’ extended warranties from the date of the Contractor’s use prior to the date of the Notice of Substantial Completion.

C. WEATHER PROTECTION
The Contractor shall, at all times, provide protection against weather, so as to maintain all work, materials, apparatus and fixtures free from injury or damages.

D. DUST PARTITIONS
If the Work involves work in an occupied existing building, the Contractor 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 Contractor 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 Contractor to layout the work and ascertain all grades and levels as needed.

F. SIGN
The Contractor 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 Contractor 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 Contractor 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.

ARTICLE 24. CLEANING UP
The Contractor 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 LIABILITY, PROPERTY DAMAGE AND AUTOMOBILE
The Contractor shall procure and maintain comprehensive commercial general liability and property damage insurance and comprehensive automobile liability and property damage insurance as hereinafter specified, at his or her own expense, during the life of this Contract. This insurance shall include a provision preventing cancellation without forty-five (45) days' prior Notice by certified mail and shall state whether the coverage is “claims made” or “per occurrence”. The Contractor shall obtain “per occurrence” insurance unless otherwise agreed in writing by the Principal Representative. A completed Certificate of Insurance shall be filed with State Buildings Programs 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.

This insurance must protect the Contractor from all claims for bodily injury, including death, and all claims for destruction of or damage to property, arising out of or in connection with, any operations under this Contract, whether such operations be by the Contractor or by any Subcontractor under him or anyone directly or indirectly employed by the Contractor or by a Subcontractor. All such insurance shall be written with limits and coverages as specified below and shall be written on a Comprehensive Form of Policy. In the event any of the hazards or exposures, normally listed in standard policies as “Exclusions”, are involved or required under this Contract, then such hazards or exposures shall be covered and protection afforded under the policy and such exclusions (X), (c) and (u), as excerpted from standard policies, must be removed from the policy as listed below:

“(X) Injury to or destruction of any property arising out of blasting or explosion, other than the explosion of air or steam vessels, piping under pressure, prime movers, machinery of power transmitting equipment”

“(c) The collapse of or structural injury to any building or structure due to: (1) grading of land, excavating, burrowing, filling, backfilling, tunneling, pile driving, caisson work or other work; or (2) moving, shoring, underpinning, raising or demolition of any building or structure, or removal or rebuilding of any structural support thereof;”

“(u) (1) injury to or destruction of wires, conduits, pipes, mains, sewers or other similar property, or any apparatus in connection therewith, below the surface of the ground, if such injury or destruction is caused by and occurs during the use of mechanical equipment for the purpose of grading of land, paving, excavating or drilling; or, (2) injury to or destruction of property at any time resulting there from.”

Such insurance shall be written with limits and coverages as follows, and the State of Colorado shall be named as an additional insured listed on the Acord form. The additional insured endorsement shall be requested on Insurance Services Office, Inc. (ISO) endorsement form No. CG20101185. If CG20101185 is not available, the endorsement shall be furnished by CG20101093. Additionally, CG20371001 shall be included, if possible. All aggregate amounts must be specified on the Acord form.

Rev. 8/2009
SC-6.23
A. **Commercial General Liability (CGL)**, (including bodily injury, personal injury and property damage) with the following coverages depending upon format:

1. Occurrence basis policy-combined single limit of $1,000,000
2. Annual Aggregate limit policy-not less than $2,000,000

   (Acord example) Minimum limits:
   - $1,000,000 each occurrence
   - $2,000,000 general aggregate with dedicated limits per project site
   - $2,000,000 products and completed operations aggregate

The following coverages shall be included in the CGL:

1. Premises-Operations
2. Explosion/Collapse Hazard
3. Underground Hazard
4. Products/Completed Operations Hazard
5. Broad Form Contractual
6. Independent Contractors
7. Broad Form Property Damage
8. Personal Injury

B. **Automobile Liability** and business auto liability covering liability arising out of any auto (including owned, hired and non-owned autos).

   Occurrence basis policy-combined single limit of $1,000,000

   (Acord example) Minimum limit: $1,000,000 combined single limit each accident

   Coverages:

1. Specific waiver of subrogation
2. Contractual liability

C. **Umbrella/Excess Liability** *(for construction projects exceeding $10,000,000, provide the following coverage)*: The vendor shall maintain umbrella/excess liability insurance on an occurrence basis in excess of the underlying insurance described in Sections A, B, and D, which is at least as broad as each and every area of the underlying policies. The amounts of insurance required in Sections A, B, and D may be satisfied by the vendor 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.

   (Acord example) Minimum limit: $5,000,000 combined single limit and aggregate limit

   Coverages:

1. Additional insured endorsement
2. Pay on behalf of wording
3. Concurrency of effective dates with primary
4. Blanket contractual liability
5. Punitive damages coverage (where not prohibited by law)

**B. WORKERS’ COMPENSATION INSURANCE**

The Contractor 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. This insurance, if issued by a private carrier, shall contain the same forty-five (45) days’ Notice of cancellation as required in Article 25, Insurance for the Comprehensive General Liability Insurance. Evidence of such insurance shall be by the issuance of either a Certificate by the State Compensation
Insurance Fund (or its successor) or, if issued by a private carrier, the completion of a Certificate of Insurance, and such Certificate shall be filed with the State Buildings Program. The Certificate shall be filed within ten (10) days after the date of the Notice of Award.

The Contractor 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 Contractor 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 Contractor shall provide, and shall cause each Subcontractor to provide, adequate and suitable insurance for the protection of employees not otherwise protected.

C. **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 Contractor shall effect and maintain a policy of insurance to provide, at Contractor’s expense, All Risk Builder’s Risk Insurance Coverage which shall be in the dollar amount of the total Project for which the Work of this Contract is to be done. Such policy may have a deductible clause but not to exceed ten thousand dollars ($10,000.00).

The Contractor shall waive all rights of subrogation as regards the State of Colorado, its officials, its officers, its agents and its employees, all while acting within the scope and course of their employment. The Insurer shall not void such insurance policy by reason of the Contractor waiving said rights. The Contractor 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. The insurance shall remain in effect until the Date of Notice specified on the Notice of Acceptance, State Form SBP-6.27, whether or not the building or some part thereof is occupied in any manner prior to final acceptance of the Project, and shall remain fully in effect not withstanding any acceptance of the work of any Subcontractor on the Project. Such insurance shall be in an amount equal to the total insurable value of the construction. 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, or materials or equipment to be incorporated in the Project, under other independent contracts let or to be let. In such event, the Contractor 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.

All such insurance shall insure the State of Colorado acting by and through its Principal Representative, the Contractor and his or her Subcontractors at any tier as their interests may appear. The insurance shall include a loss payable provision naming the State Controller, as loss payee.

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.

The Certificate of Insurance shall specifically state the inclusion of the provisions herein above. A certificate for such insurance shall be filed with State Buildings Programs within ten (10) days after date of Notice of Award. The Insurance shall include a provision preventing cancellation without forty five (45) days’ prior Notice in writing by certified mail.

D. **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. The clause entitled “Other Insurance Provisions” contained in any policy including the State of Colorado as an additional named insured shall not apply to the State of Colorado;
2. Any and all deductibles or self-insured retentions contained in any Insurance policy shall be assumed by and at the sole risk of the Contractor;
3. 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 Contractor shall promptly obtain a new policy, submit the same to State Building Programs for approval if requested, and submit a Certificate of Insurance as hereinbefore provided. Upon failure of the Contractor 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 Contractor in obtaining and/or maintaining any required insurance shall not relieve the Contractor from any liability under the Contract, nor shall the insurance requirements be construed to conflict with the obligations of the Contractor concerning indemnification;

4. All requisite insurance shall be obtained from financially responsible insurance companies, authorized to do business in the State of Colorado and acceptable to the State;

5. Receipt, review or acceptance by the State of any insurance policies or certificates of insurance required by this Contract shall not be construed as a waiver or relieve the Contractor from its obligation to meet the insurance requirements contained in these General Conditions.

ARTICLE 26. CONTRACTOR’S PERFORMANCE AND PAYMENT BONDS

The Contractor 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 Programs 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 Programs.

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 Contractor shall furnish to State Buildings Programs within ten (10) days after receipt of Notice from the State or after the Contractor otherwise becomes aware of such conditions.

ARTICLE 27. LABOR AND WAGES

In accordance with laws of Colorado, C.R.S. § 8-17-101, et. seq., as amended, Colorado labor shall be employed to perform the work to the extent of not less than eighty percent (80%) of each type or class of labor in the several classifications of skilled and common labor employed on the Project. If the Federal Davis-Bacon Act shall be applicable to the Project, as indicated in Article 54B, Modification of Article 27, the minimum wage rates to be paid on the Project will be specified in the Contract Documents.

ARTICLE 28. ROYALTIES AND PATENTS

The Contractor 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 Contractor 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 52C, Indemnification; provided, however, the Contractor 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 Contractor is unaware, or for any patent violations based on specified processes that the Contractor is unaware are patented or that the Contractor should not have had reason to believe were patented.

ARTICLE 29. ASSIGNMENT

Except as otherwise provided hereafter the Contractor 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 Section 4-9-406, C.R.S., 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 Contractor 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 Contractor 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 Contractor 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 Contractor or the assignee.

ARTICLE 30. CORRECTION OF WORK BEFORE ACCEPTANCE

The Contractor 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 Contractor 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.

If the Contractor 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 Contractor and the Surety, remove them and may store the material at the Contractor's expense. The Principal Representative may accomplish the removal and replacement with its own forces or with another Contractor. If the Contractor 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 Contractor. If the Contractor shall commence and diligently pursue such removal and replacement before the expiration of the seven day period, or if the Contractor 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.

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 Contractor.

If the Contractor 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 Contractor'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 Contractor disagrees with the Notice to remove work or materials condemned or declared irreparably defective, the Contractor 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 Contractor 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 Contractor’s responsibility to notify the Architect/Engineer at least forty-eight (48) hours in advance of such covering operation. If the Contractor fails to provide such notification, Contractor 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 Contractor shall coordinate with the Architect/Engineer regarding the continuing
covering operation.

ARTICLE 31. APPLICATIONS FOR PAYMENTS
A. CONTRACTOR'S SUBMITTALS
On or before the first day of each month and no more than five days prior thereto, the Contractor 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 within
thirty (30) days after the last day of the period for which payment is requested. The Contractor shall
submit the application for payment to the Architect/Engineer on State forms SBP-7.2, Certificate for
Contractor's Payment, or such other format as the State Buildings Programs shall approve, in an
itemized format in accordance with the schedule of values or a cost loaded CPM 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 Contractor'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 Contractor 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 Contractor 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 Contractor’s application for payment, a copy shall be forwarded to
the Contractor.

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 Contractor 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 Contractor is entitled, or return
the application for payment to the Contractor 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 ten
percent (10%) of the amount shown to be due the Contractor on each application for payment shall be
withheld until fifty percent (50%) of the work required by the Contract has been performed. Thereafter,
the remaining Certificates for Contractor's Payment (SBP-7.2) shall be paid without retaining additional
funds, if in the opinion of the Architect/Engineer and the Principal Representative, satisfactory progress
is being made in the Work. The withheld percentage of the contract price of any such work,
improvement, or construction shall be administered according to § 24-91-101, et seq., C.R.S., as
amended, and except as provided in § 24-91-103, C.R.S., 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 Contractor 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 Contractor, and the Principal Representative. Any such request shall be supported by a written approval from the Surety furnishing the Contractor’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 Contractor, 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 Contractor’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 Contractor 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 Contractor’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 Contractor’s Application for Payment, and shall be a representation by the Contractor 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 Programs 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 Contractor 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 Contractor 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 Contractor from the Contract Documents; or
12. On account of liquidated damages.

In addition, the Architect Engineer, Principal Representative or State Buildings Programs may withhold or nullify the whole or any part of any application for any reason noted elsewhere in these General Conditions of the Contract. 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 injured 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 Contractor of intent to do so, make reasonable reductions from the amounts otherwise due the Contractor on the next application for payment. Notice shall specify the amount or terms of any contemplated reduction. The Contractor may during this period elect to correct or perform the work. If the Contractor does not elect to 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 notice period shall be extended and tolled until facilitation has occurred.

ARTICLE 35. CHANGES IN THE WORK
The Principal Representative, or such other Procurement Officer as the Principal Representative may designate, without invalidating the Agreement, and with the approval of State Buildings Programs and the State Controller, may order extra work or make changes with or without the consent of the Contractor 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 Contractor 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 Programs, 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 Programs as hereafter provided in Article 35C, 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 Contractor and the Principal Representative cannot agree on the value of extra work, the Principal Representative may order the Contractor 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 Contractor pursuant to the claims process in Article 36, Claims. The Principal Representative is the Procurement Officer for purposes of all of the remedies provisions of the Contract.
3. Except as otherwise provided in Article 35B, Detailed Breakdown, below, the Cost Principles of the Colorado Procurement Rules in effect on the date of this Contract, pursuant to § 24-107-101, C.R.S., as amended, 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 Contractor’s bid or the Agreement, a detailed change proposal shall be submitted by the Contractor 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 Contractor 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.

<table>
<thead>
<tr>
<th></th>
<th>OVERHEAD</th>
<th>PROFIT</th>
<th>COMMISSION</th>
</tr>
</thead>
<tbody>
<tr>
<td>To the Contractor or to Subcontractors for the portion of work performed with their own forces:</td>
<td></td>
<td></td>
<td>10%</td>
</tr>
<tr>
<td>To the Contractor or to Subcontractors for work performed by others at a tier immediately below either of them:</td>
<td>5%</td>
<td></td>
<td>5%</td>
</tr>
</tbody>
</table>

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 Contractor 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 Programs 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 Contractor’s application for payment.

The Principal Representative reserves the right to contract with any person or firm other than the Contractor for any or all extra work; however, unless specifically required in the Contract Documents, the Contractor shall have no responsibility without additional compensation to supervise or coordinate the work of persons or firms separately contracted by the Principal Representative.

C. EMERGENCY FIELD CHANGE ORDERED WORK
The Principal Representative, without invalidating the Agreement, and with the approval of State Buildings Programs 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 Contractor, 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 a State Change Order form (SC-6.31), modified with the words “Emergency Field Change Order” at the top.

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 Contractor 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 Contractor 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 Contractor shall report all costs to the Principal Representative and the Architect/Engineer. Weekly cost reports and the final adjustment of the Emergency Field Change Orders amount and the adjustment to the Project time for completion shall be prepared 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 Programs to the Principal Representative and the Contractor, 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.

D. APPROPRIATION LIMITATIONS - § 24-91-103.6, C.R.S., as amended
The amount of money appropriated, as shown on the Agreement (SC-6.21), 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-6.13), unless one of the following occurs: (1) the Contractor 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 contractor 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 Contractor'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 Contractor 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
Procurement Code.

If the Contractor 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 Contractor's work, involve
extra cost, extra time or changes in the scope of the Work under this Contract, the Contractor 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 Contractor 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 36A4, no written judgment or decision of the
Architect/Engineer is required. If the Contractor is delayed by the lack of a response to a request for a
decision by the Architect/Engineer, the Contractor 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 Contractor shall proceed with the work as originally
directed. Where the Contractor’s claim involves a dispute concerning the value of work unilaterally directed
pursuant to Article 35A4 the Contractor shall also proceed with the work as originally directed while his or
her claim is being considered.

The Contractor 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
Contractor'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 Contractor 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 Contractor and
Principal Representative agree) after receipt of the Contractor’s Notice of claim regarding such instructions
or alleged act or omission. If no response to the Contractor's claim is received within seven (7) business
days of Contractor's Notice (or at such other time as the Contractor 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 Contractor's
claim that is denied.

If the Contractor 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, § 24-109-106, C.R.S., shall not arise until the initial claim
process described above in this Article 36 has been properly exhausted by the Contractor. The Contractor'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 Contractor 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 Contractor 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 Contractor 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 Contractor 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 Contractor of his or her right to administrative and judicial reviews as provided in the Colorado Procurement Code, § 24-109-201 et seq, C.R.S., as amended. If no decision regarding the contract controversy is issued within twenty (20) business days of the Contractor's giving Notice (or such other date as the Contractor 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 Contractor's claim.

Either the Contractor 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 Contractor 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 Contractor 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 Contractor shall proceed diligently with the work directed.

In all cases where the Contractor proceeds with the work and seeks equitable adjustment by filing a claim and or statutory appeal, the Contractor 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 Contractor in respect of such extra costs shall be limited to reimbursement for the current additional expenditure by the Contractor 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 Contractor 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 Contractor'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 Contractor under this clause shall be allowed unless the Contractor 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 Contractor for an equitable adjustment hereunder shall be allowed if not quantified and presented prior to the date the Contractor requests a final inspection pursuant to Article 41A, Notice Of Completion.

ARTICLE 38. DELAYS AND EXTENSIONS OF TIME
If the Contractor 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 Contractor or by strikes, lockouts, fire, unusual delay in transportation, unavoidable casualties or any other causes beyond the Contractor'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 Contractor shall be able to show he or she could not have avoided by the exercise of due diligence.

The Contractor shall provide Notice in writing to the Architect/Engineer, the Principal Representative and State Buildings Programs 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 Contractor 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 Programs 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 Contractor 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 Contractor'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 Contractor 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 Contractor 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 Contractor 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 Contractor 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 Programs to appoint such a person, who, if appointed, shall be accepted for this purpose by both the Contractor 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 52F, Choice of Law; No Arbitration, 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, 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 54, 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 Contractor 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 Architect/Engineer, State Buildings Programs and the Contractor. 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 Contractor 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 Contractor 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 Contractor shall file a written Notice with the Architect/Engineer that the Work, or such discrete physical portion, in the opinion of the Contractor, is substantially complete under the terms of the Contract. The Contractor 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 completed or corrected, will prevent a determination that the Work is substantially complete, those items shall be completed by the Contractor and the Notice shall then be resubmitted.
B. FINAL INSPECTION
Within ten (10) days after the Contractor files written Notice that the Work is substantially complete, the Architect/Engineer, the Principal Representative, and the Contractor 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 Programs shall be notified of the inspection not less than three (3) business days in advance of the inspection. The Contractor 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 Contractor:

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 Contractor, the Principal Representative, and State Buildings Programs. The Architect/Engineer's final punch list shall control over the Contractor's preliminary punch list.

C. NOTICE OF SUBSTANTIAL COMPLETION
Notice of Substantial Completion shall establish the date of substantial completion of the Project. The Contractor 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 Programs, 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 Contractor’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 Contractor 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 Contractor despite due diligence. The schedule shall provide for a reasonable punch list inspection process. Unless liquidated damages have been specified in Article 54D(2), the cost to the Principal Representative, if any, for re-inspections due to failure to adhere to the Contractor’s proposed punch-list completion schedule shall be the responsibility of the Contractor and may be deducted by the Principal Representative from final amounts due to the Contractor.

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 Contractor shall have the right to request a final inspection of any discrete physical portion of the Project when in the opinion of the Architect/Engineer 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 Programs, 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. The ability to beneficially occupy a discrete physical portion of the Project shall also be considered.

D. NOTICE OF ACCEPTANCE

The Notice of Acceptance shall establish the completion date of the Project. It shall not be authorized until the Contractor shall have performed all of the work to allow completion and approval of the Pre-Acceptance Checklist (SBP-05). It shall not be authorized until the Pre-Acceptance punch list (SBP-06) shall have been prepared and approved containing no more than ten items of work remaining to be completed or repaired.

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 punch list (SBP-06) 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 Contractor, the Principal Representative in his or her discretion may release to the Contractor 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 Programs. Before the Principal Representative may issue the Notice of Contractor’s Settlement and advertise the Project for final payment, the Contractor 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 Architect/Engineer:
   a. All guarantees and warranties;
   b. All statements to support local sales tax refunds, if any;
   c. Three (3) complete bound sets of required operating maintenance instructions; and,
   d. One (1) set of as-built Contract Documents showing all job changes.

2. Demonstrated to the operating personnel of the Principal Representative the proper operation and maintenance of all equipment.

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 Contractor 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 Contractor 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 Contractor, the Principal Representative and the State Controller shall withhold from the Contractor 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 Contractor, 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 Contractor 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 Contractor subject to the same conditions regarding unpaid claims.

ARTICLE 42. GENERAL WARRANTY AND CORRECTION OF WORK AFTER ACCEPTANCE

The Contractor warrants that the materials used and the equipment furnished shall be new and of good quality unless specified to the contrary. The Contractor 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 Contractor of responsibility for defects or faulty materials or workmanship. The Contractor 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 Contractor 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 45, 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, § 38-26-107, C.R.S., 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 Contractor 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 Contractor in the amount of such claims.

ARTICLE 44. ONE-YEAR GUARANTEE AND SPECIAL GUARANTEES AND WARRANTIES
A. ONE-YEAR GUARANTEE OF THE WORK
The Contractor 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 Contractor 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 Contractor 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 Contractor 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 Contractor.

The one year guarantee of the Contractor’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 Contractor’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 Contractor 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 Contractor’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 Contractor 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 54A, 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 Principal Representative shall schedule and so notify all parties concerned, including State Buildings Programs, 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 Contractor, the Principal Representative, State Buildings Programs, 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 Contractor 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 Programs.

If the Contractor fails to promptly correct all deficiencies and defects shown by this report, the Principal Representative may do so, after giving the Contractor 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 Contractor 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-6.26).

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 Contractor acknowledges that subject to any limitations in the Advertisement for Bids, issued for the Project, the Contractor’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 Contractor’s bid. The Contractor 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 54D, 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 Contractor 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 54D, Modification of Article 46.

The Contractor and the Contractor’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 54D(1), 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 54D(2), Modification of Article 46, liquidated damages, if any, shall be the amount specified in Article 54D, Modification of Article 46, for each calendar day in excess of the number of calendar days specified in the Contractor’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 54D(1) and (2), 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 Contractor’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 24-10-101, 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 Contractor 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 Contractor; 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 Contractor 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 Contractor 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 Contractor, 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 Contractor 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;
4. Contractor’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 Contractor 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 Contractor in writing stating the reasons therefore. The Contractor shall again proceed with the work when so notified in writing.

The Contractor 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 Contractor further acknowledges and agrees that in such event that State may, upon Notice to the Contractor, 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 Contractor 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 Contractor for the payment of such a claim only if the Contractor 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 Contractor 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 Contractor 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 Contractor, which termination
shall take effect immediately upon service of Notice thereof on the Contractor 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 Contractor 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 Contractor, such excess shall be paid to the Contractor. If, however, the cost,
expenses and damages as certified by the Architect/Engineer exceed such unpaid balance of
the contract price, the Contractor and his or her Surety shall pay the difference to the Principal
Representative.

2. The Principal Representative may require the Surety on the Contractor’s bond to take control
of the Work and see to it that all the deficiencies of the Contractor 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 Contractor 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 Contractor 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 Contractor, or the Surety if the Surety has been substituted for the
Contractor, 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 Contractor and his or
her Surety, or to deduct from any payment then or thereafter due the Contractor, the costs incurred in having such deficiencies made good and any damages or expenses incurred through the default of Contractor, provided the Architect/Engineer approves the amount thus charged to the Contractor.

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 Contractor shall be limited in recovery to the compensation provided for in Article 50, Termination For Convenience Of State. Termination by the Contractor 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 Contractor 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 Contractor 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 Contractor 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 Contractor 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 Contractor 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 Contractor 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 Contractor within such three month period or authorized extension thereof. Upon failure of the Contractor 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 Contractor by reason of the termination and shall thereupon pay to the Contractor the amount so determined.

Costs claimed, agreed to, or determined pursuant to the preceding and following paragraph shall be in accordance with the provisions of § 24-107-101, C.R.S., as amended and associated Cost Principles of the Colorado Procurement Rules as in effect on the date of this Contract.

Subject to the preceding provisions, the Contractor and the Principal Representative may agree upon the whole or any part of the amount or amounts to be paid to the Contractor by reason of the termination under this clause, which amount or amounts may include any reasonable cancellation charges thereby incurred by the Contractor 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 Contractor is unable to cancel, the Contractor 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 Contractor 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 Contractor 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 Contractor will be entitled hereunder.

The Contractor 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 Contractor 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 Contractor 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 Contractor 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 Contractor 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, §§ 24-109-101, et seq., C.R.S., as amended.

ARTICLE 51. CONTRACTOR’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 Contractor or of any one employed by him, then the Contractor 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. 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 Contractor any sum certified that is not disputed in whole or in part by the Principal Representative in writing to the Contractor and the Architect/Engineer within thirty (30) days after the Architect/Engineer’s certification, then the Contractor 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 Contractor 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 Contractor 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. 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 CRS 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 CRS 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
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, of the Colorado Governmental Immunity Act, CRS §24-10-101 et seq., or the Federal Tort Claims Act, 28 U.S.C. §§1346(b) and 2671 et seq., as applicable now or hereafter amended.

D. INDEPENDENT CONTRACTOR 4 CCR 801-2
Contractor shall perform its duties hereunder as an independent contractor and not as an employee. Neither Contractor nor any agent or employee of Contractor shall be deemed to be an agent or employee of the State. Contractor 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 Contractor or any of its agents or employees. Unemployment insurance benefits will be available to Contractor and its employees and agents only if such coverage is made available by Contractor or a third party. Contractor shall pay when due all applicable employment taxes and income taxes and local head taxes incurred pursuant to this contract. Contractor shall not have authorization, express or implied, to bind the State to any agreement, liability or understanding, except as expressly set forth herein. Contractor 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
Contractor 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
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. Any provision incorporated herein by reference which purports to negate this or any other Special Provision in whole or in part shall not be valid or enforceable or available in any action at law, whether by way of complaint, defense, or otherwise. Any provision rendered null and void by the operation of this provision shall not invalidate the remainder of this contract, to the extent capable of execution.

G. BINDING ARBITRATION PROHIBITED
The State of Colorado does not agree to binding arbitration by any extra-judicial body or person. Any provision to the contrary in this contract or incorporated herein by reference shall be null and void.

H. SOFTWARE PIRACY PROHIBITION. Governor’s Executive Order D 002 00
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. Contractor hereby certifies and warrants that, during the term of this contract and any extensions, Contractor has and shall maintain in place appropriate systems and controls to prevent such improper use of public funds. If the State determines that Contractor 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 CRS 24-18-201 & CRS 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. Contractor has no interest and shall not acquire any interest, direct or indirect, that would conflict in any manner or degree with the performance of Contractor’s services and Contractor shall not employ any person having such known interests.
J. **VENDOR OFFSET CRS 24-30-202(1) & CRS 24-30-202.4**
Subject to CRS §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 CRS §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.

K. **PUBLIC CONTRACTS FOR SERVICES. CRS §8-17.5-101.** [Not Applicable to agreements relating to the offer, issuance, or sale of securities, investment advisory services or fund management services, sponsored projects, intergovernmental agreements, or information technology services or products and services] Contractor 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 CRS §8-17.5-102(5)(c), Contractor 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 Contractor that the subcontractor shall not knowingly employ or contract with an illegal alien to perform work under this contract. Contractor (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 Contractor 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 CRS §8-17.5-102(5), by the Colorado Department of Labor and Employment. If Contractor participates in the Department program, Contractor shall deliver to the contracting State agency, Institution of Higher Education or political subdivision a written, notarized affirmation, affirming that Contractor has examined the legal work status of such employee, and shall comply with all of the other requirements of the Department program. If Contractor fails to comply with any requirement of this provision or CRS §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, Contractor shall be liable for damages.

L. **PUBLIC CONTRACTS WITH NATURAL PERSONS. CRS §24-76.5-101.**
Contractor, 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 CRS §24-76.5-101 et seq., and (c) has produced one form of identification required by CRS §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**
If any covenant, term, condition, or provision contained in these General Conditions is held by a court of competent jurisdiction to be invalid, illegal, or unenforceable in any respect, such covenant, term, condition, or provision shall be severed or modified to the extent necessary to make it enforceable, and the resulting General Conditions shall remain in full force and effect, and such invalidity or other failure shall not affect the validity of any other covenant, term or provision hereof. Provided the same does not work a substantial injustice, these General Conditions shall be construed as if such invalid portion had not been inserted.
C. SECTION HEADINGS
The section or paragraph headings contained within these General Conditions are inserted for convenience only and shall not be construed to vary or add to the meaning of this Contract.

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 effect 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. VENUE
The parties agree that venue for any action related to performance of this Contract shall be an appropriate District Court of the State of Colorado.

G. NO THIRD PARTY BENEFICIARIES
Except as herein specifically provided otherwise, this Contract shall inure to the benefit of and be binding upon the parties hereto and their respective successors and assigns. The enforcement of the terms and conditions of this Contract and all rights of action relating to such enforcement, shall be strictly reserved to the parties to the Agreement. Nothing contained in the Contract Documents shall give or allow any claim or right of action whatsoever by any other person or entity as beneficiary; all such non-parties shall be deemed incidental beneficiaries only.

H. WAIVER
The waiver of any breach of a term hereof shall not be construed as a waiver of any other term, of the same term upon subsequent breach.

I. INDEMNIFICATION
Contractor 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 and related costs, incurred as a result of any act or omission by Contractor, or its employees, agents, subcontractors, or assignees pursuant to the terms of this contract.

J. STATEWIDE CONTRACT MANAGEMENT SYSTEM
If the maximum amount payable to Construction Manager under this Contract is $500,000 or greater, either on the Effective Date or at anytime thereafter, this section shall apply.

Construction Manager agrees to be governed, and to abide, by the provisions of C.R.S. §24-102-205, §24-102-206, §24-103-601, §24-103.5-101, §24-105-101, §24-105-102, and §24-105-201 concerning the monitoring of vendor performance on state contracts and inclusion of contract performance information in a statewide contract management system.

Construction Manager understands that if the maximum amount payable to Construction Manager under this Contract is $500,000 or greater, either on the Effective Date or at anytime thereafter, the State shall have the additional responsibility to prepare a Contractor Performance Evaluation Report. This Report shall be maintained as part of the Contractor’s file and remain part of CMS for at least 5-years following the Report date.

Construction Manager’s performance shall be subject to Evaluation and Review in accordance with the terms and conditions of this Contract, State law, including C.R.S §24-103.5-101, and State Fiscal Rules, Policies and Guidance. Evaluation and Review of Construction Manager’s performance shall be part of the normal contract administration process and Construction Manager’s performance will be
systematically recorded in the statewide Contract Management System. Areas of Evaluation and Review shall include, but shall not be limited to quality, cost and timeliness. Collection of information relevant to the performance of Construction Manager’s obligations under this Contract shall be determined by the specific requirements of such obligations and shall include factors tailored to match the requirements of Construction Manager’s obligations. Such performance information shall be entered into the statewide Contract Management System at intervals established herein and a final Evaluation, Review and Rating shall be rendered within 30 days of the end of the Contract term. Construction Manager shall be notified following each performance Evaluation and Review, and shall address or correct any identified problem in a timely manner and maintain work progress.

Should the final performance Evaluation and Review determine that Construction Manager demonstrated a gross failure to meet the performance measures established hereunder, the Executive Director of the Colorado Department of Personnel and Administration (Executive Director), upon request by the [Insert Dept or IHE Acronym], and showing of good cause, may debar Construction Manager and prohibit Construction Manager from bidding on future contracts. Construction Manager may contest the final Evaluation, Review and Rating by: (a) filing rebuttal statements, which may result in either removal or correction of the evaluation (CRS §24-105-102(6)), or (b) under CRS §24-105-102(6), exercising the debarment protest and appeal rights provided in CRS §§24-109-106, 107, 201 or 202, which may result in the reversal of the debarment and reinstatement of Construction Manager, by the Executive Director, upon showing of good cause.

**ARTICLE 54. OPTIONAL PROVISIONS AND ELECTIONS**

The provisions of this Article 54 alter the preceding Articles or enlarge upon them as indicated:
The Principal Representative and or the State Buildings Programs shall mark boxes and initial where applicable.

A. **MODIFICATION OF ARTICLE 45. GUARANTEE INSPECTIONS AFTER COMPLETION**

If the box below is marked the six month guarantee inspection is not required.

☐ ______ Principal Representative initial

B. **MODIFICATION OF ARTICLE 27. LABOR AND WAGES**

If the box is marked the Federal Davis-Bacon Act shall be applicable to the Project. The minimum wage rates to be paid on the Project shall be furnished by the Principal Representative and included in the Contract Documents.

☐ ______ Principal Representative initial

C. **MODIFICATION OF ARTICLE 39. NON-BINDING DISPUTE RESOLUTION – FACILITATED NEGOTIATIONS**

If the box is marked, and initialed by the State as noted, the requirement to participate in facilitated negotiations shall be deleted from this Contract. Article 39, Non-Binding Dispute Resolution – Facilitated Negotiations, shall be deleted in its entirety and all references to the right to the same where ever they appear in the contract shall be similarly deleted.

The box may be marked only for projects with an estimated value of less than $500,000.

☐ ______ Principal Representative initial

D. **MODIFICATION OF ARTICLE 46. TIME OF COMPLETION AND LIQUIDATED DAMAGES**

If an amount is indicated immediately below, liquidated damages shall be applicable to this Project as, and to, the extent shown below. Where an amount is indicated below, liquidated damages shall be assessed in accordance with and pursuant to the terms of Article 46, Time Of Completion And Liquidated Damages, in the amounts and as here indicated. The election of liquidated damages shall limit and control the parties right to damages only to the extent noted.

1. For the inability to use the Project, for each day after the number of calendar days specified in the Contractor’s bid for the Project and the Agreement for achievement of Substantial Completion, until the day that the Project has achieved Substantial Completion and the Notice of Substantial Completion is issued, the Contractor agrees that an amount equal to Two
Hundred Fifty and no/100 Dollars ($250.00) shall be assessed against Contractor from amounts due and payable to the Contractor under the Contract, or the Contractor and the Contractor’s Surety shall pay to the Principal Representative such sum for any deficiency, if amounts on account thereof are deducted from remaining amounts due, but amounts remaining are insufficient to cover the entire assessment.

2. For damages related to or arising from additional administrative, technical, supervisory and professional expenses related to and arising from the extended closeout period, for each day in excess of the number of calendar days specified in the Contractor’s bid for the Project and the Agreement to finally complete the Project as defined by the issuance of the Notice of Final Acceptance) after the issuance of the final Notice of Substantial Completion, the Contractor agrees that an amount equal to One Hundred Fifty no/100 Dollars ($150.00) shall be assessed against Contractor from amounts due and payable to the Contractor under the Contract, or the Contractor and the Contractor’s Surety shall pay to the Principal Representative such sum for any deficiency, if amounts on account thereof are deducted from remaining amounts due but amounts remaining are insufficient to cover the entire assessment.

E. NOTICE IDENTIFICATION

All Notices pertaining to General Conditions or otherwise required to be given shall be transmitted in writing, to the individuals at the addresses listed below, and shall be deemed duly given when received by the parties at their addresses below or any subsequent persons or addresses provided to the other party in writing.

Notice to Principal Representative: _______________________________
____________________________________________________________

With copies to: State Buildings Programs (or Delegate)
State of Colorado
____________________________________________________________
____________________________________________________________

Notice to Contractor: _________________________________________
____________________________________________________________
____________________________________________________________
____________________________________________________________

With copies to: ______________________________________________
____________________________________________________________
____________________________________________________________
INDEX

24-30-1301(11), 3
38-26-107, 36
39-26-114(1)(d), 9
8-17-101, 2, 20
acceptance, 12, 15, 17, 19, 20, 23, 25, 33, 38
Agreement, 1, 2, 4, 5, 12, 24, 25, 27, 32, 38, 39,
45, 46, 47
American Society of Testing Materials, 14
approval, 3, 7, 11, 13, 14, 19, 20, 23, 24, 27, 31,
35, 40, 42, 43
Architect/Engineer, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11,
12, 13, 14, 15, 16, 17, 20, 21, 22, 23, 24, 25, 26,
27, 28, 30, 31, 32, 33, 34, 35, 36, 37, 39, 40, 41,
42, 43, 44, 45, 46, 47
Beneficial Occupancy, 1, 2, 33, 34
Bids, 1, 38
Bonds, 1, 4
business days, 2, 6, 28, 29, 30, 33, 41
Change Order, 2, 4, 5, 10, 13, 14, 21, 24, 25, 26,
27, 29, 31, 32, 35, 38, 40, 46
claim, 31
Contract, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 13, 14,
15, 17, 18, 19, 20, 21, 22, 23, 24, 25, 27, 28,
30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41,
42, 43, 44, 45, 46, 47
contract sum, 10, 11, 13, 14, 20, 21, 24, 25, 26,
29, 30
contract time, 13
Contractor, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13,
14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26,
27, 28, 29, 30, 31, 33, 34, 35, 36, 37, 38, 39,
40, 41, 42, 43, 44
Correct Defect, 21, 22, 34, 35, 37
Defect, 5, 7
drawings, 1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14,
16, 31, 33, 43
final acceptance, 2, 16, 17, 19, 23, 35, 37, 38, 39
final payment, 23, 35, 36, 39
final settlement, 23, 36
guarantee, 17, 23, 37, 46
indemnify, 44
instructions, 7, 10, 14, 15, 16, 28, 29, 31, 35, 39,
41
Insurance, 15, 18, 19, 20,
manufacturer’s warranty, 17
Notice, 1, 2, 4, 5, 6, 7, 8, 9, 10, 11, 12, 14, 15, 17,
18, 19, 20, 21, 23, 24, 28, 29, 30, 33, 34, 35,
36, 37, 38, 39, 40, 41, 42, 43, 47
observe, 6, 7, 22
Occupancy, 1, 2, 33, 34, 35
Owner, 2, 3
Partnering Plan, 5, 28, 32
payment, 1, 4, 20, 21, 23
precedence, 5, 45
Principal Representative, 1, 2, 3, 4, 5, 6, 7, 8, 9,
10, 11, 12, 14, 15, 16, 17, 19, 20, 21, 22, 23,
24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35,
36, 37, 38, 39, 40, 41, 42, 43, 46, 47
Procurement Officer, 2, 3, 25
Product Data, 3, 4, 10, 11, 12, 13
Samples, 3, 4, 10, 11, 12, 13
SBP-01, 1, 33
SBP-05, 1, 35
SBP-B.I.R., 7
SC-6.13, 1, 2, 4, 27
SC-6.22, 4, 20
SC-6.221, 4, 20
SC-6.26, 38
SC-6.27, 1, 19
SC-6.31, 26
SC-6.312, 25
SC-7.2, 12, 22, 23
schedule, 10, 11, 12, 13, 21, 22, 24, 27, 30, 31,
34, 37, 41
Shop Drawings, 3, 4, 10, 11, 12, 13
Specifications, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12,
13, 14, 15, 16, 18, 22, 33, 34, 36, 37, 38
State Buildings Programs, 1, 6, 7, 8, 11, 12, 14,
15, 17, 18, 19, 20, 24, 25, 27, 30, 31, 33, 34,
35, 37
State Form, i, 2, 4, 10, 11, 12, 13
Subcontractor, 3, 9, 14, 15, 18, 19, 23, 34
substantial completion, 2, 4, 16, 34, 39
Substantial Completion, 1, 2, 4, 17, 33, 34, 35,
36, 37, 38, 47
substantially complete, 4, 33, 35, 38
Surety, 4, 20, 21, 23, 38, 40, 41, 42, 47
termination, 6, 41, 42, 43
testing, 7, 12, 14, 17, 34
time of completion, 30
warranties, 17, 23, 35, 36, 37, 39
weather, 17, 25, 30, 31, 40
Work, 2, 3, 4, 6, 7, 8, 9, 10, 11, 13, 14, 17, 19, 22,
23, 24, 25, 27, 28, 30, 31, 33, 36, 37, 38, 39,
40, 41, 42
1. **GENERAL CONDITIONS, ARTICLE 23. F. SIGN** – **DELETE the entire section.**

2. **GENERAL CONDITIONS, ARTICLE 25 INSURANCE** - **DELETE the entire section and replace with the following:**

The Contractor shall obtain and maintain, at its own expense and for the duration of the contract, the minimum insurance coverages set forth below. By requiring such minimum insurance, the University shall not be deemed or construed to have assessed the risk that may be applicable to the Contractor under this contract. 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**

1. **Commercial General Liability – ISO CG 00001 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)
   - Broad Form Property Damage
   - Independent Contractors
   - Additional Insured—Owners, Lessees or Contractors Endorsement, ISO Form 2010 (2004 Edition or equivalent), if possible.
   - Additional Insured—Owners, Lessees or Contractors Endorsement, ISO CG 2037 (7/2004 Edition or equivalent), if possible.

2. **Automobile Liability including all:**
   - Owned Vehicles
   - Non-Owned Vehicles
   - Hired Vehicles

3. **Excess/Umbrella Liability (Applies to projects totaling $10,000,000 or more)**
   - Excess of Commercial General Liability, Automobile Liability, and Employers’ Liability.
   - Coverages should be as broad as primary.
   - Risk Management reserves the right to require higher limits.

4. **Workers Compensation**
   - Statutory Benefits (Coverage A)
   - Employers Liability (Coverage B)

5. **Builder’s Risk Completed Value (Applies to buildings additions and new buildings)**
   - See Builders Risk section in this document.

6. **Installation Floater**
   - Special cause of loss
   - Theft
   - Faulty workmanship
   - Vandalism
   - Labor costs to repair damaged work
7. **Contractors Pollution Liability**

This section applies only to the following types of proposals:

- ASBESTOS/LEAD ABATEMENT Contracting Services

The University requires this coverage whenever work at issue under this contract involves potential pollution risk to the environment or losses caused by pollution conditions (including asbestos) that may arise from the operations of the Contractor described in the Contractor’s scope of services. Policy shall cover the Contractors completed operations. Such coverage shall include:

- Bodily Injury, sickness, disease, mental anguish or shock sustained by any person, including death.
- Property Damage including natural resource damages, physical injury to or destruction of tangible property including resulting loss of use, clean up costs, and the loss of use of tangible property that has not been physically injured or destroyed.
- Defense, including costs, charges and expenses incurred in the investigation, adjustment or defense of claims for such compensatory damages.
- Cleanup costs, removal, storage, disposal, and or use of the pollutant; and defense, including costs and expenses incurred in the investigation, defense, or settlement of claims.
- 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). 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 (or specify desired number) years beginning from the time that work under this contract is completed.
- On the Automobile Liability Coverage endorsements CA9948 and MCS-90 are required if the Contractor is transporting any type of hazardous materials.
- The Regents of the University of Colorado, a body corporate as “Additional Insured” for work that is being performed by the Contractor and as respects the Contractors Pollution Liability.

**LIMITS REQUIRED**

The Contractor shall carry the following limits of liability as required below:

**Commercial General Liability**

<table>
<thead>
<tr>
<th>Limit</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Aggregate</td>
<td>$2,000,000</td>
</tr>
<tr>
<td>Products/Completed Operations</td>
<td>$2,000,000</td>
</tr>
<tr>
<td>Each Occurrence Limit</td>
<td>$1,000,000</td>
</tr>
<tr>
<td>Personal/Advertising Injury</td>
<td>$1,000,000</td>
</tr>
<tr>
<td>Fire Damage (Any One Fire)</td>
<td>$ 50,000</td>
</tr>
<tr>
<td>Medical Payments (Any One Person)</td>
<td>$  5,000</td>
</tr>
</tbody>
</table>

**Excess/Umbrella Liability (as required-See Coverages #3)**

<table>
<thead>
<tr>
<th>Limit</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Aggregate Limit</td>
<td>$5,000,000</td>
</tr>
<tr>
<td>Products/Completed Operations</td>
<td>$5,000,000</td>
</tr>
</tbody>
</table>

**Automobile Liability**

Bodily Injury/Property Damage (Each Accident) $1,000,000
Workers’ Compensation
Coverage A (Workers’ Compensation) Statutory
Coverage B (Employers Liability) $ 100,000 Each Accident
              $ 100,000 Disease Ea. Employ
              $ 500,000 Disease-Policy Limit

Contractors Pollution Liability (as required-See Coverages #7)
  Per Loss $1,000,000
  Aggregate $1,000,000

Builder’s Risk (as required-See Coverages #5)
  • This coverage is required for new buildings or additions to existing buildings.
  • See the Builders Risk section (below) for required terms and conditions.

Installation Floater
This coverage is to cover materials and equipment to be installed in existing structures.
  • Shall be written for 100% of the completed value (replacement cost basis)
  • Deductible maximum is $10,000.00
  • Waiver of Subrogation applies on Builders Risk

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. The Contractor shall provide the University of Colorado a Certificate of Insurance Form evidencing all required coverages, prior to commencing work or entering University premises.
3. The Contractor shall name “The State of Colorado and The Regents of the University of Colorado, a body corporate” as an Additional Insured as respects General Liability.
4. Upon request by the University, Contractor must provide a copy of the actual insurance policy effecting coverage(s) required by the contract.
5. The University requires that all policies of insurance be written on a primary basis, non-contributory with any other insurance coverages and/or self-insurance carried by the University.
6. A Separation of Insureds Clause must be included in general liability policies.
7. The Contractor shall advise the University 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 University a new certificate of insurance showing such coverage is in force.
8. Contractor’s insurance carrier should possess a minimum A.M. Best’s Insurance Guide rating of A-VI.
9. Commercial General Liability Completed Operations policies must be kept in effect for up to three (3) years after completion of the project.
10. Contractors Pollution Liability policies must be kept in effect for up to three (3) years after completion of the project.
11. Provide a minimum of thirty (30) days advance written notice to the University for cancellation, non-renewal, or material changes to policies required under the contract.
12. Certificate Holder: University of Colorado, University Risk Management, 4001 Discovery Drive, Suite 230, Campus Box 587, Boulder, CO 80303

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 University. The University reserves the right to negotiate additional specific insurance requirements at the time of the contract award.
Non-Waiver
The parties hereto understand and agree that The University 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, 24-10-101 et seq., as from time to time amended, or otherwise available to the University or its officers, employees, agents, and volunteers.

Mutual Cooperation
The University 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.

Builder’s Risk Insurance
(As required-See Coverages #5)

Unless otherwise provided, 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 voluntary deductibles. Such Builder’s Risk 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 University has insurable interest in the property to be covered, whichever is earlier. The Builder’s Risk insurance shall include interests of the University of Colorado, the General Contractor, subcontractors and sub-tier contractors in the project.

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 and earthquake, and all below and above ground structures, water and sewer mains. Other coverages may be required if provided in contract documents. Coverages shall be written for 100% of the completed value (replacement cost basis) of the work being performed. At the option of the University of Colorado, the University of Colorado may include Soft Costs (including Loss of Use)/Delay in Opening Endorsement under the builder’s risk policy. The University of Colorado agrees to provide the necessary exposure base information for quotation by the Builder’s Risk carrier. The University of Colorado agrees to pay the premium associated with the Soft Costs coverage, the University of Colorado decides to purchase this coverage.

The Builder’s Risk shall also include the follow amendments/provisions:

- Waiver of Subrogation against all parties named as insured, but only to the extent the loss is covered.
- Beneficial Occupancy Clause. The policy shall specifically permit partial or beneficial occupancy at or before substantial completion or final acceptance of the entire work. 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 University of Colorado and Contractor shall take reasonable steps to obtain consent of the insurance company or companies and agree to take no action, other than upon mutual written consent, with respect to occupancy or use of the work that could lead to cancellation, lapse or reduction of insurance.
- Equipment Breakdown Coverage (a.k.a. Boiler & Machinery) required by the Contract Documents or by law, which shall specifically cover insured equipment during installation and testing (including hot testing).
- Deletion of Coinsurance Provisions
- Replacement Costs 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
• Deletion of any exclusions pertaining to Law, Ordinance or Regulation
• Deletion of exclusions for design errors & omissions
• Modification of the electrical apparatus breakdown exclusions and the mechanical breakdown exclusion so that it does not apply to subsequent loss or damage
• Modify exclusion pertaining to damage to interior of building caused by perils insured against are covered
• Resultant Damage Extension including amendment of exclusion pertaining to design error
• Settling, cracking, shrinking or expansion (including coverage for loss resulting from settling, cracking, shrinking or expansion) of foundation walls, floors, or other parts of the structure
• Other coverages may be required if provided in Contract Documents
• The deductible shall not exceed $10,000 and shall be the responsibility of the Contractor except for losses that involve all Acts of God such as flood, earthquake, windstorm, tsunami, volcano, etc.
• The Policy shall be amended to show thirty (30) days notice of cancellation. Such notice shall be given to the University of Colorado and Contractor.
• Losses in excess of $10,000 insured shall be adjusted in conjunction with the University of Colorado. Any insurance payments/proceeds shall be made payable to the University of Colorado 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 University of Colorado shall have the authority to adjust and settle any losses in excess of $10,000 with insurers unless one of the parties in interest shall object in writing within five days after occurrence of loss to the University of Colorado 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.

If requested, the Contractor shall file with the University of Colorado a copy of the policy that includes the insurance coverages required in this section. 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 University of Colorado as stated in writing prior to commencement of the work. The University of Colorado may then effect insurance that will protect the interests of the University of Colorado, 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 University of Colorado. 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 $10,000 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 University of Colorado is damaged by the failure or neglect of the Contractor to purchase or maintain insurance as described above, without so notifying the University of Colorado, then the Contractor shall bear all reasonable costs properly attributable thereto.

Contractors engaged in modifications of existing structures are required to secure a Beneficial Occupancy Endorsement that enables the University of Colorado to occupy the facility during construction.

Revised 02/20/06
STATE OF COLORADO
OFFICE OF THE STATE ARCHITECT
STATE BUILDINGS PROGRAMS

CHANGE ORDER BULLETIN

Change Order Bulletin No: ________________________ Date ________________
Contractor: ______________________________________
Institution or Agency: University of Colorado at Boulder
Project No./Name: PR004792 / DUAN – Rm C123/123A/123B/ & 123C Remodel
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 the Principal Representative 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: ____________________________
PRINCIPAL REPRESENTATIVE
(INSTITUTION or AGENCY)
STATE OF COLORADO  
OFFICE OF THE STATE ARCHITECT  
STATE BUILDINGS PROGRAMS  

CHANGE ORDER PROPOSAL

<table>
<thead>
<tr>
<th>Change Order Proposal No.</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>University of Colorado at Boulder</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Description of Work:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>PR004792 / DUAN – Rm C123/C123A/C123B/123C Remodel</td>
<td></td>
</tr>
</tbody>
</table>

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

**PART I - WORK PERFORMED BY CONTRACTOR**

<table>
<thead>
<tr>
<th>Line</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Direct Labor Costs</td>
</tr>
<tr>
<td>2.</td>
<td>Labor Overhead (Direct Labor Burdens) (______% X Line 1)</td>
</tr>
<tr>
<td>3.</td>
<td>Total Contractor's Labor Costs (Lines 1 and 2)</td>
</tr>
<tr>
<td>4.</td>
<td>Direct Materials Costs</td>
</tr>
<tr>
<td>5.</td>
<td>Materials Overhead (Delivery Costs &amp; Taxes) (______% X Line 4)</td>
</tr>
<tr>
<td>6.</td>
<td>Total Materials Costs (Lines 4 and 5)</td>
</tr>
<tr>
<td>7.</td>
<td>Total Equipment Costs</td>
</tr>
</tbody>
</table>

**PART II - WORK PERFORMED BY SUBCONTRACTOR**

<table>
<thead>
<tr>
<th>Line</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.</td>
<td>Direct Labor Costs</td>
</tr>
<tr>
<td>10.</td>
<td>Labor Overhead (Direct Labor Burdens) (______% X Line 9)</td>
</tr>
<tr>
<td>11.</td>
<td>Total Subcontractor's Labor Cost (Lines 9 and 10)</td>
</tr>
<tr>
<td>12.</td>
<td>Direct Materials Costs</td>
</tr>
<tr>
<td>13.</td>
<td>Materials Overhead (Delivery Costs &amp; Taxes) (______% X Line 12)</td>
</tr>
<tr>
<td>14.</td>
<td>Total Subcontractor's Materials Cost (Lines 12 and 13)</td>
</tr>
<tr>
<td>15.</td>
<td>Total Subcontractor's Equipment Costs</td>
</tr>
<tr>
<td>16.</td>
<td>Total Subcontractor's L, M &amp; E Costs (Lines 11, 14 and 15)</td>
</tr>
<tr>
<td>17.</td>
<td>Subcontractor's Overhead (Indirect Costs) (______% X Line 16)</td>
</tr>
<tr>
<td>18.</td>
<td>Subcontractor's Profit (______% X Line 16) or (2 ½% Deduct)</td>
</tr>
</tbody>
</table>

**PART III - CONTRACTOR'S OVERHEAD & PROFIT**

<table>
<thead>
<tr>
<th>Line</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>20.</td>
<td>Contractor's Overhead (Indirect Costs) (______% X Part I Total)</td>
</tr>
<tr>
<td>21.</td>
<td>Contractor's Profit (______% X Part I Total)</td>
</tr>
</tbody>
</table>

**PART IV - CONTRACTOR'S MARKUP ON SUBCONTRACTOR**

<table>
<thead>
<tr>
<th>Line</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>23.</td>
<td>Contractor's Commission on Subcontractor (______% X Part II Total)</td>
</tr>
<tr>
<td>24.</td>
<td>Contractor's Profit on Subcontractor (______% X Part II Total) or (2 ½% Deduct)</td>
</tr>
</tbody>
</table>

**PART V - SUBTOTAL C.O. PROPOSAL**

<table>
<thead>
<tr>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Parts I and II and III and IV)</td>
</tr>
</tbody>
</table>

**PART VI - CONTRACTOR'S BOND COST**

<table>
<thead>
<tr>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>(______% X Part V)</td>
</tr>
</tbody>
</table>

**PART VII - GRAND TOTAL CHANGE ORDER PROPOSAL**

<table>
<thead>
<tr>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Sum of Totals: Parts V and VI)</td>
</tr>
</tbody>
</table>

**PART VIII - CONTRACT TIME**

COMPLETION DATE (IS) (IS NOT) EXTENDED ____ CALENDAR DAYS AS A RESULT OF THIS PROPOSAL.

**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 ____ 20 ____

Firm: __________________________  
Name & Title: ____________________  
Signature: _______________________  

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

**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: __________________________

**PRINCIPAL REPRESENTATIVE**

(Institution or Agency) __________________________  
(State Buildings Programs) _______________________  
Date: __________________________

State Form SC-6.312 (Rev. 9/2006)
INSTRUCTIONS FOR COMPLETING “CHANGE ORDER PROPOSAL”
COST/PRICE DATA SUMMARY (STATE FORM SC-6.312)

BULLETIN NUMBER/DATED: Insert C.O. Bulletin No. and Date Issued
LEFT HAND BOX: Fill in Contractor’s Name; State Project Number and Title
RIGHT HAND BOX: Fill in Description of Changes from Bulletin, noting exceptions that 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 letterhead/spreadsheet show costs as follows:

<table>
<thead>
<tr>
<th>Trade</th>
<th>Rate</th>
<th>Hours</th>
<th>Extended Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Direct Labor Costs = $

Line 2. Labor Overhead (Direct Labor Burdens, etc.): Fill in as a percentage of Line 1.


On letterhead/spreadsheet, show direct materials costs as follows:

<table>
<thead>
<tr>
<th>Materials</th>
<th>Units</th>
<th>Unit Cost</th>
<th>Extended Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Direct Materials Costs = $

Line 5. Materials Overhead: Fill in as percentage cost of Line 4. Overhead costs include delivery, taxes, insurance costs, etc. (As mutually agreed upon at contract signing)

Line 6. Total Materials Costs: Fill in total of lines 4 and 5.

Line 7. Total Equipment Costs: Fill in total equipment costs including indirect overhead costs in hourly rate - except indirect labor costs.
On letterhead/spreadsheet show total equipment costs as follows:

<table>
<thead>
<tr>
<th>Description</th>
<th>Rate</th>
<th>Hours</th>
<th>Extended Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total Equipment Cost = $


PART II - WORK PERFORMED BY SUBCONTRACTOR:

Line 9. Direct Labor Costs: Fill in subtotal of direct labor costs, which includes base rates plus applicable fringe benefits.
On Subcontractor’s letterhead/spreadsheet show costs by trade, rate, hours and extended costs. See Instructions for line 1.

Line 10. Labor Overhead (Direct Labor Burdens, etc.): Fill in as a percentage of Line 9.


On letterhead/spreadsheet, show direct materials costs by materials, units, unit costs and extended costs. See Instructions for line 4.

Line 13. Materials Overhead: Fill In as a percentage of line 12. Overhead costs include delivery, taxes, insurance costs, etc.


Line 15. Total Subcontractor’s Equipment Costs: Fill in total equipment costs including indirect overhead costs in hourly rate - except indirect labor costs. On letterhead/spreadsheet show total equipment costs by description, rate, hours and extended costs. See Instructions for line 7.

Line 16. Total Subcontractor’s Labor, Materials and Equipment (L, M & E) Costs: Fill in total of lines 11, 14 and 15.

Line 17. Subcontractor’s Overhead (Indirect Costs): Fill in as percentage cost of line 16. See Article 35 of General Conditions.


PARTS III THROUGH VIII - Self-explanatory.

CERTIFICATIONS

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 State Buildings Programs or Delegate for final action.

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

Change Order No: ___________________________ Date ___________________________

Contractor: ________________________________________________________________

Institution or Agency: University of Colorado at Boulder

Project No./Name: PR004792 / DUAN – Rm C123/123A/123B/ & 123C Remodel

Your Change Order Proposal(s), dated ___________________________ is/are 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 $ ___________________________.

Contract completion date is extended [ ] days, is not extended [ ]. New completion date is ___________________________ (Month/Day/Year)

*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) ___________________________ Date ___________________________

Signature

Contractor (Name of Firm) ____________________________________________________ Name and Title (print) ___________________________ Date ___________________________

Signature

University of Colorado at Boulder

Institution or Agency ___________________________ Ronald L. Ried, Director – Facilities Management Business Services 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 PROGRAMS (or Authorized Delegate) ___________________________ DATE ___________________________

Paul M. Leef, AIA, LEED™ AP

Campus Architect &

Director, Planning, Design & Construction

STATE CONTROLLER (or Authorized Delegate) ___________________________ DATE ___________________________

Steve McNally, Associate Vice Chancellor &

Controller

(Verification)
## Building & Location
DUAN C123, A, B, C

## Job Description
remove walls

## Work Order/Project Number
PR#004792

### Follow-up required for:
- Asbestos Materials
- Lead Materials
- Environmental Compliance
- Laser or X-Ray
- Hazardous Materials
- Other
- None Found

### Environmental Site Assessment Form

#### Suspect Building Components, Materials, and Site Conditions:
Area of work is offices in a laboratory building. Glued down carpet on floor tile mastic, 2X4' ceiling panels, cove base and adhesive, plaster, drywall/joint compound, and pipe insulation are suspect for asbestos. Buildings constructed prior to 1978 are presumed to contain lead based paint.

#### Samples / Results:
Floor tile and mastic, drywall/joint compound and pipe insulation are positive for asbestos. All other materials as listed are negative for asbestos. Area of work is negative for lead based paint.

#### Required Action:
Infill of the walls will not affect the asbestos drywall/joint compound or pipe insulation. Replacement of the floor materials will require abatement using AHERA trained and certified personnel. Any work outside of the scope of work will require additional assessments. Contractor shall ensure that controls are in place for all dust, odor, and vapor throughout all phases of the project. All employees of the Contractor and their subcontractors shall have, at a minimum, Class IV 2 Hour Asbestos OSHA Awareness Training while working in this building and on this project. Contractor will be responsible for notifying the building proctor prior to mobilization of planned activities and schedule.

#### Inspector:
Robert A. Longmire #12856
Date Inspected: 6/16/2010

#### EH&S Manager:
Michael Yanker #5731
Date Reviewed: 6/16/2010

This report is based upon conditions, regulations, policies at time of inspection and is valid for 180 days (per ASTM 1527-05). A change in the scope of work and/or expiration of this inspection will require re-inspection. If areas contain hazardous materials (asbestos, chemicals, gases, bio-hazards, radioactive materials or radiation) and/or involve laboratories, shops, haz exhausts, tanks, sewer drains or traps, storm or surface water, or other occupational hazards, work must be coordinated with the appropriate EH&S manager. No new materials containing asbestos may be used for any part of the construction for this project. Project must conform with all applicable codes & standards. Project Rep must submit to EH&S Env Compliance - comprehensive haz materials/chemical inventory used to determine additional requirements. Contractor and/or Project Rep must provide above information to employees, subcontractors and other relevant parties.

#### University Representative:
Gil Fike
Phone Number: (303) 735-0346

#### Contractor Name:
Phone Number:

#### Contractor Representative: (signature)
Date Signed:
STATE OF COLORADO  
OFFICE OF THE STATE ARCHITECT  
STATE BUILDINGS PROGRAMS

NOTICE TO PROCEED (DESIGN/BID/BUILD CONTRACT)

<table>
<thead>
<tr>
<th>Date of Notice:</th>
<th>Date to be inserted by the Principal Representative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date/Description of Contract Documents:</td>
<td></td>
</tr>
<tr>
<td>Institution/Agency:</td>
<td>University of Colorado at Boulder</td>
</tr>
<tr>
<td>Project No./Name:</td>
<td>PR004792 / DUAN – Rm C123/123A/123B/ &amp; 123C Remodel</td>
</tr>
</tbody>
</table>

---

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, the requisite Builder’s Risk Insurance Policy or Certificate for same, and Certificates of Insurance 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 Agreement dated ________________ covering the above described work has been fully executed.

You are hereby authorized and directed to proceed within ten (10) days from date of this Notice 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.

_Actual on-site construction may not commence until all applicable building permits have been obtained by the Contractor._

<table>
<thead>
<tr>
<th>By</th>
<th>State Buildings Programs (or Authorized Delegate)</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Paul M. Leef, AIA, LEED™ AP</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Campus Architect &amp; Director, Planning, Design &amp; Construction</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>By</th>
<th>Principal Representative (Institution or Agency)</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ronald L. Ried, Director Facilities Management Business Services</td>
<td></td>
</tr>
</tbody>
</table>

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

State Form SBP-6.26  
Rev. 7/2008
STATE BUILDINGS PROGRAMS
CERTIFICATION AND AFFIDAVIT REGARDING UNAUTHORIZED IMMIGRANTS

Institution/Agency: University of Colorado at Boulder
Project No./Name: PR004792 / DUAN – Rm C123/123A/123B/ & 123C Remodel

A. CERTIFICATION STATEMENT CRS 8-17.5-101 & 102 (HB 06-1343, SB 08-193)

The Vendor, whose name and signature appear below, certifies and agrees as follows:

1. The Vendor shall comply with the provisions of CRS 8-17.5-101 et seq. The Vendor shall not knowingly employ or contract with an unauthorized immigrant to perform work for the State or enter into a contract with a subcontractor that knowingly employs or contracts with an unauthorized immigrant.

2. The Vendor certifies that it does not now knowing employ or contract with and unauthorized immigrant who will perform work under this contract, and that it will participate in either (i) the "E-Verify Program", jointly administered by the United States Department of Homeland Security and the Social Security Administration, or (ii) the "Department Program" administered by the Colorado Department of Labor and Employment in order to confirm the employment eligibility of all employees who are newly hired to perform work under this contract.

3. The Vendor shall comply with all reasonable requests made in the course of an investigation under CRS 8-17.5-102 by the Colorado Department of Labor and Employment. If the Vendor fails to comply with any requirement of this provision or CRS 8-17.5-101 et seq., the State may terminate work for breach and the Vendor shall be liable for damages to the State.

B. AFFIDAVIT CRS 24-76.5-101 (HB 06S-1023)

4. If the Vendor is a sole proprietor, the undersigned hereby swears or affirms under penalty of perjury under the laws of the State of Colorado that (check one):

- I am a United States citizen, or
- I am a Permanent Resident of the United States, or
- I am lawfully present in the United States pursuant to Federal law.

I understand that this sworn statement is required by law because I am a sole proprietor entering into a contract to perform work for the State of Colorado. I understand that state law requires me to provide proof that I am lawfully present in the United States prior to starting work for the State. I further acknowledge that I will comply with the requirements of CRS 24-76.5-101 et seq, and will produce the required form of identification prior to starting work. I acknowledge that making a false, fictitious, or fraudulent statement or representation in this sworn affidavit is punishable under the criminal laws of Colorado as perjury in the second degree under CRS 18-8-503 and it shall constitute a separate criminal offense each time a public benefit is fraudulently received.

CERTIFIED and AGREED to this _____ day of ______________, 2010.

VENDOR:

____________________________________
Vendor Full Legal Name

BY:

____________________________________
Signature of Authorized Representative

_______________________________
Title

State Form UI-1
Issued 7/2008
NOTICE OF SUBSTANTIAL COMPLETION

Date of Substantial Completion: 

Date to be inserted by the Principal Representative

Institution/Agency: University of Colorado at Boulder

Project No./Name: PR004792 / DUAN – Rm C123/123A/123B/ & 123C Remodel

TO: Gil Fike, Project Manager
University of Colorado at Boulder
Department of Facilities Management
Campus Box 453 UCB
Boulder, CO 80309-0453
(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 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, Inspection Cards completely signed-off or a Temporary Certificate, or Certificate, of Occupancy has been issued, 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 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.
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 Programs.
NOTICE OF FINAL ACCEPTANCE

Date of Notice of Acceptance: ____________________________

Institution/Agency: University of Colorado at Boulder
Project No./Name: PR004792 / DUAN – Rm C123/123A/123B/ & 123C Remodel

TO:

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

By / Paul M. Leef, AIA, LEED AP    / Date Ronald L. Ried, Director
Campus Architect
Director, Planning, Design & Construction
Principal Representative
State Buildings Programs
(Institution or Agency)

By /    / Date    / Date
Facilities Management Business Services
(Institution or Agency)

*When completely executed, this form is to be sent by certified mail to the Contractor by the Principal Representative.
This form to be used after follow-up inspections have been made and punch list is worked down to less than ten items.

<table>
<thead>
<tr>
<th>Final Punch List Item</th>
<th>Disposition</th>
<th>Date</th>
<th>Remarks</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Architect/Engineer</th>
<th>Date</th>
<th>Contractor</th>
<th>Date</th>
</tr>
</thead>
</table>
Pahl Architecture    |      |            |      |

<table>
<thead>
<tr>
<th>State Buildings Programs</th>
<th>Date</th>
<th>Principal Representative</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>(or Authorized Delegate)</td>
<td></td>
<td>(Institution or Agency)</td>
<td></td>
</tr>
<tr>
<td>Paul M. Leef, AIA, LEED TM AP</td>
<td></td>
<td>Ronald L. Ried, Director</td>
<td></td>
</tr>
<tr>
<td>Campus Architect &amp; Director, Planning, Design &amp; Construction</td>
<td></td>
<td>Facilities Management Business Services</td>
<td></td>
</tr>
</tbody>
</table>
NOTICE OF CONTRACTOR’S SETTLEMENT

Institution/Agency: University of Colorado at Boulder
Project No./Name: PR004792 / DUAN – Rm C123/123A/123B/ & 123C Remodel

Notice is hereby given that on the _______ day of _________, 2010 at Boulder, Colorado, final settlement will be made by the STATE OF COLORADO with __________ hereinafter called the "CONTRACTOR", for and on account of the contract for the construction of a PROJECT described as DUAN – Rm C123/123A/123B/ & 123C Remodel

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 Gil Fike, project manager, Department of Facilities Management, Campus Box 453 UCB, Boulder, CO 80309-0453.

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

Dated at Boulder, Colorado, this ____th day of _____, 2010.

Paul M. Leef, AIA, LEED™ AP
Campus Architect &
Director of Planning, Design &
Construction
State Buildings Programs
(or Authorized Delegate)

Ronald L. Ried, Director
Facilities Management Business Services
Principal Representative
(Institution or Agency)

MEDIA OF PUBLICATION:

PUBLICATION DATE:

NOTES TO EDITOR:

Transmit one copy of the Affidavit of Publication, and invoice, to: Marsha Slepicka, University of Colorado at Boulder, Department of Facilities Management, Campus Box 453 UCB, Boulder, CO 80309-0453

State Form SBP-7.3
Rev. 9/2006
NOTICE OF APPROVAL OF OCCUPANCY/USE

Date of Occupancy:  
Institution/Agency:  University of Colorado at Boulder  
Project No./Name:  PR004792 / DUAN – Rm C123/123A/123B/ & 123C Remodel  

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.

<table>
<thead>
<tr>
<th>Date Completed</th>
<th>A/E Signoff</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>The Notice of Substantial Completion has been issued and the Building Inspection Record is Cards are completely signed-off (or a Temporary Certificate, or Certificate, of Occupancy has been issued and copies attached.</td>
</tr>
<tr>
<td>2a.</td>
<td>Notification has been made to the local Fire Department concerning which portion(s) of the building will be occupied and the date(s).</td>
</tr>
<tr>
<td>2b.</td>
<td>Fire alarms, smoke detection systems and building fire sprinkler systems have been fully checked and are operable.</td>
</tr>
<tr>
<td>2c.</td>
<td>The building’s fire connections must be installed and operable, if applicable.</td>
</tr>
<tr>
<td>3.</td>
<td>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.</td>
</tr>
<tr>
<td>4.</td>
<td>Sterilization of plumbing systems has been performed.</td>
</tr>
<tr>
<td>5.</td>
<td>Operational test of systems and equipment has been performed as required.</td>
</tr>
<tr>
<td>6.</td>
<td>Systems adjustments such as balancing, equipment operations, etc., have been performed. Reports have been submitted to the Architect/Engineer for approval.</td>
</tr>
<tr>
<td>7.</td>
<td>Principal Representative furnished equipment and furnishings are coordinated and placed.</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>8.</td>
<td>All elements left unfinished must be in such condition that there would be no hazard to the health or safety of the occupants.</td>
</tr>
<tr>
<td>9.</td>
<td>All restroom facilities must be fully functional and operable.</td>
</tr>
<tr>
<td>10.</td>
<td>All light fixtures must be installed and operable.</td>
</tr>
<tr>
<td>11.</td>
<td>All exit lights and emergency lighting systems have been checked and are operable.</td>
</tr>
<tr>
<td>12.</td>
<td>All windows have been glazed and hardware is available for ventilation purposes.</td>
</tr>
<tr>
<td>13.</td>
<td>All routes of egress must be clear of construction materials and debris at all times.</td>
</tr>
<tr>
<td>14.</td>
<td>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.</td>
</tr>
</tbody>
</table>

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.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Architect/Engineer</td>
<td>Date</td>
</tr>
<tr>
<td>Pahl Architecture</td>
<td></td>
</tr>
<tr>
<td>Principal Representative</td>
<td>Date</td>
</tr>
<tr>
<td>(Institution or Agency)</td>
<td></td>
</tr>
<tr>
<td>Ronald L. Ried, Director</td>
<td></td>
</tr>
<tr>
<td>Facilities Management Business Services</td>
<td></td>
</tr>
<tr>
<td>State Buildings Programs</td>
<td>Date</td>
</tr>
<tr>
<td>(or Authorized Delegate)</td>
<td></td>
</tr>
<tr>
<td>Paul M. Leef, AIA, LEED TM AP</td>
<td></td>
</tr>
<tr>
<td>Campus Architect &amp; Director, Planning, Design &amp; Construction</td>
<td></td>
</tr>
<tr>
<td>Contractor</td>
<td>Date</td>
</tr>
</tbody>
</table>
## PRE-ACCEPTANCE CHECKLIST*

<table>
<thead>
<tr>
<th>Institution or Agency:</th>
<th>University of Colorado at Boulder</th>
<th>Final Punch List Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Architect/Engineer:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contractor:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Project No./Name:</td>
<td>PR004792 / DUAN – Rm C123/123A/123B/ &amp; 123C Remodel</td>
<td></td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>1. The Notice of Approval of Occupancy/Use has been fully executed <strong>and the Inspection Cards are completely signed-off.</strong></th>
<th>DATE COMPLETED</th>
<th>A/E SIGNOFF</th>
<th>REMARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. On the Pre-Acceptance Punch List (Form SBP-06) the final punch list items are noted by the Architect/Engineer.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Schedule for corrections, deficiencies, and items to be supplied are established by Contractor.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Final Change Orders are processed (must be completed prior to Notice of Acceptance).</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. The Principal Representative shall not authorize final payment until all items on the punch list have been completed, the Notice of Acceptance issued and the Notice of Contractor’s Settlement Date is published.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Permanent keying, keys and keying instructions have been performed.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Extra materials as per specifications are delivered to Principal Representative.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. As-built drawings have been submitted to Architect/Engineer.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Guarantee/Warranty documentation requirements are met.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Removal of Contractor’s temporary work including cleanup and debris removal.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. State personnel are instructed in system and equipment operations as required by contract.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. All Instructions, manuals, guides, and charts have been transmitted to Principal Representative.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Architect/Engineer: Pahl Architecture  
Date:  
Contractor:  
Date:  

State Buildings Programs  
(or Authorized Delegate)  
Paul M. Leef, AIA, LEED™ AP  
Campus Architect &  
Director, Planning, Design & Construction  
Date:  

Principal Representative  
(Institution or Agency)  
Ronald L. Ried, Director  
Facilities Management Business Services  
Date:
CLOSING-OUT CHECKLIST*

<table>
<thead>
<tr>
<th>Institution or Agency: University of Colorado at Boulder</th>
<th>Final Punch List Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Architect/Engineer: Pahl Architecture</td>
<td></td>
</tr>
<tr>
<td>Contractor:</td>
<td></td>
</tr>
<tr>
<td>Project No./Name: PR004792 / DUAN – Rm C123/123A/123B/ &amp; 123C Remodel</td>
<td></td>
</tr>
</tbody>
</table>

After Contractor or Construction Manager is satisfied that work is complete, 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.

<table>
<thead>
<tr>
<th>DATE COMPLETED</th>
<th>SIGNOFF INITIALS</th>
<th>REMARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1a. Final inspections have been made and permission to occupy Project is obtained through SBP Delegate. The Building Inspection Cards are completely signed off and attached.

1b. If Principal Representative wishes to occupy entire project or portions of Project before completion (Beneficial Occupancy) Project review of condition and responsibility is conducted and noted. (Fill out Form SBP-01 in addition to this form).

2. Notify the local fire department of the date the building will be occupied.

3. Coordination for final utility and service connections, meters, etc., has been made (water, gas, sewer, electricity and telecommunication) and in full operating order.

4. Sterilization of plumbing systems has been performed.

5. Operational tests of systems and equipment have been performed as required.

6. Systems adjustments, such as balancing, equipment operations, etc., have been performed. Reports have been submitted to Architect/Engineer and approved.

7. State personnel are instructed in system and equipment operations as required by contract.

8. Instructions, manuals, guides, charts, etc., are transmitted to Principal Representative.

9. Principal Representative furnish equipment and furnishing are coordinated and placed.

10. Review drawing, specifications, addenda, change orders, etc. for work to be done and note.
11. On the Contract Close-out Punch List (Form SBP-06) the final punch list items deficient or still required are made by the Architect and includes lists furnished by the consultants and promptly distributed to all parties.

12. Schedule for corrections, deficiencies, and items to be supplied is established by Contractor, Assistant Contractor and trades as to location of specific defects if necessary.

13. Final Change Orders are processed (must be completed prior to contract acceptance).

14. The Principal Representative shall not authorize final payment until all items on the punch lists have been completed, the Notice of Acceptance issued and the Notice of Contractor’s Settlement Date is published.

15. Permanent keying, keys and keying instructions have been performed.

16. Extra materials, spares, etc., are delivered to Principal Representative.

17. Record drawings (as-built) requirements have been submitted to A/E.

18. Guarantee/Warranty requirements are met.

19. All records, reports, files, documents, etc., of construction inspector are in order and turned over to Owner as arranged, and to SBP as applicable.

20. Removal of Contractor’s temporary work; cleanup and debris removal is understood and performed.

21. Post-contract maintenance conditions, such as equipment, landscaping, etc., are understood and arranged for.

* Verification, item by item, as applicable, to be submitted with Notice of Acceptance Form SC-6.27.

<table>
<thead>
<tr>
<th>DATE COMPLETED</th>
<th>SIGNOFF INITIALS</th>
<th>REMARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Pahl Architecture
Architect/Engineer

Contractor

Paul M. Leef, AIA, LEED™ AP
Campus Architect &
Director, Planning, Design & Construction
State Buildings Programs
(or Authorized Delegate)

Ronald L. Ried, Director
Facilities Business Services
Principal Representative
(Institution or Agency)
Institution/Agency: University of Colorado at Boulder  
Project No./Name: PR004792 / DUAN – Rm C123/123A/123B/ & 123C Remodel

This form to be used after follow-up inspections have been made and punch list is worked down to less than ten items:

<table>
<thead>
<tr>
<th>Final Punch List Item</th>
<th>Disposition</th>
<th>Date</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Contractor

Date

Pahl Architecture

Architect/Engineer

Date

Paul M. Leef, AIA, LEED™ AP
Campus Architect &
Director, Planning, Design &
Construction
State Buildings Programs
(or Authorized Delegate)

Date

Ronald L. Ried, Director
Facilities Business Services
Principal Representative
(Institution or Agency)

Date

State Form SBP-06
Rev. 9/2006
# Pre-Acceptance Punch List

State of Colorado  
Office of the State Architect  
State Buildings Programs

## Institution/Agency  
University of Colorado at Boulder  
**Final Punch List Date**

## Architect/Engineer  
Pahl Architecture

## Contractor

## Project No./Name  
PR004792 / DUAN – Rm C123/123A/123B/ & 123C Remodel

---

This form to be used after follow-up inspections have been made and punch list is worked down to less than ten items.

<table>
<thead>
<tr>
<th>Final Punch List Item</th>
<th>Disposition</th>
<th>Date</th>
<th>Remarks</th>
</tr>
</thead>
</table>

---

**Architect/Engineer**  
Pahl Architecture  
**Date**

**Contractor**  
**Date**

---

**State Buildings Programs**  
(or Authorized Delegate)  
**Date**  
Paul M. Leef, AIA  
Campus Director  
Director, Planning, Design & Construction

**Principal Representative**  
(Institution or Agency)  
**Date**  
Ronald L. Ried, Director  
Facilities Management Business Services

---

State Form SBP-06  
Rev. 7/2008
Contractors working on the UCB campus must comply with all applicable University, City, State and Federal environmental regulations and standards.

This includes but is not limited to:

- Developing and implementing Storm Water Management Plans, obtaining associated permits (i.e. dewatering), and using erosion control techniques and Best Management Practices (BMP’s) to protect drains and sewer systems from inappropriate discharges, paying special attention to preventing any contaminants from entering storm sewers or surface water collection systems.
- Properly managing and disposing of hazardous and regulated materials.
- Controlling dust, odors, vapors, debris and run-off during project activities.
- Reporting spills or releases of hazardous materials immediately! Call 911 and during weekdays report to EH&S 303-492-6025.

You are expected do your part to promote awareness and compliance. Violations can result in serious penalties and fines for contractors!

Questions, Comments or Concerns? – Please Contact:

Environmental Health and Safety 303-492-6025.
**CERTIFICATE FOR CONTRACTOR’S PAYMENT**

**PAY APPLICATION #:**

**FROM:**

**TO:**

**P.O. NO.:**

**FEIN:**

**CONTRACTOR:**

**AGENCY/INSTITUTION:**

**PROJECT #/TITLE:** PR004792 - DUAN - Rm C123/123A/123B/ & 123C Remodel

### AMENDMENTS/CHANGE ORDER SUMMARY

<table>
<thead>
<tr>
<th>Number</th>
<th>Date</th>
<th>Deductions (L)</th>
<th>Additions (M)</th>
<th>Original Contract Sum (K/E)</th>
<th>Net Change from Amendments/Change Orders (L + M/E)</th>
<th>Present Contract Total (N/E)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$0.00</td>
<td>$0.00</td>
<td>$0.00</td>
</tr>
</tbody>
</table>

**Prior amendments / Change Orders CO#’s:**

**Approved This Period**

<table>
<thead>
<tr>
<th>Number</th>
<th>Date</th>
<th>Earned (Due to Date (I))</th>
<th>Retainage</th>
<th>Current to Date Total Amount Earned</th>
<th>Retainage</th>
<th>Prior Payments Total Amount Earned</th>
<th>Retainage</th>
<th>Prior Payments Less Retainage</th>
<th>Warrant Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>$0.00</td>
<td>$0.00</td>
<td>$0.00</td>
<td>$0.00</td>
<td>$0.00</td>
<td>$0.00</td>
<td>$0.00</td>
<td>$0.00</td>
</tr>
</tbody>
</table>

**Current to Date Payment Less Retainage**

$0.00

**Prior Payments Total Amount Earned**

$0.00

**Prior Payments Less Retainage**

$0.00

**Net change by Amendments / Change Orders (L + M)**

$0.00

**Institution/Agency (or Authorized Delegate) Date**

**State Buildings Programs (or Authorized Delegate) Date**

**Contractor**

**State Form SBP-7.2 Rev. 9/2006 Page 1 of 2**
## CONTRACTOR'S APPLICATION FOR PAYMENT

### Detail of Schedule of Values

<table>
<thead>
<tr>
<th>(A)</th>
<th>(B)</th>
<th>(C)</th>
<th>(D)</th>
<th>(E)</th>
<th>(F)</th>
<th>(G)</th>
<th>(H)</th>
<th>(I)</th>
<th>(J)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item No.</td>
<td>Description of Work</td>
<td>Material</td>
<td>Labor and Other</td>
<td>Totals (C + D)</td>
<td>Materials On-Site But Not In Place</td>
<td>WORK IN PLACE</td>
<td>Total Amount Due to Date (F+G+H)</td>
<td>% Complete and In Place (I / E)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Totals of Work Completed and Stored to Date

<table>
<thead>
<tr>
<th>(K)</th>
<th>(L)</th>
<th>(M)</th>
<th>(N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item No.</td>
<td>Description of Work</td>
<td>Material</td>
<td>Labor and Other</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

State Form SBP-7.2
Rev. 9/2006
## PROJECT SUBMITTAL LOG

**Project**: PR 004792 – DUAN - RM C123/123A1123B/C123C - Remodel into Lab

<table>
<thead>
<tr>
<th>Spec. Section No.</th>
<th>Sub No.</th>
<th>Contr No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>01010</td>
<td></td>
<td></td>
<td>Photographs-existing conditions</td>
</tr>
<tr>
<td>01300</td>
<td></td>
<td></td>
<td>CPM Schedule/Schedule of values</td>
</tr>
<tr>
<td>01400</td>
<td></td>
<td></td>
<td>Quality Control Representative</td>
</tr>
<tr>
<td>04150</td>
<td></td>
<td></td>
<td>Masonry Accessories</td>
</tr>
<tr>
<td>04200</td>
<td></td>
<td></td>
<td>Unit Masonry</td>
</tr>
<tr>
<td>07210</td>
<td></td>
<td></td>
<td>Building Insulation</td>
</tr>
<tr>
<td>07900</td>
<td></td>
<td></td>
<td>Joint Sealants</td>
</tr>
<tr>
<td>08710</td>
<td></td>
<td></td>
<td>Door Hardware</td>
</tr>
<tr>
<td>09260</td>
<td></td>
<td></td>
<td>Gypsum Board Systems</td>
</tr>
<tr>
<td>09510</td>
<td></td>
<td></td>
<td>Acoustical Ceilings</td>
</tr>
<tr>
<td>09650</td>
<td></td>
<td></td>
<td>Resilient Flooring</td>
</tr>
<tr>
<td>09900</td>
<td></td>
<td></td>
<td>Painting</td>
</tr>
<tr>
<td>15050</td>
<td></td>
<td></td>
<td>Valves</td>
</tr>
<tr>
<td>15050</td>
<td></td>
<td></td>
<td>Strainers</td>
</tr>
<tr>
<td>15170</td>
<td></td>
<td></td>
<td>VFDs</td>
</tr>
<tr>
<td>15240</td>
<td></td>
<td></td>
<td>Spring Hangers</td>
</tr>
<tr>
<td>15250</td>
<td></td>
<td></td>
<td>Insulation</td>
</tr>
<tr>
<td>15300</td>
<td></td>
<td></td>
<td>Fire Protection</td>
</tr>
<tr>
<td>15400</td>
<td></td>
<td></td>
<td>Plumbing Piping</td>
</tr>
<tr>
<td>15540</td>
<td></td>
<td></td>
<td>Pumps</td>
</tr>
<tr>
<td>15550</td>
<td></td>
<td></td>
<td>Hydronic Specialties</td>
</tr>
<tr>
<td>15580</td>
<td></td>
<td></td>
<td>Fan Coil Units</td>
</tr>
<tr>
<td>15580</td>
<td></td>
<td></td>
<td>Sound Attenuators</td>
</tr>
<tr>
<td>15580</td>
<td></td>
<td></td>
<td>Duct Liner</td>
</tr>
<tr>
<td>15580</td>
<td></td>
<td></td>
<td>FRP Ductwork</td>
</tr>
<tr>
<td>15580</td>
<td></td>
<td></td>
<td>Electrical Specification</td>
</tr>
<tr>
<td>15580</td>
<td></td>
<td></td>
<td>Temperature Controls</td>
</tr>
<tr>
<td>15580</td>
<td></td>
<td></td>
<td>Test and Balance Report</td>
</tr>
<tr>
<td>15580</td>
<td></td>
<td></td>
<td>Lighting Fixtures</td>
</tr>
</tbody>
</table>

### NOTES:

a. The Submittal Log lists the specification section that requires submittals. It is the Contractor's responsibility to reference the appropriate subsection of the specification section for specific individual submittal requirements and to submit accordingly.

b. The Submittal Log does not necessarily list all specification sections that require submittals. The Contractor is responsible for any additional submittals that may be called for and required on drawings in the individual schedules and notes.
1.01 CONDITIONS AND REQUIREMENTS

Division 1 - General Requirements shall govern work under all Divisions of the Specifications.

1.02 SPECIFICATION LANGUAGE EXPLANATION

Specifications are of abbreviated, simplified or streamlined type and include incomplete sentences. Omissions of words or phrases such as "the Contractor shall," "in conformity therewith," "shall be," "as noted on the Drawings," "a," "the" are intentional. Supply omitted words or phrases by inference in same manner as they are when "NOTE" occurs on Drawings. Supply words "shall be" or "shall" by inference when colon is used within sentences or phrases. Supply words "on the Drawings" by inference when "as indicated" is used with sentences or phrases.

Where reference is made to specifications, societies, institutes, or associations or manufacturer's directions, they are, except as may be inconsistent herewith, made part of specifications, to same extent as if written out in full herein. Use latest edition, at time of bidding, if a date is not given.

1.03 SUBMITTALS

A. Prepare data for use by the University of Colorado, Facilities Management personnel.

B. Format:
   1. Submit electronically in Portable Document Format (PDF) format as one document, OCR (Optical Character Recognition) searchable, bookmarked according to the Construction Specifications Institute (CSI) standards.
   2. Title shall be "SPECIFICATIONS", and shall include:
      a. Name of project and submittal stage and date of submittal (month, day, and year).
      b. University of Colorado Project number (Include on cover and in header or footer of each page)

1.04 CONTENT OF MANUAL

A. An electronically-written table of contents shall be provided for each volume, arranged according to CSI standards.
Include the following:
   1. Name of responsible installing principal contractor, address, and telephone number.

1.05 ABBREVIATIONS

References in Contract Documents to trade associations, technical societies, recognized authorities and other institutions include following organizations, which are sometimes referred to only by corresponding abbreviations:

AA Aluminum Association
AAMA Architectural Aluminum Manufacturer's Association
ACI American Concrete Institute
AIMA  Acoustical and Insulating Materials Association (successor to AMA and IBI)
AISC  American Institute of Steel Construction
AISI  American Iron and Steel Institute
AITC  American Institute of Timber Construction
AMA  Acoustical Materials Association
ANSI  American National Standards Institute (successor to USASI and ASA)
APA  American Plywood Association
ASHRAE American Society of Heating, Refrigerating and Air Conditioning Engineers
ASTM American Society for Testing Materials
AWI  Architectural Woodwork Institute
AWPA  American Wood Preservers Association
AWS  American Welding Society
CDA  Copper Development Associations, Inc.
CM/GC  Construction Manager/General Contractor
CRA  California Redwood Association
CRSI  Concrete Reinforcing Steel Institute
CS  Commercial Standard (U.S. Department of Commerce)
DFPA  Douglas Fir Plywood Association
EPA  Environmental Protection Agency
FGMA  Flat Glass Marketing Association
FIA  Factory Insurance Association
FM  Factory Mutual Engineering Division
FS  Federal Specification
MIA  Marble Institute of America
MIL  Military Specification
MILMA  Metal Lath Manufacturer's Association
NAAMM The National Association of Architectural Metal Manufacturers
NBFU  National Board of Fire Underwriters
NBS  National Bureau of Standards
NCMA  National Concrete Masonry Association
NEC  National Electric Code (of NBFU)
NEMA  National Electrical Manufacturers' Association
NFPA  National Fire Protection Association
NIOSH  National Institute of Occupational Safety and Health
NMWIA  National Mineral Wool Insulation Association
NPVLMA  National Paint, Varnish and Lacquer Manufacturers' Association
NTMA  The National Terrazzo and Mosaic Association
OSHA  Occupational Safety and Health Administration
PCA  Portland Cement Association
PCI  Prestressed Concrete Institute
PEI  Porcelain Enamel Institute
PS  Product Standard (U.S. Department of Commerce)
SCPI  Structural Clay Products Institute
SDI  Steel Deck Institute
SJI  Steel Joist Institute
SMACNA Sheet Metal and Air Conditioning Contractor's National Association
SPA  Southern Pine Association
SPI  The Society of Plastic Industry, Inc.
SPR  Simplified Practice Recommendation (U.S. Department of Commerce)
SSPC  Steel Structures Painting Council
SWI  Steel Window Institute
1.04 LAYING OUT WORK

The Contractor will furnish reference bench mark and maintain bench mark and all other grades, lines, and levels and dimensions as indicated in the Contract Documents. Report any errors or inconsistencies in above to Owner before commencing work.

Except as delegated by subcontract or normal trade practice, the Contractor will be responsible for all lines, elevations, and measurements of work indicated.

1.05 EXAMINATION OF SITE

Failure to visit the site will in no way relieve any Contractor from the necessity of furnishing materials or performing work that may be required to complete work in accordance with the Contract Documents without additional cost to Owner.
PART 1 - GENERAL

1.01 SCHEDULE OF DRAWINGS, SPECIFICATIONS AND ADDENDA

The following Drawings, Project Manual, and Addenda from the Contract Documents.

A. Set(s) of Drawings & project manuals dated 7/7/2010. Drawing list is as follows:

<table>
<thead>
<tr>
<th>Sheet No.</th>
<th>Titled</th>
</tr>
</thead>
<tbody>
<tr>
<td>A001</td>
<td>Project Information</td>
</tr>
</tbody>
</table>

**Architectural**
- A100      | Existing / Demolition – 1st Floor Plan   |
- A101      | New Construction Plan – 1st Floor         |

**Mechanical & Plumbing**
- M001      | Legends and Schedules                    |
- M102      | Level 1F HVAC Demolition Plan            |
- M202      | Level 1F HVAC Fit Up Plan                |
- M401      | HVAC Controls                            |
- M501      | Details                                  |
- P102      | Level 1F Piping Demo Plan                |
- P201      | Level 1B/2B Mechanical Room Mechanical Fit Up Plan |
- P202      | Level 1F Piping Plan                     |

**DIVISION 16 – Electrical Index**
- 16010     | Electrical General Provisions            |
- 16110     | Raceways                                 |
- 16120     | Conductors                               |
- 16130     | Boxes and Fittings                       |
- 16140     | Wiring Devices and Plates                |
- 16450     | Grounding                                |
- 16510     | Lighting Fixtures                        |


C. Addenda: All Addenda issued prior to bidding.

1.02 WORK COVERED BY CONTRACT DOCUMENTS

A. Work covered: Work under this contract includes all materials, equipment and labor necessary to complete the work indicated on the drawings, described in specifications, addenda or reasonably inferred.
1.03 CONTRACTORS

All work will be executed under one prime construction contract between the Owner and the Contractor.

Except as indicated otherwise, all work under this contract will be under the direction of the prime contractor.

1.04 JOB CONDITIONS

A. Areas of the building immediately adjacent to areas under construction will be occupied by the public during the work of this project.

Limit construction operations to those methods and procedures which will not adversely and unduly affect the Owner's occupied spaces inclusive of parking facilities.

B. Do not interrupt building access and use, except as permitted by the Owner.

Provide eight (8) work days notice to the Owner of construction activities which will severely impact the occupancy and use of adjacent areas.

C. Provide temporary barriers and/or partitions as required to protect the occupants of the building and the general public from injury due to the work of this project; and/or to protect adjacent areas of the building from the spread of dust and dirt caused by the work or this project.

Remove temporary barriers and partitions upon completion of the Project.

1. Temporary partitions shall be constructed of 1/2" plywood on the construction face nominal 2" X 4" wood studs and 1/2" gypsum wallboard on the public occupied face.

D. Do not interrupt power, lighting, plumbing, telephone and HVAC services to occupied areas without Owner's approval. Such interruptions must be scheduled at least eight (8) work days in advance and have Owner's approval.

1.05 PROTECTION OF WORK AND ADJACENT PROPERTY

A. Buildings and property adjacent to work included in this project may be subject to damage due to construction operations.

Prior to the start of the work included in this Contract engage the services of a photographer to record the existing condition of adjacent structures and property. Contractor shall provide one set of 3" X 5" prints or a set on disk to the Owner and retain negatives and one set of prints for their records. Sufficient photos with adequate detail to thoroughly document the conditions surrounding the work shall be provided.

B. At the completion of the project, Contractor shall restore existing buildings, landscaping, parking facilities and property to same condition as prior to the start of the work.

C. In addition to the requirements of the General Conditions of the Contract for Construction, the Contractor shall:

1. Notify, in writing, the Owner of University or private property which interferes with the work and arrange with them for disposition of such property.
2. Provide and maintain proper shoring and bracing to prevent earth from caving or washing into excavation. Provide temporary protection around openings through and at floors, roofs, and other openings.

3. Provide and maintain proper shoring and bracing for existing underground utilities, sewers, etc., encountered during excavation work, to protect them from collapse or other type of damage until such time as they are to be removed, incorporated into the work of this project, or can be properly back-filled upon completion of new work.

4. Weather Protection: Provide protection against rain, snow, wind, ice, storms, or heat so as to maintain work, materials, apparatus, and fixtures free from injury or damage. At the end of each day's work, cover new work likely to be damaged.

5. Provide and maintain adequate protection of the work from damage due to freezing, especially freezing earth and soils. Risk of proceeding with the work on or with freezing or frozen materials will be the sole responsibility of the Contractor.

6. Water Protection: Provide protection from damage at all times from rain water, ground water, backing up of drains or sewers, and other water. Provide pumps and equipment enclosures to provide this protection.

7. The Contractor will maintain free of obstructions and debris, all designated corridors and emergency exits, handicap access ramps and sidewalks to building. Provide temporary directional handicapped signage for routing to the nearest accessible facilities.

1.06 EXISTING FURNITURE AND EQUIPMENT

The Owner will remove or relocate existing movable furniture and equipment from the areas in which the Contractor is working. Notify the Owner not less than three days prior to starting work in areas where furniture and equipment require moving.

1.07 CONTRACTOR'S ACCESS PARKING AND STAGING AREAS

A. Work included in this project will need to be performed within the limitations of available access at the site. The University shall limit the area available for staging and parking due to the additional number of construction projects planned during the execution of this contract. Contractor shall adjust the means and methods of construction to allow for the restrictions surrounding the site.

B. All parking on campus except for some one-hour zones on city streets and a few metered spaces is under control and authority of the Parking and Transportation Services (PTS) of the University. All University parking is by permit only.

C. Types of parking and staging are defined as follows:

General Staging Areas are approved areas adjacent to the site when available or in University designated group staging yards. General Staging Areas may be used for any purpose, including employee parking, on a space available basis, but must be coordinated through the UCB Project Manager and PTS. Vehicles may not park outside of general staging areas except in areas coordinated and approved by PTS.
Restricted Staging Areas are approved areas near the site for the construction dumpster, off-loading of equipment, contractor's work trailer, and materials that are soon to be incorporated into the work. No vehicles shall park in a restricted staging area for more than 20 minutes between the hours of 8:00 a.m. and 5:00 p.m. weekdays.

Contractor Employee Parking are areas for workers needing parking on campus. Coordinate through UCB Project Manager and PTS.

Prohibited Parking are areas designated in the Contract Documents as No Parking areas. The contractor shall not allow any parking in areas so designated under any circumstance.

D. The restrictions in this Section are in addition to any other restrictions or rules provided by PTS. Fees shall be assessed for the use of any PTS facility for staging and construction activities.

E. The designated staging area for this project shall be: N/A Use loading Dock for deliveries

F Vehicles parked on sidewalks or in landscape areas outside the designated staging areas cause damage to University property. The contractor shall reimburse the University $25.00 per vehicle per occurrence for vehicles parked outside the designated staging areas. This amount shall be in addition to any fines which might be levied by PTS.

1.08 OCCUPANCY REQUIREMENTS

A. Owner may occupy designated areas for the purpose of storage of furnishings and equipment and installation of equipment.

B. Execute Certificate of Substantial Completion for each designated portion of work prior to Owner occupancy. Contractor shall allow:
   1. Access for Owner personnel.
   2. Use of parking facilities.
   3. Operation of HVAC and electrical systems.

C. On occupancy, Owner will provide, for occupied areas:
   1. Operation of HVAC and electrical systems.

1.09 CONSTRUCTION AND SEQUENCE SCHEDULE:

A. In order to accommodate the uninterrupted operation of the existing building during the various phases of construction, the sequence of construction operations shall be as follows:
   1. The sequence concept is to: (1) prepare the existing facility to function during renovation through completion; (2) hence occupy the newly remodeled portion; and (3) upon completion, finally reoccupy the remodeled portions.
   2. Utilizing this concept break down the Schedule into broad scope categories augmented by "Owner Action" and "Contractor action" columns that indicate coordination tasks which define the various phases of the work.
   3. The intent of the categorization is to generally summarize the nature and extent of work to be performed without in any way limiting specific requirements of the Contract Documents.
4. Some overlapping between the several construction operations will occur, and where possible, permission may be granted to start certain portions of the work before the previous operations were completed in their entirety. Such detail scheduling shall be done as the work progresses, provided that the Owner's operations remains uninterrupted, but in all cases must receive Owner approval.

5. Where it may not be possible to complete certain mechanical and electrical services in connection with making the work complete and ready for occupancy, temporary services as directed and as approved shall be installed to permit occupancy by the Owner at the earliest possible date.

6. The construction sequence schedule and related drawings are intended to aid the Contractor in bidding and in the preparation of a specific construction schedule. Deviations of sequence may be made upon approval of the Owner and the Architect. The preparation of a specific construction schedule remains the responsibility of the Contractor

1.10 TEMPORARY ELECTRIC SERVICE

A. Connect to existing power service. Power consumption shall not disrupt owners need for continuous service. Owner to pay for power consumed. Provide power outlets for construction operations, branch wiring, distribution boxes, and flexible power cords as required.
PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the contract, including General and Supplementary Conditions and other Division 1 Specification sections, apply to work of this section.

1.02 SURVEYS, LAYOUTS, AND LEVELS

A. General: Working from lines and levels established by the existing building, and as shown in relation to the work, establish and maintain bench marks and other dependable markers to set the lines and levels for the work of construction as needed to properly locate every element of the work of the entire project. Calculate and measure required dimensions as shown (within recognized tolerances if not otherwise indicated); do not scale the drawings to determine dimensions. Continuously advise tradesmen performing the work of the marked lines and levels provided for use in the layout of work.

1.03 PROJECT RECORD DOCUMENTS

A. Maintain at job site, one copy of:
   1. Contract Drawings
   2. Specifications
   3. Addenda
   4. Reviewed Shop Drawings
   5. Change Orders
   6. Other Modifications to Contract
   7. Field Test Records
   8. As-Built Drawings

B. Maintain documents in clean, dry, legible condition and do not use record documents for construction purposes. Make documents available at all times for inspection by the Consultant and Owner.

C. Label each document "Project Record" in 1" or larger printed letters.

D. Record drawing information in colored pencil with different colors for the various systems and defined by color legend.

E. Record drawings and specifications shall include the following:
   1. Location of internal utilities and appurtenances concealed in construction referenced to visible and accessible features of structure. Location of concealed valves, dampers, controls, balancing devices, junction boxes, clean-outs, and other items requiring access or maintenance.
   2. Field changes of dimension and detail, changes made by Change Order or Field Order and details not on original contract drawings.
   3. Fire protection and alarm systems shop drawings.
F. Submit all record drawings to the Consultant at the completion of the project.

1.04 CLEANING

A. Cleaning and Protection Work: At the time each unit of work or element of the construction is completed (substantially) in each area of the Project, clean the unit or element to a condition suitable for occupancy and use (as intended), and restore minor or superficial damage. Replace units and elements which are damaged beyond successful restoration. Clean and restore adjoining surfaces and other work which was soiled or damaged (superficially) during the installation; replace other work damaged beyond successful restoration. Where the performance of subsequent work could possibly result in damage to the complete unit or element, provide protective covering or other provisions to minimize possible damage. Repeat cleaning and protection operations during remainder of construction period, wherever work might otherwise be damaged by sustained soiling or exposure.

B. During Construction: Oversee cleaning and ensure that building, grounds, and public properties are maintained free from accumulation of waste materials and rubbish. At reasonable intervals during daily progress of work, clean up site and access and dispose of waste materials, rubbish, and debris. Vacuum clean interior building areas when ready and continue vacuum cleaning on an as-needed basis until building is ready for acceptance or occupancy.

1.05 PROJECT SIGN

Erect no project sign or job-site sign of any kind, except warning signs as specified in Section 01500, without written authorization of the Owner.

1.06 COORDINATION

A. The Contractor shall coordinate the work so as not to interfere with the building custodian's normal cleanup activities.

B. The Contractor shall be responsible for coordinating all the work of the project. The Contractor shall coordinate the efforts of all subcontractor(s) and the deliveries of suppliers so that the work progresses in an orderly fashion without delay towards timely completion of a complete project in accordance with the drawings and specifications.

C. The Contractor shall note that concurrent with his work, other contractors, suppliers, and the Owner’s facilities and maintenance personnel may be working in relatively close proximity. The Contractor will be solely responsible for coordinating his work with that of other contractors and will make no claims for failure to do so.

1.08 METHODS OF CONSTRUCTION

A. The procedure and method of construction is the prerogative and the responsibility of the Contractor. If professional assistance is required to safely implement method of construction, the Contractor shall, on his own, employ professional help.

END OF SECTION
PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
1. Schedule of allowances.
2. Selection of products.
3. Adjustment of costs.

1.02 ALLOWANCES FOR PRODUCTS

A. The amount of each allowance shall include:
1. The cost of the Product to the Contractor.
2. Delivery to the site.
3. Applicable taxes.
4. Handling at the site.
5. Protection.
7. Contractor's and Subcontractor's overhead and profit.
8. Other expenses required to complete the installation.

1.03 SELECTION OF PRODUCTS UNDER ALLOWANCES

A. Contractor's Duties:
1. Assist Owner in determining qualified suppliers or installers.
2. Obtain proposals from suppliers and installers.
3. Make appropriate recommendations.

1.04 ADJUSTMENT OF COSTS

A. Should the net cost be more or less than the specified amount of the allowance, the Contract Sum will be adjusted accordingly by Change Order.
1. The amount of the Change Order will recognize:
   a. Any changes in handling costs at the site.
   b. Labor.
   c. Installation costs.
   d. Overhead and profit.
   e. Other expenses caused by the selection under the allowance.

B. Submit any claims for anticipated additional costs at the site.

C. At contract close-out, reflect all approved changes in contract amounts in the final statement of accounting.

PART 2-PRODUCTS

Not Used

END OF SECTION
PART 1 - GENERAL

1.01 GENERAL ALTERNATE REQUIREMENTS

A. General: The description for each alternate is recognized to be incomplete and abbreviated but implies that each change must be complete for the scope of work affected. Refer to applicable sections and to applicable drawings for the specific requirements of the owner, whether or not references are so noted in the description of each alternate. Modify surrounding work as required to integrate with the work of each alternate.

1.02 SPECIFIC ALTERNATES

A. Add Alternates No 1.

B. Doors C123 & C127 - Remove existing double doors and frames. Prepare existing openings for new 6’-0” x 7’-10” (verify existing opening size) acoustically rated doors and frames.

C. Doors:
   D. Standard doors must comply with SDI 100, grade III. Unless otherwise approved by the University.
   E. Doors: “Curries” series 757 doors.
   F. Verify existing rough opening and door size.

G. Frames:
   H. Metal frames, 16 gage minimum, heavier if doors are wider than 3’. Continuously weld and grind smooth all corner joints and contact edges once joints are closed tight.
   I. Anchoring: Securely anchor all frames to the floor. Minimum three wall anchors on each jamb.
   J. Anchoring: Securely anchor all frames to the floor. Minimum three wall anchors on each jamb.
   K. Reinforce frames for all required hardware.
   L. “Knock-down” type frames are not acceptable except when approved by the university in exceptional situations such as remodeling projects.
   M. Grout: Fill with mortar all metal door frames in masonry walls.
   N. Verify existing rough opening and door size.

O. Hardware:

P. Refer to section 08710 Door Hardware Set No. ADD ALT #1

The sum of _________________________________________ Thousand,
_____________________________________________and no/100 Dollars* ($_______)*

END OF SECTION
PART 1 - GENERAL

1.01 SUMMARY

A. General Contractor is responsible for all of the work of this contract.
   1. Assign and subcontract portions of the work as required to assure that all work is constructed in compliance with these documents.
   2. Coordinate the work of the several subcontractors for the project.
   3. Coordinate work of this contract with work by separate contractors.

B. Each subcontractor shall:
   1. Coordinate work of his own employees and subcontractors.
   2. Expedite his work to assure compliance with schedules.
   3. Coordinate his work with that of other subcontractors and work by separate contractor.
   4. Comply with orders and instructions of owner.

C. Related Requirements
   1. All Division 1 Sections.

1.02 CONSTRUCTION ORGANIZATION AND START-UP

A. Establish on-site lines of authority and communications.
   1. Attend pre-construction meeting with subcontractors upon commencement of the project.
   2. Establish procedures for intra-project communications.
      a. Submittals.
      b. Reports and records.
      c. Recommendations.
      d. Coordination Drawings.
      e. Schedules.
      f. Resolution of conflicts.
      a. Consult with Architect to obtain interpretation.
      b. Assist in resolution of questions or conflicts which may arise.
      c. Transmit written interpretations to subcontractors, and to other concerned parties.
   4. Assist in obtaining permits and approvals.
      a. Obtain building permits and special permits required for work or for temporary facilities.
      b. Verify that subcontractors have obtained inspections for work and for temporary facilities.
   5. Control the use of site.
      a. Supervise field engineering and site layout.
      b. Allocate space for each subcontractor's use for field offices, sheds, work and storage areas.
      c. Establish access, traffic and parking allocations and regulations.
      d. Monitor use of site during construction.
1.03 **CONTRACTOR DUTIES**

A. **Construction Schedules.**
   1. Coordinate schedules with several subcontractors.
   2. Monitor schedules as work progresses.
      a. Identify potential variances between schedules and probable completion dates for each phase.
      b. Recommend adjustments in schedule to meet required completion dates.
      c. Adjust schedules of subcontractors as required.
      d. Document changes in schedule.
   3. Observe work of each subcontractor to monitor compliance with schedule.
      a. Verify that labor and equipment are adequate for the work and the schedule.
      b. Verify that product procurement schedules are adequate.
      c. Verify that product deliveries are adequate to maintain schedule.

B. **Process Shop Drawings, Product Data and Samples.**
   1. Review for compliance with Contract Documents.
      a. Field dimensions and clearance dimensions.
      b. Relation to available space.
      c. Relation to other trades, equipment and systems.
      d. Submit to Architect.

C. **Monitor the use of temporary utilities.**
   1. Verify that adequate services are provided and maintained.

D. **Inspection and Testing.**
   1. Inspection work to assure performance in accord with requirements of Contract Documents.
   2. Administer special testing and inspections of suspected work.
   3. Reject work which does not comply with requirements of Contract Documents.
   4. Coordinate testing laboratory services.
      a. Verify that required laboratory personnel are present.
      b. Verify that tests are made in accordance with specified standards.
      c. Review test reports for compliance with specified criteria.
      d. Recommend and administer required retesting.

E. **Monitor contractor’s periodic cleaning.**
   1. Enforce compliance with specifications.
   2. Resolve any conflicts.

F. **Coordinate changes.**
   1. Recommend necessary or desirable changes.
   2. Assist owner in negotiating change orders.
   3. Promptly notify all subcontractors of pending changes.

G. **Maintain Reports and Records at Job Site available to Architect and Subcontractors.**
   1. Log progress of work of each subcontractor.
   2. Records
      a. Contracts.
      b. Purchase orders.
c. Materials and equipment records.
d. Applicable handbooks, codes and standards.

3. Obtain information from subcontractors and maintain file of Project Record Documents.
4. Assemble documentation for handling of claims and disputes.

H. Coordinate work of this Contract and requirements of this section with work by Separate Contract including but not limited to:
   1. Removal of asbestos containing materials by separate contract.

1.04 CONTRACT CLOSEOUT

A. Coordinate equipment start-up.
   1. Provide seven days notification prior to start-up of each item.
   2. Ensure that each piece of equipment or system is ready for operation.
   3. Execute start-up under supervision of responsible persons in accordance with manufacturer's instructions.
   4. Perform required testing and balancing.
   5. Record dates of start of operation of systems and equipment. Submit written report that equipment or system has been properly installed and is functioning correctly.
   6. Provide written notice of beginning of warranty period for equipment put into service.

B. Demonstration and Instructions
   1. Demonstrate operation and maintenance of products to Owner's personnel two weeks prior to Substantial Completion.
   2. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, seasonal operation, and shutdown of each item of equipment.

C. At completion of work of each Section, conduct an inspection to assure that
   1. Specified cleaning has been accomplished.
   2. Temporary facilities have been removed from site.

D. At completion
   1. Conduct an inspection to list work to be completed or corrected.
   2. Supervise correction and completion of work as established in Certificate of Completion.

E. When a portion of the Project is occupied prior to final completion, coordinate established responsibilities of each subcontractor.

F. Final completion.
   1. When each Subcontractor determines that work is finally complete, conduct an inspection to verify completion of work.
   2. Assist owner and architect in inspection.

G. Administer contract closeout.
   1. Receive and review Subcontractor's final submittals.
   2. Transmit to architect with recommendation for action.

END OF SECTION
PART 1 - GENERAL

1.01 SUMMARY

A. Carefully coordinate the interface between Division 15 (Mechanical) and Division 16 (Electrical) before submitting any equipment for review or commencing installation.

B. Responsibility: Unless otherwise indicated, all motor and controls for Division 15 equipment shall be furnished, set in place and wired in accordance with the following schedule:

<table>
<thead>
<tr>
<th>ITEM</th>
<th>FURNISHED UNDER</th>
<th>SET IN PLACE UNDER</th>
<th>POWER WIRING UNDER</th>
<th>CONTROL WIRING UNDER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equipment Motor</td>
<td>15</td>
<td>15</td>
<td>16</td>
<td>-</td>
</tr>
<tr>
<td>Automatically Controlled Starter/contractors:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Separate</td>
<td>15</td>
<td>16</td>
<td>16</td>
<td>15</td>
</tr>
<tr>
<td>Factory Mounted &amp; Wired</td>
<td>15</td>
<td>15</td>
<td>16</td>
<td>15</td>
</tr>
<tr>
<td>In Motor Control Centers</td>
<td>16</td>
<td>16</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>Manually Controlled Starter/Contractors:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Separate</td>
<td>15</td>
<td>16</td>
<td>16</td>
<td>15</td>
</tr>
<tr>
<td>Factory Mounted &amp; Wired</td>
<td>15</td>
<td>15</td>
<td>16</td>
<td>15</td>
</tr>
<tr>
<td>Motor Speed Controllers</td>
<td>15</td>
<td>16</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>Disconnect (Note 1) Switches</td>
<td>16</td>
<td>16</td>
<td>16</td>
<td>-</td>
</tr>
<tr>
<td>Contactors</td>
<td>16</td>
<td>16</td>
<td>16</td>
<td>-</td>
</tr>
<tr>
<td>Thermal Overload (Note 1) Switches</td>
<td>16</td>
<td>16</td>
<td>16</td>
<td>-</td>
</tr>
<tr>
<td>Manual Operation (Note 2)</td>
<td>16</td>
<td>16</td>
<td>16</td>
<td>-</td>
</tr>
<tr>
<td>Switches</td>
<td>16</td>
<td>16</td>
<td>16</td>
<td>-</td>
</tr>
<tr>
<td>Control Relays (Note 2)</td>
<td>15</td>
<td>15</td>
<td>-</td>
<td>15</td>
</tr>
<tr>
<td>Control Transformers</td>
<td>15</td>
<td>15</td>
<td>16</td>
<td>15</td>
</tr>
<tr>
<td>Control Circuit Outlets</td>
<td>16</td>
<td>16</td>
<td>16</td>
<td>-</td>
</tr>
<tr>
<td>Thermostats (Note 2)</td>
<td>15</td>
<td>15</td>
<td>-</td>
<td>15</td>
</tr>
</tbody>
</table>
## GENERAL REQUIREMENTS
### SECTION 01042
#### MECHANICAL AND ELECTRICAL COORDINATION

<table>
<thead>
<tr>
<th>ITEM</th>
<th>FURNISHED UNDER</th>
<th>SET IN PLACE UNDER</th>
<th>POWER WIRING UNDER</th>
<th>CONTROL WIRING UNDER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time Switches (Note 2) Not in C Panel</td>
<td>15</td>
<td>15</td>
<td>16</td>
<td>15</td>
</tr>
<tr>
<td>Push Button Stations, Pilot Lights</td>
<td>16</td>
<td>16</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>Thermostats (Note 2)</td>
<td>15</td>
<td>15</td>
<td>16</td>
<td>15</td>
</tr>
<tr>
<td>Controls: Integral with Equipment Directly Applied to Ducts, Pipes, etc.</td>
<td>15</td>
<td>15</td>
<td>-</td>
<td>15</td>
</tr>
<tr>
<td>Valve Motors, Damper Motors, Solenoid Valves, etc.</td>
<td>15</td>
<td>15</td>
<td>-</td>
<td>15</td>
</tr>
<tr>
<td>EP Valves or Switches, P.E. Switches</td>
<td>15</td>
<td>15</td>
<td>-</td>
<td>15</td>
</tr>
<tr>
<td>Control Circuit Outlets</td>
<td>16</td>
<td>16</td>
<td>16</td>
<td>-</td>
</tr>
<tr>
<td>Fire Alarm Systems</td>
<td>16</td>
<td>16</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>Fire Sprinkler Alarm</td>
<td>16</td>
<td>16</td>
<td>-</td>
<td>16</td>
</tr>
<tr>
<td>Firestats</td>
<td>16</td>
<td>16</td>
<td>-</td>
<td>16</td>
</tr>
<tr>
<td>Smoke Detectors Including Relays for Fan Control</td>
<td>16</td>
<td>16</td>
<td>-</td>
<td>16</td>
</tr>
<tr>
<td>Control Air Compressor</td>
<td>15</td>
<td>15</td>
<td>16</td>
<td>15</td>
</tr>
<tr>
<td>Refrigerated Air Dryer</td>
<td>15</td>
<td>15</td>
<td>16</td>
<td>15</td>
</tr>
<tr>
<td>Equipment Interlocks</td>
<td>15</td>
<td>15</td>
<td>-</td>
<td>15</td>
</tr>
<tr>
<td>Boiler and Water Heaters</td>
<td>15</td>
<td>15</td>
<td>16</td>
<td>15</td>
</tr>
</tbody>
</table>

### NOTES:
1. If furnished as part of factory wired equipment furnished and set in place under Division 15, wiring and connections under Division 16.
2. If float switches, line thermostats, P.E. switches, time switches, or other controls carry the FULL LOAD CURRENT to any motor, they shall be furnished under Division 15, but they shall be set in place and connected under Division 16 except that where such items are an integral part of the mechanical equipment, or directly attached to ducts, piping, or other mechanical equipment, they shall be set in place under Division 15 and connected under Division 16. If they do not carry the FULL LOAD CURRENT to any motor, they shall be furnished, set in place and wired under Division 15.
C. Control Wiring: Consists of wiring in pilot circuits of contact or starters, sensors, controllers, and relays, and wiring for valve and damper operators.
   1. Connections: Connections to all controls directly attached to ducts, piping and mechanical equipment shall be made with flexible connections.

D. Starters: Provide magnetic starters for all three phase motors and equipment complete with:
   1. Control transformers.
   2. 120V holding coils.
   3. Integral hand-off-auto switch.
   4. Auxiliary contacts required for system operation plus one (1) spare.

E. Remote Switches and Push Button Stations: Provide all remote switches and/or push button stations required for manually operated equipment (if no automatic controls have been provided) complete with pilot lights of an approved type lighted by current from load side of starter.

F. Special Requirements: Motors, starters and other electrical equipment installed in moist areas or areas of special conditions, such as explosion proof, shall be designed and approved for installation in such areas with appropriate enclosure.

G. Identification: Provide identification of purpose for each switch and/or push button station furnished. Identification may be either engraved plastic sign or permanent mounting to wall below switch, or stamping on switch cover proper. All such identification signs and/or switch covers in finished areas shall match other hardware in the immediate areas.

H. Control Voltage:
   1. Maximum allowable control voltage 120V. Fully protect control circuit conductors in accordance with National Electrical Code.
   2. Provide 20A breakers in emergency panels under Division 16 as required for Building Management System Air Temperature Controls (BMS/ATC). Provide all control transformers, control wiring and connections to circuits under Section 15950 of Division 15.

I. Related Requirements
   1. Section 16480: Electric Motors
      a. Coordinate with efficiency requirements.

J. Contractor must review all concrete embedded items (including conduit) with owner prior to placement.
PART 2 - PRODUCTS

2.01 MOTOR HORSEPOWER

A. In general, all motors 1/2 HP and above shall be three phase, all motors less than 1/2 HP shall be single phase.

B. Voltage and phase of motors as scheduled on the electrical drawings shall take precedence in the case of a conflict between the mechanical and electrical drawings or General Condition 2.01 A., above.

C. Work under Division 15 includes coordinating the electrical requirements of all mechanical equipment with the requirements of the work under Division 16, before ordering the equipment.

1. If motor horsepower is changed under the work of Division 15, without a change in duty of the motor's driven device, coordination of additional electrical work (if any) and additional payment for the work (if any) shall be provided under the section of Division 15 initiating the change. Increases or decreases in motor horsepower from that specified shall not be made without written approval from the Engineer.

PART 3 - EXECUTION

NOT USED.

END OF SECTION
PART 1 - GENERAL

1.01 DESCRIPTION

A. Work Included: This section establishes general requirements in addition to those indicated in the General Conditions of the Contract for Construction pertaining to cutting, fitting, and patching of the work required to:
1. Make the several parts fit properly.
2. Uncover work to provide for installation, inspection, or both, of ill-timed work.
3. Remove and replace work not conforming to requirements of Contract Documents.
4. Patch new construction into existing construction.

B. Related Work:
1. In addition to requirements specified, upon the Consultant's request, uncover work to provide for inspection of covered work, and remove samples of installed materials for testing.
2. Do not cut or alter work performed under separate contract without the Consultant's written permission.

1.02 QUALITY ASSURANCE

A. Perform all cutting and patching in strict accordance with pertinent requirements of the Specifications and, in the event no such requirements are determined, in conformance with the Consultant's written direction.
1. Use skilled workmen to perform all cutting and patching work.
2. Use methods least likely to damage existing surfaces and materials to remain, while providing proper surfaces to receive installation of repair, patching, and/or new work.

B. Visual Quality:
1. Do not cut and patch work exposed to public view, and the exterior and/or interior of the building in a manner that will result in an unacceptable appearance as determined by the Consultant.
2. Do not cut and patch work in a manner that will result in obvious appearance that cutting and patching work was done.
3. When cutting existing structural concrete, do not extend saw cuts beyond the corners of the required opening on either side of the opening.

1.03 EXISTING CONSTRUCTION

A. Where cutting and patching of existing construction is required; prior to start of work, inform Owner of existing construction to be disturbed. Owner will determine if elements of existing construction contain asbestos. Do not proceed with work until after Owner has examined areas to be disturbed. Refer to Exhibit A, Project Pre-Inspection for Possible Presence of Asbestos for additional information concerning the possible presence of materials containing asbestos.

1.04 SUBMITTALS

A. Submit proposed cutting and patching procedures in writing for the following categories of work prior to proceeding with this work:
1. Cutting new openings in existing structural concrete walls, parapets, and suspended slabs.
2. Cutting new openings in existing roofs and roofing materials.

B. Submittals shall comply with Section 01300.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Except as otherwise indicated in pertinent sections of these specifications, or as directed by the Consultant, use materials which are identical to existing materials in workmanship, appearance, and performance.

B. If identical materials are not available, match existing as closely as possible, especially existing visual characteristics.

PART 3 - EXECUTION

3.01 INSPECTION

A. Before proceeding, inspect existing conditions, including elements subject to movement or damage during cutting, excavating, backfilling, and patching.

B. After uncovering the work, inspect conditions affecting installation of new work.

C. If uncovered conditions are not as anticipated or if existing construction is not as indicated on the Drawings, immediately notify the Consultant for further instructions.

3.02 PREPARATION

A. Provide shoring, bracing, and support as required to maintain structured integrity of the project.

B. Take all necessary action required to protect adjacent existing surfaces from damage due to the work of this section.

C. Take all precautions necessary to protect existing surfaces and materials, new work, and the work of this section from damage due to adverse weather conditions.

D. Provide temporary support of work to cut and adjacent work to prevent failure or damage due to the work of this section.

E. Properly prepare substrate surfaces exposed during cutting as required to receive the work of this or other sections of these specifications in strict compliance with manufacturer's recommendations and these specifications.
3.03 EXECUTION

A. Perform all required cutting and patching as required or reasonably implied under pertinent sections of these specifications.

B. Perform cutting and demolition by methods which will prevent damage to other portions of the work and will provide proper finished installation complying with the specified tolerances and finishes.

3.04 PERFORMANCE

A. Execute cutting and demolition by methods which will prevent damage to other work, and will provide proper surfaces to receive installation of repairs and new work. Saw-cut and otherwise isolate areas to be demolished.

B. Repair or otherwise rebuild and/or construct all surfaces affected by cutting and demolition. Execute fitting and adjustment of products to provide totally finished installation to comply with tolerances, finishes, and profiles of adjacent surfaces, whether new or existing.

C. Restore work which has been cut or exposed by demolition; install new construction in compliance with specifications for type of new work to be done or as required to match existing adjacent surfaces. In no case shall any exposed existing surface be left in a raw, marred, or unfinished surface.

D. Refinish entire surfaces as necessary to provide an even finish.
   1. Continuous Surfaces: To nearest intersections.

END OF SECTION
PART 1 - GENERAL

1.01 RELATED DOCUMENTS:
   A. Drawings and general provisions of the Contract, including General Conditions and other Division 1 - Specification sections, apply to work of this section.

1.02 SUMMARY:
   A. Section Includes:
      1. General administrative requirements and procedures and related applicable codes.

1.03 APPROVAL AND RECOMMENDATION AGENCIES:
   A. The University of Colorado at Boulder has jurisdiction for the interpretation and enforcement of code requirements for construction of projects.

1.04 CODES:
   A. All Contractors shall comply with all applicable codes, ordinances and regulations in effect at the time of bid openings.

APPROVED STATE BUILDING CODES

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.

The 2006 edition of the International Building Code (IBC)
(as adopted by the Colorado State Buildings Program as follows: Chapters 2-35 and Appendices C and I)

The 2006 edition of the International Mechanical Code (IMC)
(as adopted by the Colorado State Buildings Program as follows: Chapters 2-15 and Appendix A)

(as adopted by the Colorado State Buildings Program)

The 2008 edition of the National Electrical Code (NEC)
(National Fire Protection Association Standard 70) (as adopted by the Colorado State Electrical Board)

The 2009 edition of the International Plumbing Code (IPC)
(as adopted by the Colorado Examining Board of Plumbers as follows: Chapter 1 Section 101.2, 102, 105, 107, Chapters 2-13 and Appendices B, D, E, F, and G)

The 2009 edition of the International Fuel Gas Code (IFGC)
(as adopted by the Colorado Examining Board of Plumbers as follows: Chapter 1 Section 101, 102, 105, 107, Chapters 2-8 and Appendices A, B and C)

Please consult the website www.dora.state.co.us/plumbing/index.htm for additional information on the revisions and exceptions to the IPC and IFGC and the inclusion of the new 105 and 107 sections. It is OSA/SBP’s intent to adopt the 2009 International Building Code (IBC), the 2009 International Mechanical Code (IMC), and the 2009 International Energy Conservation Code (IECC) to be implemented at the start of the fiscal year on July 1, 2010.
The National Fire Protection Association Standards (NFPA)

The 2004 edition of the ASME Boiler and Pressure Vessel Code
(as adopted by the Department of Labor and Employment/Boiler Inspection Section as follows: sections I, IV, VIII- Divisions 1 and 2 and 3, X and B31.1)

The 2004 edition of the National Boiler Inspection Code (NBIC)
(as adopted by the Department of Labor and Employment/Boiler Inspection Section)

The 2004 edition of the Controls and Safety Devices for Automatically Fired Boilers CSD-1
(as adopted by the Department of Labor and Employment/Boiler Inspection Section)

(as adopted by the Department of Labor and Employment/Boiler Inspection Section)

The 2007 edition of ASME A17.1 Safety Code for Elevators and Escalators
(as adopted by the Department of Labor and Employment/Conveyance Section and as amended by ASME International)

The 2005 edition of ASME A17.3 Safety Code for Existing Elevators and Escalators
(as adopted by the Department of Labor and Employment/Conveyance Section and as amended by ASME International)

The 2005 edition of ASME A18.1 Safety Standard for Platform Lifts and Stairway Chairlifts
(as adopted by the Department of Labor and Employment/Conveyance Section and as amended by ASME International)

The current edition of the Rules and Regulations Governing the Sanitation of Food Service Establishments
(as adopted by the Department of Public Health and Environment/Colorado State Board of Health)

(as adopted by the Colorado General Assembly as follows: CRS 9-5-101, as amended, for accessible housing)

Note: Additional codes, standards and appendices may be adopted by the state agencies and institutions in addition to the minimum codes and standards herein adopted by State Buildings Programs.

1. The 2006 edition of the IBC became effective on July 1 of 2007. Consult the state electrical and plumbing boards and the state boiler inspector and conveyance administrator and the Division of Fire Safety for adoption of current editions and amendments to their codes.

2. Projects should be designed and plans and specifications should be reviewed based upon the approved codes at the time of A/E contract execution. If an agency prefers to design to a different code such as a newer edition of a code that State Buildings Programs has not yet adopted, the agency must contact SBP for approval and then amend the A/E contract with a revised Exhibit D, Approved State Building Codes. Please note that the state plumbing and electrical boards enforce the editions of their codes that are in effect at the time of permitting not design.

2. The state’s code review agents, or the State Buildings Programs approved agency building official, shall review all documents for compliance with the codes stipulated herein. Note: The
3. Department of Public Health and Environment, Division of Consumer Protection will review drawings for food service related projects.

4. This policy does not prohibit the application of various life safety codes as established by each agency for specific building types and funding requirements. NFPA 101 and other standards notwithstanding, approved codes will supersede where their minimum requirements are the most restrictive in specific situations. If a conflict arises, contact State Buildings Programs for resolution.

5. It is anticipated that compliance with the federal Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities (ADAAG) and Colorado Revised Statutes Section 9-5-101 will be met by compliance with the 2006 International Building Code and ICC/ANSI A117.1. However, each project may have unique aspects that may require individual attention to these legislated mandates.

6. The 2003 edition of the International Building Code (IBC) is to be applied to factory-built nonresidential structures as established by the Division of Housing within the Department of Local Affairs.

A. Appendices

Appendices are provided to supplement the basic provisions of the codes. Approved IBC Appendices are as follows:

1. Mandatory
   - IBC Appendix Chapter C - Agricultural Buildings
   - IBC Appendix Chapter I - Patio Covers

2. Optional
   - Any non-mandatory appendix published in the International Building Code may be utilized at the discretion of the agency. Use of an appendix shall be indicated in the project code approach.

B. Amendments

None

C. Referenced Codes

1. While not adopted in entirety, portions of the following codes are referenced in the International Building Code (IBC), the International Mechanical Code (IMC), the International Energy Conservation Code (IECC) the International Plumbing Code (IPC), and the International Fuel Gas Code (IFGC). These following codes would be applied as reference standards.

   - 2006 International Fire Code (IFC)
   - 2006 International Existing Building Code (IEBC)

D. Referenced Standards

The IBC, IMC, IECC, IPC and IFGC standards shall be utilized to provide specific, or prescriptive, requirements on how to achieve the requirements established in the code. These standards may be unique to the code or may be derived from other established industry standards. Recognized standards may also be used to show compliance with the standard of duty established by the code.
1.05 OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA):

A. The Contractor shall have sole responsibility for compliance on the job site to all applicable portions of the Occupational Safety and Health Act. The Contractor is responsible for other regulatory requirements as they relate to occupational Health and Safety requirements. For example, NIOSH, ANSI, and MSA.

B. Protection of life, health and public welfare as it relates to the execution of the construction contract is the responsibility of the Contractor. The Owner’s Representative may, at their discretion, observe, inspect, or comment on plans, procedures, or actions employed at the project as they relate to safety of life, health or public welfare. If conditions are imposed by the Owner which interfere with, or imply actions detrimental to safety, written notice shall be returned to the Owner for action prior to affecting any unsafe conditions.

C. Contractors shall use OSHA Lock Out / Tag Out procedures when working with energized equipment.

D. All contractors entering confined spaces owned by CU or while conducting work under contract with CU shall develop a written program and utilize procedures that, at a minimum, comply with all federal, state and local confined space standards and all applicable regulatory requirements. Contractors shall, independent of the University, monitor the space to obtain their own data to ensure a safe entry and exit. Any data generated by a contractor’s confined space entry, should be provided to the Facilities Management confined Space Program Manager.

E. When contractors perform work that may involve Facilities Management controlled permit required confined spaces, Facilities Management will:
   1. Inform contractors of permit required confined spaces and that entry is allowed only after compliance with the confined space entry standard;
   2. Require contractors planning to enter a confined space to provide the Facilities Management Confined Space Program Manager in charge of that space, 48-hour advance notice of such planned entry. The contractors entry will be in accordance with the current Occupational Safety and Health Administration confined space entry standard and a signed document stating such, shall be provided to the FM Confined Space Program Manager prior to entry.

F. The FM Confined Space Program Manager, following receipt of notice of contractor planned entry, will:
   1. Apprise contractor of the hazards identified in the confined space and of any prior experience that is documented on the space;
   2. Appraise the contractor of any precautions or procedures that CU has implemented for the protection of workers in or near the confined space;
   3. Coordinate entry operations with the contractor when both Facilities Management and contractor personnel are working in or around the confined space;
   4. Debrief the contractor at the end of the entry operations regarding hazards confronted or created.

1.06 HOT WORK PERMITS

A. All contractors shall be required to obtained a Hot Work Permit, three (3) working days in advance, for work that involves welding, heat treating, grinding, thawing pipe, hot riveting, soldering and brazing, power driven fasteners and similar activities involving spark, flame or heat. Compliance with the requirements of the applicable fire code, the International Building Code, and NFPA Standard 51B are mandatory and all contractors performing hot work activities shall read and understand these code requirements. To obtain a current Hot Work Permit, go to website:
B. Contractors shall read and comply with the procedures and requirements for Fire Watch, Fire Alarm Interruption and Fire Suppression Interruption as found on the following websites:

Fire Watch Procedures:
http://fm.colorado.edu/firesafety/firewatch.html

Fire Alarm and Detection System Interruption/Outage:
http://fm.colorado.edu/firesafety/firealarmdetectsys.html

Fire Suppression System Interruption/Outage:
http://fm.colorado.edu/firesafety/firesuppressionsystems.html

C. No hot work shall be conducted in any campus facility without a hot work permit. Any person or firm who conducts hot work without a permit shall be fined one thousand dollars ($1,000) for each occurrence and their non-permitted activities shall be stopped immediately until they obtain a hot work permit. Contractor shall be responsible for any damages caused as a result of improper hot work activities or the work stoppage.

D. Individuals or firms who obtain a permit shall fully read, understand and implement the requirements of the permit. Any person or firm who conducts hot work without the full implementation of the permit requirements shall be fined five hundred dollars ($500) the first time and one thousand dollars ($1,000) for subsequent occurrences. When the requirements of the hot work permit are not being implemented, the improper activities shall be stopped immediately until a hot work permit is obtained. Contractor shall be responsible for any damages caused as a result of improper hot work activities or the work stoppage. Any contractor who is found to be in non-compliance a third time, will not be allowed to work on campus until further notice by Facilities Management.

E. The campus inspectors, project managers and fire marshal shall have the authority to stop improper or non-permitted hot work activities.

F. The Contractor shall notify the CU Fire Alarm Supervisor to deactivate all smoke alarms in the vicinity of the work prior to any demolition and construction work activity. Failure of the Contractor to comply with the smoke alarm deactivation requirement and cause a false alarm and arrival of the Boulder Fire Department shall be a $400 fine per occurrence.

1.07 PERMITS

A. The contractor must obtain a no fee building permit prior to starting work from Office Manager, Facilities Management at (303) 492-2904 in the Planning, Design and Construction Office, Research Laboratory No. 2, 1540 30th Street, Boulder, Colorado. Building permits are required on all projects except the following:
   1. Fences not over 6 feet high & general landscape work
   2. Retaining walls which are not over 4 feet in height, unless supporting a surcharge of impounding Class I, II or III-A liquids
   3. Platforms, walks and driveways not more than 30 inches above grade and not over any basement or story below.
   4. Painting, papering, and similar finish work that meet the requirements of chapter 8 of UBC. (Uniform Building Code).
   5. Temporary motion picture, television and theater stage sets and scenery. Review for fire-safety issues is required.

B. The contractor must post the permit(s) in a prominent location at the jobsite including all inspection reports. The contractor shall have an updated set of contract documents available at the jobsite for all inspections.
1.08 INSPECTIONS

A. The Contractor must schedule all required inspections 48 hours in advance by calling (303) 492-2922. CU or their designated inspectors will complete these inspections within 48 hours with the exception of weekends and state holidays.

B. The contractor is required to arrange for the following inspections:
   1. Required inspections: General. Reinforcing steel or structural framework of any part of any building of structure shall not be covered or concealed without first obtaining the approval of the building official.
   2. Lath or gypsum board inspection: To be made after lathing and gypsum board, interior and exterior, is in place, but before any plastering is applied or before gypsum board joints and fasteners are taped and finished.
   3. Final inspection: To be made after finish grading and the building is completed and ready for occupancy.
   4. Special inspection: Special inspection may be required on special projects and special types of construction.
   5. Re-inspections: A re-inspection fee may be assessed for each inspection or reinspection when such portion of work for which inspection is called is not complete or when corrections called for are not made.

C. The Contractor will be responsible for all cost related to re-inspections and will be billed at a rate of $50.00 per hour for CU re-inspections and at the testing agency bill-out rate for other re-inspections.

1.09 UNIVERSITY OF COLORADO SEXUAL HARASSMENT POLICY

A. Contractors should be aware of and review the University of Colorado at Boulder’s policies that prohibit discrimination and harassment on the basis of race, color, national origin, sex, age, disability, creed, religion, sexual orientation or veteran status. These policies are located on the web at: http://www.colorado.edu/odh/ Contractor personnel must adhere to these policies and conduct themselves in a manner that does not discriminate or harass as a result of interacting with or around the University of Colorado faculty, staff and students and visitors.

1.10 FIRE ALARM INTERRUPTION

A. Contractor shall contact CU Fire Alarm Systems Supervisor at 303-492-0633 prior to all interruptions or shutdowns of fire alarm systems. Interruptions or shutdowns shall be scheduled three (3) working days in advance with CU Fire Alarm Systems Shop, CU Project Manager and building proctor. Contractor shall provide a fire watch as directed by CU Fire Alarm Systems Shop during interruption or shutdown.

B. The Contractor shall be responsible for preventing nuisance alarm due to activities at their worksite. Common sources of nuisance alarms are:
   1. Smoke (soldering, welding, cooking, etc.)
   2. Grinding
   3. Dust (drilling, sweeping, canister vacuums, sand blasting, etc.)
   4. Water leaking (plumbing leaks, overflows)
   5. Water sprayed on or near detectors (pressure washing or cleaning with water)
   6. Popcorn or other food burning in microwaves
   7. Static electricity (covering or uncovering detectors)
   8. Changing filters on air handling units (dust)
   9. Steam (leaks, pressure pop-offs)
  10. Broken or frozen sprinkler heads
11. Sprinkler drain valves turned by mistake
12. Vandalism
Precautions to prevent nuisance alarms are:

1. During construction projects, treat all buildings, except totally new construction, as though they were occupied buildings with live systems.
2. Do not assume that all detectors are in plain sight. Contact University personnel for verification.
3. Maintain dust control measures per UCB Standards:
   a. Maintaining barriers
   b. Covering air returns
   c. Asking CU personnel to cap or disable smoke detectors (Note any capping or disabling of fire safety devices is to be done ONLY by CU personnel, not contractors.)
   d. Avoiding recirculation of dust or smoke through the building air handling system.
4. Follow campus hot work procedures. Refer to specification Section 01060, paragraph 1.06.
5. Do not expose fire alarm devices to water or extreme temperatures.
6. Contact Fire Systems Group for any actions that affect fire detection, alarm, and suppression systems.

1.11 STORMWATER MANAGEMENT PLAN (SWMP)

A. Stormwater Management Plan (SWMP): Prior to any construction activity disturbing one acre of land or more, an approved SWMP and a Stormwater Permit for Construction Activity application from the Colorado Department of Public Health and Environment (CDPHE) are required. The SWMP shall be prepared in accordance with the CDPHE requirements for “Contents of the Stormwater Management Plan” and the UDFCD’s Urban Storm Drainage Criteria Manual, Volume 3, “Best Management Practices” (UDFCD Drainage Criteria Manual). Stormwater quality management and erosion control measures are to be constructed and maintained in accordance with the SWMP and the UDFCD Drainage Criteria Manual.

1.12 ENVIRONMENTAL/STORMWATER POLLUTION PREVENTION

A. Contractors working on the UCB campus must comply with all applicable University, City, State and Federal environmental regulations and standards. The contractor shall keep material such as saw-cut slurry, drywall mud, grout and mortar, paint, sediment, and all other wastes and process water out of gutters, streets, storm drains and parking lots. The contractor shall also be responsible for proper disposal of all waste materials. Immediately notify 911, EH&S 303-492-6025 and project manager of accidental hazardous materials releases.

B. Contractors are required to locate drains or other water discharge points in the area of the project and provide measures to protect from illicit discharges, prior to construction activities. For assistance with determining where a drain leads to (storm vs. sanitary, especially floor drains), contact the Facilities Management service center at 303-492-5522.

C. The contractor shall be responsible for all costs associated with damages and clean-up as a result of contractor caused illicit discharges of process water or other materials into the storm water system. Also, in addition to any penalties or fines imposed by the City, State or Federal agencies, the contractor shall be fined one thousand dollars ($1,000) by UCB for the first time an incident occurs and may be put on probation from working on campus. The contractor will be prohibited from working on campus, until further notice by UCB, if they are found to be responsible for an illicit discharge a second time.
D. For the purpose of eliminating storm water pollution, the contractor shall implement effective Best Management Practices (BMPs). BMPs include general good housekeeping practices, appropriate scheduling of activities, operational practices, maintenance procedures and other measures to prevent the discharge of pollutants directly or indirectly to the storm water system. These BMPs shall be maintained for the duration of the contractor's work. Contractors are required to visit website: http://www.bouldercolorado.gov/www/pace/government/index.html for examples of BMP's that are applicable to project activities. The Contractor shall ensure that all applicable employees and sub-contractors who work on site are trained and comply with storm water pollution prevention methods and proper BMP’s.

E. In addition to the BMP’s the contractor will be required to sign an Environmental Responsibilities form for all projects. The contractor shall post a copy of this form on site, throughout the duration of the project, in a visible area for all workers to see. Also, the contractor will be required to fill out a Pre-Construction Water Quality Certification form indicating any/all potential discharges of process water, chemicals, de-watering, or other materials to sewer systems or landscape areas that are expected to result from project activities.

1.13 UTILITY LOCATES

Contractor MUST CALL 811 (or 1-800-922-1987) for utility locates BEFORE DIGGING on any project at the University of Colorado at Boulder. This includes even small projects such as, but not limited to, planting trees or shrubs, sidewalk removal/installation or fence post installation. Digging without calling can disrupt service to the campus or surrounding neighborhoods and potentially result in fines and repair costs.

END OF SECTION
PART 1 - GENERAL

1.01 SUMMARY

A. Work Included:
   1. Specification system format.
   2. Grammar (syntax) description.

1.02 DESCRIPTION

A. These specifications have been derived from automated specification systems, and include minor deviations from format and traditional writing forms. Such deviations must be recognized as a normal result of this production technique, and no other meaning will be implied or permitted.

B. Imperative language of the technical sections is directed to the Contractor. The term "provide" used repeatedly in the text is defined to mean..."furnish and install, complete, in place and ready for operation and use unless specifically indicated otherwise."

C. Specifications are of abbreviated, simplified or streamlined type and include incomplete sentences. Omissions of work or phrases such as "the Contractor shall", "in conformity therewith," "shall be," "as noted on the Drawings", "A", "The", are intentional. Supply omitted words or phrases by inference in same manner as they are when "Note" occurs on Drawings. Supply words "on the Drawings" by inference when "as indicated" is used with sentences or phrases.

PART 2 - PRODUCTS

Not used

PART 3 - EXECUTION

Not used

END OF SECTION
PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Remodel Work scheduling.
   2. Construction sequence scheduling.

B. Related Sections:
   1. Section 01500 - Temporary Facilities and Controls.

1.02 SYSTEM DESCRIPTION

A. An essential condition of this Contract shall be the scheduling and conduct of all phases of construction operations in such a manner that the Owner’s operations and use of the existing buildings and campus shall be uninterrupted at all times, except for such limited interruption as is required and approved by the owner.

B. Contractor shall repair at his own expense all damage done to Owner's property, unknown utilities and adjoining public property as a result of Contractor's construction activities.

1.03 PROJECT/SITE CONDITIONS

A. Access and use of site:
   1. Contractor shall use the designated site access for construction offices and material storage in such a manner that access to existing buildings and campus remain accessible at all times for use.
   2. Confine operations to as limited a use of the existing building and campus as possible. A route of access to and from the work for employees shall be agreed upon and it shall be the Contractor's responsibility to see that the agreed route is maintained in order to prevent unwarranted or unnecessary traffic through the existing buildings or site.

B. Owner notice and approval:
   1. All arrangements and scheduling in connection with the work of this Contract shall be made with and subject to the approval of the Consultant and the Owner.
   2. All work under this Contract which will require interruption of service of the existing building shall be scheduled to suit the need and convenience of the Owner's operation, and arrangements shall be made with the Owner and the Architect at least eight (8) working days in advance of the start of such work.

PART 2 - PRODUCTS

Not Used
PART 3 - EXECUTION

3.01 REMODELING

A. Construction activities of all areas to be constructed in existing facilities shall be completely separated from the rest of the building by dust-proof enclosures erected by Contractor.

B. All surfaces in existing facilities not indicated to be remodeled, or removal of existing items by any Contractor, shall be repaired by the responsible Contractor to match existing adjoining similar surfaces.

3.02 CLEAN-UP

A. All areas within existing facilities, which are not within enclosed areas to be constructed used for access to work areas shall be completely cleaned of all debris and made "broom-clean" at the end of each day's work.

B. Dust, which permeates areas of existing facilities because of improperly constructed dust-proof barriers, shall be the responsibility of the Contractor. The Contractor shall employ the services of a professional cleaning company to clean any area outside of the designated construction dust barriers that are contaminated by Contractor's operations. Completely clean all such areas to the satisfaction of the Owner at no additional cost.

END OF SECTION
PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 - Specification sections, apply to work of this section.

1.02 SUMMARY:

A. Section Includes:
   1. General administrative requirements and procedures for Hazardous Communication Program.

B. Related Sections:
   1. Summary of Work: Section 01010.

1.03 WORK BY OWNER:

A. Asbestos:
   1. The Owner has completed an Environmental Site Assessment to identify asbestos containing materials and other immediate Health and Safety items. Do not begin work until Form Exhibit A (copy following the Supplementary General Conditions) has been executed. Where asbestos materials or other hazardous conditions are known to exist in locations affected by this project, remediation measures will be taken by the Owner under separate contract. The Contractor shall coordinate his sequence and schedule with that of the environmental remediation work.
   2. In the event that the Contractor encounters any material on the site which is reasonably believed hazardous, which has not been rendered harmless, the Contractor shall:
      a. Stop work immediately in affected areas.
      b. Report the condition in writing to the Department of Facilities Management Project Administrator.
      c. Report the condition in writing to the Architect.
      d. Resume work only under the provisions of this section.

1.04 SUBMITTALS:

A. Material Safety Data Sheets (MSDS):
   1. Copies of all material safety data sheets for all applicable products, including but not limited to; paint, adhesives, mastics, solvents, and finishes, etc., shall be retained on site by the Contractor for all applicable products used during the construction and/or remodeling work. Furnish copies of all MSDS’s to the Owner and Architect and include in the Project Record Document submittal.

1.05 QUALITY ASSURANCE:

A. Asbestos containing materials may exist within the general project area where such materials are not expected to be disturbed during the work. The Contractor shall review the Environmental Health and Safety Environmental Site Assessment Form at the project site and become familiar with known asbestos and hazardous containing materials in the work areas.
1.06 PROJECT/SITE CONDITIONS:

A. Hazard Communication Requirements:

1. All Contractors are responsible for compliance with mandatory federal rules and regulations concerning Hazard Communication, including, but not limited to those regulations contained in 29 CFR 1910.1200 Hazard Communication, 1910.146 Confined Space, 1910.147 Lock-out Tag-out, 1910.1101 Asbestos, and 1926.62 Lead. Contractor and all subcontractors working at sites under the control of the Owner shall make available to the Architect, upon request, copies of the Hazard Communication Program used by their firm. In addition to this requirement, all regulations related to Multi-employer workplaces shall be adhered to. These regulations are found in 29 CFR 1910.1200, (e) (2) (I) through (e) (4) specifically:

(e) (2) Multi-employer workplaces. Employers who produce, use, or store hazardous chemicals at workplace in such a way that employees of other employer(s) may be exposed (for example, employees of a construction contractor working on site) shall additionally ensure that the hazard communication programs developed and implemented under paragraph (e) include the following:

(e) (2) (i) The methods the employer will use to provide the other employer(s) with a copy of the material safety data sheet, or to make it available at a central location in the workplace, for each hazardous chemical the other employer(s)' employees may be exposed to while working;

(e) (2) (ii) The methods the employer will use to inform the other employer(s) of any precautionary measures that need to be taken to protect employees during the workplace’s normal operating conditions and in foreseeable emergencies; and,

(e) (2) (iii) The methods the employer will use to inform the other employer(s) of the labeling system used in the workplace

(e) (3) The employer may rely on an existing hazard communication program to comply with these requirements, provided that it meets the criteria established in this paragraph (e).

(e) (4) The employer shall make the written hazard communication program available, upon request, to employees, their designated representatives, the Assistant Secretary and the Director, in accordance with requirements of 29 CFR 1910.20 (e).

2. The referenced regulations were excerpted from 29 CFR 1910.1200. This excerpt shall not be relied upon for compliance with mandatory federal, state and local regulations. The Contractor shall comply with all such regulations and shall be solely liable for insuring that all requirements under applicable regulations are met.

PART 2 - PRODUCTS  (Not applicable)

PART 3 - EXECUTION

3.01 EXAMINATION:

A. Asbestos and Hazardous Materials Discovery:

1. The Contractor is cautioned to be alert to the possibility that his work may uncover asbestos-containing or hazardous materials. If suspected materials are found, the Contractor shall notify the Owner and stop all work in the area immediately. If the
suspected materials prove to contain asbestos or hazardous materials, the Owner will arrange to have the materials abated in a timely manner.

3.02 HAZARDOUS MATERIALS/EQUIPMENT REMOVAL:

A. Definition:
1. Removal of hazardous materials/equipment is extremely dangerous. Hazardous materials/equipment is defined to include, but not limited to the following:
   a. Fume hoods
   b. Hood exhaust duct work
   c. Exhaust fans
   d. Laboratory casework and equipment
   e. PCB ballast’s
   f. Mercury and Sodium Vapor Lights
   g. Adjacent material that could come in contact with workers or public.

B. Protection:
1. Hazardous materials/equipment removal shall include the protection of personnel, material, environment and safe legal disposal of the equipment; and further includes the following:
   a. Notification of Project Administrator and appropriate Environmental Health and Safety Unit
   b. Proper protective clothing for personnel involved in the removal.
   c. Appropriate emergency and first aid facilities.
   d. Removal procedures shall be accomplished during minimal occupancy of the remainder of the building on the weekends or at night.

C. Disposal:
1. All equipment related to the use, storage or processing of hazardous materials/equipment shall be removed and properly disposed of under the direct, full-time supervision of a qualified Laboratory Specialist fully conversant with the chemistry and properties of the material/equipment involved. Certification is required. Contractors are responsible for the removal of all hazardous materials/equipment and chemicals from the work site as well as proper disposal of all hazardous waste generated by their project.

2. Hazardous waste disposal must include prior notification to the Department of Environmental Health and Safety in order to verify that the appropriate procedures and documentation are used. Copies of all paper work for shipping and disposing of these materials (hazardous waste manifests, land disposal restrictions, etc.) will be provided by the Contractor to the Department of Environmental Health & Safety (303) 492-6025. Where appropriate, the Main Campus EPF ID COD007431505 will be used for these shipments.

3. Hazardous chemicals, waste, and other pollutants may not be discharged to the sanitary or storm sewer systems at anytime. Releases to the environment must be reported to CUPD/EH&S immediately.

END OF SECTION
PART 1 - GENERAL

1.01 REQUIREMENTS

A. The types and minimum requirements for project meetings are included but are not necessarily limited to the following categories:

Pre-construction meeting
Progress and Coordination meetings
Specially called meetings

B. The pre-construction meeting will be scheduled within fifteen days after date of Notice to Proceed, at a central site location designated by the Owner and convenient for all parties.

1. Attendance:
   a. Owner's Representative
   b. Consultant and his sub-consultants, as applicable
   c. Contractor's Superintendent
   d. Major Subcontractor(s)
   e. Others as appropriate

2. Suggested Agenda:
   a. Distribution and discussion of:
      List of major subcontractors and suppliers
      Projected construction schedules
      Critical work sequencing
      Major equipment deliveries and priorities
      Project Coordination
      Designation of responsible personnel
   b. Procedures and processing of:
      Field decisions
      Proposal requests
      Submittals
      Change Orders
      Applications for Payment
   c. Adequacy of Distribution of Contract Documents
   d. Procedure for Maintaining Record Documents
   e. Inspections
   f. Stormwater Management Plan (SWMP)

C. The Architect/Engineer will: Record the minutes; including significant proceedings and decisions.

D. The Contractor shall schedule and administer subcontractor and vendor pre-construction meetings throughout progress of the work. He will:

1. Prepare agenda for meetings.
2. Distribute written notice of each meeting four days in advance of meeting date.
3. Make physical arrangements for meetings.
4. Preside at meeting.
5. Record the minutes; including significant proceedings and decisions.
6. Representatives of Contractors, Subcontractors, and Suppliers attending meetings shall be qualified and authorized to act on behalf of the entity each represents.
7. Use of Premises:
   Office, work, staging and storage areas
   Owner's requirements

8. Temporary construction Facilities, Utilities, Controls and Construction Aids

9. Safety, First-aid, Security and Housekeeping Procedures

10. Administrative Procedures and Documents as Required by Owner

1.02 PROGRESS AND COORDINATION MEETING

The Contractor will schedule and administer job progress and coordination meeting at the site.

A. Attendance:
   1. Owner as needed
   2. Consultant and his sub-consultants as needed
   3. Subcontractor as appropriate to the agenda
   4. Suppliers as appropriate to the agenda
   5. Others

B. Suggested Agenda:
   1. Review of work progress since previous meeting.
   2. Field observations, problems and conflicts.
   3. Problems which impede Construction Schedule.
   4. Review of off-site fabrication and delivery schedules.
   5. Corrective measures and procedures to regain projected schedule.
   6. Revisions to Construction Schedule.
   7. Coordination of schedules.
   8. Progress and schedule during succeeding work period.
   9. Review submittal schedules and expedite as required.
   11. Pending changes and substitutions.
   12. Review proposed changes for:
       a. Effect on Construction Schedule and on completion date.
       b. Effect on other contracts of the Project.

C. The Architect/Engineer shall record and distribute the minutes of all progress meetings throughout the construction period and shall visit the site a minimum of once every two weeks. The Architect/Engineer shall average one visit per week during construction.

The structural engineer shall visit the site immediately prior to every major structural concrete slab pour; every major foundation wall pour; at least twice for each major segment of work [i.e., caissons, columns, steel roof joists, etc].

END OF SECTION
PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. Submit shop drawings, product data and samples as required by various sections of the specifications.

1.02 QUALITY ASSURANCE

A. Shop Drawings:
   1. Drawings shall be presented in a clear and thorough manner.
   2. Details shall be identified by reference to sheet, detail, schedule, or room numbers shown on drawings.

B. Product Data:
   1. Preparation:
      a. Clearly mark each copy to identify pertinent products or models.
      b. Show performance characteristics and capabilities.
      c. Show dimensions and clearances required.
      d. Show wiring or piping diagrams and controls.
   2. Manufacturer’s standard schematic drawings and diagrams.
      a. Modify drawings and diagrams to delete information that is not applicable to the work.
      b. Supplement Standard information to provide information specifically applicable to the work.

C. Samples:
   1. Office samples shall be of sufficient size and quantity to clearly illustrate:
      a. Functional characteristics of the product with integrally related parts and attachment devices.
      b. Full range of color, texture and pattern

D. Mock-ups:
   1. Provide complete mock-up of exterior materials to be incorporated into the work.
      a. Mock-up shall include a sample of all materials used in exterior construction, whether specified elsewhere or not in these documents, including but not limited to, masonry, stone, window systems, precast concrete, roof systems, flashing, sealants, masonry paving, paint and other readily visible materials.
      b. Secure Owner approval of mock-ups prior to ordering and placement of materials. Modify mock-ups as directed by the Architect or Owner until acceptable.
      c. Confirm exact mock-up(s) required by Owner prior to fabrication of mock-up(s).
   2. Remove mock-up at the conclusion of the project or when directed by the Architect.
      a. Restore or finish site to finish condition indicated on the Drawings.

E. Responsibilities of the Contractor:
   1. Review shop drawings, product data, samples and project record drawings for specification performance prior to submission.
2. Determine and Verify:
   a. Field measurements
   b. Field construction criteria
   c. Catalog numbers and similar data
   d. Conformance with specifications

3. Coordinate each submittal with requirements of the work and of the Contract Documents.

4. Notify the Consultant in writing, at the time of submission, of any deviations in the submittals for requirements of the Contract Documents.

5. Begin no fabrication or work that requires submittals until return of submittals with Consultant's acceptance.

6. Contractor's responsibility for deviations in submittals from requirements of Contract Documents is not relieved by Consultant's review of submittals.

7. Contractor shall stamp, sign or initial, and date each submittal to show compliance with the Contract Documents prior to submittal to the Consultant.

1.03 SUBMITTALS

A. Make submittals promptly in accordance with approved schedule and in such sequence as to cause no delay in the work. Submittals shall be packaged in entire CSI divisions for referencing related materials and equipment. All submittals are due no later than 15 days after contract date. A fee of $50 dollars per day will be assessed for each submittal not submitted when due.

B. Number of Submittals Required:
   1. Shop Drawings: Submit one reproducible transparency and electronically in Portable Document Format (PDF) form.
   2. Product Data: Submit electronically in Portable Document Format (PDF) form
   3. Samples: Submit the number stated in each specification section.

C. Submittals shall contain:
   1. Date of the submission and dates of any previous submissions.
   2. Project title and number.
   4. Names of:
      a. Contractor and Subcontractor(s), if applicable.
      b. Supplier
      c. Manufacturer
   5. Identification of product with the specification section number.
   6. Field dimensions, clearly identified as such.
   7. Relation to adjacent or critical features of the work or materials.
   8. Applicable standards, such as ASTM or Federal specification numbers.
   10. Identification of revisions on resubmittals.
   11. An 8"x3" blank space in lower right-hand corner for review stamps.

D. Resubmission Requirements:
   1. Make any corrections or changes in the submittals required by the Consultant and resubmit until accepted.

   2. Shop drawings and product data:
      a. Revise initial drawings or data and resubmit as specified for initial submittal.
b. Indicate any changes that have been made, other than those requested by the Consultant.
3. Samples: Submit new samples as required for initial submittal.

E. Distribution:
1. Distribute reproductions of approved shop drawings and copies of product data to affected subcontractors and retain one copy for use at the job-site.
2. Distribute approved samples as directed.

F. Consultant's Duties:
1. Review submittals with reasonable promptness and in accordance with schedule.
2. Review of separate item does not constitute review of an assembly in which item functions.
3. Affix stamp and initials or signature, and indicate requirements for resubmittal or acceptance of submittal.
4. Return submittals to the Contractor for distribution or for resubmission.

G. Schedule of Values and pay applications:
1. Submit typed schedule on State Form SC7.2; Contractor's standard form or media-driven printout will be considered on request.
2. Format: Table of Contents of this Project Manual.
3. Include in each line item a directly proportional amount of Contractor's overhead and profit.

H. Schedule of Submittals: The Contractor shall submit the submittals required by the specifications. The Contractor shall develop a submittal schedule that confirms the submittals and the time frame for review by the consultants.

I. Construction Schedule:
1. The Contractor shall submit a critical-path method (CPM) construction schedule prior to start of construction activities. The CPM schedule shall include notice to proceed, submittal activities, construction activities, change order work (when applicable), close-out, testing, demonstration, and acceptance. The CPM shall correlate specifically to the schedule of values line items and be cost loaded.

Float, slack time, or contingency within the schedule (i.e., the difference in time between the project's early completion date and the required contract completion date), and total float within the overall schedule, is not for the exclusive use of either the principal representative or the Contractor, but is jointly owned by both and is a resource available to and shared by both parties as needed to meet contract milestones and the contract completion date.

The Contractor will be required to submit an as-built progress CPM schedule with each progress billing. This CPM schedule will be the basis for making progress payments. The level of detail and quantity of work activities in the CPM schedule should be negotiated with the principal representative prior to starting construction.

J. Progress Photos
1. The Contractor shall submit up to 12 - 3x4 inch progress photos with each progress payment. The photos should demonstrate the work in place and be dated with a short description of the photographed item.
K. Coordination Drawings:
1. The Contractor shall submit coordination drawings with all mechanical, electrical, fire protection, and building monitoring systems prior to the Consultant review of any shop drawings or submittals for work in those trades. Approval of required shops and submittals must be obtained prior to starting work, and must be obtained prior to approval of pay applications of the work. The drawings shall be created to include all trades on a particular level of the building on one drawing. Identify conflicts between the systems or between the systems and architectural elements such as ceiling heights, ceiling types, or walls. Conduit routing for electrical, mechanical, energy management system, and security trades shall be included. Identify potential solutions to the conflicts for the Consultant and Owner to review during the submittal process. Revise the coordination drawings to show any comments made during the submittal review process, and reissue for use by all affected trades, Owner and Consultant.
2. The Coordination drawings shall include sectional coordination documents. Identify elevations of systems A.F.F. (above finish floor) and component dimensions. Show elevations whenever component changes height.

L. Daily Reports
1. The contractor shall submit daily reports, due by 5 p.m. the following day. The report should include weather, equipment, manpower count, subcontractors on site, short description of work for that day, inspections, visitors, items that may affect progress or quality of project. A fee of $50 dollars per day will be assessed for each daily report not submitted when due.

M. Request for Information (RFI):
1. The Contractor will be responsible for submitting RFIs on AIA form G716 or similar. The RFI should identify in writing any unclear, inconsistent, or conflicting item in the documents that could not be answered by thorough review by the Contractor or subcontractors. The RFI should include a description of the item and a proposed solution. The RFI should indicate schedule or cost impact, if any. Contractor shall be required to submit cost or schedule impact within seven days of receipt of the RFI response. Each RFI shall be numbered in sequence. Submit electronically in Portable Document Format (PDF) form

N. Weekly Logs:
1. The Contractor shall provide an updated RFI, change request, and submittal logs at weekly construction meetings. Contractor shall provide a 2-week detailed construction schedule at the weekly construction meeting. Media shall be in Word or Excel format.

PART 2 - MATERIALS
Not used.

PART 3 - EXECUTION
Not used.

END OF SECTION
PART 1 - GENERAL

1.01 SUPPLEMENTAL TESTING

If required, the following testing shall be performed at the expense of the contractor installing the material being tested:

A. Material Substitution: Any tests of basic material or fabrication equipment offered as a substitute for specified item on which a test may be required in order to prove its compliance with the specifications.

B. Mechanical/Electrical: Tests on mechanical and electrical systems required to insure their proper installation and operation.

C. Any test that fails shall be paid for by the installing contractor subject to the following conditions:
   1. Quantity and nature of tests will be determined by the Consultant.
   2. All test shall be done in the presence of the Owner or his representative.
   3. Proof of noncompliance will make the installing contractor liable for any corrective action which the Owner feels is prudent including complete removal and replacement of defective material.

Nothing contained herein is intended to imply that the installing contractor does not have the right to have tests performed on any material at any time for his own information and job control so long as the Consultant or Owner does not assume responsibility for costs or for giving them consideration when appraising quality of materials.

D. The Consultant shall determine the type and number of tests to be performed on the project.

1.02 TEST REPORTS

Reports of all tests made by testing laboratories shall be distributed by the testing laboratory as follows:
   1 copy - Contractor
   1 copy - Applicable supplier or subcontractor
   1 copy - Owner
   1 copy - Consultant
   Other copies - as directed

1.03 QUALITY CONTROL SYSTEM

A. General: The contractor shall establish a quality control system to perform sufficient inspection and tests of all items of work, including that of all subcontractors, to ensure conformance to the Contract Documents for materials, workmanship, construction, finish, functional performance and identification. This control shall be established for all construction except where the Contract Documents provide for specific compliance tests by testing laboratories or Consultants employed by the Owner.

The quality control system is the means by which the Contractor assures that construction complies with the requirements of the Contract Documents. Controls shall be adequate to cover all construction operations and should be keyed to the proposed construction schedule.
B. The Contractor shall designate a quality control representative on staff to review the work to
insure compliance with the contract documents by weekly jobsite visits for observation. The
designated employee shall not be involved in the performance of the work. The quality control
representative shall review the work and make necessary corrections to bring the work into
compliance prior to scheduling the Architect for the final punchlist review.

C. Records: The Contractor shall maintain correct records on an appropriate form for all inspections
and tests performed, instruction received from the Owner and actions taken as a result of those
instructions. These records shall include evidence that the required inspections or tests have
been performed (including type and number of inspections or tests, nature of defects, causes for
rejection, etc.) proposed or directed remedial action, and corrective action taken. The Contractor
shall document inspections and tests as required by each Section of the Specifications.

1.04 INDEPENDENT TESTING AGENCY SERVICES

A. The Owner will employ and pay for the services of an independent Testing Agency to perform the
Inspections, special inspections, tests and other services when required by sections of the
specification. Services shall be performed in accordance with requirements of governing
authorities and with specified standards.

1. Contractor shall cooperate with Testing Agency personnel and shall furnish tools, sample
of materials, design mixes, equipment and assistance as requested.

2. Contractor shall provide and maintain, for the sole use of the Testing Agency, adequate
facilities for the safe storage and proper curing of concrete testing cylinders on the
project site for the first 24 hours after casting as required by ASTM C 31, Method of
Making and Curing Concrete Test Specimens in the field.

3. Contractor shall notify Testing Agency sufficiently in advance of operations to allow for
completion of initial tests and proper assignment of inspection personnel.

4. Contractor shall notify the testing agency sufficiently in advance of cancellation of
required testing operations. The Contractor shall assume responsibility for costs incurred
due to the failure to provide such notice.

END OF SECTION
PART 1 - GENERAL

1.01 RELATED DOCUMENTS
A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification sections, apply to work of this section.

1.02 DESCRIPTION OF REQUIREMENTS
A. This section of the General Requirements outlines the basic requirements for temporary services, utilities, and facilities which will indirectly enable adequate construction progress and processes, and will accommodate other necessary activities at the project site except as otherwise indicated, the costs of providing and using temporary services are included in the Contract Sum.

1.03 QUALITY ASSURANCE
A. Comply with governing regulations and utility company regulations and recommendations for the construction of temporary facilities, including but not necessarily limited to, code compliance, permits, inspections, testing, and health and safety compliance.

1.04 SITE CONDITIONS
A. Provide Temporary facilities and services at the time first needed at the site and maintain, expand, and modify the facilities as needed throughout the construction period and do not remove until no longer needed.

PART 2 - EXECUTION

2.01 GENERAL
A. Use qualified tradesmen for the installation of temporary facilities. Locate facilities where they will serve the total project construction work adequately and result in minimum interference with performance of the work. Relocate, modify, and extend facilities as required during the course of the work to properly accommodate the entire work of the project.

2.02 TEMPORARY FACILITIES
A. Temporary Water: Connect to existing water source as designated by the Owner for construction operations.

B. Temporary Telephone: Provide, maintain and pay for telephone service to field office at time of project mobilization. If a mobile phone is designated as the field office phone then it shall be a local number.

C. Sanitary Facilities: Comply with governing regulations, including safety and health codes for the type, number, location, operation, and maintenance of fixtures and facilities. Install sanitary facilities in available locations which will best serve the needs of personnel at the project site. Toilet rooms in existing buildings or in new construction may not be used without written approval of the Owner.
D. Temporary Heat and Ventilation: Provide such OSHA approved heat and fuel, heating units, equipment as necessary to provide the required environmental conditions and to protect the work from damage due to cold. Maintain equipment in a clean, safe condition.

E. Fire Extinguisher:
1. Except as otherwise indicated or required, comply with the applicable recommendations of NFPA No. 10 "Portable Fire Extinguisher" for each area of each construction activity whenever combustible materials, flammable liquids, and similar exposures to possible fires are present.
2. Locate extinguisher where most convenient and effective for the intended purposes. Store combustible materials in recognized fire-safe locations and containers.

F. Protection
1. Barricades, Warning Signs, and lights: Comply with recognized standards and code requirements for the erection of substantial and structurally adequate barricades wherever needed to prevent accidents and losses. Paint with appropriate colors, graphics and warning signs to inform personnel at the site and the general public where exposure exists of the hazard being protected. Provide lighting where appropriate and needed for the recognition of the facility, including flashing red lights where appropriate.

G. Temporary Enclosure: Wherever required, provide temporary enclosure of materials, equipment, work in progress, and completed portions of work, so as to afford protection for both the work and employees.

H. Miscellaneous Facilities:
1. Provide ladders, ramps, and temporary stairs for access to all levels of the construction for general access by all trades. Individual contractors and subcontractors shall furnish their own stepladders, scaffolds, staging, work platforms, and other facilities for use of their workmen and as necessary for safety of all personnel.

I. Field Office:
1. The Contractor shall provide and maintain a suitable temporary field office for his own use. Offices and all other temporary structures shall be removed from the site upon completion of the work.
2. Temporary structures or storage used for storage and offices for contractors shall be located on the site in an orderly manner as determined by the Owner.

2.03 OPERATIONS AND TERMINATIONS

A. Supervision: Enforce strict discipline in the use of temporary facilities at the project site. Limit availability of facilities to essential and intended uses, so as to minimize waste and possibility of abuses and the resulting unsanitary and hazardous or dangerous conditions.
B. Maintenance: Operate and maintain temporary facilities in good operating condition through the time of use and until removal is authorized. Protect from damage by freezing temperatures and similar elements at the site.

C. Termination and removal: At the time the need has ended for each temporary facility, or when it has been replaced by authorized use of a permanent facility, or at the time of Substantial completion, promptly remove the facility unless requested by the Consultant to be retained for a longer period of time. Complete or restore permanent work which may have been delayed or otherwise affected by the temporary facility. Replace work which cannot be satisfactorily restored. Except as otherwise indicated, the materials and equipment of temporary facilities remain the property of the contractors.

END OF SECTION
PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Products.
   2. Transportation and Handling.
   4. Manufacturer's Instructions.
   5. Product Options.
   6. Products List.
   7. Substitutions.

B. Related Sections:
   1. Section 01400 - Quality Control.
   2. Section 01730 - Operation and Maintenance Data.

1.02 QUALITY ASSURANCE

A. Conform to applicable specifications and standards.

B. Comply with size, make, type and quality specified, or as specifically approved in writing by the Consultant.

C. Manufactured and Fabricated Products:
   1. Two or more items of the same kind shall be identical, by the same manufacturer.
   2. Equipment capacities, sizes and dimensions shown or specified shall be adhered to unless variations are specifically approved in writing.

1.03 TRANSPORTATION AND HANDLING

A. Arrange deliveries of products in accord with construction schedules, coordinate to avoid conflict with work and conditions at the site.

B. Promptly inspect shipments to assure that products comply with requirements, quantities are correct, and products are undamaged.

1.04 STORAGE AND PROTECTION

A. Store products in accordance with manufacturer's instruction, with seals and labels intact and legible.

B. Arrange storage to provide access for inspection. Periodically inspect to assure products are undamaged, and are maintained under required conditions.

1.05 MANUFACTURER'S INSTRUCTIONS

A. When Contract Documents require that installation of work shall comply with manufacturer's printed instructions, obtain and distribute copies of such instructions to parties involved in the installation, including one copy to the Consultant and one copy to the Contractor.
B. Perform work in accord with manufacturer's instructions. Do not omit any preparatory step or installation procedure unless specifically modified or exempted by Contract Documents.

1.06 PRODUCT OPTIONS

A. Products Specified by Reference Standards or by Description Only: Any product meeting those standards.

B. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not specifically named.

C. Consultant will review requests for substitutions with reasonable promptness, and notify, by Addendum, of the decision to accept or reject the requested substitution.

1.07 PRODUCT LIST

A. Within 15 days after signing of agreement, submit complete list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.

1.08 SUBSTITUTIONS

A. Will only be considered prior to bid or in the event that Equipment is not available.

1.09 SYSTEMS DEMONSTRATION

A. Prior to final inspection, demonstrate operation of each system to Consultant and Owner.

B. Instruct Owner's personnel in operation, adjustment, and maintenance of equipment and systems, using the operation and maintenance data as the basis of instruction.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION
PART 1 - GENERAL

1.01 SUBSTANTIAL COMPLETION AND FINAL INSPECTION

A. The Contractor shall comply with procedures stated in the General Conditions of the Contract for Notice of Completion, Final Inspection, Notice of Substantial Completion and Notice of Acceptance.

B. Should the Architect/Engineer or the Principle Representative determine that the work is not substantially complete, or the punch list items exceed 25, he will immediately notify the Contractor, in writing, stating reasons. After Contractor completes work, he shall resubmit certification and request for final inspection. The Contractor will be responsible for all costs beyond two Architect/Engineer walk-throughs.

C. Owner may occupy designated portions of the Project under provisions stated in the General Conditions of the Contract.

1.02 CLOSE-OUT FORMS

The Architect/Engineer will complete the Notice of Approval of Beneficial Occupancy, Closing-out Checklist and Contract Close-out forms and forward them to the Contractor. Comply with procedures stated in General Conditions of the Contract.

1.03 FINAL SETTLEMENT AND PAYMENT

A. Contractor shall comply with procedures stated in the General Conditions of the Contract before final settlement and payment are made.

B. The Contractor shall also submit the following prior to the final application for payment:
   1. Contractor’s Affidavit of Payment of Debit and Claims: AIA G706.
   2. Contractor’s Affidavit of Release of Liens (claims): AIA G706A, with:
      a. Consent of Surety to final payment: AIA G707
      b. Contractor’s release of waivers of claims.
      c. Separate release of waivers of claims for subcontractors, suppliers and others with claim rights, against property of owner, together with list of those parties.

1.04 GUARANTEE INSPECTION

A. The Contractor shall comply with procedures stated in the General Conditions of the Contract for Guarantee Inspections after completion of the work.

1.05 WARRANTIES AND SPECIAL GUARANTEES

The Contractor shall comply with procedures and criteria outlined in the General Conditions of the Contract for all warranties and special guarantees of the work.

1.06 OPERATING AND MAINTENANCE DATA

A. Refer to Section 01730 - Operating and Maintenance.

B. Mechanical - By Mechanical Contractor: See Division 15.
C. Electrical - By Electrical Contractor: See Division 16.

1.07 DEMONSTRATIONS

A. Refer to Section 01730 - Operating and Maintenance

B. Mechanical - By Mechanical Contractor: See Division 15

C. Electrical - By Electrical Contractor: See Division 16.

1.08 SPARE PARTS AND MAINTENANCE MATERIALS

A. Provide products, spare parts, and maintenance materials in quantities specified in each Section, in addition to that used for construction of work. Coordinate with Owner, deliver to Project site and obtain receipt prior to final payment.

B. At the completion of the project, all loose keys for hose bibs; adjustment keys and wrenches for door closers and panic hardware; and keys for electric switches, electrical panels, etc., shall be accounted for by the Contractor and turned over to the Owner.

END OF SECTION
PART 1 - GENERAL

1.01 CLEANING

A. Clean-up During Construction: Each contractor shall keep the building and premises free from all surplus material, waste material, dirt and rubbish caused by his employees or work, and at the completion of his work he shall remove all such surplus material, waste material, dirt and rubbish, as well as his tools, equipment and scaffolding, and shall leave his work clean and spotless, unless more exact requirements are specified. In case of dispute, the owner may remove all such items and charge the cost of such removal to the contractor.

Each sub-contractor shall perform his clean-up daily and shall transport his rubbish to an on-site location designated by the Contractor who will arrange for its removal.

B. Cleaners: With the exception of clean-up of the site and cleaning specifically assigned to Contractors under various sections of the specifications, all final clean-up of exterior and interior of the building shall be done by professional cleaners.

C. Final Clean-up:
   1. Exterior: In addition to items specified below, any new surfaces on exterior, concrete, metal, etc., shall be carefully and thoroughly cleaned.
   2. Glass: Both sides of all glass in work areas shall be carefully and thoroughly cleaned by professional window cleaners and left absolutely clean and free from paint, grease, dirt, etc.
   3. Hardware: Clean and polish all hardware and leave clean and free from paint, grease, dirt, etc.
   4. Plumbing: Clean and polish all plumbing fixtures, fittings, and exposed plated piping. Leave clean and free from paint, grease, dirt, etc. Remove all labels.
   5. Electrical: Clean and polish all electric fixtures, including glassware, switch plates, etc. and leave clean and free from paint, grease, dirt, etc.
   6. Equipment: Carefully and thoroughly clean all items of equipment, mechanical, electrical, cabinets, ductwork, etc.
   7. Floors: Thoroughly clean all floors. Vacuum and clean carpeting. Shampooing of pre-existing carpet is required once project is complete. Contractor is responsible for this.
      a. Contractors are responsible for cleaning (stripping floors if necessary) then applying the required two coats of sealer and three coats of finish before releasing the building for occupancy. Facilities Management will provide a contact person for help concerning campus standards free of charge. Or Custodial floor care services may be sub-contracted out through Facilities Management's work order system.
      b. Facilities Management Approved Sealers and Finishes for Vinyl Tile Flooring:

CU requires floor care products to be from the same product line. (Different brands may interact disastrously).

All of these products may be ordered through Construction Stores, but these products not stocked at Stores, please place orders at least two weeks in advance.
Strippers: JohnsWax Freedom Butchers: Airim Time Buster Airim Full Impact

Sealers: Over & Under Iron Stone Laser, Gemini Technique

Finishes: Show Place Laser, Gemini MainStay Laser, Gemini Above

Campus safety standards require at least TWO (2) coats of Sealer be applied to a cleaned floor, and at least THREE (3) coats of Finish must be applied on top of the sealer.

c. Floor Cleaning Procedures:
   1. Sweep floor clean of debris
   2. Cord off area if necessary
   3. Put up Caution signs
   4. Mix Stripper or Cleaning solution according to label
   5. Apply solution to floor
   6. Start setting up equipment
   7. Place RED abrasive pad on buffer (buffer less than 300 rpms)
   8. Begin stripping or cleaning floor working with buffer moving it side to side across the floor.
   9. Use HEPA filtered water vacuum to begin to suck up slurry*
      *use of HEPA filtered water vacuum is required on existing floor tile which contains asbestos.
   10. Apply additional coats of water and re-vacuum up floor
   11. Mop floor with clean water, change rinse water often
   12. Mop floor a second time
   13. Mop floor to dry completely
   14. Clean up equipment
   15. Wash red pad with clean water.

d. Sealing Procedures:
   1. Using a new mop head or clean wax mop and clean bucket, apply first coat of approved sealer to floor
   2. Allow floor to dry completely (at least 20 minutes)
   3. Apply second coat of sealer
   4. Allow floor to dry

e. Finishing (Waxing) Procedures:
   1. Using a clean wax mop and bucket apply first coat of approved finish (wax)
   2. Allow floor to dry completely (at least 20 minutes)
   3. Apply second coat of finish (wax)
   4. Allow floor to dry completely (at least 20 minutes)
   5. Apply third coat of finish (wax)
   6. Allow floor to dry completely (at least 30 minutes)
   7. Wash mop and bucket with clean water
   8. If floor is dry - remove caution signs and open area up
f. Burnishing Procedures:
The next working day
1. Sweep floor clean of debris
2. Spot mop floor to remove spots and dirt
3. Set up High Speed Burnisher to make for a safe environment
4. Start Burnishing. Walk forward in a straight line
5. At end of row, turn around and start forward again
6. Repeat steps 5 & 6 until finished
7. Clean up equipment and pad.

E. Completion: The entire work inside and out, and the entire premises shall be in first-class, clean condition upon completion before being accepted by the Owner.

END OF SECTION
PART 1 - GENERAL

1.01 SUMMARY

A. This section describes the definitions, recording and maintenance requirements and the submittal requirements for record documents.

1.02 DEFINITIONS

A. The Project Record Documents are intended to indicate all changes and deviations from the original contract documents and permanently record the “as-built” condition of material, equipment and structure. The project record documents shall include the contract drawings, project manual, addenda, change orders, modifications and clarifications, field directives, approved shop drawings, approved product data, manufacturer’s certificates and project test results.

1.03 SUBMITTALS

A. Submit the project record documents in conformance with Section 01700 and prior to the final applications for payment. The final application for payment will not be approved prior to the submittal of record documents.

1.04 QUALITY ASSURANCE

A. The project record documents shall be updated at a minimum on a weekly basis and shall be readily available for inspection by the owner and consultants. Maintain a separate set of complete documents for exclusive use of record documents and protect the documents from damage in a clean, dry location. Note: Progress applications for payment will not be approved if record documents are not current.

B. The record documents shall contain a clear, legible record of all detail and dimensional changes and locate all concealed work including, but not limited to:
   1. Interior and Exterior Utilities
   2. Valves
   3. Dampers
   4. Controls
   5. Junction Boxes
   6. Clean-outs
   7. Access Doors

C. The project manual (specifications) shall indicate all manufacturers’ products complete with catalogue number and trade name of products installed. All changes and corrections to the project manual shall be clearly indicated.

END OF SECTION
PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. Compile product data and related information appropriate for the University of Colorado's maintenance and operation of products furnished.

B. Prepare operating and maintenance data as specified in this section and as referenced in other pertinent sections of specifications.

C. Instruct the University of Colorado, Facilities Management personnel in the maintenance of PRODUCTS and in the operation of equipment and systems.

1.02 QUALITY ASSURANCE

A. Preparation of data shall be done by personnel:
   1. Trained and experienced in maintenance and operation of the described products.
   2. Completely familiar with requirements of this section.
   3. Skilled as a technical writer to the extent required to communicate essential data.
   4. Skilled as a draftsman competent to prepare required drawings.

1.03 SUBMITTALS

A. Prepare data in the form of an instructional manual for use by the University of Colorado, Facilities Management personnel. Quantities are listed in Part 1.07.

B. Format:
   1. Submit electronically in Portable Document Format (PDF) format as one document, OCR (Optical Character Recognition) searchable, bookmarked according to the Construction Specifications Institute (CSI) standards.
   2. Title shall be “OPERATING AND MAINTENANCE INSTRUCTIONS”, and shall include:
      a. Name of project and date of completion (month and year).
      b. Project number.
      c. Identify of general subject matter covered in the manual (e.g., Architectural, Mechanical, Electrical and/or Civil).

1.04 CONTENT OF MANUAL

A. An electronically-written table of contents shall be provided for each volume, arranged according to CSI standards.
   Include the following:
   1. Name of responsible installing principal contractor, address, and telephone number.
   2. A list of each product being included, indexed to the content of the volume.
   3. List with each product, the name, address, and telephone number of:
      a. Maintenance contractor, as appropriate.
      b. Identity of the area of responsibility of each.
   4. Identify each product by product name and other identifying symbols.
GENERAL REQUIREMENTS

SECTION 01730 OPERATING AND MAINTENANCE

B. Product Data:
1. Local source of supply for parts and replacement.
2. Include only those sheets that are pertinent to the specific product, with the following information.
   a. Clearly identify the specific product or part installed.
   b. Clearly identify the data applicable to the installation.
   c. Delete references to inapplicable information.

C. Drawings:
1. Supplement product data with drawings as necessary to clearly illustrate:
   a. Relations of component parts of equipment and systems.
   b. Control and flow diagrams.
2. Coordinate drawings with information in project record drawings to ensure correct illustration of completed installation.
3. Do not use project record drawings as maintenance drawings.

D. Provide written text, as required, to supplement product data for the particular installation:
1. Organize in a consistent format under separate headings for different procedures.
2. Provide a logical sequence of instructions for each procedure.

E. Provide a copy of each warranty, bond, and service contract issued. Provide information sheets for the University of Colorado, Facilities Management's personnel and give:
1. Proper procedures in the event of failure.
2. Instances that might affect the validity of warranties or bonds.

1.05 MANUALS FOR ARCHITECTURAL MATERIAL AND FINISHES

A. Submit copies (per schedule shown in paragraph 1.07) of complete manual in final form.

B. Content for architectural products include applied materials and finishes.
1. Manufacturer's data, giving full information on products.
   a. Catalog number, size, and composition.
   b. Color and texture designations.
   c. Information required for reordering special manufactured products.
2. Instructions for care and maintenance:
   a. Manufacturer's recommendation for types of cleaning agents and methods.
   b. Cautions against cleaning agents and methods that are detrimental to the product.
   c. Recommended schedule for cleaning and maintenance.

C. Content for moisture-protection and weather-exposed products:
1. Provide manufacturer's data, giving fully information on products.
   a. Applicable standards
   b. Chemical composition
   c. Details of installation
2. Provide instructions for inspection, maintenance, and repair.
1.06 MANUAL FOR NON-ARCHITECTURAL EQUIPMENT AND SYSTEMS

A. Submit copies (per schedule) of complete manual in final form.

B. Content for each unit of equipment and system, as appropriate shall contain:
   1. Description of unit and component parts (Consultant-approved submittals).
      a. Function, normal operating characteristics, and limiting conditions.
      b. Performance curves, engineering data, and tests.
      c. Complete nomenclature and Commercial number of all replaceable parts.
   2. Operating Procedures:
      a. Start-up, break-in, routine, and normal operating instructions.
      b. Regulation, control, stopping, shutdown, and emergency instructions.
      c. Summer and winter operating instructions.
      d. Special operating instructions.
   3. Maintenance Procedures:
      a. Routine operations.
      c. Disassembly, repair, and reassembly.
      d. Alignment, adjustment, and checking.
   4. Servicing and Lubrication Schedule, including a list of lubricants required.
   5. Manufacturer's operating and maintenance instructions.
   6. Description of sequence of operation by control manufacturer.
   7. Original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance and replacement.
      a. Predicted life of parts subject to wear.
      b. Items recommended to be stocked as spare parts.
   8. List of original manufacturer's spare parts, manufacturer's current prices, and recommended quantities to be maintained in storage.

C. Content for each electric and electronic system, as appropriate, shall contain:
   1. Description of system and component parts:
      a. Function, normal operating characteristics, and limiting conditions.
      b. Performance curves, engineering data, and tests.
      c. Complete nomenclature and Commercial number of replaceable parts.
   2. Operating Procedures:
      a. Routing and normal operating instructions.
      b. Sequences required.
      c. Special operating instructions.
   3. Maintenance Procedures:
      a. Routing operations.
      c. Disassembly, repair, and reassembly.
      d. Adjustment and checking.
      e. Manufacturer's printed operating and maintenance instructions.
      f. List of original manufacturer's spare parts, manufacturer's current prices, and recommended quantities to be maintained in storage.

D. Prepare and include additional data when the need for such data becomes apparent during instruction of the University of Colorado, Facilities Management's personnel.
1.07 OPERATION & MAINTENANCE MANUAL

A. Operations and Maintenance Manuals – all disciplines – submit electronically in **Portable Document Format** (PDF) format as one document, OCR (Optical Character Recognition) searchable, bookmarked according to the Construction Specifications Institute (CSI) standards.

1.08 SUBMITTAL SCHEDULE

A. Submit one electronic copy to the Consultants and one to the University a draft of proposed formats and outlines of contents **upon completion of the submittal process**. The Consultants and the University staff will review the draft and will submit comments through the consultants.

B. Submit electronic copies of complete manual(s) in final form 15 days prior to final inspection or acceptance. Comments will be submitted after final inspection.

C. Submit specified number of CDs or DVDs of approved data in final form prior to acceptance.

1.09 INSTRUCTION OF UNIVERSITY OF COLORADO, FACILITIES MANAGEMENT PERSONNEL

A. Fully instruct the University of Colorado, Facilities Management personnel's designated operating and maintenance personnel in the operation, adjustment, and maintenance of all products, equipment, and systems as required elsewhere in the specification.

B. Operating and Maintenance manual may be required as the basis of instruction.

PART 2 - MATERIAL

Not Used.

PART 3 - EXECUTION

Not Used.
PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

A. Prepare commissioning process based on the Commissioning Checklists found in the UCB Standards website:

http://fm.colorado.edu/construction/standards/

B. Coordinate the requirements of Project Closeout and Operating and maintenance sections that are part of Division 1.

C. Schedule the required commissioning activities with the University of Colorado Facilities Department and their consultants at least 72 hours prior to conducting Commissioning activities.

PART 2 - MATERIALS

Not Used.

PART 3 - EXECUTION

NOT USED END OF SECTION
PART 1 – GENERAL

1.01 SUMMARY

A. Section includes:
   1. Construction Storm Water Requirements
   2. Post-Construction Storm Water Requirements

B. Related Sections
   1. Section 02200 - Earthwork
   2. Section 02221 – Trenching, Backfilling, Compaction

1.02 QUALITY ASSURANCE

A. All construction sites
   1. All construction sites that disturb any land must take appropriate erosion control and stormwater detention measures to contain water run-off from site.

B. Construction sites – one acre and larger
   1. All construction sites that are one acre and larger must prepare and submit a Storm Water Management Plan (SWMP) for approval before any work begins. The SWMP must conform to all the requirements contained herein.

1.03 SUBMITTALS

A. Storm Water Management Plan (SWMP)

   Storm Water Management Plan (SWMP): Prior to any construction activity disturbing one acre of land or more, an approved SWMP and a Stormwater Permit for Construction Activity application from the Colorado Department of Public Health and Environment (CDPHE) are required. The SWMP shall be prepared in accordance with the CDPHE requirements for “Contents of the Stormwater Management Plan” and the UDFCD’s Urban Storm Drainage Criteria Manual, Volume 3, “Best Management Practices” (UDFCD Drainage Criteria Manual). Stormwater quality management and erosion control measures are to be constructed and maintained in accordance with the SWMP and the UDFCD Drainage Criteria Manual.

PART 2 – MATERIALS

2.01 Storm Water Management Plan

A. Preparation Standards: Design of the SWMP and the Storm Water Quality and Erosion Control Plan shall include the following elements:
   1. Protection for adjacent properties (including public right-of-way) from erosion and/or sediment deposition.
   2. Protection for public streets from the deposit of sediment from run-off or vehicles tracking mud at construction access routes.
   3. Stabilization for all disturbed areas as defined in the UDFCD Drainage Criteria Manual.
4. Protection for all storm sewer inlets from the entry of sediment-laden water.
5. Long-term stability of cut and fill slopes and the successful establishment of permanent vegetative cover on exposed soil.
6. The following standard notes:
   a. “All temporary erosion control facilities shall be installed before any construction activities take place”.
   b. “Solid waste, industrial waste, yard waste and any other pollutants or waste on any construction site shall be controlled through the use of BMP’s. Waste and/or recycling containers shall be provided and maintained by the owner or contractor on construction sites where there is the potential for release of waste. Uncontained waster that may blow, wash or otherwise be released from the site is prohibited. Sanitary waste facilities shall be provided and maintained by the owner or contractor”.
   c. “Ready-mixed concrete, or any materials resulting from the cleaning of vehicles or equipment containing or used in transporting or applying it, shall be contained on construction sites for proper disposal. Release of these materials is prohibited”.
   d. “Cover shall be applied within 14 days to inactive soil stockpiles, and shall be maintained for stockpiles that are proposed to remain in place longer than 30 calendar days”.
   e. “BMP’s shall be implemented to prevent the release of sediment from construction sites. Vehicle tracking of mud shall not be allowed to enter the MS4 or waters of the State. Sediment tracked onto public streets shall be removed immediately”.
   f. “Techniques shall be used to prevent dust, sediment or debris blowing from the site”.
   g. “Stormwater discharges from construction activities shall not cause or threaten to cause pollution, contamination or degradation of waters of the State”.
   h. “All earth disturbances shall be designed, constructed and completed to limit the exposed area of any disturbed land to the shortest possible period of time”.
   i. “Bulk storage structures for petroleum products and other chemicals shall have adequate protection so as to contain all spills and prevent any spilled material from entering the MS4 or waters of the State”.
   j. Any disturbance to temporary and permanent BMP’s resulting from construction activity shall be repaired or replaced within 48 hours.

PART 3 – EXECUTION

3.1 PERMITTING

A. Contractor shall develop the SWMP in accordance with all of the requirements herein and utilizing the most recent SWMP guidance document prepared by the CDPHE and good engineering hydrologic and pollution control practices and submit to the University for approval.

B. Contractor shall apply for and obtain a CDPHE storm water general permit for construction activities. Provide copies of the permit to the University prior to the start of construction operations.
3.2 CONSTRUCTION

A. The Contractor will be required to have the SWMP on site at all times and shall be prepared to respond to maintenance of specific BMP’s.

B. The Contractor shall inspect all BMP’s at least every 14 days and within 24 hours after any precipitation or snow melt event that causes surface run-off. Inspections of BMP’s shall be conducted by an individual who has successfully completed formal training in erosion and sediment control by an organization acceptable to the University. A certification of successful completion of such training shall be provided upon request.

C. The Contractor shall amend the SWMP whenever there is a change in design, construction, operation, or maintenance, which has an effect on the potential for discharge of pollutants to the MS4 or receiving waters, or if the SWMP proves to be ineffective in achieving the general objectives of controlling pollutants in stormwater discharges associated with construction activities.

D. Records of inspection are to be maintained on site with the SWMP. Inspection records are to be available at the project site at all times and shall be made available to the University upon request.

E. Prior to commencement of work, all general contractors, subcontractors and utility agencies shall obtain and comply with the approved, current SWMP for the project.

3.3 POST CONSTRUCTION

At the conclusion of all construction activities and as a part of construction close-out, contractor shall remove all temporary BMP’s and inactivate the stormwater permit.

END OF SECTION
SECTION 02070
SELECTIVE DEMOLITION

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Demolition and removal of selected interior partitions.
2. Demolition and removal of doors and frames.
4. Salvage of existing items to be reused or recycled.

B. Demolition requires the selective removal and subsequent off-site disposal of removed material, except salvaged items or items to be relocated. The disposal of all debris must be off the UCB campus. Any construction debris placed in University dumpsters will be removed at the Contractor’s expense.

C. Related Sections:


1.02 DEFINITIONS

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

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

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

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

1.03 INFORMATIONAL SUBMITTALS

A. Schedule: Submit schedule indicating proposed methods and sequence of operations for selective demolition work.

B. Include selective demolition work in the construction waste management plan.
1.04 FIELD CONDITIONS

A. University personnel will be continuously occupying areas of the building immediately adjacent to areas of selective demolition. Verify with CU project manager whether building will be occupied or vacated during expected work activities.

B. Conduct selective demolition work in manner that will minimize the need for disruption of normal operations if building remains occupied.

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

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

E. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
   1. Hazardous materials will be removed by Owner before start of the Work.
   2. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.

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

G. 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.

1.05 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS

2.01 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/ASSE A10.6 and NFPA 241.

C. Requirements for Building Reuse:
   1. Maintain existing interior nonstructural elements (interior walls, doors, floor coverings, and ceiling systems) not indicated to be demolished; do not demolish such existing construction beyond indicated limits.
3.01 EXAMINATION

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

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

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

D. Perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective building demolition operations.

3.02 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.

1. Outages of services require a 10 day notice be given to CU Project Manager in order to coordinate with building Users.

B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.

1. Arrange to shut off indicated utilities with utility companies.
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 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.
   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.
3.03 PREPARATION

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

1. Comply with requirements for access and protection specified in Division 01.

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

C. Temporary Shoring: Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.

3.04 SELECTIVE DEMOLITION, GENERAL

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

1. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.

2. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.

3. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain fire watch and portable fire-suppression devices during flame-cutting operations.

4. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.


B. Reuse of Building Elements: Do not demolish building elements beyond what is indicated on Drawings without Architect's approval.

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 cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.05 DISPOSAL OF DEMOLISHED MATERIALS

A. All selective demolition debris that is recyclable must be recycled.

B. Except for items or materials to be recycled, reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site.

1. Do not allow demolished materials to accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.

C. Burning: Do not burn demolished materials.

D. Disposal: Transport demolished materials off Owner's property and legally dispose of them. Under no circumstances should the University's dumpsters be used for disposal of demolished materials.

3.06 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 02070
PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Mortar for Unit Masonry.
   2. Grout for Unit Masonry.

B. Related Sections:
   1. Section 04150 – Masonry Accessories for reinforcement.
   2. Section 04200 – Unit Masonry for CMU block.

1.02 ACTION SUBMITTALS

A. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.
   1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C 109/C 109M for compressive strength, ASTM C 1506 for water retention, and ASTM C 91 for air content.
   2. Include test reports, according to ASTM C 1019, for grout mixes required to comply with compressive strength requirement.

PART 2 - PRODUCTS

2.01 MORTAR AND GROUT MATERIALS

A. Regional Materials: Aggregate for mortar and grout shall be extracted, harvested, or recovered, as well as manufactured, within 500 miles of Project site.

B. Portland Cement: ASTM C 150, Type I, except Type III may be used for cold-weather construction. Do not use masonry cement.

C. Hydrated Lime: ASTM C 207, Type S.

D. Aggregate for Mortar: ASTM C 144.

E. Aggregate for Grout: ASTM C 404, size 1 for fine aggregate, size 8 or 89 for course.

F. Water: Potable.
2.02 MORTAR AND GROUT MIXES

A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated.

1. Do not use calcium chloride in mortar or grout.
2. Use portland cement-lime mortar unless otherwise indicated.

B. Mortar for Unit Masonry: Comply with ASTM C 270. Provide the following types of mortar for applications stated unless another type is indicated.

1. For reinforced masonry, use Type S: 1800 psi average compressive strength in 28 days.
2. For interior non-load-bearing partitions, Type N: 750 psi average compressive strength in 28 days.

C. Grout for Unit Masonry: Comply with ASTM C 476.

1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with Table 1.15.1 in ACI 530.1/ASCE 6/TMS 602 for dimensions of grout spaces and pour height.
2. Proportion grout in accordance with ASTM C 476, paragraph 4.2.2 for specified 28-day compressive strength indicated, but not less than 2000 psi.

PART 3 - EXECUTION

3.01 REINFORCED UNIT MASONRY INSTALLATION

A. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.

1. Comply with requirements in ACI 530.1/ASCE 6/TMS 602 for cleanouts and for grout placement, including minimum grout space and maximum pour height.

3.02 REPAIRING, POINTING, AND CLEANING

A. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

3.03 MASONRY WASTE DISPOSAL

A. Excess Masonry Waste: Remove excess masonry waste and legally dispose of off Owner's property.

END OF SECTION 04100
SECTION 04150

MASSONRY ACCESSORIES

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Anchors and joint reinforcement.

B. Related Sections:
   1. Section 04100 - Mortar and Grout.
   2. Section 04200 – Block.

1.02 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

1.03 QUALITY ASSURANCE

A. Masonry Standard: Comply with ACI 530.1/ASCE 6/TMS 602 unless modified by requirements in the Contract Documents.

PART 2 - PRODUCTS

2.01 REINFORCEMENT

A. Masonry Joint Reinforcement, General: ASTM A 951/A 951M.

B. Masonry Joint Reinforcement for Single-Wythe Masonry: Either ladder or truss type with single pair of side rods.

C. Manufacturers:
   1. Dur-O-Wal, Inc.
   2. AA Wire Products Company.
   3. Heckman Building Products, Inc.
   4. Hohmann and Barnard, Inc.
   5. Masonry Reinforcing Corporation of America.
   6. Approved substitute in accordance with Section 01600.

D. General For CMU: Welded wire units of ASTM A82 cold-drawn steel wire, No. 9 gage, deformed continuous side rods and No. 9 gage plain cross rods. Width shall be approximately 2" less than width of wall or partition. Provide prefabricated corners, tees, and straight lengths not less than 10'. Furnish with galvanized finish, ASTM A641, Class 1 for interior walls and A153, Class B-2 for exterior walls.
PART 3 - EXECUTION

3.01 MASONRY JOINT REINFORCEMENT

A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches.

1. Space reinforcement not more than 16 inches o.c.

B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.

C. Provide continuity at wall intersections by using prefabricated T-shaped units.

D. Provide continuity at corners by using prefabricated L-shaped units.

3.02 REINFORCED UNIT MASONRY INSTALLATION

A. Placing Reinforcement: Comply with requirements in ACI 530.1/ASCE 6/TMS 602.

END OF SECTION 04150
SECTION 04200
UNIT MASONRY

PART 1 - GENERAL

1.01 SUMMARY
A. Section Includes: Concrete masonry units (CMU's).
B. Related Sections:
   1. Section 04100 – Mortar and Grout.
   2. Section 04150 – Masonry Accessories.

1.02 ACTION SUBMITTALS
A. Product Data: For each type of product indicated.
B. Product Certificates: For products and materials required to comply with requirements for regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material.

1.03 INFORMATIONAL SUBMITTALS
A. Material Certificates: For each type and size of product indicated. For masonry units include data on material properties.

1.04 QUALITY ASSURANCE
A. Masonry Standard: Comply with ACI 530.1/ASCE 6/TMS 602 unless modified by requirements in the Contract Documents.

PART 2 - PRODUCTS

2.01 MASONRY UNITS, GENERAL
A. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated in the standard. Do not use units where such defects will be exposed in the completed Work.
2.02 CONCRETE MASONRY UNITS

A. Regional Materials: CMUs shall be manufactured within 500 miles of Project site from aggregates that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of Project site.

B. Shapes: Provide shapes indicated and for lintels, corners, headers, bonding, and other special conditions.

C. CMUs: ASTM C 90.
   1. Density Classification: Lightweight.
   2. Classification: Grade N, Type 1.

PART 3 - EXECUTION

3.01 INSTALLATION, GENERAL

A. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

3.02 LAYING MASONRY WALLS

A. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.

3.03 REPAIRING, POINTING, AND CLEANING

A. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

B. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
   1. Protect surfaces from contact with cleaner.
   2. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2A applicable to type of stain on exposed surfaces.

3.04 MASONRY WASTE DISPOSAL

A. Excess Masonry Waste: Remove excess clean masonry waste and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION 04200
PART 1 - GENERAL

1.01 SUMMARY:

A. Section Includes:
   1. Non-load-bearing metal stud wall framing.

B. Related Work:

1.02 REFERENCES:

A. Design and Manufacturers: Meet requirements of AISC Specification for the Design of Light Gage Cold Formed Steel Structural Members, latest edition.

1.03 SUBMITTALS:

A. Product Data: Copies of manufacturer's specifications covering all materials to be used with all materials and accessories plainly identified.

PART 2 - PRODUCTS

2.01 MATERIAL:

A. Framing Members:
   1. Studs and Track: Head and sill track and header members to be un-punched track, same gage as studs or one gage heavier.
      a. All studs to be stamped or marked with ASTM standard, Grade, and gage.
   2. Steel: All framing members to be formed from steel conforming to the following:
      a. 18 Gage and Lighter Galvanized: ASTM A446, Grade A.
      b. 18 Gage and Lighter Painted: ASTM A611, Grade C, 33 ksi yield.
      c. 16 Gage and Heavier, Galvanized: ASTM A446, Grade D, 50 ksi yield.
      d. 16 Gage and Heavier, Painted: ASTM A570, Grade E, 50 ksi yield.
   3. Stud Bridging:
      a. 18 gage or heavier channel studs of same width as studs noted on the drawings.
b. Continuous minimum 1-1/2" cold-rolled channels positioned through stud punch-outs.

2.02 FASTENERS:


B. Anchorage Devices: Powder driven or powder actuated; drilled expansion bolts; screws and sleeves.

PART 3 - EXECUTION

3.01 ERECTION:

A. Align head and sill tracks according to wall or partition location. Secure with screws, powder driven fasteners or welding at 24" on center.

B. Studs:
   a. Place studs 16" on center, minimum, or at tighter spacing as noted, and not more than 2" from abutting walls and at each side of openings.
   b. Provide deflection allowance below supported horizontal building framing in ceiling or head track for non-load-bearing framing.

C. Miscellaneous Framing and Furring:
   1. Provide all necessary framing, furring, etc., for special framing at specialty items.
   2. Attach cross studs or furring channels to studs for attachment of fixtures behind lavatory basins, toilet and bathroom accessories, grab bars and other items anchored to partitions or walls.

END OF SECTION 05400
SECTION 07210
BUILDING INSULATION

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Glass-fiber blanket insulation.
   2. Safing insulation.

B. Related Sections:
   1. Section 09260 – Gypsum Board Systems for sound attenuation batts.
   2. Section 15250 – Mechanical Insulation for pipe and duct insulation.

1.02 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Product Data: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content.

PART 2 - PRODUCTS

2.01 GLASS-FIBER BLANKET INSULATION

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. CertainTeed Corporation.
   2. Johns Manville.
   3. Owens Corning.

B. Foil-Faced, Glass-Fiber Blanket Insulation: ASTM C 665, Type III (reflective faced), Class B (faced surface with a flame-propagation resistance of 0.12 W/sq. cm); Category 1 (membrane is a vapor barrier), faced with foil scrim, foil-scrim kraft, or foil-scrim polyethylene.

2.02 SAFING INSULATION

A. Conform to ASTM C612, Class 1 and 2 (melt point of over 2,000 degrees F.) Provide USG “Thermafiber Safing Insulation”, or approved substitute, thickness as required.
PART 3 - EXECUTION

3.01 INSTALLATION, GENERAL

A. Comply with insulation manufacturer's written instructions applicable to products and applications indicated.

B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.

C. Extend insulation to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

D. Provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.

3.02 INSTALLATION OF INSULATION FOR FRAMED CONSTRUCTION

A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.

B. Glass-Fiber or Mineral-Wool Blanket Insulation: Install in cavities formed by framing members according to the following requirements:

1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.

2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.

3. Maintain 3-inch clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.

4. For metal-framed wall cavities where cavity heights exceed 96 inches, support unfaced blankets mechanically and support faced blankets by taping flanges of insulation to flanges of metal studs.

END OF SECTION 07210
SECTION 07900

JOINT SEALANTS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Joints between dissimilar materials.
   2. Door, window and louver frames.
   3. Acoustical joint sealants.

B. Related Sections:
   1. Section 04200 – Unit Masonry
   2. Section 08100 – Metal Doors and Frames.
   4. Divisions 15 and 16.

1.02 ACTION SUBMITTALS

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

B. Product Data: For sealants and sealant primers used inside the weatherproofing system, documentation including printed statement of VOC content.

1.03 QUALITY ASSURANCE

A. Applicator Qualifications: Application shall be done by a Joint Sealant Subcontractor with five years experience. Submit documentation to the Architect and Owner.

B. Manufacturer Technical Assistance: Materials shall be supplied by manufacturer who will provide qualified technical assistance at the project site.

1.04 WARRANTY

A. Submit 2 copies of written 2-year warranty agreeing to repair or replace joint sealers which fail to perform as airtight and watertight joints; or fail in joint adhesion, cohesion, abrasion resistance, weather resistance, extrusion resistance, migration resistance, stain resistance, or general durability; or appear to deteriorate in any other manner not clearly specified by submitted manufacturer's data as an inherent quality of the material for the exposure indicated.
PART 2 - PRODUCTS

2.01 MANUFACTURERS

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

1. Tremco Manufacturing.
2. Dow Corning.
4. Pecora Corporation.
5. Mameco International.
7. Sonneborn Building Products.

2.02 MATERIALS, GENERAL

A. Low-Emitting Interior Sealants: Sealants and sealant primers used inside the weatherproofing system shall meet or exceed the VOC limits of South Coast Air Quality Management District Rule #1168 and all sealants used as fillers must meet or exceed the requirements of the Bay Area Quality Management District Regulation 8, Rule 51.

B. Liquid-Applied Joint Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied joint sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.

C. Stain-Test-Response Characteristics: Where sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.

2.03 SEALANTS

A. One-Component Acrylic Sealant:

1. Acrylic emulsion sealant, one-part, mildew resistant and paintable, complying with ASTM C834, recommended by manufacturer for general use as an exposed building construction sealant, Pecora AC-20 or approved substitute.

2.04 ACOUSTICAL JOINT SEALANTS

A. 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.
2.05 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.01 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions.

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.

3.02 INSTALLATION

A. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

B. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

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.

C. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

D. 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.

E. Acoustical Sealant Installation: Comply with ASTM C 919 and with manufacturer's written recommendations.

F. 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.

END OF SECTION 07900
SECTION 08710
DOOR HARDWARE

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes: Items known commercially as finish hardware or builders hardware, required for swinging doors.

B. Related Sections:

1. Section 08100 – Metal Doors and Frames.
2. Section 08210 – Wood Doors.

1.02 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Door Hardware Schedule: Prepared by or under the supervision of Installer, detailing fabrication and assembly of door hardware, as well as installation procedures and diagrams. Coordinate final door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

1.03 QUALITY ASSURANCE

A. Supplier Qualifications:

1. Recognized builders hardware supplier, with warehousing facilities, who has been furnishing hardware in the Denver-Metro area for a period of not less than 3 years.

2. Employs an experienced AHC certified hardware consultant, available for consultation during the course of the work.

B. Fire-Rated Door Assemblies: Where fire-rated door assemblies are indicated, provide door hardware rated for use in assemblies 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, unless otherwise indicated.

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

D. Accessibility Requirements: For door hardware on doors in an accessible route, comply with ICC/ANSI A117.1 and Uniform Federal Accessibility Standards.

1. Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf.

2. Comply with the following maximum opening-force requirements:
a. Interior, Non-Fire-Rated Hinged Doors: 5 lbf applied perpendicular to door.
b. Fire Doors: Minimum opening force allowable by authorities having jurisdiction.

3. Bevel raised thresholds with a slope of not more than 1:2. Provide thresholds not more than 1/2 inch high.
4. Adjust door closer sweep periods so that, from an 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 leading edge of the door.

1.04 WARRANTY
A. Mechanical failure on door closers for 5 years.
B. Blanket coverage on locksets for 5 years.
C. Failure on parts of all hardware except door closures for 2 years.

PART 2 - PRODUCTS

2.01 MECHANICAL LOCKS AND LATCHES
A. Mortise Locks: BHMA A156.13; Operational Grade 1; stamped steel case with steel or brass parts; Series 1000.
B. Products: Match existing key system.
C. Supply all locks with construction cylinders to secure the building until replaced by Owner with "Medeco" cylinders at job completion. All locks must accommodate "Medeco" cylinders.
D. Lock Throw: 3/4" minimum throw of latch and 1" minimum throw of deadbolt.
E. Trim: Cast lever and cast escutcheon, Schlage Lock Co. #03L (no substitutions).
F. Finish: Match finish of existing hardware in adjacent areas.

2.02 DOOR CLOSERS
A. Surface Closers: BHMA A156.4; rack-and-pinion hydraulic type with adjustable sweep and latch speeds controlled by key-operated valves and forged-steel main arm. Comply with manufacturer's written recommendations for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force.
B. Manufacturer: LCN (no substitutions).
   1. Closer Series is 4040 or 4041, may be used with "CUSH" arm if required.
      a. Provide EDA arm (Extra Duty Arm) on parallel arm applications.
b. Provide "CUSH" arm where required.

2. Through bolted on all doors unless otherwise directed by Owner.
4. Interior Doors: Delayed action and conform to UFAS requirements.

C. Size of Units: Adjust closers to comply with the manufacturer's recommendations for size of door control unit, depending upon size of door, exposure to weather, wind conditions, and anticipated frequency of use.

D. Location: Provide for operable door only.

2.03 DOOR TRIM, STOPS AND HOLDERS

A. Manufacturers:
   1. Hager
   2. Trimco
   3. Rockwood
   4. Quality
   5. Master Manufacturers, Inc.
   6. Glynn-Johnson
   7. Approved substitute.

B. Door Stops: BHMA A156.16.
   1. Locate in position to permit maximum door swing but not to present a hazard or obstruction.

C. Push/Pull Units and Kick Plates: BHMA A156.6.
   1. Manufacturer's standard exposed fasteners.
   2. Through-bolted push/pull units for matched pairs, but not for single units.
   3. Trim Plates: .050" in thickness.
   4. Protection Plates (armor, kick, or mop): Minimum 2" less than door width on stop side and minimum 1/2" less than door width on pull side.
   5. Wheelchair Entries: Kickplates shall be a minimum 12" high.

D. Thresholds: BHMA A156.21.
   1. Height and slope shall conform to ANSI A117.1 and UFAS requirements.

2.04 DOOR GASKETING

A. Standard: BHMA A156.22

B. General: Provide smoke, light, and sound Gasketing on interior doors where indicated, scheduled or required.
   1. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
   2. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.
3. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.

C. Air Leakage: Not to exceed 0.50 cfm per foot of crack length for Gasketing other than for smoke control, as tested according to ASTM E 283.

D. Sound Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound rating of 30, based on testing according to ASTM E1408. Provide evidence that this STC, can be maintained under industry allowable tolerances for warp (AWI) and plumb (SDI).


F. Meeting Stile Gasketing: Provide a self-adhesive seal at the meeting stiles where an astragal is not permitted due to the operation of hardware or by code restrictions.

G. Door Bottoms: Provide fully adjustable cap sweep door bottom for interior doors where designated. Where an undercut is required for HVAC design, provide product that allows air to pass but still blocks light and offers sound attenuation.

H. Available Manufacturers:
   1. Door and Hardware Systems, Inc. (DHS)
   2. Hager Companies (HAG).

2.05 DOOR STRIP UNITS

A. Manufacturers:
   1. Pemko.
   2. Reese.
   4. Master Manufacturers, Inc.
   5. National Guard.
   6. Approved substitute.

B. Continuous Weatherstripping:
   1. At each edge of every exterior door leaf.
   2. At each edge of computer room doors.

C. Smoke Seal Applications: As required to meet all applicable codes.
   1. Provide National Guard No. 2525 or approved substitute.

2.06 FINISHES

A. Match the finish of the locksets.

B. Closers: Paint to match locksets.

C. Thresholds and Weatherstrip Housing: Aluminum with natural aluminum finish.
D. Coordinate all the various manufactured items furnished on this work to ensure an acceptable uniform finish.

2.07 KEYING
A. Final cylinders and keying shall be "Medeco" purchased by the Owner and installed by the Contractor.

2.08 FABRICATION
A. Fasteners: Provide door hardware manufactured to comply with published templates prepared for machine, wood, and sheet metal screws. Provide screws that comply with commercially recognized industry standards for application intended, except aluminum fasteners are not permitted. Provide Phillips flat-head screws with finished heads to match surface of door hardware, unless otherwise indicated.

2.09 FINISHES
A. Provide finishes complying with BHMA A156.18 as indicated in door hardware schedule.
B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 - EXECUTION

3.01 INSTALLATION
A. Steel Doors and Frames: For surface applied door hardware, drill and tap doors and frames according to ANSI/SDI A250.6.
B. Wood Doors: Comply with DHI WDHS.5 "Recommended Hardware Reinforcement Locations for Mineral Core Wood Flush Doors."
C. Mounting Heights: Mount door hardware units at heights to comply with the following unless otherwise indicated or required to comply with governing regulations.
   2. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
D. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work. Do not install surface-mounted items until finishes have been completed on substrates involved.
   1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.

E. Thresholds: Set thresholds for exterior doors and other doors indicated in full bed of sealant complying with requirements specified in Section 079200 "Joint Sealants."

F. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they will impede traffic.

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

H. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.

I. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.

J. Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

3.02 DOOR HARDWARE SCHEDULE

Door Hardware Set No. 1
Locations: 123B, C123C

<table>
<thead>
<tr>
<th>Qty.</th>
<th>Item</th>
<th>Manufacturer</th>
<th>Product</th>
<th>Finish</th>
</tr>
</thead>
<tbody>
<tr>
<td>-</td>
<td>Hinges</td>
<td>Use existing</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1</td>
<td>Lockset</td>
<td>Schlage</td>
<td>L9070 F05</td>
<td>Match Ext’g</td>
</tr>
<tr>
<td>1</td>
<td>Frame Seal Gasket</td>
<td>DHS</td>
<td>105, 105-3HJ</td>
<td>Dark Brown</td>
</tr>
<tr>
<td>1</td>
<td>Door Bottom</td>
<td>DHS</td>
<td>CS</td>
<td>Dark Brown</td>
</tr>
<tr>
<td>1</td>
<td>Wall Stop</td>
<td>Hager</td>
<td>230W</td>
<td>Match Ext’g</td>
</tr>
</tbody>
</table>

Door Hardware Set No. 2
Locations: 123A

<table>
<thead>
<tr>
<th>Qty.</th>
<th>Item</th>
<th>Manufacturer</th>
<th>Product</th>
<th>Finish</th>
</tr>
</thead>
<tbody>
<tr>
<td>-</td>
<td>Hinges</td>
<td>Use Existing</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1</td>
<td>Lockset</td>
<td>Schlage</td>
<td>L9070 F05</td>
<td>Match Ext’g</td>
</tr>
<tr>
<td>1</td>
<td>Closer</td>
<td>LCN</td>
<td>4040</td>
<td>Match Ext’g</td>
</tr>
<tr>
<td>1</td>
<td>Frame Seal Gasket</td>
<td>DHS</td>
<td>105, 105-3HJ</td>
<td>Dark Brown</td>
</tr>
<tr>
<td>1</td>
<td>Door Bottom</td>
<td>DHS</td>
<td>CS</td>
<td>Dark Brown</td>
</tr>
<tr>
<td>1</td>
<td>Floor Stop</td>
<td>Hager</td>
<td>242F</td>
<td>Match Ext’g</td>
</tr>
</tbody>
</table>

Door Hardware Set No. 3
Locations: C127

<table>
<thead>
<tr>
<th>Qty.</th>
<th>Item</th>
<th>Manufacturer</th>
<th>Product</th>
<th>Finish</th>
</tr>
</thead>
<tbody>
<tr>
<td>-</td>
<td>Hinges</td>
<td>Use Existing</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>-</td>
<td>Flushbolts</td>
<td>Use Existing</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1</td>
<td>Lockset</td>
<td>Schlage</td>
<td>L9070 F05</td>
<td>Match Ext’g</td>
</tr>
<tr>
<td>1</td>
<td>Closer</td>
<td>LCN</td>
<td>4040</td>
<td>Match Ext’g</td>
</tr>
<tr>
<td>Qty</td>
<td>Item</td>
<td>Manufacturer</td>
<td>Product</td>
<td>Finish</td>
</tr>
<tr>
<td>-----</td>
<td>-----------------------</td>
<td>--------------</td>
<td>---------------------</td>
<td>------------</td>
</tr>
<tr>
<td>1</td>
<td>Frame Seal Gasket</td>
<td>DHS</td>
<td>105, 105-3HJ</td>
<td>Dark Brown</td>
</tr>
<tr>
<td>1</td>
<td>Door Bottom</td>
<td>DHS</td>
<td>CS</td>
<td>Dark Brown</td>
</tr>
<tr>
<td>1</td>
<td>Door Stops</td>
<td>Use Existing</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Door Hardware Set No. 4
Locations: C123

<table>
<thead>
<tr>
<th>Qty</th>
<th>Item</th>
<th>Manufacturer</th>
<th>Product</th>
<th>Finish</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Frame Seal Gasket</td>
<td>DHS</td>
<td>105, 105-3HJ</td>
<td>Dark Brown</td>
</tr>
<tr>
<td>1</td>
<td>Door Bottom</td>
<td>DHS</td>
<td>CS</td>
<td>Dark Brown</td>
</tr>
<tr>
<td>1</td>
<td>Door Stops</td>
<td>Use Existing</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Door Hardware Set No. ADD ALT #1
Locations: C123, C127

<table>
<thead>
<tr>
<th>Qty</th>
<th>Item</th>
<th>Manufacturer</th>
<th>Product</th>
<th>Finish</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>Hinges</td>
<td>Hager</td>
<td>BB1279</td>
<td>Match Ext’g</td>
</tr>
<tr>
<td>1</td>
<td>Lockset</td>
<td>Schlage</td>
<td>L9070 F05</td>
<td>Match Ext’g</td>
</tr>
<tr>
<td>2</td>
<td>Flushbolt</td>
<td>Hager</td>
<td>281D</td>
<td>Match Ext’g</td>
</tr>
<tr>
<td>1</td>
<td>Closer</td>
<td>LCN</td>
<td>4040</td>
<td>Match Ext’g</td>
</tr>
<tr>
<td>1</td>
<td>Frame Seal Gasket</td>
<td>DHS</td>
<td>105, 105-3HJ</td>
<td>Dark Brown</td>
</tr>
<tr>
<td>1</td>
<td>Door Bottom</td>
<td>DHS</td>
<td>CS</td>
<td>Dark Brown</td>
</tr>
<tr>
<td>1</td>
<td>Floor Stops</td>
<td>Hager</td>
<td>242F</td>
<td>Match Ext’g</td>
</tr>
</tbody>
</table>

END OF SECTION 08710
SECTON 09260
GYPSUM BOARD SYSTEMS

PART 1 - GENERAL

1.01 SUMMARY
A. Section Includes:
   1. Metal framing required for gypsum board.
   2. Interior gypsum board.
   3. Acoustical insulation.
B. Related Sections:
   1. Section 07210 – Building Insulation for safing insulation.
   2. Section 07900 – Joint Sealers for acoustic sealant.

1.02 ACTION SUBMITTALS
A. Product Data: For each type of product. Certify that products furnished for this project are asbestos free. For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content.
B. Product Certificates: For products and materials required to comply with requirements for regional materials, certificates indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating distance to Project, cost for each regional material, and fraction by weight that is considered regional.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS
A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.
B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.
C. Low Emitting Materials: For ceiling and wall assemblies, provide materials and construction identical to those tested in assembly and complying 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."
2.02 FRAMING SYSTEMS

A. Steel Studs and Runners: ASTM C 645. Use either steel studs and runners or dimpled steel studs and runners of equivalent minimum base-metal thickness.

1. Minimum Base-Metal Thickness: 0.018 inch.
2. Depth: As indicated on Drawings.
3. Use 20 gage at door jambs. Use double studs at door jambs.
4. Space all studs 16-inches o.c. maximum, unless specifically approved otherwise.

2.03 GYPSUM BOARD

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

1. Georgia-Pacific Gypsum LLC.
2. Domtar Gypsum.
4. USG Corporation.

B. Gypsum Board, Type X: ASTM C 1396/C 1396M.

1. Thickness: 5/8 inch.
2. Long Edges: Tapered.

2.04 TRIM ACCESSORIES

A. Interior Trim: ASTM C 1047.

1. Material: Galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized steel sheet.

2.05 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C 475/C 475M.

B. Joint Tape: 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.

2.06 AUXILIARY MATERIALS

A. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.

B. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing), Class 25 flame-spread. Provide 1½ inch mineral fiber 3.0 lb. density or full thickness of 1.0 density glass fiber.
PART 3 - EXECUTION

3.01 INSTALLATION, GENERAL

A. Installation Standard: ASTM C 754. Also comply with requirements in ASTM C 840 that apply to framing installation.

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.

3.02 INSTALLING FRAMED ASSEMBLIES

A. Install framing system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.

B. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.

C. Install studs so flanges within framing system point in same direction.

D. Install tracks (runners) at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings, except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts penetrating 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 runner track section (for cripple studs) at head and secure to jamb studs.

   a. Install two studs at each jamb unless otherwise indicated.
   b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch clearance from jamb stud to allow for installation of control joint in finished assembly.
   c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.

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.

5. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.
E. 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.

3.03 APPLYING AND FINISHING PANELS

A. Comply with ASTM C 840.

B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.

C. Install 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.

D. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.

E. Gypsum Board Finish Levels: Finish panels to levels indicated below, according to ASTM C 840, for locations indicated:

1. Level 1: Embed tape at joints in ceiling plenum areas, concealed areas, and where indicated for fire-resistance-rated assemblies and sound-rated assemblies.
2. Level 2: Embed tape and apply separate first coat of joint compound to tape, fasteners, and trim flanges where panels are substrate for thin set ceramic tile, acoustical tile, and where indicated.
3. Level 3: Embed tape and apply separate first and fill coats of joint compound to tape, fasteners, and trim flanges. Level 3 is suitable for surfaces receiving medium or heavy textured finishes before painting of wall covering in conditions where lighting conditions are not critical.
4. Level 4: Embed tape and apply separate first, fill, and finish coats of joint compound to tape, fasteners, and trim flanges. Level 4 is suitable for surfaces receiving light-textures finish, wall coverings, and flat paints. It is generally the standard exposed finish.

F. Protect adjacent surfaces from drywall compound and texture finishes and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.

G. Remove and replace panels that are wet, moisture damaged, and mold damaged.

END OF SECTION 09260
SECTION 09510
ACOUSTICAL CEILINGS

PART 1 - GENERAL

1.01 SUMMARY
A. Section includes acoustical panels and exposed suspension systems for ceilings.

1.02 ACTION SUBMITTALS
A. Product Data: For each type of product.
B. Samples: For each exposed product and for each color and texture specified.

1.03 INFORMATIONAL SUBMITTALS
A. Certification Requirements:
   1. Certify that products furnished for this project are asbestos free.
   2. Certify that products meet or exceed specification requirements.

1.04 CLOSEOUT SUBMITTALS
A. Maintenance data.
   1. Submit instructions for proper maintenance and cleaning.
   2. Provide instructions for refinishing.
   3. Provide recommendations on precautions against materials and methods which may be detrimental to finishes and acoustical performance.

1.05 QUALITY ASSURANCE
A. Manufacturer: Company specializing in the manufacture of acoustical ceiling tile and panels with three years minimum experience.
B. Installer: Company with three years minimum experience and approved by manufacturer of acoustical units.
C. Terminology and Performance: Applicable publications by the Ceilings and Interior Systems Contractors' Association (CISCA), including former Acoustical Materials Association Standards issued by CISCA.
E. Fire Hazard Classification: UL tested, listed and labeled as "Class O-25", smoke developed of 50 or less per ASTM E84.

1.06 MAINTENANCE MATERIALS

A. At time of completing the installation, deliver stock of maintenance materials to the Owner. Furnish full size units matching the units installed, packaged with protective covering for storage, and identified with appropriate labels.

B. Acoustical Units: Furnish an amount equal to 2.0% of the amount installed of each type, pattern, color, but not less than 10 units. Do not use for replacement of damaged units prior to building occupancy or substantial completion whichever occurs later.

PART 2 - PRODUCTS

2.01 ACOUSTICAL PANEL CEILINGS, GENERAL

A. Low-Emitting Materials: Acoustical panel ceilings 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."

B. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content 33-54 percent.

C. Acoustical Panel Standard: Comply with ASTM E 1264.

D. Metal Suspension System Standard: Comply with ASTM C 635.

2.02 ACOUSTICAL PANELS

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. Armstrong World Industries, Inc.
2. CertainTeed Corp.
3. USG Interiors, Inc.; Subsidiary of USG Corporation.

B. Classification: Type III, Form 2.

C. Color: White.

D. Edge/Joint Detail: Square.

E. Thickness: 3/4 inch.

F. Modular Size: 24 by 48 inches.
2.03 METAL SUSPENSION SYSTEM

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. Armstrong World Industries, Inc.
2. CertainTeed Corp.
3. USG Interiors, Inc.; Subsidiary of USG Corporation.

B. 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.

2. Face Design: Flat, flush.

C. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that comply with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension-system runners.

PART 3 - EXECUTION

3.01 INSTALLATION

A. 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. 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.

END OF SECTION 09510
SECTION 09650
RESILIENT FLOORING

PART 1 - GENERAL

1.01 SUMMARY
   A. Section Includes: Vinyl composition floor tile and resilient base.

1.02 ACTION SUBMITTALS
   A. Product Data: For each type of product indicated.
   B. Product Data for adhesives: Documentation including printed statement of VOC content.
   C. Certification Requirements: Certify that products furnished for this project are asbestos free.
   D. Samples: Full-size units of each color and pattern of floor tile required.

1.03 CLOSEOUT SUBMITTALS
   A. Maintenance data.

1.04 QUALITY ASSURANCE
   A. Installer Qualifications: Minimum 3 years experience installing resilient floor covering material.
   B. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.
      1. Flame Spread: 75 or less per ASTM E84.
      2. Smoke Density: 450 or less per ASTM E662.
      3. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

1.05 PROJECT CONDITIONS
   A. Maintain ambient temperatures within range recommended by manufacturer in spaces to receive floor tile.
   B. Close spaces to traffic during floor tile installation.
   C. Close spaces to traffic for 48 hours after floor tile installation.
   D. Install floor tile after other finishing operations, including painting, have been completed.
1.06 MAINTENANCE

A. Furnish extra materials at the rate of 2% of total square footage installed, but not less than one carton for each color and pattern of flooring.

B. Furnish materials at the rate of 120 lineal feet (one carton) for each color and type of base installed.

C. Maintenance materials must be from the same manufactured lot as materials installed.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

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

1. Vinyl Composition Tile:
   a. Armstrong World Industries, Inc.
   b. Tarkett, Inc.
   c. Kentile Floors, Inc.
   d. Azrock Industries, Inc.

2. Resilient Base:
   a. Flexco Company.
   b. Johnsonite
   c. Burke
   d. Roppe Corporation

2.02 TILE MATERIAL

A. Tile Standard: ASTM F 1066, Composition 1 (asbestos free).

1. Size: 12 by 12 inches.
2. Colors and Patterns: As selected by Owner from full range of industry colors.

2.03 BASE

A. Resilient Base Standard: ASTM F 1861 and FS SS-W-40A, Type I.

1. Style: Provide straight base without cove for carpet and topset style with coved base for all other locations.
2. Minimum Thickness: 0.125 inch.
3. Height: 4 inches.
4. Lengths: Coils in manufacturer's standard length.
5. Outside Corners: Preformed.
7. Colors and Patterns: As selected by Owner from full range of industry colors.
2.04 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by manufacturer to suit floor tile and substrate conditions indicated.

1. Adhesives shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24): VCT and Asphalt Tile Adhesives: Not more than 50 g/L.

PART 3 - EXECUTION

3.01 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 and remove bumps and ridges to produce a uniform and smooth substrate.

C. Do not install floor tiles until they are same temperature as space where they are to be installed.

D. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

3.02 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.

C. 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.

D. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.

3.03 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protection of floor tile. Cover floor tile until Substantial Completion.

END OF SECTION 09650
SECTION 09900

PAINTING

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes surface preparation and the application of paint systems on interior substrates.

1.02 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions. For paints and coatings, including printed statement of VOC content.

B. Samples: For each type of paint system and in each color and gloss of topcoat. Submit 3 sets of samples with scheduled color product type, color formula and texture to simulate actual conditions on 12" x 12" hardboard for Architect and UCB Project Manager review.

C. At beginning of project, provide a complete summary list of specific manufacturer's products, color identification numbers, manufacturer technical data sheets and MSDS Sheets that will be applied in this project. List shall compare each color number with each specified or selected color number. A copy of this list shall be given to the appropriate UCB Project Manager, and Structural Analyst in Work Management Group.

1.03 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. Leave on premises, where directed by the UCB Project Manager, not less than 1 gallon of each standard color and 1 gallon of each accent color.

2. All material shall be in 1 gallon containers, tightly sealed and clearly marked with manufactures name, color number or formula, base number and sheen.

1.04 QUALITY ASSURANCE

A. Conform to Painting and Decorating Contractors of America "Architectural Specification Manual".

B. All materials shall be applied free from runs, sags, wrinkles, streaks, shiners and brush marks. All materials shall be applied uniformly. If any reduction of the coating’s viscosity is necessary, it shall be done in accordance with the manufacturer’s label directions.
C. Adequate ventilation shall be maintained at all time to control excessive humidity which will adversely affect the curing of coatings. The Contractor is solely responsible for maintaining suitable temperature and ventilation.

D. Enamel and varnish undercoats are to be sanded smooth prior to the recoating. Tops and bottoms of doors are to be finished in the same manner as door facing, after the carpenters complete fitting of them.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Subject to compliance with requirements, manufacturer’s offering products that may be incorporated into the Work include:

1. Benjamin Moore & Company
2. Diamond Vogel
3. The Glidden Company
4. Kelly Moore
5. KWAL-Howells, Inc.
6. PPG Industries
7. Sherwin-Williams Company
8. ICI

B. Substitutions must be pre-approved by UCB project manager and UCB paint shop. Any proposed substitution must be available in the Boulder Metro area.

2.02 PAINT, GENERAL

A. MPI Standards: Provide products that comply with MPI standards indicated and that are listed in its "MPI Approved Products List."

B. Material Compatibility:

1. Provide materials for use within each paint system that are 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, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

C. VOC Content: Products shall comply with VOC limits of authorities having jurisdiction and, for interior paints and coatings applied at Project site, the following VOC limits, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

1. Flat Paints and Coatings: 50 g/L.
2. Nonflat Paints and Coatings: 150 g/L.
3. Primers, Sealers, and Undercoaters: 200 g/L.
4. Clear Wood Finishes, Varnishes: VOC not more than 350 g/L.
5. Shellacs, Clear: VOC not more than 730 g/L.
6. Stains: VOC not more than 250 g/L.
D. Colors:
   1. PT -1: “SHERWIN-WILLIAMS #6244 NAVAL, FLAT SHEEN.” Verify w/ owner prior
to selection.
   2. PT -2: White - Contact UCB Facilities Planning for Campus Standard Colors.

E. Waterborne or latex acrylic coatings shall be used unless prior approval for substitution is
obtained.

F. Material Safety data sheets and technical product data sheets must be included with O&M
Manuals for all products used.

2.03 VOLUME SOLID CONTENTS

A. When applied at a rate of 400SF per gallon-obtaining a MIL thickness when dry of a
minimum of 1.3 MILS, the minimum acceptable Volume Solid Content must be A (see list
below) minimum and angular specular sheen should be B (see list below).

<table>
<thead>
<tr>
<th>Finish</th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flat finish</td>
<td>38%</td>
<td>0-5 @ 60°</td>
</tr>
<tr>
<td>Eggshell or Satin finish</td>
<td>36%</td>
<td>16-32 @ 60°</td>
</tr>
<tr>
<td>Semi-Gloss finish</td>
<td>34%</td>
<td>30-60 @ 60°</td>
</tr>
<tr>
<td>Gloss finish</td>
<td>34%</td>
<td>60-80 @ 60°</td>
</tr>
</tbody>
</table>

PART 3 - EXECUTION

3.01 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. Verify suitability of substrates, including surface conditions and compatibility with existing
finishes and primers.

C. Proceed with coating application only after unsatisfactory conditions have been corrected.

1. Application of coating indicates acceptance of surfaces and conditions.

3.02 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural
Painting Specification Manual" and "MPI Maintenance Repainting Manual" applicable to
substrates 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.

3.03 APPLICATION

A. Apply paints according to manufacturer's written instructions and to recommendations in "MPI Manual."

B. 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.

3.04 CLEANING AND PROTECTION

A. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refurnishing, as approved by Architect, and leave in an undamaged condition.

B. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.05 INTERIOR PAINTING SCHEDULE

A. For all paint finishes:

1. New surfaces shall have 1 primer coat and 2 finish coats.
2. Existing surfaces shall have minimum 2 finish coats.
3. If sprayed, all walls must be backed rolled on final coat.
4. All walls must be painted with a paint that meets CU sheen standards for the 16-32 measurement at 60 degrees, and volume solids ratings.

B. All trim is to be painted with semi-gloss paint that meets CU sheen and volume solids ratings.

C. Patch painting is not acceptable, total affected area shall be painted. Terminate painting only at corners or joints.

END OF SECTION 09900
SECTION 15010
MECHANICAL GENERAL PROVISIONS

PART 1 - GENERAL

1.01 RELATED SECTIONS
A. The General Conditions of the Contract, Supplementary Conditions, and General Requirements are a part of and apply to this Section. Consult them for additional conditions and requirements.

1.02 SUMMARY
A. The General Conditions of the Contract, Supplementary Conditions, and General Requirements.
B. Section includes General Provisions applicable to Division 15 Mechanical.
   1. Provide all labor, equipment, and material necessary to complete the work as specified and as shown on the drawings.
   2. Provide supervision, coordination, tools, and accessories and appurtenances necessary or required to perform and accomplish the work.

1.03 SUBMITTALS
A. Submit shop drawings, product data, and samples in accordance with Section 01300 - Submittals.
B. The following provisions also apply:
   1. Submittals will be reviewed by the Engineer only for the purpose of determining that the materials, equipment, and installation methods are in accordance with the project design concepts. The Contractor shall be responsible for space requirements, quantities, configurations, performance, bases, supports, structural members and openings in structure, and other apparatus that may be affected by the material, equipment, or installation.
   2. Include current, published catalog and specification sheets pertaining to proposed material and equipment.
   3. Identify each item with identification symbols identical to those used on the drawings and/or in the specifications.
   4. Where submittals indicate work that is at variance with the requirements of the drawings or specifications, the Contractor shall note the discrepancy and advise the Engineer of it. Work that is at variance, with the requirements of the drawings and specifications and which has not been so noted and accepted by the Engineer, shall be replaced by the Contractor at no cost to the Owner.
   5. The Contractor shall pay the Engineer at their standard hourly rate for review of submittals that need to be reviewed in excess of three times.
   6. Submit data for items as indicated in each Section.
   7. Drawings and specifications govern the work. Submittals shall not be construed as authorizing or requesting changes to the work. Where submittals indicate work that is at variance with the requirements of the drawings or specification, the Contractor shall
advise the Engineer of the discrepancy. Work that is a variance with the requirements of the drawings and specifications shall be replaced by the Contractor at no cost to the Owner.

1.04 QUALITY ASSURANCE

A. Chemical and physical properties, design, and performance characteristics of all material and equipment, and methods of construction shall be in accordance with the following applicable codes, regulations, and standards. Current editions in effect 30 days prior to receipt of bids will apply.

1. Air Movement and Control Association, Inc. (AMCA)
2. American National Standards Institute (ANSI)
3. American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE)
4. American Society of Mechanical Engineers (ASME)
5. American Standard Code for Pressure Piping (ASCPP)
7. American Water Works Association (AWWA)
8. Compressed Gas Association (CGA)
9. Environmental Protection Agency (EPA)
10. Factory Mutual Laboratories (FM)
11. Manufacturer's Standards Institute (MSI)
12. National Certified Pipe Welding Bureau (NCPWB)
13. National Electrical Code (NEC)
14. National Electrical Manufacturer's Association (NEMA)
15. National Fire Protection Association (NFPA)
16. Sheet Metal and Air Conditioning Contractor's National Association (SMACNA)
17. State of Colorado Energy Conservation Standards
18. Underwriters' Laboratories, Inc. (UL)
20. International Mechanical Code (IMC)
21. International Plumbing Code (IPC)

A. Comply with applicable UCB, state, and federal codes, rules, and regulations. As a minimum requirement, codes, rules and regulations take precedence over the drawings and specifications. Where the requirements of the drawings and specifications exceed those of applicable codes, rules and regulations, the drawings and specifications shall govern.

1.05 PRODUCTS

A. Material and equipment shall be new and free from defects.

B. Install all material and equipment in accordance with the manufacturer's current published recommendations.

C. Certain materials and equipment are specified by manufacturer and model or catalog number. Such specified items are the basis of design and establish a degree of quality, performance, and physical configuration. The Contractor shall be responsible for the quality, performance, and physical configuration of the work should he use products of a listed acceptable manufacturer in lieu of the specific product upon which the design is based.

1.06 SUBSTITUTIONS

A. Equipment and materials manufactured by any one of the manufacturers listed on the drawings or in the specifications will be acceptable, provided it meets the specified requirements.
B. Where no manufacturer is listed, provide a standard product meeting the requirements of the drawings and specifications, and manufactured by a firm regularly engaged in the manufacture of such products.

C. Requests prior to bid for approval of equipment or material not specified will be considered for this project. Requests must be received seven days prior to bid date.

1.07 DELIVERY AND STORAGE OF EQUIPMENT AND MATERIAL
A. Make provisions for delivery and safe storage of equipment and materials.

B. Make arrangements for the introduction into the building of equipment too large to pass through finished openings and spaces.

1.08 PROTECTION
A. Protect all equipment, material, and completed work from damage. Repair or replace damaged items as necessary to establish conformance with requirements of the drawings and specifications.

B. Protect equipment, material, and completed work until acceptance by Owner.

C. Close open ends of work, and stored equipment and materials with temporary covers or plugs to prevent entry of foreign objects, dirt, water, or debris.

1.09 GUARANTEE
A. Guarantee all equipment, materials, workmanship, and proper operation of equipment and apparatus for a period of one year from date of final acceptance.

B. Repair or replace at no cost to the Owner work which is judged defective by the Engineer or Owner during the guarantee period.

1.10 DEFINITIONS
A. Provide: Furnish and install complete and ready for use.

B. Contractor: Any Contractor performing work under Division 15 of the specifications.

C. Mechanical: Applies to all work specified in Division 15 of the specifications.

D. Shall, secure or other performance terms: Work shall be performed by the Mechanical Contractor.

1.11 DRAWINGS AND SPECIFICATIONS
A. Mechanical drawings are diagrammatic in character and do not indicate every required offset, valve, fitting, accessory, or appurtenance.

B. Review and consider all drawings and specifications relating to this project in preparation of bid.

C. Drawings and specifications are complementary. Whatever is required by either the drawings or specifications shall be provided.

D. Refer discrepancies between and within the drawings and specifications to the Engineer for resolution. In general, the more stringent requirements will take precedence.
E. Do not scale drawings.

1.12 WORKMANSHIP

A. Workmanship shall conform to the highest industry standard for each specific type of work.
B. Perform work in accordance with standard commercial practices.
C. All plumbing work to be performed under the direct supervision of licensed journeyman plumbers (4-year), with an on site ratio of not more than two apprentices per journeyman. The requirement also applies to licensed pipe fitters.

1.13 EXAMINATION OF SITE

A. Visit site and ascertain existing conditions prior to submitting bid. Include in bid all considerations necessary to accomplish the work under the existing conditions.
B. Additional charges will not be authorized due to the Contractor's failure to become familiar with the existing conditions.

1.14 PERMITS AND INSPECTIONS

A. Secure and pay for all required permits and licenses.
B. Pay all applicable royalties, inspection fees, and taxes.
C. File necessary plans, prepare necessary documents, and obtain necessary approvals from the Authorities Having Jurisdiction.
D. Upon completion of the work, furnish to the Owner and Engineer a certificate of inspection and final approval from each authority having jurisdiction for inspection and approval of the work.

1.15 RESPONSIBILITY OF CONTRACTOR

A. The Contractor is responsible for the complete installation and satisfactory operation of all work in accordance with requirements of the drawings and specifications.
B. Include in bid all incidental, accessory, and appurtenant items required or necessary, even though not specified or indicated, to provide complete operating systems.
C. The component parts of the installation shall function together as workable systems. Each system shall be left with all parts adjusted and in proper working order.

1.16 OPERATION AND MAINTENANCE MANUAL

A. Furnish operation and maintenance manuals for equipment and systems installed under Division 15 of the specifications, in accordance with Division 1 and the following.
B. Submit one copy of the manual to the Engineer for preliminary review prior to production of the final manuals. The engineer will share this copy with the University Engineer for his/her review.
C. Following review of the preliminary manual by the Engineer prepare and submit the number of final copies of the manual stated in Division 1, complying with the Engineer's comments noted on the preliminary manual.
D. In addition, the O&M manual(s) shall be submitted electronically, in a CD or DVD.
E. Bind information into 8-1/2-inch by 11-inch loose leaf, three-ring or post binders having hard plastic covers.

1. Provide typed indexes to identify each item of equipment and each system.
2. Provide table of contents for each binder.

F. Include the following information:

1. Alphabetical list of all system components with the name, address, and 24-hour phone number of the company responsible for servicing each item during the first year of operation.

2. Manufacturer's data that are applicable to the installed equipment such as the following:
   a. Shop drawings (reviewed and accepted)
   b. Product and performance data (reviewed and accepted)
   c. Installation instructions
   d. Lubrication instructions
   e. Wiring and temperature control diagrams (reviewed and accepted Shop Drawings)
   f. Parts lists
   g. Copies of warranties
   h. Signed off commissioning checklists
   i. Start up information by factory representative
   j. On-site dynamic balancing report by independent balancing firms as required.

3. Emergency procedures for equipment operation during a fire or following the failure of major equipment. Procedures for normal starting/operating/shutdown and long-term shutdown.

4. Maintenance instruction including valves, valve tag, and other identified equipment lists, proper lubricants and lubricating instruction for each piece of equipment, and necessary cleaning, replacing, and adjusting schedules.

5. Assembly, installation, alignment, and adjustment instructions.

6. Valve tag list.

7. System balancing report.

8. Fire protection record drawings shall be submitted as a separate manual.

9. Temperature controls, cut sheets, and record drawings/prints. Provide one in Operation and Maintenance Manual and one in separate binder with only this information. Each manual shall have a CD of drawing files.

G. All equipment shall be identified and tagged as specified in Section 15190 - Mechanical Identification, and shall be keyed to the Operation and Maintenance Manual.

1.17 COORDINATION

A. Coordinate project in accordance with Division 1 and the following:

B. Examine each drawing and specification section. Report in writing to the Engineer all discrepancies within and between the documents. Additional cost made necessary by the Contractor's neglect or failure to report discrepancies shall be borne by the Contractor.

C. Coordinate the work of each Division 15 Section with all other specification sections. Schedule work to ensure that the various parts fit together in an orderly sequence.
D. Cooperate with each trade and assist in working out space allocations and minor construction details.

1. When necessary to ensure efficient use of space and orderly construction sequences, prepare composite coordination drawings. Prepare drawings at a scale of 1/4 inch equals 1 foot 0 inches or larger. Submit drawings to Engineer for review.

2. If Contractor installs work before coordinating with other trades and the work interferes with the work of other trades, the Contractor shall make necessary changes in his work to correct the condition. Additional charges will not be authorized because of the Contractor’s failure to coordinate the work.

1.18 SCAFFOLDING, RIGGING, AND HOISTING

A. Provide necessary services to deliver, erect, place, and install all equipment and apparatus furnished.

B. At completion of the work, all mechanical material and equipment furnished shall be inspected for damage.

1. Repair damaged factory finishes to match adjacent, undamaged areas.

2. Replace deformed metal cabinets, jackets, and enclosures with new items. Finish shall match similar undamaged items.

1.19 CLEAN UP

A. At completion of the work, check and thoroughly clean all equipment.

1. Clean coils and plenums.

2. Clean under, in, and around equipment.

3. Clean exposed surfaces of piping, ducts, and hangers.

4. Clean exposed surfaces of piping, ducts, and hangers.

5. Clean equipment cabinets and enclosures.

1.20 RECORD DRAWINGS

A. Maintain a complete set of blue-line prints of the project drawings and indicate in red ink all changes to the original information.

1. Include changes such as locations of equipment, system layout, and piping and duct sizes.

2. All drawings generated by the Contractor shall be 24" x 36" format. Include these and other drawings, such as temperature controls, as part of project record drawings. Submit reproducible Mylar drawings of all drawings produced by the Contractor.

1.21 EXISTING EQUIPMENT AND SYSTEMS

A. The layout of existing mechanical systems as shown on the drawings was prepared from information indicated on drawings which describe the existing conditions and from observations at the site. The information shown is the most accurate available at this time.

1. Contractor may visit site to determine the quantities and extend of existing equipment and systems that are indicated to be removed, abandoned, relocated or extended.
B. If sewer, water, gas, or other piping is encountered which interferes with the proper installation of new work, remove or relocate the items as directed by the Engineer.

C. Materials that are removed shall become the property of the Contractor and shall be removed from the site.

1.22 OPERATING INSTRUCTIONS

A. Upon completion of the work and prior to final acceptance, equipment and system suppliers shall instruct the Owner on the operation and maintenance of all equipment and systems.

1. Use the operation and maintenance manual as a guide for the instruction.

2. Provide a total of one 8-hour day of instruction. Advise the Owner of the time scheduled for the instruction period at least 7 days in advance.

3. Use the instruction period to demonstrate the proper operation of all equipment and systems.

PART 2 - PRODUCTS

Not used in this section.

PART 3 - EXECUTION

Not used in this section.

END OF SECTION 15010
SECTION 15050
BASIC MATERIALS AND METHODS

PART 1  - GENERAL

1.01 RELATED SECTIONS

A. The General Conditions of the Contract, Supplementary Conditions, and General Requirements are a part of and apply to this Section. Consult them for additional conditions and requirements.

1.02 SECTION INCLUDES

A. Basic materials and methods applicable to each Division 15 Section.

1.03 CONTENT SUMMARY

A. Cleaning and Flushing
B. Escutcheon Plates
C. Hangers and Supports
D. Instrument Connections
E. Pressure Gauges
F. Pressure and Temperature Plugs
G. Sleeves and Inserts
H. Strainers
I. Thermometers
J. Unions
K. Valves
L. Motors
M. Piping Installation Procedures
N. Piping System Tests
O. Supporting Steel
P. Welding
Q. Fire watch information

1.04 SUBMITTALS

A. Comply with Section 15010.

B. Product Data:

1. Motors
2. Pressure Gauges
3. Strainers
4. Thermometers
5. Valves

   a. Valve submittal shall indicate pressure rating (applies to all valves), and the applicable MSS standard.

1.05 QUALITY ASSURANCE

A. All plumbing piping and fixtures shall be installed under the direct supervision of licensed plumbers (4-year).

B. The ratio of apprentices to journeymen shall not exceed two-to-one for plumbers and pipefitters.
C. Welding shall be performed by ASME Certified Welders with current certificates in accordance with ANSI B31.1 for shop and project site welding of piping work.

PART 2 - PRODUCTS

2.01 HANGERS AND SUPPORTS

A. Hangers in contact with steel, iron, cast or ductile iron shall be plated.

B. Hangers in contact with copper piping shall be copper clad or have a suitable lining to prevent electrolysis.

C. For cold insulated pipe hangers shall be around the outside of the insulation. Thermal hanger inserts shall be used at these locations: high density, 100 psi, waterproofed calcium silicate encased in a 180 degree sheet metal shield with vapor barrier jacket. Calcium silicate shall be color coded indicating non-asbestos bearing composition.

D. Thermal hanger shields at inserts: galvanized sheet metal.

E. Acceptable Manufacturers:

1. Hangers and supports:
   a. B-line
   b. Grinnell
   c. Michigan
   d. P.H.D.
   e. Tolco

2. Thermal hanger shields:
   a. Pipe Shields, Inc.
   b. Insulshield
   c. Uni-Grip
   d. Value Engineered Products, Inc.

2.02 VALVES

A. Valves in each classification shall be the product of the same manufacturer, except as noted otherwise.

B. Acceptable Manufacturers:

1. Ball Valves: Bronze body, tunnel balls, comply with MSS-SP-110.
   a. Apollo Conbraco
   b. Dynaquip
   c. Hammond
   d. Jamesbury
   e. Jomar
   f. Milwaukee
   g. Nibco
   h. Watts
   i. Worcester

2. Butterfly Valves: MSS-SP-67
   a. Crane (Not allowed for steam service)
   b. DeZurik
c. Fisher (Not allowed for steam service)
d. Grinnell (Not allowed for steam service)
e. Hammond (Not allowed for steam service)
f. Jamesbury

g. Keystone

h. Milwaukee (Not allowed for steam service)
i. Milliken

j. Posi-Seal (Not allowed for steam service)
k. Victaulic (Not allowed for steam service)

3. Stop and Drain Valves
   a. Hammond
   b. Prier
   c. United Brass

4. Balancing Valves (See Hydronics Section)

C. Valves shall conform to the Manufacturers’ Standardization Society of the Valves and Fittings Industry where standards have been established for the type valves specified.

D. Valves shall be pressure rated.

2.03 BUTTERFLY VALVES

A. Lug type, cast iron body, extended neck, bronze alloy disc, stainless steel shaft, cartridge style EPDM seat and seal, standard 150 psig with 150 psig ANSI companion flanges for system shut off (static) pressures less than 200 psig. Teflon or nylatron bearings, 200 WOG.

1. 6 inches or smaller: Infinite position lever-locking handle

2. 6 inches or smaller, steam service: 300LB, gear actuator.

3. 8 inches or larger: Worm gear actuator

2.04 BALL VALVES

A. Bronze, full port, solid bored-hole stainless steel ball and trim; Teflon seals and seat; pressure rated 150 SWP, 600 WOG. Blowout-proof stem with packing nut. Body to meet ASTM B61, B62 or B584 Bronze.

B. Use three-piece if greater than 2-1/2”.

C. Memory stop where indicated.

D. Handle extension where insulation is greater than 1” thick.

2.05 STRainers

A. 2 inches and smaller: Y-type, bronze body, threaded or solder ends, removable 20 mesh stainless steel or Monel screen, 250 psig working pressure.

B. 2-1/2 inches and larger: Y-type, cast-iron body, flanged, removal stainless steel or brass or Monel screen, 125 psi WSP or 200 WOG.

1. 3 inches and smaller: 3/64-inch perforations

2. 4 inches and larger: 1/8-inch perforations
C. Acceptable Manufacturers:
   1. Boylston
   2. AW Cash
   3. Armstrong
   4. ITT
   5. Plenty
   6. Keckley
   7. Hoffman
   8. Mueller
   9. Plenty

2.06 UNIONS

A. 2 inches and smaller: Malleable iron, AAR type with ground joints, brass to iron seats, 250 lb.

B. 2-1/2 inches and larger: Flanged, 150 pound, ground joints, brass to iron seats, slip on welding flanges

C. On steam service, use Type A-105 steel unions.

2.07 DIELECTRIC PIPE FITTINGS AND ISOLATORS

A. Acceptable Manufacturers:
   1. Perfection Corporation: Dielectric Waterway, Flow Design

B. Dielectric fittings shall conform to ASA B16.8, plated as applicable a minimum of .0005" and have no flow restriction when assembled.

2.08 THERMOMETERS

A. Die cast 9" case with baked enamel finish, red-reading mercury-filled tube, Standard and SI scale, insertable stem with adjustable hinge and bulb well.

B. Thermowell:
   1. For measuring temperature of piped fluids, provide separable brass thermowell with insertion length roughly half the pipe diameter.
   2. For measuring air temperature, provide flange mounted air sensitive bulb instead of separable well.

C. Ranges:
   1. For chilled water systems: 0-100 degree Fahrenheit scale with one-degree subdivisions
   2. For heating water systems: 100-250 degree Fahrenheit scale with two-degree subdivisions

D. Calibrated dial thermometers shall be hermetically sealed with stainless steel case and bezel, 5-inch aluminum non-reflective dial with Fahrenheit and Celsius scales. External reset adjustment. Stainless steel stem with adjustable viewing angle. One percent of full scale accuracy.

E. Acceptable Manufacturers:
2.09 PRESSURE GAUGES

A. Phenolic turret case, 4-1/2-inch dial with suitable range, phosphorus bronze Bourdon tube, corrosion resistant movement, adjustable stainless steel pointer, 2 percent of full scale accuracy, 1/4-inch NPT brass connection, dual unit (Standard and SI) scales.

1. Duro series 800

B. Furnish with each gauge:

1. 1/4-inch brass needle valve: Hammond IB-415

2. Pressure snubber: Ray model 1, Operating and Maintenance Specialties

C. Acceptable Manufacturers:

1. Crosby
2. Dwyer
3. H.O. Trerice Company
4. U.S. Gauge
5. Weksler

2.10 PRESSURE AND TEMPERATURE TEST PLUGS

A. Brass combination pressure and temperature test plugs with neoprene valve covers.

1. Pressure gages and thermometers in individual shock-proof cases.

B. Plugs suitable for vacuum to 600 psig and temperatures of -20°F to 300°F with cap and extension for insulated pipe where required.

C. Acceptable Manufacturers:

1. Peterson Equipment (Pete=s Plug)
2. H.O. Trerice Company
3. Fairfax

2.11 MOTORS

A. Motors 1 hp and larger shall be Premium Efficient, complying with Xcel Energy Requirements; and where driven by VFD=s, shall be rated for inverter-duty with an attached steel nameplate indicating Inverter-Duty Motor.

B. Motors shall be NEMA Design B with Class F insulation; and where driven by VFDs, motors shall have insulation rated for 1600 volts or greater.

C. Motors shall be selected to operate within name plate horsepower at 5400 feet elevation and shall not operate on the service factor.

D. NEMA rated with tolerances for allowable electrical system voltage fluctuations.
E. Electrical characteristics shall be as indicated for specific motors. Where characteristics are not indicated, provide motors with characteristics as follows:

1. 1/2 horsepower and smaller: Single-phase
2. 3/4 horsepower and larger: Three-phase
3. Voltage rating:
   a. Single-phase, 120/208V service: 115 volts
   b. Three-phase, 120/208V service: 200 volts
   c. Three-phase, 277/480V service: 460 volts
4. Frequency rating: 60 hertz

F. Bearings:

1. Ball or roller bearings with inner and outer shaft seals.
2. Regreasable except permanently sealed where motor is normally inaccessible for regular maintenance.
3. Sleeve type acceptable for fractional horsepower, light duty motorized equipment.

G. Three-Phase Motors:

1. Squirrel cage type suitable for continuous and intermittent operation, Class B insulation, maximum of 40 degrees Centigrade temperature rise at full-load continuous operation.
2. Corrosion-resistant cast iron yoke with integrally cast supporting feet, cast iron bearing housing with rabbeted fit to ensure proper alignment of rotating and electrical components, double-shielded ball type grease lubricated bearings with accessible grease inlet and outlet plugs in housing, inner bearing caps on both ends, die cast aluminum cage type rotor with integrally cast fan.

H. Power factor: 85 percent or higher under rated load conditions for motors rated at more than 1,000 watts.

1. Power factor correction capacitors: UL listed non PCB, internally fused, three-phase, 60 hertz. Size based on manufacturer’s recommendation for motor served.

I. Overload Protection:

1. Built-in thermal overload protection for each leg of each phase.
2. Internal sensing device suitable for signaling and stopping the motor at the starter.

J. Acoustical:

1. Motors shall not exceed 80 db rating when running at their full speed and power range.

K. Mounts:

1. All belt driven motors over 5 HP shall have dual push-pull adjustment screws for alignment.
2. Where existing motors are replaced, and existing mounts do not have dual push-pull screws for alignment adjustment, the mounts shall be replaced with mounts of this type.

L. Acceptable Manufacturers:

1. ABB
2. AO Smith
3. Baldor
4. General Electric
5. Gould
6. Lincoln
7. Louis Allis
8. Reliance
9. Toshiba
10. Westinghouse

2.12 ESCUTCHEON PLATES

A. Split hinged type, chrome plated brass or stainless steel.

PART 3 EXECUTION

3.01 ACCESSIBILITY

A. Locate all equipment which must be serviced, operated, or maintained in fully accessible positions. Equipment shall include, but not be limited to, valves, traps, cleanouts, motors, controllers, and drain points. Minor deviations from drawings may be made to allow for better accessibility.

B. Where required to assure accessibility, provide access doors. Minimum size is 20" x 20". Size to assure adequate access to service equipment.

3.02 PIPE AND FITTINGS

A. Install piping as shown on drawings insofar as practical. Make minor adjustments to fit piping to conditions. Obtain approval of Engineer prior to making changes.

B. Install horizontal drainage piping with straight alignment and at a uniform slope.

C. Locate piping so as not to interfere with equipment removal or maintenance.

D. Arrange piping to minimize pressure losses.

E. Provide suitable adapters at junctions of dissimilar materials and incompatible connections.

F. Keep braze joints as far as possible from threaded joints and valve seats. Heat sink piping to prevent the heat of brazing from damaging the seal of joint tapes or valve seats.

G. Install piping, valves, fittings, and flanges with a minimum clearance of 2 inches when installed in concrete trenches.

H. Unless otherwise indicated on drawings, install piping with a minimum passageway of 3 feet between piping and equipment, and a minimum vertical clearance of 9 feet 6 inches between piping and finished floor.
I. Install piping with minimum of 1-1/2-inch clearance between pipes including insulation when installed on pipe racks. Stagger valves horizontally a minimum of 6 inches to allow for operation of valve handles and installation of other piping accessories.

J. Make screw joints with tapered threads conforming to GSA Federal Standards. Use Teflon joint tape or non-toxic joint compound (joint compound not allowed for steam service).

K. Make direction changes with fittings, except for underground, copper water piping. Install underground, copper water piping with sweeping bends and without crimping or joints.

L. Do not hammer or pound piping joints or equipment.

M. Provide sufficient swing joints, anchors, expansion loops and devices to permit free expansion and contraction without causing undue stresses. Support piping independently at all equipment so that the piping weight is not supported by the equipment. Install piping without springing or forcing.

N. Do not cut building structure to facilitate piping installation.

O. Install piping to clear windows, doors, and other openings.

P. Install piping horizontal or vertical unless otherwise indicated on drawings or required for proper system functioning. Install vertical risers plumb and straight, horizontal runs parallel with partitions. Conceal piping above ceilings and within partitions when practical. Bullhead tee construction is prohibited.

Q. The use of wire or perforated metal strap to support piping is not permitted.

R. Provide shutoff valves and unions suitably located to isolate each item of equipment, branch circuit, or section of piping.

S. Burning of holes in piping is not allowed. Provide fittings or drilled taps.

T. Provide dielectric waterways at junctions of dissimilar metals in hydronic and domestic water systems.

3.03 PIPING DRAINS

A. Install piping so that it can be easily drained.

B. Provide drain valves and drain lines from each piping low point, between two block valves, between block valves and backflow preventer discharge check valves, and from each item of equipment requiring drains.

3.04 HANGERS AND SUPPORTS

A. Support each pipe with a separate hanger rod except as noted below. Hanger rod size and spacing as follows:

<table>
<thead>
<tr>
<th>Pipe Size (inches)</th>
<th>Spacing Grooved (feet)</th>
<th>Welded (feet)</th>
<th>Hanger Rod Diameter (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/2</td>
<td>5</td>
<td>5</td>
<td>0.375</td>
</tr>
</tbody>
</table>

Basic Materials and Methods 15050-8 Duane Rm C119 – C127 Lab Remodel
07/07/10 PR 004792
<table>
<thead>
<tr>
<th>Pipe Size (inches)</th>
<th>Spacing (feet)</th>
<th>Grooved</th>
<th>Welded</th>
<th>Hanger Rod Diameter (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/4</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>0.375</td>
</tr>
<tr>
<td>1</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>0.375</td>
</tr>
<tr>
<td>1-1/4</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>0.375</td>
</tr>
<tr>
<td>1-1/2</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>0.5</td>
</tr>
<tr>
<td>2</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>0.5</td>
</tr>
<tr>
<td>2-1/2</td>
<td>10</td>
<td>12</td>
<td>12</td>
<td>0.5</td>
</tr>
<tr>
<td>3</td>
<td>10</td>
<td>12</td>
<td>12</td>
<td>0.5</td>
</tr>
<tr>
<td>4</td>
<td>10</td>
<td>12</td>
<td>12</td>
<td>0.5</td>
</tr>
</tbody>
</table>

2. Copper tube

<table>
<thead>
<tr>
<th>Pipe Size (inches)</th>
<th>Spacing (feet)</th>
<th>Hanger Rod Diameter (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/8</td>
<td>5</td>
<td>0.375</td>
</tr>
<tr>
<td>1/2</td>
<td>6</td>
<td>0.375</td>
</tr>
<tr>
<td>3/4</td>
<td>8</td>
<td>0.375</td>
</tr>
<tr>
<td>1</td>
<td>8</td>
<td>0.375</td>
</tr>
<tr>
<td>1-1/4</td>
<td>10</td>
<td>0.375</td>
</tr>
<tr>
<td>1-1/2</td>
<td>10</td>
<td>0.375</td>
</tr>
<tr>
<td>2</td>
<td>10</td>
<td>0.375</td>
</tr>
<tr>
<td>2-1/2</td>
<td>12</td>
<td>0.5</td>
</tr>
<tr>
<td>3</td>
<td>12</td>
<td>0.5</td>
</tr>
<tr>
<td>4</td>
<td>12</td>
<td>0.5</td>
</tr>
</tbody>
</table>

3. Cast iron

<table>
<thead>
<tr>
<th>Pipe Size (inches)</th>
<th>Spacing</th>
<th>Hanger Rod Diameter (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Note 1</td>
<td>3/8</td>
</tr>
<tr>
<td>3</td>
<td>Note 1</td>
<td>1/2</td>
</tr>
<tr>
<td>4</td>
<td>Note 1</td>
<td>5/8</td>
</tr>
</tbody>
</table>

1. Cast Iron: Substantially support suspended horizontal runs of cast iron soil piping from the building structure at each pipe joint and at intervals not to exceed 5 feet on center.

B. Suspend mains and branches from overhead construction with expansion type anchors or beam clamps with a minimum safety factor of 5.

C. Multiple pipe runs may be supported on trapeze hangers or with individual pipe hangers. Hanger rods for trapeze supports shall be one size larger than specified for the largest pipe supported by...
the trapeze. Determine hanger spacing based on the smallest pipe supported by the trapeze. Install additional trapeze hanger rods at mid-span of trapeze which exceed 42 inches in width.

D. Provide thermal hanger inserts at supports where insulation is specified to be continuous through hanger. Extend insulation insert one-inch beyond galvanized sheet metal shield. Use double layer shield on bearing surface if pipe hanger spacing exceeds 10 feet. Provide shield lengths and shield metal gauges as follows:

<table>
<thead>
<tr>
<th>PIPE SIZE</th>
<th>INSULATION LENGTH</th>
<th>MINIMUM GAUGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/2 through 1-1/2</td>
<td>6</td>
<td>22</td>
</tr>
<tr>
<td>2 through 4</td>
<td>9</td>
<td>20</td>
</tr>
</tbody>
</table>

E. Locate piping supports and hangers to allow for expansion, contraction, structural settlement and vibration.

F. Support piping which is located closer to the floor than it is to the ceiling on adequately constructed floor-mounted supports. Fabricate supports from steel angles or steel pipe. Anchor supports to floor with same spacing, same degree of safety, and same degree of flexibility as specified for overhead supports.

G. Provide roller type hangers/supports where pipe movement due to thermal expansion/contraction is expected.

3.05 VALVES

A. Use ball valves 2 inches and smaller and butterfly valves 2-1/2 inches and larger in domestic water, chilled water and process cooling water systems.

B. Provide valves of sizes indicated on drawings. Where size is not indicated, provide full-line size valve.

C. Provide extended handles or chain-wheel operators for valves that must be operated during normal operation and which are located more than seven feet above the floor.

D. Provide temperature control valves and balancing valves of sizes suitable for the application based on their CV rating.

E. Install valves in accessible locations with sufficient clearance around hand wheels and levers to permit easy operation. Install gate valves and temperature control valves with stems upright.

3.06 INSTALLATION OF PRESSURE AND TEMPERATURE WELLS

A. Install pressure and temperature wells and taps so that they are visible and flush with the exterior of the piping insulation.

B. Provide angle taps on pressure gauges and thermometers to allow viewing from the floor.

3.07 INSTRUMENT CONNECTIONS AND PRESSURE GAUGES

A. Provide shutoff valves at each gauge to permit maintenance of each individual instrument.

B. Provide gauges on the inlet and outlet of pump.
C. Use gauges with the smallest standard gauge range which is 10 percent larger than the final balanced flow.

D. Install instruments in accordance with the manufacturer’s recommendations.

3.08 STRAINERS

A. Provide strainers with a strainer area of at least two times the internal pipe area.
B. Use strainer screens and bodies which are compatible with the application.
C. Provide a 3/4-inch blowdown valve on 2-1/2-inch and larger strainers and reheat coil strainers.
D. Following systems start-up, remove strainer screens, clean screen and body, and reinstall screen. Provide documentation that this was done.

3.09 UNIONS

A. Provide unions at each equipment connection, at each relief or control valve, at specialty items, and at locations to accommodate maintenance and to ensure safety. Locate unions between shut-off valves and equipment so as to permit removal of the equipment with minimal disturbance to the piping.
B. Unions are not required at flanged valves, flanged equipment connections, or victaulic type mechanical joints provided that maintenance and safety requirements are met.

3.10 DIELECTRIC PIPE FITTINGS AND ISOLATORS

A. Provide dielectric waterways at all connections between dissimilar metals in water systems to control corrosion potential caused by galvanic or electrolytic action. Dielectric unions are not acceptable.
B. Typical locations are: water heaters, tanks, water treatment equipment, changes in piping material, make up to boilers and chilled water systems, and all locations where materials of different electrode potential are joined.

3.11 WELDING

A. Welding shall be in accordance with ANSI B31.1 Standards and ASME Standards. Provide necessary shielding.
B. Provide local exhaust ventilation for all welding operations done indoors. Provide portable exhaust unit.
C. Joints in black steel pipe may be welded, except not allowed on steam service. Paint joints black after welding.
D. Weld shall thoroughly fuse to the base metal and shall penetrate to the bottom of the joint. The strength of finished welded joints shall be equal to the strength of the pipe in all directions. Width of finished welds shall be at least 2-1/2 times the thickness of the parts joined. Finished welds shall present a neat and workmanlike appearance.
E. Machine cut pipe for welded joints, bevel V-type joints. Use welding fittings to make changes in direction and intersections of welded lines. Use long radius fittings for elbows.
F. Use factory manufactured fittings appropriate for the application. Do not use field fabricated fittings and do not alter factory manufactured units.
G. Do not weld connections directly to valves, strainers, apparatus or related equipment. Make connections to flanged valves and to accessories with flanged connections using welded flanges.

H. Weld-O-Lets may be used in lieu of welding tees provided that the intersecting pipe is at least two sizes smaller than the main and with the specific approval of the Engineer.

I. The Engineer will visually inspect welded joints with the Contractor’s supervisory personnel. Chip out and re-weld joints judged defective by the Engineer.

J. Coordinate welding occurrences with Owner to avoid fire alarm trips and spread of welding fumes throughout facility. Obtain "Hot Works Permit" as required.

3.12 MECHANICAL AND ELECTRICAL COORDINATION

A. Refer to coordination schedule in Section 01040.

3.13 CUTTING AND PATCHING

A. Be responsible for the costs of cutting and patching for work under Division 15 caused by improper coordination or notification. Comply with the requirements of Section 01045.

B. Cutting: Coordinate and supervise cutting required. Notify Architect before any cutting, channeling, chasing or drilling. Use rotary type drill or other method as approved by the Architect. Holes cut with pneumatic hammer will not be accepted. Cutting of steel, wood or other main structural parts must be approved by architect prior to commencing cutting.

C. Patching: Seal openings and repair and refinish any damage to building elements using skilled mechanics of trades involved in manner acceptable to Architect.

3.14 PIPE AND DUCTWORK PENETRATIONS

A. Where horizontal ducts and pipe pass through walls, and vertical ducts and pipes pass through floors, seal off void between opening and duct, or pipe and sleeve.

B. Calcium silicate inserts can be used in place of sleeves and fire resistant material. Provide fire caulk between penetration and calcium silicate insert.

C. When insulated pipes penetrate floors which will covered with finish flooring, a sheet metal protective covering shall be installed around the insulation jacket. Sheet metal shall extend above the pipe sleeve far enough to protect the insulation from damage by floor maintenance machines. Space between the pipe sleeve and the sheet metal must be sealed.

1. Sleeve heights above finished material on floor shall be:
   a. 2” above floor for rooms with floor drains.
   b. 4” above floor for kitchens and mechanical equipment rooms
   c. 1/4” in all other areas where pipes are exposed.

D. Wherever any pipe, duct, conduit steel member, bracket, equipment or other material penetrates or passes through fire-resistant or smoke barrier wall, ceiling or floor, completely seal voids in construction with cement grout, plaster or other fire-resistant material, embedding sealing material full thickness of material being penetrated.

3.15 SLEEVES AND INSERTS
A. Provide and locate all required sleeves and inserts before floors and walls are constructed where possible. Provide cutting and patching necessary to install omitted sleeves and inserts, and to reallocate improperly located sleeves and inserts. Sleeves in exterior walls shall have integral water stops. Sleeves shall be provided for the existing building.

B. Provide sleeves for piping passing through concrete floor slabs, and for piping passing through concrete, masonry, tile, or gypsum-board walls.

C. Seal the space between pipes or conduits and sleeves. Make seal watertight, using Linkseal by Thunderline or approved equivalent where pipes penetrate foundation.

D. Size sleeves two pipe sizes larger than pipe to permit free movement of piping due to expansion and contraction of the piping. Provide sleeves of sufficient size to pass the piping and insulation unless the floor or wall is fire-rated. Maintain fire-resistive rating at penetrations of fire-rated assemblies and surfaces, use UL listed sealants and procedures.

E. Calcium silicate inserts can be used in place of sleeves and fire resistant material. Provide fire caulk between penetration and calcium silicate insert.

F. Provide sleeves where plastic piping passes through hollow construction that is fire rated. Fill space between sleeve and pipe with UL listed intumescent caulk.

G. Provide sleeves of proper lengths to ensure the following:
   1. Terminate sleeves flush with walls, partitions, and ceilings.
   2. Extend sleeves 2” above floor where pipes penetrate areas that may get wet including concealed spaces such as chases and walls.
   3. In areas where pipes are exposed, extend sleeves 2” above floor in rooms with floor drains, 1/4-inch above floor in rooms without floor drains, and 4” above floor in mechanical equipment rooms.

H. Where insulated pipes penetrate floors which are covered with finished flooring, provide sheet metal shields around the insulation for a height of 12” above finished floor.

3.16 CLEANING AND FLUSHING WATER CIRCULATING SYSTEMS

A. Thoroughly clean all new and existing water circulating systems before placing them in operation. Rid the system of dirt, piping compounds, mill scale, oil, and all other materials which are foreign to the water being circulated.

B. After system is complete, add trisodium phosphate in an aqueous solution to the system at the proportion of 3 pounds per 100 gallons of water in the system. After the system is filled with the solution, bring system up to temperature and circulate the solution throughout the system for 48 hours. Drain system and refill with fresh water.

C. After cleaning, test system with litmus paper or other approved method. Leave system on the slightly alkaline side with pH value of approximately 7.5. If the test reveals that the system is on the acid side, repeat the cleaning procedure.

D. Do not add stop-leak compounds to the systems at any time.

E. Advise the Engineer 48 hours prior to the start of the cleaning operation.

3.17 PERFORMANCE TESTS - PIPING
A. After piping systems and equipment which is installed but not furnished under Division 15 are put in service, perform operational and performance test to ascertain that the systems and equipment are performing properly.

3.18 PERFORMANCE TESTS - DUCTWORK

A. All new ductwork in new systems shall be pressure-tested per SMACNA, from fans to terminal control devices (e.g. VAV boxes).

3.19 PIPING SYSTEM TESTS

A. Perform pipe testing of all pipe systems, including:

1. Domestic water piping.
2. Plumbing waste and vent piping.
3. Compressed air piping.

B. Perform tests after piping and equipment installation is complete and prior to putting systems into service. Perform tests prior to installation of insulation and with all joints, connections, valves, and accessories exposed to view. Testing of new piping systems shall occur prior to connection to existing.

C. Advise Engineer and Owner in writing 48 hours prior to the start of testing. Owner will witness all pressure test. Tests may be observed by Engineer.

D. Perform hydrostatic tests at 1-1/2 times the system operating design pressure, unless otherwise indicated.

E. Hydrostatically test all domestic water piping, process water piping, and chilled and heating water piping. Test at a pressure of 125 psig for 8 hours. At completion of the test, systems shall show no pressure loss. Test piping prior to making final connections to fixtures and equipment.

F. Do not exceed rated working pressures stamped on plastic piping.

G. Test soil, waste, vent, roof drainage, acid waste, and acid drainage systems with a minimum hydrostatic head of 10 feet.

H. Pneumatic test pressures shall not exceed 110 percent of the design pressure of the piping system.

I. Test all joints and components of pneumatic systems using a Sherlock 5-second leak detector solution, type CG concentrate. Use test solutions equal to American Gas and Chemical Leak-Tex or Nupro Snoop. Comply with manufacturer's instructions supplied with the leak detection product.

J. Test all compressed air piping prior to initial operation to assure tightness. The test medium shall be air or inert gas. Perform test prior to installation of insulation and with all joints, connections, valves, and accessories exposed to view. Ensure that excessive pressures will not develop due to thermal expansion during the test. Use test pressure of at least 3 psig. Test for a duration to determine if there are any leaks, but not less than 30 minutes for each 500 cubic feet of pipe volume. Visually examine piping systems for signs of leakage and other defects. Test for leaks using soap bubbles or other approved foaming agents. If repairs or additions are made to the systems following the test, retest the affected piping.
K. During tests, leave automatic control valves in the open position unless provided with a bypass which applies pressure to both sides of the valve.

L. Supply pressure to piping which contains check valves upstream of the check valve so that pressure is applied under the valve seat. Where this is not possible, remove the check device or hold it in an open position during testing.

M. If the test pressure will be different upstream from control valves than it will be downstream from control valves, perform the test with bypass valve closed, upstream block valve open, downstream block valve open, and control valve open.

N. During testing, do not exceed the permitted test pressure on vessels, exchangers, separators, strainers, or other items installed in the line and subject to test pressures. Advise the Engineer of conflicts.

O. Do not subject the following to test pressures:
   1. Pumps
   2. For hydrostatic tests, equipment which would be damaged by water
   3. Pressure gauges, pressure sensing instruments

P. Test all piping and joints. Repair leaks and retest until satisfactory results are obtained.

Q. After satisfactory completion of all testing, remove temporary blanks and blinds, drain all lines, and open valves that were closed solely for testing. After piping has been drained, complete specified insulation, cleaning, and painting.

R. Provide written certification of the satisfactory completion of the testing. Owner's representative to sign off on testing. Include document in O & M Manual.

3.20 SUPPORTING STEEL

A. Provide structural steel supports for mechanical equipment.

3.21 CONCRETE FOUNDATIONS, BASES, AND PADS

A. Provide minimum 4-inch concrete foundations, bases, and pads.

B. Layout work and establish dimensions and locations in accordance with shop drawings and equipment requirements.

C. Securely anchor bases and pads to concrete floors with dowels. Epoxy dowels into floor. Rough up floor and epoxy pad to floor.

3.22 GUARDS AND RAILS

A. Provide removable guards and railings for all belt drives and rotating machinery.

3.23 FIRE WATCH PROCEDURES

A. A fire watch is implemented to ensure the fire-safety of a building or area in the event of any act, e.g., hot work, or situation instigating an increased risk to persons or property. The term "Fire Watch" is used to describe a dedicated person or persons whose sole responsibility is to look for fires within an established area.

B. A fire watch is required:
1. When, in the opinion of the Fire and Life-Safety Group (FLS) of FM, it is essential for public safety in any place where people congregate, due to the number of persons, or the nature of the performance, exhibition, display, contest or activity, one or more qualified persons are to be employed to be on fire watch duty at such place.

2. A fire watch is required when Hot Work is being performed. Details are specified on the Campus Hot Work Permit Form.

3. A fire watch may be required in the event of temporary failure of the alarm system or where activities require the interruption of any fire detection, suppression or alarm system component which would conflict with the intent of NFPA 72. Note that a fire watch is required on a case by case basis as determined by University personnel. Further information is available under Fire Alarm and Detection System Requirements for Interruptions and Fire Suppression Systems Requirements for Interruptions.

C. A fire watch is conducted:

1. During Hot Work Operations, the fire watch is to perform the following functions.
   a. Fire watch personnel are to keep diligent watch for fires in the general area where the work is being performed.
   b. Fire watch personnel are to be familiar with facilities and procedures for sounding an alarm in the event of a fire.
   c. Fire watch personnel are to have fire extinguishing equipment readily available and be trained in its use, including practice on test fires.
   d. Fire watch personnel are to inspect the site prior to hot work activities to ensure that combustibles are removed or covered and that any nearby holes or penetrations in the floor and walls are sealed or covered with fire-safe materials.
   e. Fire watch personnel are to watch for fires in all exposed areas. If a fire is located, fire watch personnel are to sound the evacuation alarm immediately and after that try to extinguish the fire only when obviously within the capacity of the equipment available.
   f. For Hot Work operations, the fire watch is to be maintained for at least 30 minutes after completion of cutting, welding, or other open flame operations to detect and extinguish smoldering and flaming fires. During this time, the work area and other adjacent areas, where sparks or flame may have traveled, are to be searched for signs of combustion.

2. Fire system interruptions: Fire watch requirements for fire system outages will be determined on a case by case basis based on extent of the interruption, building use, number of expected occupants, and expected outage time of the interruption. However, in general, a fire watch is to fulfill the intent of NFPA 72 as follows:
   a. Notify occupants to evacuate when there is a fire in the building.
   b. Notify the Central Monitoring station to initiate emergency personnel response.
   c. Activate fire protection systems, e.g., in order to release door holders, close smoke dampers, and shut down fans.
   d. The persons performing this type of fire watch are not to be permitted to perform any other duties; see UFC 2501.18. Fire Systems Group personnel are to be responsible for determining the procedures to be followed for each specific circumstance. If uncertain about a specific situation, Fire Systems Group personnel are to contact FLS for direction.

3. Additional information:
   a. Coordinate with UCB personnel for emergency contact personnel, building evacuation procedures, and emergency communication procedures.
   b. Obtain documentation from project manager for procedures if fire is discovered or if fire alarm is activated and distribute to construction personnel.
END OF SECTION 15050
PART 1 – GENERAL

1.01 RELATED SECTIONS

A. The General Conditions of the Contract, Supplementary Conditions, and General Requirements are a part of and apply to this Section. Consult them for additional conditions and requirements.

1.02 SUMMARY

A. Section Includes: Variable Frequency Drives

1.03 SUBMITTALS

A. Product Data: Submit manufacturer’s technical product data for variable frequency drives showing dimensions, weights, capacities, electrical characteristics, gauges, finishes of materials, and installation instructions.

B. Shop Drawings: Submit assembly-type shop drawings showing dimensions, required clearances, construction details, and field connection details.

C. Wiring Diagrams: Submit manufacturer’s electrical requirements for power supply wiring to variable frequency drives. Submit manufacturer's ladder-type diagrams for interlock and control wiring. Clearly differentiate between portions of wiring that are factory installed and portions to be field installed.

D. Maintenance Data: Submit maintenance instructions, including spare parts lists. Include this data, product data, shop drawings, and wiring diagrams in maintenance manuals.

E. IEEE-519 Compliance: Manufacturer shall optimize the impedance of reactors or transformer and provide calculations to the owner certifying that the installed system is within IEEE-519 standards.

1.04 QUALITY ASSURANCE

A. Referenced Standards:

   1. Institute of Electrical and Electronic Engineers (IEEE)
   2. Underwriters laboratories
      a) UL508C
   3. National Electrical Manufacturer’s Association (NEMA)
      a) ICS 7.0, AC Adjustable Speed Drives
   4. IEC 16800 Parts 1 and 2

B. Qualifications:

   1. VFDs and options shall be UL listed as a complete assembly.

1.05 WARRANTY

1. Three (3) year warranty.

PART 2 – PRODUCTS
2.01 VARIABLE FREQUENCY DRIVES

A. The VFD package as specified herein shall be enclosed in a NEMA 1 enclosure, completely assembled and tested by the manufacturer. The VFD tolerated voltage window shall allow the VFD to operate from a line of +30% nominal, and -35% nominal voltage as a minimum.

1. Environmental operating conditions: 0 to 40°C continuous. 6000 feet above sea level.

B. VFD shall be capable of operating the served motor up through its service factor ampere draw without exceeding the VFD’s overload ampere rating.

C. The VFD shall have the following features:

1. VFD shall have a digital display and keypad.
2. The keypad shall include Hand-Off-Auto selections and manual speed control. The drive shall incorporate “bumpless transfer” of speed reference when switching between “Hand” and “Auto” modes.
3. The VFD shall be capable of starting into a coasting load (forward or reverse) up to full speed and accelerate or decelerate to setpoint without safety tripping or component damage (flying start).
4. The VFD shall have the ability to automatically restart after an over-current, over-voltage, under-voltage, or loss of input signal protective trip. The number of restart attempts, trial time, and time between attempts shall be programmable.
5. The overload rating of the drive shall be 110% of its normal duty current rating for 1 minute every 10 minutes, 130% overload for 2 seconds. The minimum FLA rating shall meet or exceed the values in the NEC/UL table 430-150 for 4-pole motors.
6. The VFD shall have an integral 5% impedance line reactors to reduce the harmonics to the power line and to add protection from AC line transients. The 5% impedance may be from dual (positive and negative DC bus) reactors, or 5% AC line reactors. VFD’s with only one DC reactor shall add AC line reactors.
7. The input current rating of the VFD shall be no more than 3% greater than the output current rating. VFD’s with higher input current ratings require the upstream wiring, protection devices and source transformers to be oversized per NEC 430-2.
8. The VFD shall include a coordinated AC transient protection system consisting of 4-120 joule rated MOV’s (phase to phase and phase to ground), a capacitor clamp, and 5% impedance reactors.
9. The VFD shall be capable of sensing a loss of load (broken belt / broken coupling) and signal the loss of load condition. The drive shall be programmable to signal this condition via a keypad warning, relay output and/or over the serial communications bus. Relay outputs shall include programmable time delays that will allow for drive acceleration from zero speed without signaling a false underload condition.
10. If the input reference (4-20mA or 2-10V) is lost, the VFD shall give the user the option of either (1) stopping and displaying a fault, (2) running at a programmable preset speed, (3) hold the VFD speed based on the last good reference received, or (4) cause a warning to be issued, as selected by the user. The drive shall be programmable to signal this condition via a keypad warning, relay output and/or over the serial communication bus.
11. Door interlocked, padlockable circuit breaker that will disconnect all input power from the drive and all internally mounted options.
12. The following indicating lights (LED type) shall be provided. A test mode or push to test feature shall be provided.
   a. Power-on (Ready)
   b. Run enable (safeties) open
e. Drive running
f. Drive fault
g. Drive fault
h. Safety open

13. Customer Interlock Terminal Strip – provide a separate terminal strip for connection of an external start/stop command.

14. Class 20 or 30 (selectable) electronic motor overload protection shall be included.

15. There shall be an adjustable current sensing circuit for the bypass to provide loss of load indication (broken belt) when in the bypass mode.

D. The VFD shall have the following adjustments:

1. Three (3) programmable critical frequency lockout ranges to prevent the VFD from operating the load continuously at an unstable speed.

2. Independently adjustable accel and decel ramps with 1 – 1800 seconds adjustable time ramps.

E. All applicable operating values shall be capable of being displayed in engineering (user) units. A minimum of three operating values from the list below shall be capable of being displayed at all times. The display shall be in complete English words (alpha-numeric codes are not acceptable):

- Output Frequency
- Motor Speed (RPM, %, or Engineering units)
- Motor Current
- Calculated Motor Torque
- Calculated Motor Power (kW)
- DC Bus Voltage
- Output Voltage

F. Serial Communications

1. The VFD shall have an RS-485 port with BACnet protocol in the base VFD. Protocol shall be “certified” by the governing authority.

2. The BACnet connection shall be an RS485, MISTP interface operating at 9.6, 19.2, 38.4, or 76.8 Kbps. The connection shall be tested by the BACnet Testing Labs (BTL) and be BTL Listed. The BACnet interface shall conform to the BACnet standard device type of an Applications Specific Controller (B-ASC). The interface shall support all BIBBs defined by the BACnet standard profile for a B-ASC including, but not limited to:
   a. Data Sharing – Read Property – B.
   b. Data Sharing – Write Property – B.
   e. Device Management – Communication Control – B.

   If additional hardware is required to obtain the BACnet interface, the VFD manufacturer shall supply one BACnet gateway per drive. Multiple VFDs sharing one gateway shall not be acceptable.

3. Serial communication capabilities shall include, but not be limited to; run-stop control, speed set adjustment, current limit, accel/decel time adjustments, and lock and unlock the keypad. The drive shall have the capability of allowing the DDC to monitor feedback such as process variable feedback, output speed / frequency, current (in amps), % torque, power (kW), kilowatt hours (resettable), operating hours (resettable), and drive temperature. The DDC shall also be capable of monitoring the VFD relay output status, digital input status, and all analog input and analog output values. All diagnostic warning and fault information shall be transmitted over the serial communications bus. Remote VFD fault reset shall be possible. The following additional status indications and settings shall be
transmitted over the serial communications bus – keypad "Hand" or "Auto" selected.

G. ACCEPTABLE PRODUCTS

1. ABB Model ACS320
2. Motor Drive International, Inc. (Mitsubishi)
3. Reliance
4. Toshiba
5. Cutler-Hammer

PART 3 – EXECUTION

3.01 INSTALLATION

A. Installation shall be the responsibility of the mechanical contractor. The contractor shall install the drive in accordance with the recommendations of the VFD manufacturer as outlined in the installation manual.

B. Power wiring shall be completed by the electrical contractor. The contractor shall complete all wiring in accordance with the recommendations of the VFD manufacturer as outlined in the installation manual.

3.02 START-UP

A. Certified factory start-up shall be provided for each drive by a factory authorized service center. A certified start-up form shall be filled out for each drive with a copy provided to the owner, and a copy kept on file at the manufacturer.

3.03 PRODUCT SUPPORT

A. Factory trained application engineering and service personnel that are thoroughly familiar with the VFD products offered shall be locally available at both the specifying and installation locations. A 24/365 technical support line shall be available on a toll-free line.

B. A computer based training CD or 8-hour professionally generated video (VCR format) shall be provided to the owner at the time of project closeout. The training shall include installation, programming and operation of the VFD, bypass and serial communication.

3.04 WARRANTY

A. Warranty shall be 24 months from the date of certified start-up, not to exceed 30 months from the date of shipment. The warranty shall include all parts, labor, travel time and expenses. There shall be 365/24 support available via a toll free phone number.

3.05 TRAINING

A. Provide owner orientation and training for not less than 2 hours.

END OF SECTION 15170
PART 1 - GENERAL

1.01 RELATED SECTIONS

A. The General Conditions of the Contract, Supplementary Conditions, and General Requirements are a part of and apply to this Section. Consult them for additional conditions and requirements.

1.02 SUMMARY

A. Section Includes: Identification of mechanical products installed under Division 15.

1.03 REFERENCES

A. American National Standards Institute (ANSI).
   ANSI A13.1 "Scheme for the Identification of Piping Systems"
   ANSI Z53.1 "Safety Color Code for Marking Physical Hazards"

B. American Society of Heating, Refrigerating and Air conditioning Engineers (ASHRAE).

PART 2 - PRODUCTS

2.01 IDENTIFICATION MATERIALS FOR PIPING AND EQUIPMENT

A. Metal Tags:
   1. Round brass discs, minimum 1-1/2" diameter with edges ground smooth.
   2. Each tag punched and provided with brass chain for installation.

B. Engraved Nameplates:
   1. Laminated three-layer plastic with engraved black letters on light contrasting background color.

C. Paint Stencils:
   1. Of size and color per ANSI/ASME A13.1 using clean cut letters and acrylic-enamel semigloss paint.
   2. Paint material shall comply with 09900 - Painting.
   3. Size of Legend and Letters for Stencils:

<table>
<thead>
<tr>
<th>Insulation or Pipe Diameter</th>
<th>Length of Color Field</th>
<th>Size of Letters</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/4&quot; to 1-1/4&quot;</td>
<td>8&quot;</td>
<td>1/2&quot;</td>
</tr>
<tr>
<td>1-1/2&quot; to 2&quot;</td>
<td>8&quot;</td>
<td>3/4&quot;</td>
</tr>
<tr>
<td>2-1/2&quot; to 6&quot;</td>
<td>12&quot;</td>
<td>1-1/4&quot;</td>
</tr>
<tr>
<td>8&quot; to 10&quot;</td>
<td>24&quot;</td>
<td>2-1/2&quot;</td>
</tr>
<tr>
<td>Over 10&quot;</td>
<td>32&quot;</td>
<td>3-1/2&quot;</td>
</tr>
<tr>
<td>Ductwork &amp; Equipment</td>
<td>N/A</td>
<td>2-1/2&quot;</td>
</tr>
</tbody>
</table>
D. Pressure Sensitive Markers: Brady Type 350 flexible vinyl film identification markers and tape, with legend, size and color coding per ANSI A13.1.

E. Semi-rigid Plastic Identification Pipe Markers: Seton Setmark with legend, size and color coding per ANSI A13.1. Direction of flow arrows are to be included on each marker, unless otherwise specified.
   1. Setmark Type SNA markers to be used on diameters 3/4" thru 5".
   2. Setmark Type STR markers to be used on diameters 6" or larger.

PART 3 - EXECUTION

3.01 IDENTIFICATION OF PIPING AND EQUIPMENT

A. General:
   1. Provide pipe identification as described in this section to clearly identify all mechanical equipment, including motors, piping and directional flow of piping, and controls of the various mechanical systems. Valve tags are not required.
   2. Use unit identifications as shown in the contract documents.

B. Methods for Identification as Follows:
   1. Metal Tags:
      a. Stamp tags with letter prefixes to indicate service, followed by a number for location in system.
   
   2. Engraved Nameplates:
      a. Attach nameplates with brass screws.
      b. Pressure-sensitive embossed labels are not acceptable.
      c. Nameplates shall bear the same identifying legend used on the Contract Documents.

   3. Painted Stencils:
      a. Pipes and equipment to be stenciled shall first be wiped clean of dirt, dust, rust, grease and moisture.
      b. Prepare and paint surfaces in accordance with Section 09900-Painting for stencils.
      c. Pipes and equipment shall be painted with required color code to a smooth hard surface in the area the stencil is to be applied.
      d. Stenciled markings shall be neatly performed with no overspray, drips, or other imperfections.
      e. Legend Letters and Color field size as specified for Paint Stencils in Part 2 of this Section.

   4. Pressure Sensitive Markers: Apply pressure sensitive markers in accordance with manufacturer's recommendations with complete wrap around. Marker adhesion will be tested for permanence. Any markers showing dog ears, bubbles, or other failings shall be replaced.

   5. Semi-Rigid Plastic Identification Markers: Seton Setmark premolded (not pressure sensitive) identification markers may be used at Contractor's option on service piping which is accessible for maintenance operations (but not on piping in finished spaces). This type marker shall not be installed on bare pipe when surface temperature exceeds
C. Classification of Hazards of Materials, Designation of Colors and Owner Legend:

<table>
<thead>
<tr>
<th>Classification</th>
<th>Color of Field</th>
<th>Letters</th>
<th>Legend</th>
</tr>
</thead>
<tbody>
<tr>
<td>Materials Inherently Hazardous:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Domestic Hot Water</td>
<td>Orange</td>
<td>Black</td>
<td>DHW</td>
</tr>
<tr>
<td>Domestic Hot Water, Circulating</td>
<td>Orange</td>
<td>Black</td>
<td>HWC</td>
</tr>
<tr>
<td>Heating Water Supply</td>
<td>Yellow</td>
<td>Black</td>
<td>HWS</td>
</tr>
<tr>
<td>Heating Water Return</td>
<td>Yellow</td>
<td>Black</td>
<td>HWR</td>
</tr>
<tr>
<td>Sanitary Sewer</td>
<td>Orange</td>
<td>Black</td>
<td>SAN</td>
</tr>
<tr>
<td>Waste Vent</td>
<td>Orange</td>
<td>Black</td>
<td>V</td>
</tr>
<tr>
<td>Materials of Inherently Low Hazard:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Process Chilled Water Supply</td>
<td>Green</td>
<td>White</td>
<td>PCHS</td>
</tr>
<tr>
<td>Process Chilled Water Return</td>
<td>Green</td>
<td>White</td>
<td>PCHR</td>
</tr>
<tr>
<td>Domestic Cold Water</td>
<td>Green</td>
<td>White</td>
<td>DCW</td>
</tr>
<tr>
<td>Medium Pressure Compressed Air (30 to 90 psig)</td>
<td>Blue</td>
<td>White</td>
<td>CA</td>
</tr>
<tr>
<td>Fire Quenching Materials:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fire Lines</td>
<td>Red</td>
<td>White</td>
<td>FL</td>
</tr>
</tbody>
</table>

D. Piping:

1. 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:
   a. 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.
   b. If flow can be in both directions, use a double-headed arrow indication.
   c. Apply pipe legend and arrow indication at every point of pipe entry or exit where line goes through wall or ceiling cut.
   d. Apply pipe legend and arrow indication within 3" of each valve to show proper identification of pipe contents and direction of flow.
   e. The legend shall be applied 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 from floor level.
   f. For pipes under 3/4" O.D., fasten brass tags securely at specified legend locations.
   g. Legend on steam piping, condensate return, compressed air, gas, and vacuum systems shall include working pressure or vacuum.
   h. Markers shall be spaced every 20 feet and at least once in every room.
i. Provide marker within 3’ of every change in direction.

E. Controls:
   1. Magnetic starters and relays, shall have nameplates or be stenciled to identify connecting or controlled equipment.
   2. Manual operating switches, fused disconnect switches and thermal over-load switches which have not been specified as furnished with indexed faceplates shall also have nameplates or be stenciled as to "connected" or "controlled" equipment.
   3. Automatic controls, control panels, zone valves, pressure electric, electric pressure switches, relays, and starters shall be clearly identified.
   4. Identify locations of control transformers in the as-built control drawings, and install labels on the ceiling grid with the designation “CNTL XRMR”. Add tag at transformer indicating devices it serves.

F. Pumps:
   1. Pumps shall be identified as to service and zones served.
   2. Base-mounted pumps shall be stenciled or have system served nameplates.
   3. Brass tags secured by tie wires may be used on small in-line pumps.

G. Fans:
   1. Supply and exhaust fans and air handling units and connecting ductwork supplying one or more areas from an equipment room or isolated crawl or furred space shall have nameplate or be stenciled as to plan code number, service and areas of zones served.

H. Access Doors and Lift-Out ceilings:
   1. Provide Kroy type adhesive labels on ceiling tee or access door to identify concealed valves, controls, dampers or other similar concealed mechanical equipment. Use the following colors.
      a. 3/8” white letters on red background for fire-protection devices, including dampers.
      b. 3/8” black letters on white background for air-handling terminal devices.
      c. 3/8” black letters on white background for isolation, balancing and control valves.
      d. 3/8” blue letters on white background for plumbing devices and piping.
   2. Label shall be oriented so that the bottom of the words is next to the ceiling tile that needs to be removed for access.
   3. Obtain Owner approval before installation on all access doors in finished areas.

I. Terminal Units:
   1. Identify all units with unique numbers corresponding to the drawings, and indicate the space being served.

J. Motors Controlled By Energy Management System:
   1. The Owner shall furnish the following self-adhering signs which the Contractor shall install as indicated:
CAUTION

THIS EQUIPMENT IS UNDER COMPUTER CONTROL AND MAY CYCLE AT ANY TIME.

BEFORE WORKING ON IT, DISCONNECT THE ELECTRICAL POWER AND CONTACT THE UNIVERSITY SERVICE CENTER AT EXT. 2-5522

END OF SECTION 15190
PART 1 - GENERAL

1.01 RELATED SECTIONS

A. The General Conditions of the Contract, Supplementary Conditions, and General Requirements are a part of and apply to this Section. Consult them for additional conditions and requirements.

1.02 SECTION INCLUDES

A. Vibration isolation for Division 15 systems and equipment.

1.03 CONTENT SUMMARY

A. Piping and Equipment Isolation:

1. Hangers

1.04 SUBMITTALS

A. Comply with Section 15010.

B. Product Data: Provide product data to show compliance of all products furnished under this section with specified requirements.

C. Shop Drawings:

1. Include design data for each isolator indicating spring OD, operating and solid heights, and ratio of horizontal to vertical stiffness.

2. Include installation details for each type of isolator.

3. Data to follow format and compliance with current edition of ASHRAE Application Handbook, Chapter 42, Table 34 Vibration Isolator Selection Guide.

D. Manufacturer’s Instructions:

1. Installation instructions for each type of isolator and base.

E. Submit manufacturer’s certification of installation.

1.05 QUALITY ASSURANCE

A. All work shall operate in accordance with this Section under all conditions of load. Sound or vibration conditions not in accordance with this Section and considered objectionable by the University shall be corrected in a manner approved of by the Project University under the Work of Division 15.

1.06 DESIGN

A. Isolation materials manufacturer shall design the vibration isolation systems in accordance with ASHRAE 1991 Application Handbook, Chapter 42, Table 34 Vibration Isolator Selection Guide, and in accordance with specified requirements.
1. Select isolators to accomplish the specified minimum static deflection based on the actual operating weight and weight distribution of the equipment.

2. Select isolators based on the actual structural conditions of the equipment placement.

1.07 COORDINATION

A. Furnish product data and shop drawings for equipment scheduled to receive vibration isolation to the vibration-isolation-materials manufacturer. The information shall include:

1. Operating weights of the equipment and the distribution of weight at support points.

2. Layouts of piping and ductwork indicating vertical risers, and size or weight and support points of the piping and ductwork systems.

PART 2 - PRODUCTS

2.01 PIPING AND EQUIPMENT ISOLATION

A. Acceptable Manufacturers:

1. Amber/Booth Company
2. Mason Industries, Inc.
3. Korfund
4. Metraflex
5. Vibration Mountings and Control Company
6. Vibrex

2.01 HANGERS

A. Combination Spring Hangers:

1. Hangers consisting of laterally stable steel springs in series with precompressed, molded, Glass Fiber Pad inserts. Complete with load transfer plates and assembled in a stamped or welded steel bracket.

2. Free standing, unhoused, laterally stable steel springs wound from high strength steel. Lateral stiffness shall be 0.8 times the rated vertical stiffness. Size to provide 50 percent overload capacity. Color coded to indicate load capacity.

3. Hanger bracket sized to provide 500 percent overload capacity and designed to allow the support rod to move through a 30 degree arc without metal-to-metal contact or other short circuit.

4. For maximum static deflection, under the operating load conditions not exceeding 0.40 inch.

PART 3 - EXECUTION

3.01 GENERAL REQUIREMENTS

A. Isolate all vibrating mechanical equipment from the building structure by means of noise and vibration isolators.

B. Provide flexible connectors for duct connections to vibrating mechanical equipment.
C. Coordinate work with other trades. Ensure that work of other trades does not interfere with or negate the vibration isolation systems.

D. Minimum deflection for isolators shall be 0.75 inches.

E. The installation or use of vibration isolators shall not result in any change of position of equipment or piping that will stress pipe connections or misalign shafts or bearings. Load shall not be transferred to the isolator until the installation is complete and under full operational load.

F. Install all flexible connectors level, square and in-line with equipment, piping and ductwork. Flexible connectors shall not be used to compensate for misalignment.

3.02 DUCTWORK

A. Provide metal-edged Ventglas Fabric flexible connection with 24-gauge stainless attaching strips between both the inlets and outlets of low pressure fans and the connecting ductwork.

1. Connectors shall be securely clamped by heavy, bolted clamps, closely fitted to assure minimum air leakage.

2. Ensure that flexible connections are not painted. Remove and replace painted connections.

3.03 FANS AND AIR HANDLING UNITS

A. Provide flexible duct connections with a free length of not less than 8 inches.

B. Air handling equipment shall be protected against excessive displacement which might result from high air thrusts in relation to the equipment weight. Provide horizontal restraints attached at the centerline of thrust and symmetrically located on both sides of the unit.

3.01 TESTING

A. Upon completion of the installation and after the system is put into operation, the systems of noise and vibration control shall be inspected and any discrepancies or maladjustments shall be corrected. If necessary, instrumentation tests and measurements shall be made to determine the source, cause, and path of any objectionable noise or vibration. Proper steps shall be taken after such tests are completed to correct the objectionable condition.

3.02 CERTIFICATION

A. Provide written certification from the manufacturer of the isolation material and equipment, or his authorized representative, indicating that the systems are properly installed and in conformance with the specification. Include certification in O & M manuals.

END OF SECTION 15240
SECTION 15250
MECHANICAL INSULATION

PART 1 - GENERAL

1.01 RELATED SECTIONS
A. The General Conditions of the Contract, Supplementary Conditions, and General Requirements are a part of and apply to this Section. Consult them for additional conditions and requirements.

1.02 SECTION INCLUDES
A. Insulation for pipes.
B. Firestop insulation.

1.03 SUBMITTALS
A. Comply with Section 15010.
B. Product Data:
   1. Insulation
   2. Jacketing

1.04 REFERENCES
A. All insulation shall be in accordance with ASHRAE Standard 90A.

1.05 QUALITY ASSURANCE
A. Installer qualifications: minimum of three years of experience installing insulation. Work similar in scope and application requirements.
B. Furnish insulation, supplies, and accessories to site bearing the manufacturer's label.

PART 2 - PRODUCTS

2.01 GENERAL
A. All insulation shall be Non-combustible as defined in NFPA Pamphlet 220, and Underwriters Laboratory Listed or Labeled.
B. Composite mechanical insulation (insulation, jackets, coverings, sealers, mastics and adhesives) shall have a maximum flame spread rating of 25 and maximum smoke developed rating of 50, as tested by ANSI/ASTM E-84 (NFPA255) method.
C. Adhesives, sealants, facings, and vapor barriers shall be impervious to moisture.

2.02 ACCEPTABLE MANUFACTURERS
A. Insulation:
   1. Johns-Manville
   2. CertainTeed
   3. Armstrong
   4. Owens-Corning
5. Knauf
6. NOMACO
7. Manson
8. Armaflex

B. Adhesives, Coatings, and Sealants:
   1. Foster
   2. Chillers Product Company

2.03 PIPE INSULATIONS:

A. Glass Fiber:
   1. Rigid, molded, noncombustible, conforming to ASTM C547
   2. K value: 0.23 at 75 degrees Fahrenheit
   3. Service temperature rating: Minimum of 850 degrees Fahrenheit
   4. Vapor retarder jacket: Pressure sensitive, self-sealing tape lap system of white Kraft paper reinforced with glass fiber yarn and bonded to aluminum foil (Foil Scrim Kraft)

B. Calcium Silicate:
   1. Rigid, molded block, conforming to ASTM C533.
   2. Asbestos-free color coded throughout material. Coding shall remain stable throughout rated temperature range.
   3. K value: 0.40 at 300 degrees Fahrenheit.
   4. Service temperature rating: Minimum of 1,200 degrees Fahrenheit.
   5. Compressive strength: Minimum of 160 PSI to produce 5 percent compression at 1-1/2 inch thickness.
   6. Tie wires: 16 gauge stainless steel.

2.04 FIELD APPLIED PIPE AND FITTING JACKETING

A. PVC Plastic:
   1. One-piece, molded type, gloss white finish with fiberglass insulation insert for fittings
   2. Johns-Manville Zeston 2000 (indoors)
   3. Paintable where exposed in labs.

2.05 FIRE-STOP INSULATION

A. Flexible Blanket, Amorphus Wool.
   1. K value: 0.85 at 1000 degrees Fahrenheit and 1.70 at 1,800 degrees Fahrenheit
   2. Continuous use-temperature rating: 1834 degrees Fahrenheit
   3. Melting point: 2327 degrees Fahrenheit
   4. Thickness: 1/2-inch or 2 inches
   5. Density: 6 pounds per cubic foot
   6. Thermal Ceramics SF607

PART 3 - EXECUTION

3.01 EXAMINATION AND PREPARATION
A. Verify that piping, ducts, and equipment have been tested and approved by the authorities having jurisdiction prior to beginning the installation of insulation.

B. Verify that all surfaces which are to receive insulation are clean, dry and free of foreign materials.

3.02 INSTALLATION - GENERAL

A. Maintain highest level of workmanship. The appearance of the completed work is of equal importance to its technical performance.

B. Install insulation tightly over clean, dry surfaces which are free of foreign materials. Butt all edges firmly together.

C. Install insulation only after piping has been tested and approved by the authorities having jurisdiction, and after all other tests and certifications which are required by the specifications have been satisfactorily completed.

D. Install pipe insulation and vapor barriers continuous through wall and floor openings except where the penetrated surfaces or assemblies are fire-resistance rated. Maintain fire-resistance ratings of penetrated surfaces and assemblies.

E. Install insulation on cold surfaces with a continuous, unbroken vapor seal. Insulate and vapor seal supports and anchors which are directly secured to cold surfaces.

F. Finish all exposed raw edges of insulation with finishing cement.

G. Do not use staples on vapor barrier jackets. Where staples must be used, thoroughly seal the vapor barrier penetrations with a white vapor-barrier finish. Use of staples must be approved by the Engineer prior to installation.

H. Do not weld insulation support pins to pressure vessels.

I. Leave all insulation surfaces dry and clean, and ready for subsequent work.

3.03 INSTALLATION OF PIPING INSULATION

A. Unless noted otherwise, install insulation and covers with seams in the least visible location.

B. Neatly finish insulation at supports, protrusions, and interruptions.

C. Verify that piping wells, taps, and P & Ts are extended so that they will be flush with the surface of the finished insulation.

D. For insulated dual-temperature piping systems and for insulated piping which conveys fluids of a temperature which is less than the ambient temperature, provide vapor-retardant jacket with self-sealing lap joints. Insulate the complete systems.

E. For insulated piping which conveys fluids of a temperature which is greater than the ambient temperature, provide jacket with or without vapor barrier, with self-sealing lap joints. Bevel and seal ends of insulation at equipment, flanges, and unions.

F. Where pipe insulation has the hanger on the outside of the insulation jacket, supply 180 degree cal-sil with metal shield or wood blocks with 180 degree metal shield.

3.04 INSTALLATION OF INSULATION ON PIPING SYSTEM COMPONENTS
A. For all insulated piping systems, provide factory precut or premolded insulation shapes for all fittings, flanges, couplings, valves, and pipe terminations. Provide one-piece PVC covers equivalent to Johns-Manville Zeston 2000.

B. Precut or premolded insulation shall be applied to components using two layers for pipe temperatures above 250 degrees Fahrenheit or below 35 degrees Fahrenheit. Single layer insulation is acceptable between 35 degrees Fahrenheit and 250 degrees Fahrenheit. The ends of the precut or premolded insulation shall be tucked snugly into the throat of the fitting and the edges adjacent to the pipe covering, tufted and tucked in, fully insulating the pipe fitting. Covers shall overlap the adjoining pipe insulation and jackets, and on cold pipes shall be sealed at all seam edges with vapor barrier adhesive. Seal circumferential edges of all covers with pressure sensitive vinyl tape. The tape shall overlap the jacket and the cover at least one inch.

C. At locations where PVC covers are prohibited, the Contractor may use as an alternate one of the following methods: aluminum covers, one coat insulation cement, premolded fiberglass fitting covers, or mitered segments of pipe insulation. Finish for non PVC or aluminum shall be glass fabric embedded in fire retardant mastic lapped 2 inches over piping insulation. Finish with second coat of mastic. Mastic shall be vinyl acrylic mastic for hot piping and shall be vapor barrier mastic for cold piping.

D. Valves and in-line pumps may be insulated with sections of Fiberglass pipe insulation complete with All Service Jacket. Raw ends shall be coated with vinyl acrylic mastic for hot water valves and in-line pumps or vapor barrier mastic for in-line chilled water pumps and valves.

E. Circuit setters, strainer drains, hose bibs, high and medium pressure steam traps, valves and strainers, and any other components requiring periodic maintenance shall be insulated with removable/reusable insulation.

3.05 INSTALLATION OF FIRESTOP INSULATION

A. Pack insulation into openings between fire-rated partitions where pipes and ducts penetrate. Compress to density recommended by manufacturer. Maintain fire-resistance ratings at penetrations of fire rated surfaces and assemblies.

B. Caulk with intumescent firestop caulk.

3.06 FIBERGLASS

<table>
<thead>
<tr>
<th>PIPE INSULATION SCHEDULE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum Pipe Insulation (inches)</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Fluid Design Operating Temperature Range (°F)</td>
</tr>
<tr>
<td>---------------------------------------------</td>
</tr>
<tr>
<td>1 and less</td>
</tr>
</tbody>
</table>

A. Heating Systems: Heating Water

| 141-200 | 125 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 |
### PIPE INSULATION SCHEDULE

#### Minimum Pipe Insulation (inches)

<table>
<thead>
<tr>
<th>Fluid Design Operating Temperature Range (°F)</th>
<th>Mean Rating Temperature of Insulation</th>
<th>Nominal Pipe Diameter (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1 and less</td>
</tr>
<tr>
<td>B. Domestic and Service Hot Water Systems including recirculation</td>
<td>105 and Greater</td>
<td>100</td>
</tr>
<tr>
<td>C. Cooling Systems: Chilled Water</td>
<td>40-55</td>
<td>75</td>
</tr>
<tr>
<td>D. Domestic Cold Water</td>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>

#### DUCT INSULATION SCHEDULE

<table>
<thead>
<tr>
<th>THICKNESS</th>
<th>FINISH</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Rectangular ducts: Cooling systems</td>
<td>1&quot;  Permacoat Liner</td>
</tr>
<tr>
<td>B. Round Supply ducts: Cooling systems Flexible duct wrap</td>
<td>1-1/2&quot; Foil Scrim Kraft</td>
</tr>
</tbody>
</table>

END OF SECTION 15250
PART 1 - GENERAL

1.01 RELATED SECTIONS

A. The General Conditions of the Contract, Supplementary Conditions, General Requirements, Division 1, and Section 16721 are a part of and apply to this Section. Consult them for additional conditions and requirements.

1.02 SECTION INCLUDES

A. Water-based fire suppression systems

1.03 SUBMITTALS

A. Product Data:

1. Piping and fittings
2. Sprinkler heads

B. Shop Drawings:

1. Submit shop drawings complying with requirements of NFPA 13. Include certifications, riser diagram, calculations, and anchoring details and plot to a noted scale no smaller than 1/8 = 1'-0". Drawings for tenant finish or remodel work which involves fewer than 10 sprinkler heads need not show all the details indicated in NFPA 13, but drawings must be complete enough to define the work.

2. Drawings shall be a minimum of 24 inches by 36 inches. Drawings shall be CAD drafted to UCB standards, drawn full scale. Drawings must include column line indicators, where provided on the contract documents.

3. Drawings shall include a site plan and floor plans, sections, and details which clearly define and describe the system design and arrangement. Include a complete material list and catalog sheets. Indicate required water supply information per NFPA 13 on the site plan.

4. Drawings shall indicate location and fire-rating of all fire rated floors, walls, and ceiling assemblies. Include details of the penetrations of fire-rated surfaces and assemblies.

5. Coordinate layout of the work with architectural reflected ceiling plan, mechanical equipment and electrical lighting. Indicate on the drawings all equipment occurring at the ceiling.

6. Submit hydraulic calculations or pipe schedule basis for the proposed layout per NFPA 13.

7. Submit completed State of Colorado Plan Registration Form with shop drawings.

C. As-Built Drawings:

1. Comply with NFPA 13. Drawings shall indicate the systems as installed. Drawings shall be a minimum of 24 inches by 36 inches, CAD drafted.
2. Drawings shall include all information which was indicated on the shop drawings and all equipment as installed. Provide riser diagrams indicating equipment and locations.

3. Include revised hydraulic calculations for those portions of the systems which were approved to be installed at variance with the shop drawing. Calculations will not be required for changes which the Engineer judges as minor.

4. Submit within 30 days after completion of the work in the building.

D. Certifications:

1. Submit certifications that the contractors and the contractors' employees meet the required qualifications.

2. Test certificates showing that hydrostatic and final tests were conducted in accordance with the applicable NFPA standards shall be submitted to the AHJ.

1.04 QUALITY ASSURANCE

A. The entire fire-protection work including all sub-systems must be performed by a single contractor that has the capability to perform all the work required by this Section.

B. Qualifications:

1. Contractor qualifications:
   a. Shall be licensed in the State of Colorado. Shall be licensed for design and installation of the types of fire protection systems which are specified.
   b. Minimum of five years experience in the design and installation of similar projects of comparable size and value.
   c. Shall maintain an established office and service facility within 100 miles of the project.
   d. Capability of providing a full service maintenance, testing, and inspection program in accordance with NFPA standards. Contractor shall be certified to perform these services.
   e. Emergency 24-hour service, capable of responding within four hours of receiving notification.

2. Designer qualifications:
   a. Experienced NICET level III designer with experience in the specific types of systems specified, or a Colorado-registered professional engineer with experience in the specific types of systems specified and meeting the qualifications for a grade of Full Member in the national organization of the Society of Fire Protection Engineers.

3. Installation qualifications:
   a. Welders: comply with AWS D10.9, "Specifications of Qualifications of Welding Procedures and Welders for Piping and Tubing, Level AR-3."
   b. Job Foreman: Trained for the installation and operation of each type of system specified and possess documentation of qualifications and training. Minimum of three years successful installation experience on similar projects of comparable size and value.

1.05 CODES AND REGULATIONS

A. Comply with the following codes and the regulations of the authorities having jurisdiction.

1. IBC, 2006
2. IFC, 2006  
3. IMC, 2006  
4. IPC, 2006  
5. UL Fire Resistance Directory  
6. UL Fire Protection Equipment Directory  
7. NFPA-13, 14, 72  
8. Other NFPA Standards as applicable  
9. Colorado Department of Public Safety, Division of Fire Safety 8 CCR 1507-11  
10. Colorado Revised Statutes Section 24-33.5 - 1202 through 1208

1.06 STANDARDS  
A. Comply with the recommendations of the following:  
1. Factory Mutual  
2. National Fire Protection Association  
3. National Institute for Certified Engineering Technicians

1.07 DESIGN  
A. General Requirements:  
1. Provide fire protection systems to protect all areas of the project in accordance with NFPA Standards 13 and 14, except areas which are specifically excluded on the drawings.  
2. Design shall allow for proper and adequate clearances for lighting, filter access, and other equipment that will be provided in proximity to the fire protection systems. Remove and relocate piping not meeting this requirement at no cost to the owner. Design system to allow other trades to install their equipment without removing fire protection equipment.  
3. Maintain fire-resistive ratings at all penetrations of fire rated surfaces and assemblies.  
4. Provide guards for sprinkler heads that are subject to damage or that are located below 7 feet AFF, or that protect mechanical or electrical rooms.  
5. All valves shall be accessible and operable from the floor.  
6. Velocity in above-ground sprinkler system piping shall not exceed 20 feet per second.  
7. The "small room rule" shall not be used in the design of sprinkler systems.

1.08 WARRANTY  
A. All material and workmanship shall be warranted for a minimum period of one (1) year beginning with the date of final acceptance by the Owner.  
B. The Contractor shall be responsible during the design, installation, testing and guarantee periods for any damage caused by Contractors or by defects in the Contractors work, materials or equipment.

1.09 EMERGENCY SERVICES  
A. During the installation and warranty period, the Contractor shall provide emergency repair service for the sprinkler system within four (4) hours of a request by the Owner.  
B. Service shall be available twenty-four (24) hours per day, seven (7) days per week.
C. The contractor shall guarantee the system against freezing for reasons other than building owners=’s negligence.

PART 2 - PRODUCTS

2.01 GENERAL REQUIREMENTS

A. All material and equipment shall be UL listed or FM approved for the application. All material and equipment must be new and compatible.

B. Incidental items, which are essential, but which may not be described by this specification, shall also be provided and installed in the best available method in the best available quality.

2.02 PIPING

A. Piping: Schedule 40 black steel for 2 inch and smaller piping; ASTM A135.

B. Piping: Schedule 10 black steel; ASTM A135 for 2-1/2" and larger piping. Schedule 10 piping shall be roll-grooved only.

C. Grooved couplings, fittings, and gaskets: Designed for the application and supplied from the same manufacturer. No FIT-type fittings or hooker-type tees. Couplings shall be greaseless type.

   1. Acceptable Manufacturers:
      a. Grinnell
      b. Central
      c. Victaulic

2.03 AUTOMATIC SPRINKLER HEADS

A. Sprinkler manufacturer shall match existing in adjacent spaces.

B. Finished ceiling applications:

   2. Pendant type, chrome plated brass, with chrome ceiling escutcheons.

C. Exposed areas: Ordinary temperature, upright type, standard brass

D. Acceptable Manufacturers:

   1. Central
   2. Globe
   3. Viking

PART 3 - EXECUTION

3.01 PIPING AND FITTINGS

A. Provide auxiliary drains in trapped sections of piping. Connect drains to floor drains or other approved location.

B. Clean piping, and keep clean and free of foreign matter before and during installation. Carefully remove dirt, scale, welding icicles or beads, and cutting burrs. Flush piping with clear water.
C. Provide unions at valves in pipes two inches and smaller. Unions are not required at flanged devices or in installations using grooved mechanical couplings.

D. Piping with screwed construction shall be made up with as few joints as possible. Screwed joints shall have clean machine-cut threads and shall be made up with a piping compound or teflon pipe thread tape. The threads shall be cleaned and piping compound or teflon pipe thread tape applied before making the joint.

E. Tighten Flange Bolts with Wrenches.
   1. In tightening joints, take care to ensure uniform pressure on the gasket and to avoid overstressing the bolts or dishing or breaking the flanges.
   2. Flanged joints that have been made up and broken shall be remade with new gaskets.

F. The end of each cross main shall be equipped with a minimum of 1-1/4 inch threaded and capped connection to facilitate flushing.

G. Where circular openings are cut into pipes at the job site, the circular pipe sections shall be removed from the pipe and shall be taped to the pipe and be available for inspection.

H. Ream and remove burrs and sharp edges from pipe outlets. Reaming shall be performed to the full internal diameter of the pipe.

I. System risers shall not be attached to the supply connection until the underground piping has been flushed and tested and the system has been approved by the authorities who have jurisdiction.

J. Conceal piping to the maximum extent practical. Paint exposed pipe per Section 09900.

3.02 PIPE HANGERS AND SUPPORT

A. In addition to the requirements of Section 15050, piping shall be hung in accordance with NFPA 13.

B. Powder driven studs shall not be used.

3.03 SPRINKLER HEADS

A. Locate sprinkler heads at quarter center of ceiling tiles.

B. Ensure that sprinkler heads are not painted, sprayed with fireproofing, or are not otherwise damaged. Replace damaged or impaired sprinkler heads.

C. Installations shall be in accordance with sprinkler listing and manufacturers recommended practices.

D. Coordinate sprinkler piping and head installations with mechanical, electrical fixtures, other components, and building structural elements.

E. Maintain the maximum height possible. Sprinkler heads installed below seven (7) feet - four (4) inches requires permission from UCB.

3.04 TESTING
A. General Requirements:

1. Provide a minimum of 3 working days notice to the Engineer and Owner prior to scheduling of tests. Provide two weeks of notice for the hydrant flow test. At least 48 hours notice is required to cancel a test, or it shall be considered as a retest.

2. Prior to scheduling tests, ensure that all systems and equipment are functioning properly.

3. Final testing shall be accomplished in conjunction with the building fire alarm and detection system.

B. Re-Testing:

1. If a system fails a test, retest in accordance with specified test requirements.

2. Contractor shall reimburse the observers of the test for time incurred during retest.

C. Acceptance Tests:

1. Ensure that damage to the facility will not result as a consequence of testing including the failure of the systems being tested.

2. Repair all damage which results from testing at no cost to the Owner.

3. Record test results and provide certifications of testing to the owner in accordance with NFPA 13.

4. Test as follows:
   a. Complete a separate test record for each test.
   b. Prior to testing sprinkler and standpipe systems, flush piping to remove foreign matter which might have entered the system during installation.
   c. Provide functional tests on all valves and manual operating devices.

D. Wet Pipe Systems:

1. For retrofit installations, a 40 psi pneumatic test shall be conducted prior to a hydrostatic test to avoid water damage due to leaks. This test does not replace the hydrostatic test.

2. All piping, including all supply pipe to the fire department connection, shall be hydrostatically tested at not less than 200 psi or at 50 psi in excess of the maximum pressure, when the maximum pressure to be maintained in the system is in excess of 150 psi, for a minimum of two hours with no visible leaks and no loss of pressure. This test shall be conducted prior to concealing any piping.

3. If visible signs of leakage occur or the system loses any pressure within the two-hour test period, the test shall be considered as failed and shall require re-testing. A complete installation inspection shall be conducted in conjunction with the hydrostatic test while all piping is exposed.

4. Perform a final inspection when the installation is complete. Inspection shall include functional tests of all system components and of all alarms. Manual tripping of alarm activating devices is not acceptable.

3.05 SPARE PARTS
A. Provide spare sprinkler heads for each type installed. Quantity shall be in accordance with NFPA 13.

END OF SECTION 15300
PART 1 - GENERAL

1.01 RELATED SECTIONS

A. The General Conditions of the Contract, Supplementary Conditions, and General Requirements are a part of and apply to this Section. Consult them for additional conditions and requirements.

1.02 SECTION INCLUDES

A. Domestic water distribution system
B. Sanitary sewer system

1.03 CONTENT SUMMARY

A. Cleanouts
B. Installation
C. Pipe and fittings
D. Testing
E. Valves

1.04 SUBMITTALS

A. Comply with Section 15010.
B. Product Data:
   1. Cleanouts
   2. Drains
   3. Traps
   4. Valves

1.05 CODES AND REGULATIONS

A. Comply with requirements, rules, and regulations of:
   1. Colorado Energy Conservation Code
   3. Local plumbing codes and ordinances
   4. Water and waste-water authorities having jurisdiction

PART 2 - PRODUCTS

2.01 PIPE AND FITTINGS

A. Domestic Water Piping:
   1. Above grade:
      a. Less than 2": Type K hard-drawn copper tube with wrought-copper fittings or cast bronze; fittings with low-liquidus/solidus solder, which does not contain lead or antimony, with a shear strength equal or greater than 10,000 psi. All-State Aquasafe or approved equal.
b. 2" and above, Type K hard drawn copper with 15% silver solder to braze fittings.

B. Interior sanitary, storm, waste and vent:

1. Suspended pipe:
   a. Service weight cast iron pipe no hub system using hubless cast iron soil pipe couplings certified to withstand a minimum of 13 psig internal pressure.
   b. No-hub couplings shall be of super-duty type, such as Husky series 4000 or equivalent.

2. PVC shall not be used unless approved by the University.

C. Equipment Drain Piping:

1. Type M copper with wrought copper fittings, 95/5 solder; or schedule 40 galvanized steel pipe with 150 pound malleable iron threaded fittings.

D. Compressed Air:

1. Type L copper tubing and wrought copper fittings with 95-5 class SnSb (Tin-Antimony) soldered joints equal to domestic water.

2.02 CLEANOUTS AND CLEANOUT ACCESS COVERS

A. Cleanouts in Wall:

1. Brass countersunk plug
2. Polished Nikaloy, round access cover plate secured to plug by countersunk screw

B. Acceptable Manufacturers:

1. Josam
2. Smith
3. Zurn
4. Wade

2.03 TRAPS

A. Material and type of connections compatible with the connecting drainage system. Suitable for the application.

2.04 PLUMBING FIXTURES AND TRIM

A. Traps, stops, supplies, air gaps, drains:

1. American Standard
2. Brasscraft
3. Eljer
4. Kohler
5. Chicago Faucet

B. Stop valves shall be 1/4 turn with brass stem and metal handle.
C. Under counter premolded trap insulation covers, where required for scald protection: Skal-guard, Brocar Trap Wrap, Truebro Lavguard, or acceptable equal.

PART 3 - EXECUTION

3.01 PLUMBING, GENERAL

A. All plumbing piping and fixtures shall be installed under the direct, on-site supervision of a journeyman plumber licensed by the State of Colorado. The ratio of plumbing apprentice-helpers shall not exceed two apprentice-helpers for each journeyman.

3.02 DOMESTIC WATER PIPING INSTALLATION

A. Provide drip ball valves so that the entire system can be drained. Provide manual air vents at high points in the system where air can be trapped.

B. Provide swing or swivel joints on connections from mains to risers and from risers to branches with loops, bends, expansion joints, guides, and anchors as required to prevent noise or vibration of the piping due to pipe expansion, contraction, or shock. Provide fixture stops at all fixtures, hose bibbs, and equipment.

C. Run all piping on warm side of building insulation. Pipe insulation is not considered freeze protection.

D. Ream out all pipes when cuts are made.

E. Provide ball valves and unions on all lines to equipment for isolation and removal.

F. Provide ball valves for isolation of branch lines. Provide ball valves in all domestic hot water and cold water supplies to plumbing fixture groups.

G. Provide pipe hangers of the same material as the piping system or use coated hangers.

H. Joints between copper tubing and fittings for below-grade locations shall be silver brazed. Minimize the number of below-grade connections.

I. Provide water tight sleeves at all floor penetrations. Sleeves shall extend 2 inches above floor, in all locations.

3.03 SANITARY SEWER INSTALLATION

A. Slope piping inside of building with a uniform pitch of not less than 1/8-inch per foot for all horizontal piping.

B. Underground pipe shall be surrounded by a minimum of 6" of squeegee.

C. Collect all soil and waste piping, make connections to all fixtures, floor drains and equipment requiring waste service, extend piping as indicated on the drawings. Trap each fixture separately with an approved trap placed as near the fixture as possible, except fixtures which are indicated to have indirect connections.

D. Provide floor clamps at each floor for uniform support of stacks.

3.04 CLEANOUT INSTALLATION
A. Provide cleanouts for sanitary and storm sewer systems. Cleanouts shall be full size except that maximum size shall be 4 inches.

B. Install cleanouts within 2” of wall surface.

C. Install cleanouts at base of all vertical stacks, at ends of sanitary mains, and at changes in direction of sanitary mains. Install cleanouts in horizontal piping for interior sanitary systems at a maximum spacing of 50 feet for piping 3 inches or smaller and 100 feet for piping 4 inches or larger.

D. Install cleanouts 6 inches above the highest trap on the floor in the main vent of each group of fixtures and in vent stacks for isolated fixtures on each floor.

E. Install cleanouts so that they are accessible by extending them through walls or floors.

F. Lubricate cleanout plugs with non-harding thread lubricant.

G. Locate cleanouts to assure minimum disturbance to occupants and building operations. Locate wall cleanouts where piping is concealed in walls or non-accessible chases at 42 inches above finished floor.

3.05 PLUMBING FIXTURE INSTALLATION

A. Assemble lavatory and sink wastes and traps with slip joints with lock nuts and rubber gaskets or with threaded joints on fixture side of trap. Do not use slip joints on sewer side of traps. Make sewer side connections with screwed trap nipples, compression fittings or solder joints.

B. Provide a vacuum breaker at each hot and cold water service outlet to which a hose can be attached including janitor's faucets.

C. Provide chrome plated rigid or flexible supplies to fixtures with screwdriver stops, reducers, and escutcheons.

D. Do not caulk wall mounted fixtures.

E. Set all fixtures level.

F. Remove labels, clean fixtures, and leave installation ready for use.

G. Seal joints between fixtures and mounting surfaces with silicone sealant.

3.06 STERILIZATION

A. Prior to placing the potable water system in operation but after all testing has been completed, the entire potable water system shall be sterilized using 10% bleach. Bleach will be fed by infecting it into the main water supply header feed the facility. An LMI Model A151-392S! chemical feed pump is recommended for injection of bleach.

B. The sterilization procedure shall be as follows:
   1. Run all domestic water supply facets at 2 to 3 gallon per minute.
   2. Begin pumping bleach and adjust bleach injection rate such that a 1.0-2.0 ppm free Cl2 residual is attained at all faucets.
   3. Maintain above flow rates and free chlorine residuals for a 4-6 hour period.
4. Cease bleach injection. Monitor free Cl2 residuals at facets and observe when free Cl2 residual drops below .02 ppm. Run all facets for an additional two hours at a 2-3 gpm rate.

3.07 PIPE TESTING

A. Test all piping systems. Systems shall prove tight prior to concealment. Tests will be witnessed by the local authority having jurisdiction.

B. Ensure that fixtures and equipment will not be damaged by test pressures. Valve-off or otherwise isolate fixtures and equipment that could be damaged by the test pressures.

C. All hydrostatic tests shall be held for a minimum of eight hours without loss of pressure. All air tests shall be held for a minimum of one hour without loss of pressure.

D. Test Procedures:

1. Drainage systems, including sanitary sewers, storm sewers, and sanitary vents:
   a. Hydrostatic test: All low points of such systems shall be plugged and filled with water to uppermost outlet or a minimum of 10 feet static pressure shall be applied to each joint. System shall stand full of water for 8 hours with no indication of leaks.

2. Domestic Hot and Cold Water: 150 psig hydrostatic test, except 200 psig on water service when serving a fire line.

END OF SECTION 15400
PART 1 - GENERAL

1.01 RELATED SECTIONS

A. The General Conditions of the Contract, Supplementary Conditions, and General Requirements are a part of and apply to this Section. Consult them for additional conditions and requirements.

1.02 SECTION INCLUDES

A. Flow Control Valves
B. Hydronic Piping and Fittings

1.03 SUBMITTALS

D. Comply with Section 15010
E. Product Data:
   1. Flow Measuring and Balancing Devices

PART 2 - PRODUCTS

2.01 FLOW CONTROL VALVES

A. Flow control valves shall automatically control flow rates within ± 5% accuracy over an operating pressure differential of at least 14 times the minimum required for control.

B. Manufacturer shall be able to provide certified independent laboratory tests verifying accuracy of performance.

C. Flow control valve cartridges shall be warranted by the manufacturer for five years.

D. Flow control valve shall be combined with shutoff ball valve.

E. Flow control valve shall be constructed with brass alloy body (ASTM B584) rated at no less than 300 psi/250 deg.

F. Flow control valve shall be available in flow rates matching the flows called for on the drawings for process chilled water service drops.

G. Valves shall be equipped with test ports for verifying accuracy of low performance.

H. Valve assembly shall terminate with female threaded end for user hookup.

I. Acceptable Manufacturers:
   1. Griswold
   2. Nexus
   3. Approved equal.

2.02 HYDRONIC PIPING AND FITTINGS
A. General:

1. 2" and smaller, threaded pipe and fittings
2. 2-1/2" and larger, welded pipe and fittings

B. Above grade closed loop systems:

1. Type L hard drawn with wrought copper fittings with antimony-free, lead-free, solder joints with shear strength not less than 7250 psi. Solder equal to Allstate Aquasafe. Pipe diameters of 2" and above shall be brazed with filler material of no less than 15% silver.

2. Black steel, Schedule 40, standard fittings.
   a. 2" and smaller: threaded pipe and fittings
   b. 2-1/2" and larger: flanged/welded pipe and fittings

3. In accessible locations, with UCB approval, pipe may be mechanical grooved type, schedule 40 black steel, standard square cut or roll grooved to coupling manufacturer’s specification and recommendations for the application.

4. Acceptable Manufacturers of Grooved Pipe:
   a. ITT Grinnell Corporation GRUVLOCK.
   b. Victaulic
   c. Central

PART 3 - EXECUTION

3.01 FIRE RATINGS

A. Where piping passes through fire-rated construction, maintain fire-resistive rating of penetrated surfaces and assemblies.

B. Sealants shall be UL listed.

3.02 HOT WATER AND CHILLED WATER PIPE INSTALLATION

A. Install all supply and return mains with concentric fittings. Install supply and return mains level and square with the lines of the building unless otherwise indicated.

B. Provide copper clad clamps or plastic isolators at clamps for hot-water copper tubing.

C. Chilled water piping shall have full insulation where clamped.

D. Provide manual air vents, consisting of ½” ball valves with hose end fittings, at all high points of all piping. Where high point occurs at a change in elevation downward in the direction of flow, provide full size air chamber and pipe vent down to accessible location with ¼” copper tubing to a petcock.

E. Provide drain valves, consisting of ¾” ball valves with hose end fittings, at all low points of all piping, at main shutoff valves, at the bases of vertical risers, and at equipment.

F. Provide manual shutoff valve in supply line, and combination balancing and shutoff valve in return line from each hot water heating element, continuous run of fin tube, or cooling coil.
3.03 PIPE TESTING

A. All piping systems shall be tested an proven tight prior to concealment. Tests may be witnessed by the Engineer.

B. Ensure that test pressures which might damage equipment does not reach such units. Valve off or otherwise isolate equipment during tests.

C. Open and close all system valves at least once while system is pressurized to test valve packing. Tighten as required.

D. All hydrostatic tests shall be held for a minimum of eight hours without loss of pressure. All air tests shall be held for a minimum of one hour without loss of pressure.

E. When job site conditions do not permit the use of water, air may be used in lieu of water.
   1. Test procedures shall be as follows:
      a. Hot water/chilled water: 100 psig hydrostatic

F. Repair all leaks and retest the system.

END OF SECTION 15510
PART 1 - GENERAL

1.01 RELATED SECTIONS

A. The General Conditions of the Contract, Supplementary Conditions, and General Requirements are a part of and apply to this Section. Consult them for additional conditions and requirements.

1.02 SECTION INCLUDES

A. In-line pumps

1.03 SUBMITTALS

A. Product Data:
   1. Pumps

PART 2 - PRODUCTS

2.01 IN-LINE PUMPS

A. Pumps shall be 1,750 RPM, single-stage, in-line centrifugal, oil lubricated, sleeve bearing pump with cast iron casing with flanged piping connections, bronze fitted, and mechanical seals.

B. Motors shall be open drip-proof type and shall be non-overloading under all pump conditions of operation.

C. All pumps shall be of the same manufacturer.

D. Acceptable Manufacturers:
   1. Bell and Gossett
   2. Taco
   3. Armstrong
   4. Grundfos

PART 3 - EXECUTION

3.01 PUMPS

A. Pumps shall be piped such that they can be removed without dismantling or removing any piping.

B. Pumps shall not be mounted with motor shaft vertical unless special thrust bearings are provided in pump design for vertical installation.

END OF SECTION 15540
SECTION 15850
MECHANICAL AIR HANDLING

PART 1 - GENERAL

1.01 RELATED SECTIONS

A. The General Conditions of the Contract, Supplementary Conditions, and General Requirements are a part of and apply to this Section. Consult them for additional conditions and requirements.

B. The Mechanical General Provisions, Section 15010, and Basic Materials and Methods, Section 15050 are a part of and apply to this Section. Consult them for additional provisions and requirements.

1.02 SECTION INCLUDES

A. Fan Coil Units

1.03 SUBMITTALS

A. Comply with Section 15010.

B. Product Data:

1. Fan Coil Units

C. Shop Drawings:

1. Fan Coil Units

1.04 CODES, REGULATIONS AND STANDARDS

A. Comply with the following:

1. ARI 410 Standard for Forced Circulation, Air Cooling and Air Heating Coils
2. ARI 430 - Standard for Central Station Air Handling Units.
4. ANSI-AFBMA 9 - Load Ratings and Fatigue Life for Ball Bearings.
5. SMACNA - HVAC Duct Construction Standards.
6. ANSI/UL 900 - Test Performance of Air Filter Units.

PART 2 - PRODUCTS

2.01 FAN SYSTEMS - GENERAL

A. For all fan systems having structural frame supports for the fan housing, the following is required.

1. Design resonant speed of the fan system shall be a minimum of 25% above the fan operating speed, considering both wheel mass and inertia.
2. Operating fan bearing motions (inboard and outboard) shall not exceed 1.5 mils peak-to-peak in any direction when measured in the \( \text{filter out} \) measurement mode at any operating speed; \( \text{filter in} \) mode measurements are not acceptable. The instrument system used must have a flat response down to 120 RPM.
2.02 FAN COIL UNITS

A. General

1. Units shall be tested in accordance with ARI 430 and ARI 260 and comply with NFPA 90A.

2. Units shall be UL listed.

3. Units shall consist of a filter section, a hydronic coil, drain pan, and centrifugal fan with motor and drive mounted in a common cabinet.

4. Units shall be provided with knockouts in all four corners for suspending the unit from the ceiling with threaded rods.

5. Unit and accessories shall be insulated with 1”, 1-1/2 lb/ft 3 density fiberglass insulation.

6. Large motor access panels shall be provided on both sides of the unit and accessories.

B. Casings

1. Casings (structural components) shall be constructed of heavy-gauge galvanized steel, insulated with one-inch, 1-1/2 lb density fiberglass fire resistant and odorless glass fiber material to provide thermal and acoustical insulation.

2. Fan housing sides shall be directly attached to the unit top and bottom panels strengthening the entire unit assembly.

3. Coil access panels shall be located on the sides of the unit and allow easy removal of the internal coils and drain pan.

4. Main access panels shall provide generous access to the fan, motor and drive.

C. Hydronic Coils

1. Cooling coils shall be four or six-row, chilled water, suitable to meet scheduled performance.

2. Coils shall use highly efficient aluminum fins, mechanically bonded to seamless copper tubes, and be specifically designed and circuited for water use.

3. Coils shall be factory tested with 450 psi air under water. Maximum standard operating conditions are: 300 psig, 200°F.

D. Fans

1. Fans shall be forward curved, centrifugal blower type equipped with heavy-duty adjustable speed V-belt drive.

2. The fan shaft shall be supported by heavy-duty, permanently sealed ball bearings.

3. Fans shall be dynamically balanced.

E. Drain Pan
1. The drain pan shall be noncorrosive and double-sloped to allow condensate drainage.

2. The drain pan construction shall be stainless steel.

3. Coils shall mount above the drain pan—not in the drain pan—thus allowing the drain pan to be fully inspected and cleaned. The drain pan shall also be removable for cleaning.

4. The stainless steel drain pan connection shall be 3/4" NPT schedule 40 stainless steel pipe.

5. The main drain connection shall be at the lowest point of the drain pan. An auxiliary drain connection shall be provided on the same side as the main connection.

F. Filters

1. Two-inch MERV 8 filters shall be provided on the unit.

2. Unit shall have a standard flat filter rack that is sized for less that 500 feet per minute at nominal airflow. Filter rack shall use standard filter sizes.

G. Motor

1. Fan motor shall be three-phase 208 volt.

2. Motor shall have a plus or minus 10 percent voltage utilization range.

3. Motor shall be open drip-proof with permanently sealed ball bearings, internal current and thermal overload protection, a minimum 1.15 service factor and resilient base frame.

4. Motor shall be factory-installed and wired to the unit junction box.

H. Drive

1. Single belt drives shall not be used on equipment with motors 1 horsepower and larger.

2. Drives shall be installed with provisions for center distance adjustment.

3. Motors shall be located on their respective motor bases with two base adjustment screws per motor assembly allowing for 1/6 of the total motor base travel for installation of new belts with remaining 5/6 of the travel available for belt tightening.

4. Arc of contact on the smaller sheave should not be less than 120 degrees.

5. Ratios of sheaves should not exceed 8:1.

6. Belt speed should not exceed 5000 feet per minute.

7. A full and free circulation of air shall be around the drive at all times.

8. Original sheaves shall be changed when required for proper balancing.

9. Provide belt covers with tachometer access.
10. Drives shall be rated at 150 percent of fan brake horsepower requirement.

I. Performance

1. FCU shall meet performance criteria scheduled on drawings.

2. FCU shall fall within the sound generation limits scheduled below.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>FCU-1,3</th>
<th>FCU-2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inlet Sound (dB)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>63 Hz</td>
<td>76</td>
<td>77</td>
</tr>
<tr>
<td>125 Hz</td>
<td>76</td>
<td>78</td>
</tr>
<tr>
<td>250 Hz</td>
<td>62</td>
<td>65</td>
</tr>
<tr>
<td>500 Hz</td>
<td>48</td>
<td>51</td>
</tr>
<tr>
<td>1,000 Hz</td>
<td>45</td>
<td>48</td>
</tr>
<tr>
<td>2,000 Hz</td>
<td>44</td>
<td>46</td>
</tr>
<tr>
<td>4,000 Hz</td>
<td>40</td>
<td>43</td>
</tr>
<tr>
<td>8,000 Hz</td>
<td>31</td>
<td>35</td>
</tr>
<tr>
<td>Casing Sound (dB)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>63 Hz</td>
<td>73</td>
<td>74</td>
</tr>
<tr>
<td>125 Hz</td>
<td>68</td>
<td>70</td>
</tr>
<tr>
<td>250 Hz</td>
<td>61</td>
<td>64</td>
</tr>
<tr>
<td>500 Hz</td>
<td>56</td>
<td>58</td>
</tr>
<tr>
<td>1,000 Hz</td>
<td>51</td>
<td>55</td>
</tr>
<tr>
<td>2,000 Hz</td>
<td>43</td>
<td>47</td>
</tr>
<tr>
<td>4,000 Hz</td>
<td>36</td>
<td>40</td>
</tr>
<tr>
<td>8,000 Hz</td>
<td>31</td>
<td>34</td>
</tr>
<tr>
<td>Discharge Sound (dB)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>63 Hz</td>
<td>84</td>
<td>86</td>
</tr>
<tr>
<td>125 Hz</td>
<td>82</td>
<td>85</td>
</tr>
<tr>
<td>250 Hz</td>
<td>74</td>
<td>78</td>
</tr>
<tr>
<td>500 Hz</td>
<td>74</td>
<td>78</td>
</tr>
<tr>
<td>1,000 Hz</td>
<td>71</td>
<td>76</td>
</tr>
<tr>
<td>2,000 Hz</td>
<td>69</td>
<td>73</td>
</tr>
<tr>
<td>4,000 Hz</td>
<td>67</td>
<td>72</td>
</tr>
<tr>
<td>8,000 Hz</td>
<td>61</td>
<td>67</td>
</tr>
</tbody>
</table>

J. Acceptable Manufacturers

1. Trane
2. McQuay
3. York

PART 3 - EXECUTION

3.01 FAN COIL UNIT INSTALLATION

A. Install unit in accordance with manufacturers printed instructions.

B. Do not operate unit until ductwork is clean, filters are in place and bearings lubricated.
PART 1 - GENERAL

1.01 RELATED SECTIONS

A. The General Conditions of the Contract, Supplementary Conditions, and General Requirements are a part of and apply to this Section. Consult them for additional conditions and requirements.

1.02 SECTION INCLUDES

A. Duct accessories
B. Ductwork
C. Grilles, registers, and diffusers

1.03 CONTENT SUMMARY

A. Access panels
B. Duct liner
C. Elbows and turning vanes
D. Flexible connections
E. Flexible duct and fittings
F. Fume exhaust ductwork
G. Grilles, registers and diffusers
H. HVAC ductwork
I. Sealants
J. Sound attenuators

1.04 SUBMITTALS

A. Comply with Section 15010.

B. Product Data:
   1. Duct liner
   2. Flexible duct and fittings
   3. Fume exhaust ductwork
   4. Grilles, registers, diffusers
   5. Sound Attenuators

PART 2 - PRODUCTS

2.01 ACCESS PANELS IN DUCTS

A. Access panels shall consist of three, one piece stampings: the door frame, the door, and the pan. Space between door and pan shall be filled with 1/2-inch thick insulation. The door shall be hung with loose-pin hinges.

B. Access panel sizes shall be as follows unless otherwise indicated on drawings:
C. Access doors shall be fabricated in accordance with the details in the SMACNA duct manuals. Latches and hinges shall be equal to Ventlok of appropriate type and size.

D. Acceptable manufacturers:
   1. Ventfabrics Inc.
   2. C. E. Sparrow Company

2.02 DUCT LINER

A. General:
   1. Duct liner shall comply with the requirements of NFPA 90A and the "Duct Liner Materials Standard" of the Thermal Insulation Manufacturers Association.

B. Square and rectangular duct liner:
   1. Flexible blanket with factory coated edges conforming to ASTM C1071.
   2. K value: 0.25 at 75 degrees Fahrenheit.
   3. Noise reduction coefficient: Minimum of 0.65 based on type-A mounting.
   4. Velocity rating: Minimum of 5000 feet per minute.
   5. Adhesive: UL listed waterproof type.
   7. Manville Permacote, Linacastic HP, or equal by Certain-teed or Owens Corning.

C. Duct Liner Schedule:
   1. Where liner is required per ductwork schedule, 3.01, U, provide 1" thick, 1.5 pound density, unless noted otherwise.

D. Duct sizes shown on drawings are interior clear dimensions.

2.03 ELBOWS AND TURNING VANES

A. Elbows shall have radius equal to duct depth wherever possible. Where necessary, mitered elbows may be used with turning vanes.

B. Turning vanes shall be single-walled and formed to assure that any joint on one blade is equidistant from the same point on an adjacent blade. Double-walled turning vanes shall be used only where shown on the drawings or where required for strength of vanes and shall be approved by engineer and owner prior to installation. Construction of all turning vanes shall conform to SMACNA standards. Vanes longer than 36" shall be provided with intermediate supports. Edges of vanes shall be parallel with sides of elbow.
C. Acceptable Manufacturers:

1. Tuttle & Bailey
2. Barber-Colman

2.04 FLEXIBLE CONNECTIONS

A. Fabricate in accordance with SMACNA HVAC duct construction standards.

B. UL listed fire-resistant neoprene coated woven glass fabric to NFPA 90A, minimum density 30oz per sq yd, crimped into metal edging strip.

C. Exposed to weather: Vention

D. Not exposed to weather: Ventglas

E. Acceptable Manufacturers:

1. Ventfabrics, Inc.

2.05 FLEXIBLE DUCT AND FITTINGS

A. Flexible duct shall conform to Class I requirements of NFPA 90A with a flame spread rating of 25 or less and a smoke developed rating not higher than 50.

B. Ducts shall be either corrugated aluminum or fabric supported by helically wound steel wire or flat steel strips. Ducts shall have a minimum working pressure of six inches WG positive pressure, two inches WG negative pressure, and 2500 FPM velocity.

C. All flexible ducts shall be insulated unless otherwise indicated. Insulation shall be minimum one-inch thick fiberglass with K value of 0.23 at 75 degrees Fahrenheit.

D. Takeoff fittings shall be conical with quadrant damper unless otherwise indicated.

E. Acceptable Manufacturers:

1. Wiremold
2. Omni-Air
3. Flexmaster Type 5-Insulated
4. Thermaflex

2.06 FUME EXHAUST DUCTWORK

A. FRP ductwork to match existing duct being modified.

2.07 GRILLES, REGISTERS, AND DIFFUSERS

A. Provide frames and mounting hardware appropriate to the installation.

B. Grilles, registers, and diffusers shall have baked off-white finish unless otherwise indicated.

C. Laminar flow diffusers:

1. Integral internal baffle for even distribution of air over the entire face of the diffuser.
2. Integral volume damper accessible from the face of the diffuser.
3. Face of diffuser shall be constructed of 22 gauge steel perforated with 3/32" diameter holes on 1/4" centers.

D. Acceptable Manufacturers:
   1. Anemostat
   2. Carnes
   3. Krueger
   4. Metal Aire
   5. Price
   6. Titus
   7. Tuttle & Bailey

2.08 SHEET METAL DUCTWORK

A. Sheet metal used for duct and plenum construction shall be galvanized steel unless otherwise specified. Galvanized steel shall be of lock forming quality with a zinc coating of 1.25 ounces per square foot on each side in conformance with ASTM A90.

B. Ducts and plenums shall be constructed in accordance with the applicable SMACNA duct manuals. Gauge of metal, type of joint, and reinforcing shall be in accordance with SMACNA standards.

C. Factory-made air ducts shall be either Class 0 or Class 1.

D. All rigid round and oval single-wall, spiral pipe and fittings shall be manufactured by a company whose primary business is the manufacture of spiral pipe and who has been in business for at least 10 years. All spiral pipe and fittings shall be manufactured by the same manufacturer.

E. Round duct, fittings, and couplings shall be fabricated of prime G90 galvanized steel.

2.09 SEALANTS

A. Duct sealer shall be a metal-to-metal air pressure sealant which is flexible and self-curing.

B. Sealant shall be water resistant and fire resistive when dry in accordance with NFPA 90.

C. Manufacturers:
   1. Adhesive: Benjamin Foster A81-99”.
   2. Sealer: Benjamin Foster A82-07”.

2.10 SOUND ATTENUATORS

A. Materials and Construction:
   1. Outer casings of rectangular silencers shall be made of 22-gauge galvanized steel in accordance with ASHRAE guide for recommended construction for high pressure rectangular ductwork. Seams shall be lock formed and mastic filled.

   2. Interior partitions for silencers shall be made of not less than 26-gauge galvanized perforated steel.

   3. Filler material shall be of inorganic mineral or glass fiber of a density sufficient to obtain the specified acoustic performance and be packed under not less than 5 percent
compression to eliminate voids due to vibration and settling. Materials shall be inert and vermin and moisture proof.

4. Combustion rating for the silencer acoustic fill shall be not less than the following when tested in accordance with ASTM E 84, NFPA Standard 255, or UL No. 723:
   a. Flame Spread Classification: 25
   b. Smoke Development Rating: 0
   c. Fuel Contribution: 20

5. Silencers shall not fail structurally when subjected to a differential air pressure of 8 inches WG inside to outside of casing.

6. Seal construction air-tight with duct sealing compounds.

B. Acoustic Performance:

1. Silencer ratings shall be determined in a duct to reverberant room test facility which provides for airflow in both directions through the test silencer during rating. The test setup and procedure shall be such that all effects due to end reflection, directivity, flanking transmission, standing waves, and test chamber sound absorption are eliminated.

2. Acoustic ratings shall include dynamic insertion loss and self-noise power levels, both for forward flow and reverse flow with airflow of at least 2000 FPM entering face velocity.

C. Aerodynamic Performance:

1. Static pressure loss of silencers shall not exceed those listed in the silencer schedule at the airflow indicated. Airflow measurements shall be made in accordance with applicable portions of ASME, AMCA, and ADC airflow test codes.

D. Duct Transitions:

1. Provide transitions as required to adapt silencer connections to connecting ductwork.

E. Acceptable Manufacturers:

1. Vibro-Acoustics
2. Industrial Acoustics Company
3. Semco
4. Acoustifoil Noise Control Products
5. Tran Sonics
6. Commercial Acoustics

PART 3 - EXECUTION

3.01 DUCT FABRICATION AND INSTALLATION

A. Exercise the utmost care to obtain a smooth surface inside of all ductwork, absolutely free from small fins, imperfect joints or other obstructions which cause noise and increase friction. Internal ends of slip joints shall be made in the direction of airflow. Ducts shall be securely attached to the building construction in an approved manner.

B. All ducts and plenums shall be constructed in accordance with the applicable SMACNA duct manuals including gauge of metal, type of joint, and reinforcing.
C. Factory-made air ducts shall be approved for the use intended.

D. All ductwork shall be fabricated and installed so that no undue vibration or noise results. All joints shall be airtight with additional taping and caulking provided if necessary.

E. Hang ducts with strap iron attached to bottom of ducts spaced not over five feet center-to-center and according to the SMACNA manual.

F. Curved elbows shall have a center line radius equal to 1-1/2 times the duct width. Square elbows shall have turning vanes where indicated. Job fabricated turning vanes will not be accepted without prior approval. Elbows with square throat and radius heel are not acceptable.

G. Provide dampers as necessary for proper adjustment and control of air distribution. All dampers shall have rigid bearings and locking quadrants which allow no rattling. All damper rods shall be marked to indicate the relative position of the damper blade with respect to the rod.

H. Provide 1-inch angle collars for all exposed ducts passing through walls, ceilings, or floors. Anchor collars in position after installation is complete.

I. Provide flexible connections at inlet and discharge connections of fans and air-handling equipment to prevent mechanical noises from being transmitted to connecting ductwork. Isolators shall be Class 0 or Class 1 and shall not exceed 10 inches in length in accordance with UMC, but shall provide at least 1" slack.

J. At all places where inside of duct will be visible through return air grilles, louvers, registers, or diffusers, paint normally visible inside portion of duct with flat black paint.

K. Install hinged access panels on ductwork and housing to provide access to all parts of every automatic damper, fire damper, turning vanes, and all other items requiring maintenance or inspection.

L. Transitions in ductwork, for changing shapes and sizes, shall be made with angles not exceeding 15 degrees per side wherever possible. Indicate any deviation from this on shop drawings or obtain approval from Engineer.

M. Where vertical ducts pass through floors, supporting angles shall be rigidly attached to ducts and to the floor. Angles shall be galvanized and of the approved sizes to properly support the ductwork. Supporting angles shall be placed on at least two sides of the duct.

N. Where horizontal ducts pass through walls and vertical ducts pass through floors, opening shall be tightly sealed to provide a tight seal between duct and opening.

O. All ducts passing through floor slabs shall be provided with 16-gauge galvanized sheet-metal sleeves, grouted in place, which extend two inches above the finished floor. The exposed top end of the sleeve shall be reinforced with a hemmed's slip all around.

P. Maintain fire ratings where ducts penetrate fire rated surfaces and assemblies. Sealants shall be UL listed.

Q. Ensure that work of other trades do not penetrate ducts. Piping, conduits and similar items shall not pass through ducts.

R. Provide supports for horizontal flexible ducts at maximum of 36 inches on center using a minimum 3/4-inch wide flat banding material. Joints and connections in flexible ducts shall be
made with 1/2-inch wide positive locking steel straps. Length of flexible ducts shall not exceed 6 feet.

S. Supply connections to terminal boxes shall be straight for a distance of at least 3 duct diameters.

T. Fibrous glass duct shall not be used where it may violate fire code requirements and shall only be used for return air sound boots.

U. Ductwork Schedule:

Ductwork shall be in accordance with the following:

<table>
<thead>
<tr>
<th>APPLICATION</th>
<th>DUCTWORK REQUIREMENTS</th>
<th>SMACNA PRESSURE CLASS (Pos. or Neg., Note 1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. All Rectangular duct</td>
<td>Lined sheet metal</td>
<td>2&quot;</td>
</tr>
</tbody>
</table>

Notes:

3.02 PERFORMANCE TEST

A. After systems and equipment which is installed but not furnished under Division 15 are put in service, perform operational and performance test to ascertain that the systems and equipment are performing properly.

B. All new ductwork in new systems required to meet pressure class of 3” or above shall be pressure-tested per SMACNA, from fans to terminal devices.

3.03 INSTALLATION OF DUCT LINER

A. Velocities up to 2000 FPM:

1. Duct liner shall be secured with 100 percent coverage of UL listed fire retardant adhesive. In addition to the adhesive, secure liner with mechanical fasteners in accordance with SMACNA to compress the liner and hold it firmly in place. Fasteners shall start within three inches of the leading edge of each duct section and any line transverse joints within the duct section, and shall be spaced no more than 12 inches OC around the perimeter of the duct, except that they need to be no closer than 9 inches to a corner break. Elsewhere, they shall be a maximum of 18 inches OC, except that they shall be placed not more than 6 inches from a cut edge nor 12 inches from a corner break.

2. Install liner so that exposed edges and leading edges are factory coated.

3. Fit liner snugly into corners.

4. Coated or most dense surface of the liner shall face the airstream.

5. Repair liner surface penetrations with UL listed adhesive.

6. Interrupt duct linings at fire dampers and fire doors.

7. Interrupt duct coverings and linings in the immediate area of operation of heat sources in a duct system using electric resistance or fuel burning heaters.
B. Velocities between 2000 FPM and 4000 FPM:
   1. Comply with requirements for velocities up to 2000 FPM except that mechanical fasteners shall be spaced no more than 6 inches OC around the perimeter of the duct, except that they need be no closer than 6 inches to a corner break. Elsewhere, they shall be a maximum of 10 inches OC, except that they shall be placed not more than 6 inches from a cut edge nor 12 inches from a corner break.

3.04 FABRICATION AND INSTALLATION OF FIBROUS GLASS DUCT
   A. Fibrous glass duct is not permitted.

3.05 SEALING OF DUCTS
   A. General:
      1. All ducts shall be sealed with sealant.
      2. Metal surfaces to be joined shall be clean, dry, and grease free.
      3. Apply a heavy brush coat of sealant to the interior metal surface of the duct slip joint, then interlock securely the duct sections and position into place.
      4. Apply a heavy brush coat finish of sealant to the exterior metal surface duct joint or seam covering heads of lock joint screws. Ensure that all voids are completely filled to provide a continuous air pressure sealant.
      5. Where ducts are subject to excessive vibration or mechanical abuse, the exterior joint finish shall consist of a heavy coat of brush applied sealant reinforced with 2-inch wide glass fabric. Press the reinforcing fabric into the wet sealant and cover with a second coat of brush applied sealant.

3.06 GRILLES, REGISTERS, AND DIFFUSER INSTALLATION
   A. In moist areas, install grilles, registers, and diffuser with stainless steel fasteners.
   B. When installing grilles, registers, and diffusers in existing drop ceilings provide additional T-sections as required for a finished opening for the grille, register, or diffuser.

3.07 ACCESS PANELS
   A. Install access panels for inspection, maintenance, and cleaning of all duct turning vanes, before and after all coils, and at other locations where equipment will require service.

3.08 FILTER INSTALLATION
   A. Provide two (2) complete sets of medium efficiency filters for use during construction, testing, and balancing periods, and at end of project.
   B. Provide a complete set of new spare filters after completion of testing and balancing.
   C. A total of three (3) complete sets of filters are required.
END OF SECTION 15880
PART 1 - GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

General Requirements Divisions 0 and 1
Mechanical Division 15
Testing, Balancing, and Adjusting Section 15990
Electrical Division 16

A. The General Conditions of the Contract, Supplementary Conditions, and General Requirements bound herewith are a part of these Specifications and shall be used in conjunction with this Division as a part of the Contract Documents. Consult them for further instructions pertaining to this work. Contractors shall be responsible for, and be governed by, all requirements thereunder.

B. Fire protection Control: control of fire/smoke, and smoke dampers, and smoke control systems, supervisory control, as applicable, are to be controlled by the Simplex Fire protection system. Please refer to UCB standard Section 15400 and Division 16 Electrical. Status of equipment such as air handling units which are tripped by smoke duct detectors are required to be sent to the Campus BAS system, Andover. Refer to Division 16 for wiring requirements of the air handling unit in regards to shutting down the system upon detection of smoke.

D. Electrical wiring in connection with the automatic temperature control system, where shown on the Division 16 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.

E. The automatic temperature control valves, separable wells for immersion sensors, and taps for flow and pressure instruments shall be provided by the Controls Contractor for installation by the Mechanical Contractor under the Controls Contractor's supervision.

G. 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:

1. Providing on-site instruction on the proper interfacing and operation of their equipment

2. Providing the necessary software for use with the balancer's personal computer for interfacing with their control equipment. Where proprietary equipment/gateways are required, this equipment shall be provided for the Balancing Contractor's use.

1.02 SPECIAL CONDITIONS

A. The University uses only Andover Controls for all DDC applications. The University has a
fixed-price agreement with Westover Controls for all Andover products. A multiplier (discount) to the current Andover price list is disclosed in an agreement between UCB and Westover. The multiplier to be used for each project shall be published in an addendum.

B. Currently, there are three approved Controls Contractors allowed to bid on projects utilizing Andover Controls products on the campus:
   Arkay Services
   Rocky Mountain Power and Controls, with UCB pre-approval
   Westover Controls.

These companies competitively bid against each other for the entire controls portion of the project; including design, programming, component purchasing, installation, and startup. The cost of any Andover equipment will be included in their price, along with the cost of all other items for which the Controls Contractor is responsible.

In order to perform programming, the company shall have staff who have been certified by Andover within the last 3 years.

1.03 SCOPE

A. Type of System: The automatic temperature control system shall be Direct Digital Control (DDC/EMCS).

B. All digital and analog control loops shall be microprocessor (DDC) controlled with electronic final control elements, unless otherwise shown on the Drawings.

C. All damper and valve actuators, including those for smoke/fire or smoke dampers, shall be electric.

D. Coordination: This Contractor shall interface with controls furnished with equipment. Provide additional control devices, interlock relays, and signal conditioners when necessary to accomplish specified sequences.

E. The system shall include all interlocks, field devices, wiring, piping, hardware, and software required to provide a complete, functional system in accordance with these specifications and drawings.

F. The Controls Contractor is responsible for layout of control panels, based on the points and the type of controllers depicted in the Contract Documents. The following guidelines shall be used for laying-out the panels.

   1. Each system shall be controlled through a dedicated panel or set of panels for all its points, in order to achieve stand-alone operation. One panel can be used for several systems only if that panel can handle all the points of each system. If more than one panel is used for a system, the panels shall be installed side-by-side.

   2. Provide at least one spare analog and digital input and output per panel.

   3. It is the Contractor’s responsibility to include in his bid the cost of any additional controllers necessary for a complete job, conforming to specifications.

   4. The shop drawings submitted for review shall include the layout of each panel for approval by the UCB HVAC Shop, before installation.
1.04 WORK INCLUDED

A. Furnishing and installing a complete, fully functional control system per this specification and the Construction Documents (drawings, specifications, addenda, etc.).

B. Pre-assembled control panels.

C. Actuators, thermostats, sensors, transmitters, thermowells, instrument air compressors, filter/dryers, gauges, and mounting hardware as applicable.

D. Control valves, dampers, linkages, and mounting hardware.

E. Construction supervision.

F. Startup and performance testing.

G. Demonstration and training.

H. Warranty.

I. Demolition:

When equipment wiring, piping, pneumatics, tubing, telecommunications, cables etc. are abandoned or disconnected, they must be physically removed and disposed of in a professional manner. In cases where the demo could have an adverse effect, or where the scope of demolition is unclear, consult with Shop technician prior to bid submittal. Approval from HVAC/Controls must be given prior to bid submittal for waiver of demolition.

1.05 DEFINITIONS

A. These specifications and drawings require finished work, tested, and ready for operation. Wherever the word “provide” is used, it shall mean “furnish and install complete and ready for use.”

B. "Contractor" shall mean the Controls Contractor performing work under this Division of the Specifications.

C. Where this specification states work to be performed by the words "shall" or "secure" or other performance functions, it shall be assumed that such work shall be performed by this Contractor unless stated otherwise.

D. The word "Mechanical" applies to all work specified herein wherever applicable.

E. The phrase "Architect/Engineer" implies that either may perform the task at hand.

F. The phrases "University Engineer" or "Owner's Representative" implies an assigned representative from the UCB Facilities Management Department.

G. The term “UCB HVAC Shop” or “CU HVAC Shop” implies a representative of the HVAC shop of the University of Colorado Boulder.
1.06 DRAWINGS AND SPECIFICATIONS

A. The mechanical drawings are diagrammatic in character and do not necessarily indicate every required offset, valve, fitting, etc.

B. All drawings relating to this structure, together with these specifications, shall be considered in bidding. 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 arise between 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 5,400 ft.).

D. Drawings are not to be scaled.

1.07 SUBMITTAL DATA AND SHOP DRAWINGS

A. All shop drawings, I/O schedules, point lists, system schematics, sequences of operation, and product data shall be submitted for approval per Division 1, Section 01300.

B. 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 material he intends to furnish and install.

C. Submittal data and shop drawings shall conform to the following requirements:

1. All shop drawings shall be prepared according to the requirements in the most current version of Division 00050 of the University of Colorado at Boulder Construction Standards (Computer - Aided Drafting and Facilities Management Standards). A copy is available upon request. Some of the requirements in this document are listed below.

   a. Shop drawings shall be developed using the most current version of AutoCAD (Autodesk, Inc.) or a version that is 100% compatible with the current version.

   b. Specific information shall be added to the title block of each sheet to aid in the UCB archiving/retrieval process for construction documentation. A copy of the specific requirements is available from the Facilities Management CAD Office.

2. All final or as-built shop drawings for temperature control will become permanent record documents and shall be prepared on size (36” x 24”). Plain paper and CAD files on a standard digital media (i.e., CD, Disk, Thumbdrive).

3. All submittal data shall be bound or in a three-ring hard cover binder as appropriate. All the information shall be indexed and tabbed with reference to the specific section of these specifications. Product data sheets shall be marked with the tag number as indicated on the drawings. All options, ranges, and voltages (which will be provided) shall be clearly indicated on each product data sheet.

4. The format for submittal information shall be as follows:

   a. Control drawings and building plans shall be CAD-prepared drawings. Drawings that cannot represent the total information on one drawing (i.e., a building plan)
shall be noted with appropriate match lines, cross references, and key plans.

b. The control drawing package shall consist of:

1. A title sheet listing the project title, and index of all the control drawings, and a network schematic showing all DDC Panels and network connections on the project. The network diagram shall indicate all communication devices. The following information shall be provided for each network device:
   a. Location (room number)
   b. Power source (breaker panel I.D. and breaker number)
   c. Panel software name and serial number
   d. Type of controller: The network diagram shall depict the actual connection sequence of the devices, including distances between devices, type of wire used and serial number of controller.

2. The second drawing in the control package shall consist of actual installation details, a valve schedule, and a damper schedule. The valve schedule shall have entries for: Valve tag, system served, quantity type (3w, 2w), GPM, actual CV, actual pressure drop, size, close off rating, spring range, part number, and manufacturer. The damper schedule shall have entries for: Damper tag, system served, quantity, type (PB, OB), CFM, size, actual pressure drop, quantity of actuators, spring range, damper model number, and, and actuator model number.

3. Subsequent drawings shall depict complete systems (air handler, chiller, boiler, etc.). The drawing shall show the system schematic, all wiring of the DDC controller, all wiring of field devices, starters, and connections to equipment. Each drawing shall have a bill of materials and a sequence of operation.

4. Floor plans shall depict equipment location, sensor, and panel locations. The duct and space static pressure monitor points shall be shown.

D. Submittal data and control drawings for all equipment and systems shall be submitted (per Section 01300) 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 which include size, Cv (valves), closeoff pressure rating (valves), [at 0 psi for N.C., two-way valves; at 20 psi for N.O., two-way valves; and at 0 psi between ports A and B for three-way valves], gpm or cfm, spring range of the actuator, quantity of actuators (dampers), and actual pressure drop for each item.
   b. Technical specification data sheets of each system component and device which includes all data needed to show compliance with this specification.
2. **60 Days or Less After Notice to Proceed:**

   a. Control drawings with detailed piping and wiring diagrams; system schematics with controlled/monitored device locations; and connections to all enclosures, panels, and controllers, including a bill of material for all systems. Ladder-type electrical schematic diagrams shall be provided for all interlock wiring with magnetic starters, control relays, safety devices, etc.

   b. Sequence of operation for all controlled and monitored points for each system. Sequence shall be on same drawing as corresponding system schematic.

   c. A complete input/output schedule for each DDC panel and dedicated controller including point name (the same name to be used in software), functional description of each point, point type, complete wiring diagram for each point from controller to input or output device, field device type, and location, etc.

   d. Communications cable schematic showing panel and controller locations, controller power source, and all interconnecting data and communication conductors. Arrange the panels in the order in which they will actually be interconnected in the field.

   e. On control drawings show sensor, panel, and equipment locations by referring to room number. VAV boxes shall be shown indicating room number that has sensor or Smart Stat connected to controller. Also indicate, in a matrix-diagram, each room served by that zone.

   f. DDC network configuration complete with interconnection diagrams for all peripheral devices, batteries, power supplies, etc.

   g. A bill of material shall be shown on each drawing. The bill of material shall include the device code used on the controls drawings, description of the product, name of the manufacturer, complete model number, measurement range (if applicable), and quantity.

   h. Identify the electrical power source for each DDC panel by location (room number), panel designation, and breaker number. Include the identification on the drawing and at the DDC panel itself. (Dedicated Power Source.)

   i. Submittals shall also include a complete test plan and procedures. Test plan shall be coordinated with the (Section 15990) Testing, Adjusting, and Balancing Contractor. The test plan shall delineate the methods of testing and recording the results of the point by point verification and calibration of the hardware and the testing and tuning of the software. The test plan shall include a listing of all hardware points with columns for calibration, test and certification. There shall be a similar record for software.

3. **14- Days Prior to System Demonstration and Acceptance Testing:**

1.08 PROJECT RECORD DOCUMENTS

   A. Upon completion of the installation, provide a complete set of record (as-built) drawings on digital media. The content and format of the drawings shall be as described previously.
B. Prior to Final Completion of the installation, prepare complete Operation and Maintenance manuals. Refer to Division 1, Section 01300, and Division 15, Section 15050, for requirements. Also provide one set of digital media containing all CAD-prepared drawings. The file format shall conform to the requirements in the most current version of Division 00050 of the University of Colorado at Boulder Construction Standards (Computer - Aided Drafting and Facilities Management Standards). A copy is available upon request.

1. Temperature control diagrams including an explanation of the control sequence of each system along with the following instruction wherever applicable.

   a. Emergency procedures for fire or failure of major equipment.

   b. Normal starting, operating and shutdown.

   c. Summer or winter shutdown.

3. A reduced copy of the controller drawing, listing all input and output points with functional descriptions, shall be placed inside the door to each controller enclosure in a plastic pocket attached to the door. The sheet shall be laminated. One sheet is required for each controller housed in the enclosure.

1.09 DEMONSTRATION AND TRAINING

A. This Contractor shall provide a minimum of 4 hours of system and control demonstration time at the job site for the Owner's personnel.

B. This Contractor shall provide at least 4 hours of classroom training sessions at times and location as directed by the Owner. The training shall focus on design, operation, and maintenance procedures of the products installed.

C. The instructor(s) for the above sessions shall be employee(s) of the Control Contractor whose primary function is customer training and applications support.

D. A minimum of two copies of the most current control drawings shall be provided to the UCB HVAC Shop before the training begins. These shall be in addition to the drawings to be provided under Paragraph 1.08, if the O&M Manuals have not been turned in to the Architect before the time of the training.

E. The training may be phased. The Owner may elect to conduct training and demonstration in two- to four-hour sessions over the life of the warranty period. All instructional material shall be available to each employee at each training session up to a maximum of ten (10) individuals.

F. All demonstration and training sessions shall be coordinated with the University HVAC supervisor.

1.10 WARRANTY

A. The warranty period shall begin as authorized by the Owner's representative in writing. Authorization will not be given before the following conditions are met. Under no conditions will the Controls Warranty begin before the starting date of the General Warranty for the overall project.
1. Completion of the tests required in Paragraph 3.09 and correction of all problems discovered during the testing process.

2. Completion of all punch list items that are the direct responsibility of the Controls Contractor.

3. Conduction of a preliminary training session for personnel of the HVAC Shop of the Department of Facilities Management. The training shall consist of an orientation session at the job site to familiarize the personnel with the location and type of controlled equipment and controls on the project, a discussion of the control sequences, and a review of the control drawings. A copy of the as-built control drawings shall be provided to the HVAC Shop at this time as well. Other, more detailed, training sessions (such as for review of the control programs) may be held at a later date during the warranty period.

4. Completion and distribution of the as-built control drawings, including correction of all items noted by the Owner and Engineer after review of the documents.

B. The control system shall be guaranteed to be free from original defects in material and workmanship and in software design and operation for a period of one year after completion of the contract. The Contractor shall provide the necessary skills, labor, and parts to assure that all system and component failures are promptly repaired.

C. 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.

D. During the warranty period, the Contractor shall maintain a backup of all software installed in the system. The backup shall be updated monthly or whenever the Contractor makes a change to the software. A reload of backup software into the system shall be performed by the Contractor immediately upon notification by the Owner. The reload shall be free of charge.

E. The Contractor shall optimize all control software and tune all PID loops to assure acceptable operating and space conditions and peak energy efficiency. This shall include changes needed to optimize operation of the systems even if not explicitly described in Control Strategies.

F. At the end of the warranty period, the Contractor shall supply updated copies of the latest versions of all project record documentation as described in Paragraph 1.08, Project Record Documents. This includes final updated drawings, software documentation, and electronic media backups that include all changes that have been made to the system during the warranty period.

G. Coordinate with UCB BAS administrator or, if unavailable, the UCB HVAC Shop in advance before connecting new DDC control system to campus network.

H. Once the building DDC is connected to the network, the Contractor shall notify a representative of the UCB HVAC Shop before and after performing any work on the DDC components, and report any changes made.
During the warranty period, University personnel shall make a reasonable effort to determine if a problem is due to the control system or some other source not the responsibility of the Controls Contractor, before requesting warranty service. However, if the Controls Contractor is called out and determines that the problem is not due to the controls system or other building components, the Contractor shall not charge the University for a service call if it is determined that the source of the problem is not his responsibility.

1.11 QUALITY ASSURANCE

A. 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.

B. All products used in this installation shall be new and currently under manufacture. Spare parts shall be available for at least ten (10) years after completion of this contract.

C. All DDC components shall be compatible with the rest of the DDC network at the beginning of the warranty period.

1.12 OWNERSHIP OF PROPRIETARY MATERIAL

A. All project developed hardware and software shall become the property of the Owner. 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 other documentation.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

A. Regardless of the manufacturer, the specific products and design chosen shall meet the requirements of this specification.

B. Use the manufacturers listed below or in the description of the devices:

1. Control Wiring
   a. TVSS surge protectors
      1. Leviton 51010WM or Kelle HSP-121BT IRU or pre approved equal.
   b. Infinet Communication Wiring
      1. Windy City, Belden or equal: 24 gauge stranded, single twisted pair, shielded, low capacitance (less than 12.5 pico-farads/ft), 78% velocity of propagation.
2. Control Valves
   a. Pressure Independent Belimo control valves.

5. Local Control Panels
   a. Kele RET Series (color: orange)
   b. Panel locks utilize standard 2050 keyed locks

9. Solid-State Sensing Devices
   a. Room Thermostats: Andover Smart Sensors for DDC applications, will be LCD Type.

10. Transmitters - Solid State
    b. Water differential pressure transmitters
       1. Rosemount series 3051, Foxboro 841 series or pre-approved equal
       2. with isolation / bypass manifold

11. Auxiliary Devices - Electric
    1. Current Sensors:
       a. Split Core (clamp on) Neilsen-Kuljian or Kele SCS series or SD100 with led or pre-approved equal

12. Actuators - Electric (current or voltage only)
    a. Siemens
    b. Belimo, Johnson, or Honeywell

15. Identification
    a. Wire and pneumatic tubing shall be labeled and reflect on drawings.
       1. BRADY or pre-approved equal.

16. Fiber Optics - Networking
    a. Translators
       1. Andover Infilink, Model I2_210 series

2.02 AIR TUBING AND CONTROL WIRING

A. Air tubing shall be either copper (ACR) in exposed areas, or Type FR polyethylene (within conduit). Soft copper is acceptable in concealed areas.

B. 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.
C. All insulated wire to be copper conductors, UL labeled for 90°C minimum service.

D. Raceway for both wiring and pneumatic tubing shall be per Division 16.

E. The Contractor shall provide and install:

1. TVSS surge protectors for incoming 120 VAC power to all controllers. Surge protectors furnished shall be UL 1449 listed.

2. Transient voltage protection for all twisted pair and coaxial data communication lines between controllers. Provide all required repeaters to assure signal integrity.

2.03 CONTROL VALVES

A. Shall be two-way or three-way type for two-position or modulating service as scheduled, shown on drawings, or as specified in Sequence of Operation.

B. Closeoff (differential) Pressure Rating: Valve actuator and trim shall be furnished to provide the following minimum closeoff pressure ratings:

1. Water Valves:

   a. Two-way - 150% of total system (pump) head.

   b. Three-way - 300% of pressure differential between ports A and B at design flow or 100% of total system (pump) head.

C. Water Valves: 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, except where stated otherwise.


       b. Two-way modulating service: Pressure drop across the valve in a wide-open position, with full flow through the valve, shall be equal to 50% of the available pressure differential between the mains, with a minimum of 4 psi.

       c. Three-way Modulating Service: Pressure drop across the valve in a wide-open position, with full flow through the valve, shall be equal to twice the pressure drop through the heat exchanger (load), with a 3 psi minimum.

3. Construction:

   a. Valves 1/2" through 2" shall be bronze body or cast brass ANSI Class 250, spring loaded, Teflon or ring packing, and stainless steel stems. Two-way valves to have replaceable composition disc.

   b. 2-1/2" valves and larger shall be cast iron ANSI Class 125 with guided plug, stainless steel stems and Teflon or ring packing.

4. Water valves shall fail as specified in the Control Sequences section.
2.05 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 sub-panels, UL-listed, wall-mounted or free-standing as indicated on plans.

B. Panels shall house the microprocessor, modem, communication interface, all controllers (except those required at VAV boxes), relays, indicators, clocks, switches, pilot lights, override timers, etc., to allow quick access for adjustment and troubleshooting.

C. Manual switches and indicating devices shall be flush-mounted on panel face.

D. Internal components shall be securely mounted on removable sub-panels. Each component shall be individually labeled with function and device identification, as shown on control/interlock shop drawings.

E. Interconnections between internal and face-mounted devices pre-wired with labeled conductors neatly installed in plastic troughs and/or tie-wrapped. Terminals for field connections shall be UL-listed for 600-volt service, individually identified per control/interlock drawings, with adequate clearance for field wiring. Control terminations for field connection shall be individually identified per control drawings.

F. Provide on/off power switch with over-current protection for each controller and a 1-1/2” main air gauge if applicable for control pressure sources to each local panel.

G. All control panel locks shall conform to the University standard lock for control cabinets. Contractor shall give the keys to the HVAC Shop at completion of training.

2.07 VAV Box Controls:

1. Electric VAV box controls shall be configured to meet the specified sequence of operation. All hardware necessary to meet the sequence of operation shall be provided. Coordinate with supplier of VAV box. (No pneumatic)

2. The Controls Contractor shall check, calibrate and setup all VAV box controllers, and be responsible for their operation. This applies whether the controls are provided by the Mechanical Contractor as part of the VAV box or the Temperature Controls Contractor.

3. Provide assistance to the Test and Balance Contractor in making adjustments to the controls.

2.10 SOLID-STATE SENSING DEVICES

A. Space (room) sensors shall be surface-mounted. Space sensors shall have an exposed sensing bead mounted behind a suitable protective enclosure. Sensors mounted to the back of a blank junction-box cover are not acceptable.

2.11 TRANSMITTERS - SOLID STATE

A. Transmitters shall have sensing elements suitable for the application.
1. Provide averaging elements for mixed and discharge-air temperature applications.

B. Transmitters shall have direct-acting, linear output signal compatible with controller, with full scale accuracy of ±1% or better. Zero and span shall be field-adjustable.

1. Transmitter sensing elements shall withstand continuous operating conditions plus or minus 50% greater than calibrated span without damage. Air pressure transmitters shall have a minimum overpressure rating of 10” W.C.

4. Water differential pressure transmitters for flow measurement shall have stainless steel diaphragm construction, proof-pressure of 150 psi minimum, and the accuracy shall be ±0.25% of calibrated span. Overrange limit (AP) and maximum static pressure shall be 3,000 psi. Transmitter shall be complete with 4-20 mA output, required mounting brackets, and five-valve manifold. Provide quick-connects on high- and low-pressure lines. Mount in a location accessible for service.

5. All differential pressure transmitters for water service shall have a differential pressure gauges mounted at the point of application. Provide tees with 1/2” size, quick-connect fittings (Hanson fittings) on the high- and low-pressure lines.

6. All differential pressure transmitters for air shall have panel-mounted differential pressure gauges. Provide tees with removable caps on the high- and low-pressure lines.

C. Transmitter Span Selection:

1. The span of each transmitter must be carefully selected by the Contractor. Typical spans are shown above in Section 2.11 B. General selection procedures are given below.

2. The selection of the appropriate transmitter span is a crucial step in the design of a functional control system. In general, the span of the transmitter should match the normal ranges of the variable to be controlled. For example, the measurement of system pressure where the normal operating pressure is 20 psi and the peak system pressure is 35 psi, the correct span selection would be 0 to 50 psi. A 0 to 100 psi span, while workable, would be operating in the lower third of the span under normal conditions. This decreases the controller’s ability to detect small changes in pressure. Ideally, the control setpoint should be at approximately 75% of the transmitter’s span. However, expected maximum and minimum values encountered during normal operation of the system must be accounted for.

3. Particular attention to transmitter span must be taken with airflow monitoring stations. The recommendations of the airflow-monitoring station supplier must be followed. Be sure to include an altitude correction factor.

4. Transmitters found operating in the lower 33% or upper 20% of their span, during normal conditions of system operation, shall be replaced, at the Contractor’s expense, with units having an acceptable span.
A. Flow-proving or equipment-operating-status switches shall be paddle, differential-pressure, or current-sensing types as indicated below.

1. Paddle-type switches (water service only) shall be UL-listed, SPDT snap-acting with pilot duty rating (125 VA minimum). Adjustable sensitivity with NEMA 1 enclosure unless otherwise specified.
   a. Paddle switches shall be used to prove flow through boilers, chillers, and other applications where actual flow must be confirmed to protect equipment, or for other safety reasons.

2. Differential-pressure-type switches (air or water service) shall be UL-listed, SPDT snap-acting, pilot duty rated (125 VA minimum), NEMA 1 enclosure, with scale range and differential suitable for intended application, or as specified.

3. Current-sensing-type sensor shall be used to prove equipment operation in those applications. Current-operated switches shall be self-powered, solid state clamp on with adjustable trip current and led. The switches shall be selected to match the current of the application.

B. Damper end-switches shall be UL-listed, line voltage SPDT snap-acting, pilot duty rated (125 VA minimum)

C. Control relays shall be UL-listed, plug-in type with dust cover and a "energized" indication light. Contact rating, configuration, and coil voltage suitable for application. Provide diodes to limit back EMF on all DC relays and MOVs on AC. IDEC, or approved equal.

D. Time-delay relays shall be UL-listed, solid-state, plug-in type with adjustable time delay. Delay shall be adjustable plus or minus 200% (minimum) from setpoint shown on plans. Contact rating, configuration, and coil voltage suitable for application. Provide NEMA 1 enclosure when not installed in local control panel.

E. 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.

F. Manual control switches shall be UL-listed for use in NEMA 1 enclosures with contact arrangement and rating suitable for application. Bat handle or knob actuator with nameplate clearly identifying function of each switch position.

G. Override timers shall be spring-wound, line-voltage, UL-listed, with a contact rating and configuration as required by the application. Provide 0 to 6-hour calibrated dial unless otherwise specified; suitable for flush mounting on control panel face, located on local control panels or where shown on plans. Timers shall not be provided with a hold or override feature.

2.13 ACTUATORS - ELECTRIC

A. Electric actuators are acceptable. HVAC Shop will pre-approve.

B. Actuator size and rating shall be suitable for intended application.
1. Damper actuators shall be selected per manufacturer's recommendations to provide sufficient close-off force to effectively seal damper. Modulating actuators shall provide smooth modulating control under design flow and pressure conditions.

2. Valve actuators shall provide tight close-off at design system pressure. Modulating actuators shall provide smooth modulation at design flow and pressure conditions.

3. Provide feedback transmitters and/or end switches where specified.

4. Actuators shall be specified per the Control Sequences section. Actuators relying on batteries are not acceptable.

2.14 SAFETY CONTROLS

B. Smoke Detectors: Specified to be furnished under Division 16 and mounted by this Contractor. This Contractor shall install smoke detectors for HVAC systems where called for in sequence of operation, installed per NFPA, IBC, and/or local codes. All smoke detectors shall be UL-listed for intended service. Detector shall provide isolated SPDT control interlock contact rated for pilot duty service (125 VA minimum), as well as separate alarm and trouble contacts suitable for remote monitoring by Division 16.

1. Smoke detectors located in air handling units or ducts shall be complete with duct-mounting accessories as recommended by manufacturer.

2. This Contractor shall be responsible for all smoke detector interlock wiring to HVAC equipment.

3. Wire smoke detectors to shut down the equipment in 'hand' and 'automatic' mode. Automatic operation: Wire one set of contacts directly to the fan starter circuit and the other to an alarm input as a dry contact.

PART 3 - EXECUTION

3.03 CONTROL WIRING

A. All control and interlock wiring shall comply with the national and local electrical codes and Division 16 of these specifications.

B. All Class 1 (line voltage) wiring shall be UL-listed in approved raceway per NEC and Division 16 requirements.

C. All low-voltage wiring shall also be in conduit, unless pre-approved. Conduit type, sizing, and installation requirements shall conform to NEC and Division 16.

D. All cable conductors shall be minimum 18 AWG TFFN stranded. Cables shall be shielded when so recommended by the manufacturer. Line-voltage power and interlock wiring conductors shall be sized in accordance with NEC.

E. All wire insulation shall be color-coded and labeled for ease of identification.

F. All control wiring shall be installed in a neat and workmanlike manner parallel to building

Duane Rm C119 – C127 Lab Remodel 15950-15 Temperature Controls
PR 004792 07/07/10
lines, with adequate support. Install without splices.

G. This Contractor shall terminate all control and/or interlock wiring and shall maintain updated (as-built) wiring diagrams with terminations identified at the job site.

H. Flexible metal conduits and liquid-tight, flexible metal conduits shall not exceed 3’ in length and shall be supported at each end. Flexible metal conduit less than 1/2” electrical trade size shall not be used. In areas exposed to moisture, liquid-tight, flexible metal conduits shall be used.

I. Low-voltage (24V or less) AC or DC wiring shall not be run in conduit containing 120 VAC wiring.

J. Infinet Communication Wiring:
   1. Splicing is not acceptable.
   2. Label all junction boxes. Labels provided by the UCB HVAC Shop
   3. All infinet communication wires shall be run in 1/2’ conduit and must be dedicated.
   4. Plenum-rated cable not in conduit is not allowed unless pre-approved by UCB HVAC Shop. If permitted, it shall be installed as noted in 3.05 Installation, below.

K. Label all temperature control wiring and pneumatic tubing junction box covers with an adhesive backed water proof flexible mylar label with the letters T/C using an orange background with black letters to differentiate them from junction boxes installed by the electrical and fire alarm contractor. The labels shall be 3” by 3”.

L. Use proper size wire nut type connectors on all sensor wiring. Crimp connectors are not allowed on sensor wiring.

3.04 ANDOVER CONTROLLERS

A. NET CONTROLLERS
   1. The Controls contractor shall follow the specifications shown in the Andover Hardware Installation Guide unless stated otherwise herein.

   2. All Andover DDC controllers shall be connected to the existing university Andover network.

   3. Operating Andover controllers that are not connected to the university Andover network shall not be accepted.

   4. Andover Netcontrollers shall be installed in a KELE RET2826 OR, RET4230 OR cabinet.

   5. Ensure proper shield grounding is applied on the RS485 connections.

   6. Install Minimum 650VA UPS in Separate Panel to Feed net Controller. Manufacturer: APC 650 VA

B. ALL FIELD BUSS CONTROLLERS
   1. The Controls contractor shall follow the specifications shown in the Andover Hardware Installation Guide unless stated otherwise herein.
2. Controller Power shall have a separate disconnect (or fuse) for each controller.

3. All controllers will be connected for 24VAC, or 120V.

4. All digital outputs will have a relay to operate the device

5. Only Two pair of communication wires shall be connected to the communication terminal on the controller.

C. Expansion Modules: Andover DDC

1. The Controls contractor shall follow the specifications shown in the Andover Hardware Installation Guide, unless stated otherwise herein.

2. The use of Andover DCC expansion Modules shall be pre-approved by the University HVAC Shop.

3. Expansion modules greater than one can be used only with authorizations from HVAC shop.

D. Infilink Installation

1. The Controls contractor shall follow the specifications shown in the Andover Hardware Installation Guide unless stated otherwise herein.

2. Use an Infilink I2200 to connect controllers in a building together.

3. Use an Infilink I2210 to connect controllers between buildings.

4. When Infilink I2210s are required, Controls Contractor shall supply two Infilinks.

5. To series Infilinks together communication wires shall be connected to Port 1.

6. Only 2 pair on port 1.

7. Only 1 pair on ports 2-5

8. Ensure proper shield grounding is applied.

3.05 INSTALLATION AND SETUP REQUIREMENTS

A. Metal Oxide Varistors (MOV) on Outputs:

1. Install MOVs across all inductive loads being switched by an output from an Andover controller. This includes all relay coils, solenoid coils (E/Ps), etc. Install the MOV across the coil of the device. Use an MOV rated for the voltage of the coil.

B. Grounding the Shield on Communication Wiring:

1. The shield on communication wiring should be grounded in only one location per building. The connection point for the shield wire on LCX and SCX panels is not
grounded. Connect the shield to this terminal on each panel just for consistency. The standard grounding location for each building shall be at the Infilink (see 3.03,C).

2. Tape any exposed shield wiring so that it cannot short-out on the Infilink housing or other source.

C. Splices in Communication Wiring:

1. Not allowed.

D. Standard Nomenclature for Valve and Damper Position Description:

1. Set up the conversion table for each valve or damper control output so that 100% OPEN = open and 0% OPEN = closed.
2. For mixed-air dampers, 100% OPEN = fully open outside air damper and closed return damper.
3. For face and bypass dampers, 100% OPEN = face damper fully open and bypass damper closed. This would apply to both a face and bypass damper for a heating coil, which is normally open to the coil; and to a face and bypass damper for an evaporative cooling pad, which is normally closed to the pad.

E. Setup of Setpoints

1. The Setpoint Box in the CX and Cyberstation software shall be checked for all numerical points to be used as non-calculated setpoints or any type of constant value point.

F. Setup of Inputs

1. THRESHOLDS: The threshold shall be filled-in with the following value. Where a particular application is not listed, enter a reasonable value based on the application.

   Temperature (Space, OAT, MAT, DAT, RAT, etc.) 0.1°F
   Space Static Pressure 0.01”W.C.
   Duct Static Pressure 0.2W.C.
   Relative Humidity (Space, OAT, MAT, DAT, RAT, etc.) 1%

G. Provide thermal-conducting compound for all sensors in thermowells.

H. Protect all points where pneumatic tubing or sensing elements come in contact with metallic surfaces by enclosing the tubing or sensor with a section of poly-tubing. This applies at such locations as duct penetrations, points where tubing is attached to ductwork, points where sensing elements come into contact with or are attached to coil frames, etc.

I. Seal all penetrations into ductwork or air-handling units with duct sealant or other means to make the installation airtight.

J. Mount all control valves so that the stem is vertical. Prior approval is required from the UCB

Temperature Controls 15950-18 Duane Rm C119 – C127 Lab Remodel 07/07/10 PR 004792
Averaging-type sensing elements shall be firmly supported in ductwork or air-handling units using 1/2” EMT or other auxiliary support.

For all applications utilizing outside-air, relief, isolation or exhaust dampers; install an E/P to automatically close the dampers when its associated air-handling unit or fan is turned off. The E/P shall be wired (not thru software) so the damper is closed when the fan or AHU is turned off with the starter switch in the OFF or AUTO position (or in either the Bypass or VFD modes when a variable-frequency drive is used.) The dampers shall open, or return to automatic control, as required, when the fan or AHU is turned on, whether the started switch is in the HAND or AUTO position (or in either the Bypass or VFD modes when a variable-frequency drive is used.)

Layout of Points on Controllers: The points on controllers shall be coordinated for approval by the UCB HVAC Shop

Plenum-Rated Cable not in conduit:

1. Ten (10) feet above finished floor, where possible.
2. Cabling shall be neatly run at right angles and be kept clear of other trades work.
3. Cabling shall be supported at a maximum of 4-foot intervals utilizing ‘bridal-type’ mounting rings anchored to ceiling concrete, piping supports or structural steel beams. If cable sag at mid-span exceeds 12-inches, another support shall be provided. Mounting rings shall be designed to maintain cables bend to larger than the minimum bend radius (typically 4 x cable diameter).
4. Cabling shall not be attached to or supported by existing cabling, plumbing or steam piping, suspended ceiling supports or electrical conduit. Additionally, cabling shall not be laid directly on the ceiling grid. Cable may follow ductwork routing and may be fixed to the top or side of the ductwork.
5. To reduce or eliminate Electro-Magnetic Interference (EMI), the following minimum separation distances for ‘Free-Air’ cabling installations shall be adhered to: - Twelve (12) inches from power lines of less than 5kV.
- Thirty-nine (39) inches from power lines of 5kV or greater.
- Thirty-nine (39) inches from high voltage transformers and motors.
6. All cable shall be free of tension at both ends. Nylon strain relief connectors shall be provided at each device and junction box where cables enter. In cases where the cable must bear some stress, Vellum type grips may be used to spread the strain over a longer length of cable.
7. Cable manufacturers minimum bend radius shall be observed in all instances. Care should be taken in the use of cable ties to secure and anchor the station cabling. Ties should not be over tightened as to compress the cable jacket. No sharp burrs should remain where excess length of the cable tie has been cut.
8. All exposed vertical cable extensions to devices located below the finished ceiling shall be in conduit.
9. Provide protection for exposed cables where subject to damage.
10. Install wiring in a sleeve where wiring passes through walls and floors. Maintain the fire rating (if any) at all penetrations.
11. Network data cables shall be identified with permanent labels installed every 12 feet (3.7m).
12. Exposed splices shall not be permitted. Cable shall be installed without splices between terminal points.
13. Maintain a minimum of 6 inches (152mm) from high temperature equipment (e.g., steam
pipes, flues, etc.).

14. All mechanical room comm lines will be run in conduit - no free air cable run allowed.

3.06 CONTROL DEVICE LOCATIONS

A. Room thermostats and sensors shall be mounted 5'-0" above finished floor unless otherwise noted on drawings.

B. Outdoor-temperature-sensing bulbs and sensors shall be located generally on a northern exposure, in a shaded location, preferably in a place where there is a continuous stream of outside air over the sensor, unless shown otherwise. Provide sun shield for temperature sensors. All locations shall be pre-approved by the Owner’s Representative.

C. Remote control devices not in local panels shall be accessible for adjustment and service - below 6' above finished floor whenever possible.

D. Locate all control devices wired by the Electrical Contractor under Division 16.

3.07 CONTROL PANELS

A. Refer to Part 2 - Products for construction details.

B. Field wiring shall be in conduit.

C. Panels shall be wall-mounted at eye level for accessibility and service.

D. Local control panels shall be located within same room of system served otherwise location shall be approved by UCB HVAC Shop.

E. Control devices shall be installed in panels. Electro pneumatic switches (EPs) and relays shall be grouped together and installed in a single, central panel located next to the enclosure housing the associated controller. Remotely-mounted relays and EPs are not acceptable and PE switches are allowed unless preapproved by HVAC Shop.

F. Electrical power for each panel shall be from a dedicated circuit. For retrofit applications, where connecting to existing control-power wiring, it is Contractor's responsibility to verify that the power source is from a dedicated circuit. Side-by-side panels may be served by the same circuit, with separate disconnect for each controller. Notify the Owner if the source is not from a dedicated circuit. Where available in a building, utilize emergency-power circuits for all controls.

G. Mount panels on solid, non-vibrating surfaces. 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.

3.08 IDENTIFICATION

A. All control equipment shall be clearly identified by HVAC shop drawing designation code and a functional description as follows:


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 panels: 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.

5. All wiring, including wiring within factory-fabricated panels, shall be labeled within 2" of each termination with DDC point number/controller number or other descriptive information.

6. When connecting DDC controllers, terminating of inputs and outputs shall be color coded as follows:
   120VAC shall be black = hot, white = neutral, green = ground
   24VAC shall be (+) black with white tracer, (-) white with black tracer
   24VDC shall be (+) red with black tracer, (-) black with red tracer
   All pneumatic tubing shall be labeled within 2" of termination with a descriptive identifier.

7. All metal and plastic engraved labels shall be secured with chains, nylon tie-wraps, or rivets. Permanent adhesive is acceptable only when mechanical fasteners would damage the labeled equipment.

8. All switches, relays, and panel components shall be labeled.

9. Labels shall not be mounted on removable surfaces, such as cable tray covers.

3.09 PROTECTION

A. The Contractor shall protect all work and material from damage by his work or workmen, and shall be liable for all damage thus caused.

B. The Contractor shall be responsible for work and equipment until finally inspected, tested, and accepted. He shall protect work against theft, injury, or damage; and shall carefully store material and equipment received on site which is not immediately installed. He shall close open ends of work with temporary covers or plugs during storage and construction to prevent entry of foreign objects.

3.10 CLEANUP

A. At the completion of work, all equipment on the project shall be checked and thoroughly cleaned including under equipment and any and all other areas around or in equipment provided under this section. Clean exposed surfaces of all equipment and panels of all grease, plaster, or other foreign material. Remove all stick-on labels and clean surfaces.

B. At the completion of the work, remove from the building, the premises, and surrounding streets, alleys, etc., all rubbish and debris resulting from this project, and leave all equipment spaces clean and ready for use.

C. At the completion of work, all equipment furnished under this contract shall be checked for paint damage, and any factory finished paint that has been damaged shall be repaired to match
the adjacent areas. Any metal cabinet, jacket, or enclosure that has been deformed shall be replaced with new material and repainted to match the adjacent areas.

3.11 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 his 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 HVAC Shop.

C. The Contractor shall provide at least two men equipped with two-way communication, and shall demonstrate 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 setup, 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 shall observe, direct and review these tests on site at controller panel / field location.

1. The system software shall be complete such that each control loop shall function as specified in the Sequence of Operation and proper PID tuning. This Subcontractor shall be required to furnish the software program and test the operation of every control loop.

2. After all field connections have been made and control power is available in the control panel, the Owner's representative shall be notified and the control system shall be energized. Any required reloading of the software shall be performed and commissioning of the mechanical system, automatic temperature control system, and other connected systems shall commence.

3. This Subcontractor 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. Control performance criteria is specified in the sequence of operations shown on the drawings and/or the specifications.

D. Operational logs for each system which indicate all setpoints, operating points, valve/damper positions, mode, and equipment status shall be submitted to the Architect/Engineer. These logs shall cover a 24-hour period and have a sample frequency of not more than 10 minutes. The logs shall be provided in printed and digital media formats.

E. Control loops shall maintain setpoint within the following tolerances:

<table>
<thead>
<tr>
<th></th>
<th>Tolerance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air Pressure</td>
<td>0.5&quot; w.g. range 0-6&quot; w.g.</td>
</tr>
<tr>
<td></td>
<td>0.01&quot; w.g. range -0.1 to 0.1&quot; w.g.</td>
</tr>
<tr>
<td>Airflow</td>
<td>100 cfm</td>
</tr>
<tr>
<td>Temperature</td>
<td>1.0°F</td>
</tr>
</tbody>
</table>
Humidity 5% RH

Fluid Pressure 2.0 psi range 1-150 psi
2.0" w.g. range 0-50" differential pressure

Control loops that do not meet the above tolerances shall be re-tuned.

F. 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. 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.

G. After the system has operated properly for 90 days following startup of the final component of the heating and air conditioning systems, as-built copies of the software on electronic media and a printed copy shall be submitted to the Owner for permanent record purposes. Any software upgrading or enhancements to improve the system operation or as required for proper operation of the system during the first year of operation is the responsibility of this Subcontractor. When changes are made to the software, the HVAC Shop must approve. The Contractor shall immediately provide updated copies of the files.

3.12 CONTROL EXECUTION - GENERAL

A. This Contractor shall provide all required control interface relays, including Control Contactors for single-phase pumps and fans (generally 1/3 hp or less) and any isolation relays required for interface to three-phase magnetic starter control circuits. All power wiring to single-phase motors and three-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. Accessibility: Install all control devices in readily accessible locations as defined by Chapter 1, Article 100, Part A of the NEC.

D. Program as follows: Initially set times so as not to exceed six starts per hour. On two-speed motors, provide a 20-second adjustable time delay when transferring from high speed to low-speed, to allow the load to decelerate.

E. All set points, operating points, sequencing ratios, PID tuning parameters, and all other numeric and digital constants shall be adjustable by the user (only with a high-level password) from the graphic. To change these values, the user shall not be required to modify program code, recompile, or download.

F. Hand-Off-Auto switches 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.

G. System logs, trend logs, and event-initiated logs shall be set up to provide historical and real-time monitoring of system operation. Logs shall be grouped by equipment.
H. Safety Shutoffs - Boilers and Chiller: Boilers and/or chiller will be provided with all required safety controls as specified in Division 15. Safety trip shall shut down respective boiler or chiller directly and shall be annunciated at the Central Work Station.

I. Safety Shutoffs - General: All safety shutdowns of electrical equipment shall be hardwired. All shutdowns shall occur directly through interconnection of contacts on the safety device with the controlling circuit of the electrical equipment. Safety shutdowns through software are not acceptable. Interposing relays may be used only with prior approval of the Engineer and Owner's Representative when no alternative exists.

J. This Contractor shall notify the University two weeks in advance of when connection to the BAS network will be beneficial to the system so the work can be scheduled.

3.13 WORKSTATION PROGRAMMING

A. The University has multiple workstations networked across the campus. The main file server is located in the Facilities HVAC office in the Stadium Building. All graphics, alarms, trend logs, and schedules shall be accessible from any workstation and be fully integrated with existing menus.

B. Graphics:

1. The system shall be programmed by the Controls Contractor to provide a color graphic for:

   a. Opening screen graphic showing the building, campus, facility, etc.

   b. Each HVAC air and water system monitored or controlled

   c. Each floor and zone controlled (floor plan) - both HVAC and smoke detectors where applicable

   d. Each VAV box with DDC controls

   e. Each electrical subsystem monitored or controlled

   f. Each prime mover subsystem (boilers, chillers, heat exchangers, pumps, towers, and distribution system)

   g. Each time-scheduling program

   h. Utility consumption and outdoor condition logs

   i. Fuel oil and generator systems

   j. Each miscellaneous monitored or controlled point

2. Menu Penetrations: "Buttons" shall be provided to allow the user to easily move among the various graphics and menus. At any time, the operator shall be able to return to the main menu with one mouse click and shall switch from graphic to other modes within two mouse clicks.
C. Alarm Setup:

1. UCB personnel shall program all general equipment alarms not specified elsewhere in this section. Alarm programming will begin after the contractor has completed programming for all controllers and the new control system is on-line on the campus Andover network.

2. The contractor shall allow full access to the control system by authorized UCB personnel for the purpose of programming alarms.

D. Trend Logging:

1. The system shall trend and display numerically and graphically any analog or digital points in the system.

2. Trend logging and historical logging shall be programmed for all points and be fully operational.

3.14 FIBER OPTICS - NETWORKING [Note to Consultant: The networking requirement varies for each job. This section will have to be modified for each project involving Andover Controls. The requirements for a given project will be provided by the UCB Andover Controls System Administrator upon request.]

A. Provide all required translators and power connections required to connect DDC panels to the University network. Fiber will be routed from the main telephone closet in the [Add building name] Building, Room # [ ] to the enclosure in the mechanical room where the Infilink will be mounted, Room # [ ]. The conduit and fiber will be provided under separate contract.

B. The fiber network is duplex multi-mode A and D (two strands of fiber). At least one spare set of fiber strands is included with each run.

C. Power is already provided at the [Add building name] Building location. The UCB Telecommunications Department will make all necessary connections in the campus fiber network to make a continuous run from the [Add building name] Building to the [Add building name] Building.

D. The temperature controls contractor shall be responsible for connecting the new Infilink in the [Add building name] Building to the other Infilinks already mounted at that location. Final connection of the [Add building name] Building controls to the campus Andover Network, and bringing them on-line, shall be supervised by and be the responsibility of the temperature controls contractor. The contractor shall confirm that the communication network linking controllers within the [Add building name] functions properly, before connecting the new controllers to the campus network.

3.15 DDC SOFTWARE

A. Provide sufficient internal memory for the specified control sequences and logging. There shall be a minimum of 15% of available memory free for future use.

3.16 THIRD PARTY PROTOCOLS
A. **BacNet**

All BacNet connections, such as BACNET IP, BACNET ETHERNET, BACNET MS/TP will require pics and bibbs documentation for review by the UCB HVAC SHOP. The UCB HVAC Shop will determine if the protocol meets the needs of the University’s objective for each project.

B. **MODBUS**

All Modbus connections will be reviewed by the UCB HVAC Shop. The UCB HVAC Shop will require a detailed list of X-Driver points to determine if the protocol meets the needs of the University’s objective for each project.

### 3.17 INSTALLATION

A. All controllers are to be installed with a minimum clearance of 36” or manufacturer’s requirements, whichever is the most restrictive. Variances are permitted only with prior approval from University Representative.

B. Identify locations of control transformers in the as-built control drawings, and install labels on the ceiling grid with the designation “CTRL XFMR”. Add tag at transformer indicating the devices it serves.

END OF SECTION 15950
PHASE 1 - GENERAL

A. RELATED SECTIONS

1. The General Conditions of the Contract, Supplementary Conditions, and General Requirements are a part of and apply to this Section. Consult them for additional conditions and requirements.

B. SECTION INCLUDES

A. Testing and balancing of environmental systems.

1. Air distribution systems
2. Hydronic distribution systems
3. Equipment and apparatus connected to distribution systems

B. System Commissioning.

1.03 QUALITY ASSURANCE

A. Qualifications of Contractor:

1. Independent testing and balancing firm specializing in testing and balancing of environmental systems with NEBB (National Environmental Balancing Bureau) certification.

2. The firm shall have a Registered Professional Engineer or NEBB certified supervisor in charge of the work, must have a local office with resident personnel within 100 miles of the project, have an experience record of not less than five years in the mechanical contracting industry, and shall have been engaged in the TAB industry for a minimum of five years.

3. All work must be done under the direct supervision of and the results attested to by the Registered Professional Engineer or NEBB certified supervisor. The Balancing Engineer shall be available to interpret all material found in the balance reports and shall represent the TAB firm at meetings.

B. Independent Status of Contractor:

1. TAB firm shall be a direct subcontractor of the General Contractor. The firm providing the work under this Section shall not provide work under any other Division 15 Section.

C. Pre-qualified Firms:

1. Finn and Associates
2. Checkpoint Balance
3. TAB services
4. JPG Engineering

1.04 STANDARDS

A. Comply with the applicable procedures of the following:

3. NEBB Certification Requirements.

1.05 PERFORMANCE REQUIREMENTS

A. Calibration and maintenance of instruments shall be in accordance with manufacturer's standards and recommendations, and calibration histories for each instrument shall be available for examination.

B. Accuracy of measurements shall be in accordance with the applicable measurement means as listed in the chapter on Measurement and Instruments in the ASHRAE Fundamentals Handbook.

C. Allowable Tolerances:
   1. Tolerances of adjustment for air-handling systems: Plus or minus 5 percent for supply systems and plus or minus 10 percent for return and exhaust systems from information indicated on drawings.
   2. Tolerances of adjustment for hydronic systems: Plus or minus 5 percent of design conditions indicated on drawings.

D. Obtain CAD reduced size drawings from the Engineer for the TAB report.

1.06 STATUS OF SYSTEMS PRIOR TO BALANCING

G. The TAB contractor shall review the location and type of balancing devices being installed by other Division 15 contractors, and shall issue a letter to the Mechanical Engineer that they are in agreement with the use of the devices.

H. Air and water testing and balancing shall not begin until the systems have been completed, cleaned and flushed, and are in full working order.

I. Outside temperature conditions shall be within a reasonable range of the design conditions.

J. Put all heating, ventilating, and air conditioning systems and equipment into full operation and continue operation of the systems during each working day of testing and balancing. Preliminary testing, adjusting, and balancing requirements shall be ascertained prior to the commencement of work through a review of available plans and specifications for the project. In addition, observations at the site during construction shall be made to determine the location of required balancing devices and to determine that the devices are being installed properly for the need.

K. Before any air balance work is done, systems shall be checked for:
   1. Excessive duct leakage.
   2. Dirt and debris in ducts and/or FUCs
   3. Filters are installed (and changed if they are dirty).
   4. Coil fins are clean and combed when 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.

L. Before any hydronic balancing work is done, the system shall be checked for:
1. Proper cleaning and flushing: glycol 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.

M. The TAB contractor shall furnish all necessary tools, scaffolding, and ladders that are required and shall provide all required instruments, take all readings, and make all necessary adjustments.

N. COORDINATION
1. The TAB contractor shall coordinate with work of other sections to make sure all items such as thermometer wells, pressure test cocks, and access doors are furnished and installed as required to allow tests and adjustments to be made as described in this section.
2. Schedule of TAB work to coincide with testing and verification of control system where practical.
3. Provide written notification (within 24 hours) to the General Contractor, A/E, and owner or his representative of any component and/or system deficiencies.

PART 2– PRODUCTS
Not used in this section.

PART 3 – EXECUTION

3.01 TEMPERATURE CONTROLS
A. Inspect all temperature control systems for proper sequence of operation and approximate calibration. Report any deficiencies to the responsible contractor immediately.
B. Check the physical operation of each operating piece of equipment.
C. Obtain written assurance from contractor(s) that all controls are accurately calibrated and operating properly.

3.02 ADJUSTING AND BALANCING
A. Adjust and balance air and water systems. Check, adjust, and balance all systems to meet the design conditions and tabulate all information on acceptable forms. All systems shall be checked for proper performance during both heating and cooling. Provide coordination with controls installer to set all water and airflows, including outside air.
B. Balancing and adjusting shall include the following:
   1. Air balance:
      a. Air supply, return, and exhaust systems with air quantities for each air device and fan coil unit, including supply and return temperatures and fan data including cfm, static pressure, fan rpm, motor running and full load amperage before and after final balance.
b. Diffusion patterns shall be set to minimize objectionable drafts and noise.
c. Sheaves shall be changed to fixed pitch and belts shall be changed as required to
   adjust the rpm of all fans so they handle specified air quantities. Sheaves and
   belts shall be provided by TAB contractor.
d. The pitot tube traverse method for determining cfm shall be used and recorded on
   all fans and reconciled with the inlet/outlet measurements.
e. Final adjustment shall include the following:
   1) Adjust rpm on belt drive fans. Include sheave and belt exchange to deliver
      airflow within limits of installed motor horsepower and mechanical stress
      limits of the fan. Determine the limiting fan tip speed before increasing rpm.
      Final fan speed setting shall allow for predicted filter loading and shall
      establish proper duct pressures for operation of zone cfm regulators.
   2) Adjust rpm on direct drive fans. For motors with speed taps, set fan speed
      on tap which most closely approaches design cfm. Report tap setting on
      equipment data sheet as high, medium, or low.
   3) Final balancing position of manual air duct dampers shall be plainly
      marked.
   4) Air diffuser patterns shall be set to minimize objectionable drafts and noise.
   5) All test holes shall be plugged.

2. Hydronic balance:
   a. Using pressure taps on flow control valves (actuated and automatic) subcontractor
      shall verify the quantity of fluid handled by each process chilled water customer.
      (Provide temporary hose connection between supply and return of process service
      drops to accomplish balance.)
   b. Check pump motor amperage and recalculate brake horsepower if necessary.
   c. Reset or adjust controls to put the control system back into operation.
   d. Mark or score balancing cocks and gauges at their final set points.
   e. Record circulating pump flow rates, pressures, running amperage, and full load
      amperage at design flow and shutoff conditions.
   f. Determine pump impeller size by plotting no-flow pump differential pressure on
      pump curve. Plot new pump curve if necessary.

C. When deemed necessary by the Owner or Mechanical Engineer, the TAB contractor shall run
   performance tests and shall read the report quantities in the presence of the Owner and
   Mechanical Engineer for verification purposes. Tests shall be made until the Owner is satisfied
   with the results being obtained. The operating mode of the system shall be the same for
   readback as it was during balancing. The number of readings verified will not exceed 10% of the
   total in the report. Any required rebalance of the system shall be performed without additional
   cost.

3.03 SYSTEM COMMISSIONING

A. Provide pre-operational verification and functional performance verification of items listed:

1. Pre-operational verification (Refer to example of required pre-operational verification
   check lists attached to this specification):
   a. Automatic Temperature Control System
   b. Air handling units (Fan Coil Units)
   c. Exhaust Fans
   d. Chilled water coils
   e. Pumps
   f. Hydronic piping and specialties (Heating water, Chilled water)
   g. Ductwork
   h. Testing, Adjusting, and Balancing
2. Functional performance verification (Refer to example of required functional performance check lists attached to this specification):
   a. Automatic Temperature Control System
   b. Air handling units (Fan Coil Units)
   c. Exhaust Fans
   d. Air outlets
   e. Chilled water coils
   f. Pumps
   g. Testing, Adjusting, and Balancing

3.04 REPORT OF WORK

A. Submit five (5) bound copies of the final testing and balancing report at least seven days prior to the Contractor’s request for final inspection of the mechanical systems. All data shall be recorded on applicable reporting forms. The report shall include all operating data, a list of all equipment used in the testing and balancing work, method of balancing, altitude correction calculations, and shall be signed by the supervising engineer and affixed with his certification seal. Report shall contain the following information:

1. Equipment data sheets listing make, size, serial number, rating, and operating data of all mechanical equipment including fans, pumps, motors, starters, and drives. Operating data shall include rotational speed, inlet and outlet pressures, pressure drop across filters, coils and other system components, pump heads, and measured motor current and voltage.

2. Manufacturer's grille, register, and diffuser data.

3. Manufacturer's fan curve sheets indicating point of operation.

4. Manufacturer's pump curve sheets indicating point of operation.

5. Rpm drive sheave information (as installed and as changed), final belt number and size, fan nameplate information, motor nameplate information, and amperage and voltage input to all motors in all operating modes.

6. Static pressure across each individual component of the system and the summarized system total.

7. Design and final balanced cfm at each system terminal. Include the terminal size, reading orifice size, and velocities read to attain the cfm.

8. Design and final minimum and maximum cfm setting at each terminal box.

9. Total cfm, required and final, for each fan system.

10. Pump and motor nameplate information, amperage and voltage to all motors, pressure drop across all system terminals, pressure rise across the pump in psi and feet of head, and gpm flow of all pumps. Include manufacturer's pump curves.

11. Water temperature and pressure at entrance and exits of each coil. Sheet shall show in comparison final as-balanced versus design values.
12. Flow meter size, brand, and location on the project. Required and actual flow rates and pressure drops through the meters. Valve settings on the meters and flow rates at these settings for both full flow and full bypass flow if applicable.

13. Thermal protection for all motors shall be recorded. Starter brand, model, enclosure type, installed thermal heaters and the rating of the heaters, required thermal heaters and the rating of the heaters if different than installed shall be recorded.

14. Make special note of any discrepancy between tabulated conditions and specified conditions and locate in a separate section of the report. Such items shall include missing items, non-functioning items, and items without final connections.

15. A reduced set of contract drawings (11"x17") shall be included in the report with all terminals clearly marked, all equipment designated, and all referenced to the device test report.

16. Submit letter stating that the test and balance work is complete and systems are ready for final commissioning.

17. The TAB 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. The report shall include all operating data as previously listed, a list of all equipment used in the testing and balancing work, and shall be signed by the supervising registered engineer or certified TAB supervisor and certified TAB technician, and affixed with his certification seal. Final acceptance of this project will not take place until a satisfactory report is received.

END OF SECTION 15990
1.01 PROVISIONS

A. Drawings, general provisions of the Contract between the Construction Manager/General Contractor and the University of Colorado, any General and Supplementary Conditions to the Contract, provisions of applicable Subcontractor Agreements, and other Division 1 Specification sections apply to work of this section.

1.02 DESCRIPTION

A. This project includes the remodel of existing office and lab spaces in the Duane building.

B. Furnish and install all materials and equipment and provide all labor required and necessary to complete the work shown on drawings and/or listed below and all other work and miscellaneous items, not specifically mentioned, but reasonably inferred for a complete testing of the system. It is the intent of Drawings and Specifications that all systems be complete and ready for operation.

1.03 WORK INCLUDED

A. Electrical work includes demolition, relocating existing conduits, new light fixtures, mechanical equipment connections and new receptacles.

B. Certain labor, materials and/or equipment may be furnished under other sections, or by Owner. When such is the case, extent, source and description of these items shall be indicated on drawings or described herein. Unless otherwise noted, all labor, materials, and/or equipment for complete installation of electrical work shall be provided under this Division.

1.04 DEFINITIONS

A. Instructions such as "Provide the outlets" shall mean the same as though the words "This contractor shall" proceeded each such instruction. "Provide" shall mean "Furnish and Install." Where the words "Accepted or Acceptable" are used, such "Accepted" or "Acceptable" action by the Engineer denotes that the work or equipment item is in conformance with the design concept of the project and, in general, complies with information in the Contract Documents.
1.05 STANDARDS FOR MATERIALS

A. All materials shall conform with the current applicable industry standards and the University of Colorado Standards. Workmanship and neat appearance shall be as important as electrical and mechanical operation. Defective or damaged materials shall be replaced or repaired prior to final acceptance in a manner meeting approval of Engineer and at no additional cost to Owner.

B. The latest editions of the following standards are minimum requirements.

1. Underwriters’ Laboratories, Inc. (UL)

2. National Electrical Manufacturer's Association (NEMA)

3. American National Standards Institute (ANSI)

4. Institute of Electrical and Electronic Engineers (IEEE)

1.06 SUBSTITUTION OF EQUIPMENT AND MATERIALS

A. No substitutions of equipment without written approval from the Engineer in the form of an addenda, submittals shall be received by the Engineer a minimum of 7 calendar days prior to the bid date.

1.07 CODE COMPLIANCE

A. All work and materials shall comply with latest rules, codes and regulations, including but not limited to the following: CU Standards, OSHA, National Fire Codes of National Fire Protection Association (NFPA), 2008 National Electrical Code and all other applicable State and local laws and regulations.

B. Code compliance is mandatory. The Drawings and Specifications shall not permit work that does not conform to these codes.

C. No work shall be concealed until after inspection and approval by proper authorities and design engineer. If work is concealed without inspection and approval, Contractor shall be responsible for all work required to expose and restore the concealed in addition to all required modifications.

1.08 DRAWINGS

A. Drawings indicate general arrangement of circuits and outlets, locations of switches, panelboards and other work. Drawings and specifications are complementary each to
the other, and what is called for by one shall be binding as if called for by both. Data presented on drawings is as accurate as planning can determine, but accuracy is not guaranteed and field verification of all dimensions, locations, levels, etc. to suit field conditions is directed. Review all drawings and adjust all work to conform to all conditions shown therein. Discrepancies between different drawings or between drawings and specifications or regulations and codes governing installation shall be brought to the attention of the Engineer.

PART 2 - PRODUCTS

2.01 EQUIPMENT AND MATERIALS

A. All equipment and materials installed shall be new and UL approved unless otherwise specified.

B. All major equipment components shall have manufacturer's name, address, model number and serial number permanently attached in a conspicuous location.

PART 3 - EXECUTION

3.01 CONDITIONS AT SITE

A. Visit to site is required of all bidders prior to submission of bid. All will be held to have familiarized themselves with all discernible conditions, and no extra payment will be allowed for work required because of these conditions, whether specifically mentioned or not.

B. Lines of other services that are damaged as a result of this work shall promptly be repaired at no expense to Owner to complete satisfaction of Engineer.

3.02 LICENSE, FEES, AND PERMITS

A. Arrange for required inspections for all license, permit and inspections. Furnish a certificate of final inspections and approval from local authority having jurisdiction over electrical installation.

3.03 WORKMANSHIP AND CONTRACTOR'S QUALIFICATIONS

A. Only quality workmanship will be accepted. Haphazard or poor installation practice will be cause for rejection of work. A journeyman to apprentice ratio of 1:1 must be maintained.

B. Provide foreman in charge of this work at all times.
C. Contractor must have been in business under the same name for a minimum of 5 years and have a manned office, full time. Also provide a current and complete financial statement for review.

D. Where specifications call for an installation to be made in accordance with Manufacturer's recommendations, a copy of such recommendations shall at all times be kept in job superintendent's office and shall be available to Engineer's and/or Owner's representative.

E. Contractors bidding this project must complete AIA Document A305-1986 "Contractor's Qualification Statement" and submit it with their proposal for information purposes.

3.04 SUBMITTALS

A. Submit shop drawings and product data in accordance with provisions of Division 1.

B. Prior to submission, shop drawings, material lists and catalog cuts or manufacturer's printed data shall be thoroughly checked for compliance with contract requirements, compatibility with equipment being furnished by the Contractor or Owner, accuracy of dimensions, coordination with work of other trades, and conformance with sound and safe practice as to erection of installation. Each submittal shall bear Contractor's signed statement evidencing such checking.

C. Clearly mark each shop drawing as follows for purposes of identification:

   Equipment Identification Used on Contract Drawings
   Date
   Name of Project
   Branch of Work
   Architect/Engineer's Name
   Contractor's Name

D. Clearly mark printed material, catalog cuts, pamphlets or specification sheets, and shop drawings with the same designation shown on the contract document schedules. Identify specific item proposed, showing catalog number, recess openings, dimensions, capacities, electrical characteristics, etc. Submittals which are incomplete will be returned to the Contractor without review.

E. Contractor agrees that submittals processed by the Architect/Engineer are not change orders; that the purpose of submittals is to demonstrate to the Architect/Engineer that the Contractor understands the design concept; and that the Contractor demonstrates this understanding by indicating which equipment and material he intends to furnish and install and by detailing the fabrication and installation methods he intends to use.
F. Contractor shall be responsible for dimensions (which he shall confirm and correlate at the job site), fabrication processes and techniques of construction, and coordination of his work with that of other trades. The Contractor shall check and verify all measurements and review shop drawings before submitting them. If any deviations from the specified requirements for any item of material or equipment exist, such deviation shall be expressly stated in writing and incorporated with the submittal.

G. Maintain one copy of shop drawings at the project field office until completion of the project, and make this copy available, upon request, to representatives of the Architect/Engineer and Owner.

H. No equipment or materials shall be installed or stored at the jobsite until submittals for such equipment or materials have been given review action permitting their use.

I. Shop drawings and manufacturer's published data shall be submitted for:

   Lighting fixtures (catalog cuts)
   Wiring devices (switches & receptacles)

3.05 TESTS

A. The right is reserved to inspect and test any portion of the equipment and/or materials during the progress of its erection. This contractor shall test all wiring and connections (whether new or existing) for continuity and grounds before connecting any equipment.

B. The Contractor shall test the entire system in the presence of the Engineer when the work is completed to ensure that all portions are free from shorts or grounds. All equipment necessary to conduct these tests shall be furnished at the Contractor's expense.

3.06 DELIVERY AND STORAGE OF MATERIALS

A. Make provisions for delivery and safe storage of all materials. Deliver materials to job at such stages of the work as will expedite work as a whole. Carefully mark and store all materials. Carefully check materials furnished for installation, and furnish a receipt acknowledging acceptance of delivery and condition of materials received. Thereafter assume full responsibility for safekeeping of same until final installation has been approved and accepted.

3.07 CUTTING AND PATCHING

A. Carefully lay out all work and coordinate location with architect and other trades. Where cutting, channeling, chasing or drilling of floors, walls, partitions, ceilings or
other surfaces is necessary for proper installation, support or anchorage of raceways, outlets or other electrical equipment, this work shall be the responsibility of this Contractor. Any damage to building, piping, equipment or any defaced finish, plaster, woodwork or metalwork shall be repaired by this contractor at no additional cost to Owner. Do no cutting, channeling, chasing or drilling of unfinished masonry, tile, etc. or cutting, drilling, welding of structural members of building, etc. without first obtaining permission from Engineer. If permission is granted, perform work in a manner approved by Engineer. All penetrations through fire resistive construction must be sealed with an approved fire resistive sealant.

3.08 DIRECTORY CARDS, NAMEPLATES, AN LABELS

A. All components of electrical system shall be neatly and accurately labeled to facilitate ready identification and service. Temporary type of markings, which are visible on equipment, will not be permitted. Repaint trims, housing, etc. where such marking cannot be readily removed. Defaced finish must be refinished. All spares or spaces must be labeled in erasable pencil.

3.09 OPERATING MANUAL AND PARTS LIST AND INDOCTRINATION OF OPERATING AND MAINTENANCE PERSONNEL

A. Refer to Division 1.

3.10 CLEAN-UP

A. Remove all materials, scrap, etc. relative to electrical installation, and leave premises in a clean, orderly condition. Any costs to Owner for cleanup of site will be charged to Contractor. At completion, all equipment, lighting fixtures, etc. shall be thoroughly cleaned and all residue removed from the inside and outside surfaces.

3.11 GUARANTEE

A. Provide in accordance with the General Conditions and Division 1. Leave entire electrical system installed under this Division in proper working order. Replace, without additional charge, any work materials or equipment provided under this Division which develops defects within one year from date of final acceptance. Guarantee all materials and equipment against defects in composition, design or workmanship.

END OF SECTION
PART 1 - GENERAL

1.01 RELATED WORK IN OTHER SECTIONS

A. Section 16010 General Provisions; Section 16450 Grounding.

1.02 RELATED DOCUMENTS

A. Drawings, general provisions of the Contract between the Construction Manager/General Contractor and the University of Colorado, any General and Supplementary conditions to the Contract, provisions of applicable Subcontractor Agreements, and other Division 1 Specification sections apply to work of this section.

PART 2 - PRODUCTS

2.01 CONDUITS

A. Rigid Steel Conduit: Rigid, threaded, thick-wall, zinc-coated on the outside and either zinc-coated or coated on the inside. ANSI C80.1.

B. Electrical Metallic Tubing (EMT): Mild steel, zinc-coated on the outside and either zinc-coated or coated with an approved corrosion-resistant coating on the inside. The use of 2" or larger EMT by UCB permission only.

C. Flexible Conduit: Commercial Greenfield, galvanized steel, with a separate grounding bond wire installed in the conduit in addition to other wires. MC and AC cable and extra flexible conduit are not acceptable.

D. PVC Conduit (schedule 40): Polyvinyl chloride.

E. Liquidtight flexible conduit: PVC coated with an inner metallic jacket.

F. Conduit Size: Minimum conduit size is 3/4" for all circuits. All conduit for branch circuit receptacles, motor feeders and panelboard feeders shall be as required by the NEC for RH, RHH, and RHW insulation regardless of the type of insulation actually used.

F. Provide a pull string in all empty conduits.
G. Provide a grounding conductor with all circuits.

2.02 CONDUIT FITTINGS

A. Rigid Steel Conduit, IMC, and EMT Fittings: Iron or steel only.

B. Flexible Conduit Fittings (Commercial Greenfield): Steel only, with insulated throats, and shall be:
   1. Squeeze or clamp type with bearing surface contoured to wrap around the conduit and clamped by one or more screws.

C. Connectors and Couplings: Compression type threadless fittings for rigid steel conduit or IMC not permitted. EMT couplings and connectors shall be steel only, "Concrete-tight" or "Rain-tight" (gland and ring compression type) or steel set screw type. Connectors to have insulated throats.

D. Bushings: Insulated type, designed to prevent abrasion of wires without impairing the continuity of the conduit grounding system, for rigid steel conduit, IMC, and EMT conduit larger than 1-1/4" size. Provide grounding type bushings on all feeder conduits.

PART 3 - EXECUTION

3.01 CONDUIT SIZING, ARRANGEMENT, AND SUPPORT

A. Size all conduits to meet the requirements of National Electrical Code, all power or feeder conduits shall meet the requirements for RHH and RHW insulation regardless of the type of wire actually used. Minimum flexible conduit size shall be 1/2". Three-eights inch flexible conduit is permitted if furnished as part of a manufactured equipment connection.

B. The maximum length of flexible conduit for connections to lighting equipment is 6'-0". Flexible conduit may also be used where installing new devices in existing walls and the wall or structure has to be “fished”. MC and AC cables are not acceptable.

C. Route exposed conduit and conduit above accessible ceilings parallel and perpendicular to walls and adjacent piping. Coordinate the proposed conduit routing with the Architect prior to installation.

D. Maintain minimum 6 inch clearance between conduit and piping. Maintain 12 inch clearance between conduit and heat sources such as flues, steam pipes, and heating appliances.
E. Arrange conduit supports to prevent distortion of alignment by wire pulling operations. Support conduit from building structure using galvanized straps, clevis hangers, or bolted split stamped galvanized hangers. Do not support conduits from ceiling suspension wires.

F. Group conduit in parallel runs where practical and use conduit rack constructed of steel channel with conduit straps or clamps. Provide space for 25 percent additional conduit.

G. Do not fasten conduit with wire or perforated pipe straps. Remove all wire used or temporary conduit support during construction, before conductors are pulled. Multi-use suspension systems for plumbing and other piping along with electrical conduits shall not be permitted unless the hangers were designed for all the piping and conduit loads and will support a minimum of 200 lbs.

3.02 CONDUIT INSTALLATION

A. Cut conduit square using a saw or pipe cutter; de-burr cut ends.

B. Bring conduit to the shoulder of fittings and couplings and fasten securely.

C. Use conduit hubs or sealing locknuts for fastening conduit to cast boxes, and for fastening conduit to sheet metal boxes in damp or wet locations.

D. For all metallic conduits, provide insulated bushing or throat bushings for 1-1/4" diameter and larger. Provide grounding lug bushings where conduits enter switchboards.

E. Use conduit bodies to make sharp changes in direction, as around beams.

F. Use hydraulic one-shot conduit bender or factory elbows for bends in conduit larger than 2 inch size.

G. Avoid moisture traps where possible; where unavoidable, provide junction box with drain fitting at conduit low point.

H. Use suitable conduit caps to protect installed conduit against entrance of dirt and moisture.

I. Provide No. 12 AWG insulated conductor or suitable pull string in empty conduit, except sleeves and nipples.

J. Install expansion joints where conduit crosses building expansion joints.
K. Where conduit penetrates fire-rated walls and floors, provide mechanical fire-stop fittings with UL listed fire rating equal to wall or floor rating or seal opening around conduit with UL listed foamed silicone elastomer compound. Coordinate with Division 0 requirements.

L. Where conduit penetrates waterproofed floors or exterior walls subject to entry of moisture, provide pipe sleeves two sizes larger than conduit, suitably flashed or sealed where appropriate. Seal annular space around conduit with UL listed foamed silicone elastomer compound. For conduit penetrations through exterior foundation walls below grade, all conduit shall be sloped away from the building to prevent entry of moisture. Pipe sleeve shall be large enough to allow up to 3” of vertical movement about the conduit without damage in the event that the foundation rises.

3.03 CONDUIT INSTALLATION SCHEDULE

A. Concealed Dry Interior Locations: Rigid steel conduit or electrical metallic tubing. Do not use EMT in concrete slabs or walls.

B. Exposed Dry Interior Locations: Rigid steel conduit from floor level to +4'-0" above finished floor where exposed to travel areas (corridors, receiving, etc.) or where likely to be damaged. Electrical metallic tubing above +4'-0" from finished floor. All surface conduit shall be painted. Wiremold shall be used in some finished areas as shown on the drawings.

C. Flexible metal conduit shall be utilized for the following:
   1. Transformer final connections.
   2. Mechanical equipment final connections.
   3. Lighting equipment final connections.
   4. Installation of devices in existing walls or ceilings to remain where rigid conduit cannot be installed.

D. Direct buried conduit: PVC schedule 40 conduit with transition to GRC with a GRC elbow before rising above grade through a floor or into a wall. No PVC shall be located inside the building.

E. Liquidtight flexible conduit: metallic type to be used below computer floors, for final motor connections, flow and tamper switch connections and exterior final equipment connections.

END OF SECTION

16110-4
PART 1 - GENERAL

1.01 RELATED WORK IN OTHER SECTIONS

A. Section 16010 General Provisions; Section 16450 Grounding.

1.02 RELATED DOCUMENTS

A. Drawings, general provisions of the Contract between the Construction Manager/General Contractor and the University of Colorado, any General and Supplementary Conditions to the Contract, provisions of applicable Subcontractor Agreements, and other Division 1 Specification sections apply to work of this section.

PART 2 - PRODUCTS

2.01 CONDUCTORS AND CABLES (600 VOLTS)

A. Type: Conform to the applicable UL and ICEA Standards for the use intended. Copper conductors with 600-volt insulation unless otherwise specified or noted on the drawings. All #12 conductors shall be solid with stranded conductors for No. 10 and larger.

B. Aluminum Conductors Prohibited: Aluminum conductors will not be permitted.

C. Insulation: Type THWN/THHN insulation minimum unless otherwise specified or noted on the drawings. Type THW minimum or type XHHW filled cross-linked polyethylene 90-degree C thermosetting insulation for conductors larger than No. 6 and elsewhere as required by NEC.

D. Size: No. 12 minimum unless otherwise specified or noted on the drawings. Not less than NEC requirements for the system to be installed. If the equipment to be installed requires larger conductor and equipment sizes than indicated on the drawings, the owner shall be notified.

E. Wire Color Coding:

1. Color code wires for building voltage classes as follows:

   120/208V - 3 Phase    277/480V - 3 Phase
   16120-1


2.02 CONNECTORS AND LUGS

A. For copper conductors No. 10 and smaller: 3M Scotch-Lok, T&B or equal spring wire connectors.

B. For copper conductors larger than No. 10: Split bolt-type pressure connectors, properly taped or insulated.

PART 3 - EXECUTION

3.01 WIRE AND CABLE TESTS (600 VOLTS)

A. Measure the insulating resistance of service entrance conductors, feeder circuit conductors, and service ground. Measurements shall be taken between conductors and between conductors and ground. Resistance shall be 1,000,000 ohms or more when tested at 500 volts by megger without branch circuit leads. Tests and procedures shall meet the approval of the Architect/Engineer, and shall be in accordance with the applicable ICEA standards for the wires and cables to be installed. Furnish all instruments, equipment and personnel required for testing, and conduct tests in the presence of the Architect/Engineer. Submit written reports of the tests and results when requested by the Architect/Engineer.

3.02 SPLICES (480 VOLTS AND UNDER)

A. Permitted only at outlets or accessible enclosures. Conductor lengths shall be continuous from termination to termination without splices unless approved by the Architect/Engineer.

3.03 PULL WIRES

A. In each empty conduit, except underground conduits, installed a No. 14 galvanized steel pull wire or a plastic line having a tensile strength of not less than 200 pounds.

3.04 RACEWAYS

A. Install all conductors in an approved raceway system.

B. Install a ground conductor in all power & lighting circuits above 50 volts.
3.05 CABLE BENDS

A. Radius of bends shall be not less than 10 times the outer diameter of the cable.

3.06 CONDUCTOR PULL

A. Conductors shall not be pulled into conduits until after all plastering or concrete work is completed, and all conduits in which moisture has collected have been swabbed out.

3.07 CONNECTORS AND LUGS

A. Install with manufacturer's recommended tools and with the type and quantity of deformations recommended by manufacturer.

END OF SECTION
ELECTRICAL  DIVISION 16
SECTION 16130  BOXES AND FITTINGS

PART 1 - GENERAL

1.01 RELATED WORK IN OTHER SECTIONS

A. Section 16010 General Provisions; Section 16450 Grounding.

1.02 RELATED DOCUMENTS

A. Drawings, general provisions of the Contract between the Construction Manager/General Contractor and the University of Colorado, any General and Supplementary Conditions to the Contract, provisions of applicable Subcontractor Agreements, and other Division 1 Specification sections apply to work of this section.

PART 2 - PRODUCTS

2.01 OUTLET BOXES

A. Construction: Zinc-coated or cadmium-plated sheet steel boxes of a class to satisfy the condition at each outlet except where unilet or conduit bodies are required. Knockout type with knockouts removed only where necessary to accommodate the conduit entering. Square cornered, straight sided gang boxes, 4-inch octagon concrete rings and 4-inch octagon hung ceiling boxes with bars may be folded type; one-piece deep-drawn for all other boxes.

B. Size: To accommodate the required number and sizes of conduits, wires and splices in accordance with NEC requirements, but not smaller than 4" square. Standard concrete type boxes not to exceed 6 inches deep except where necessary to permit entrance of conduits into sides of boxes without interference with reinforcing bars. Special purpose boxes shall be sized for the device or application indicated.

C. Fixture Studs: 3/8-inch malleable-iron fixture stud in outlet boxes for ceiling lighting fixtures and interior bracket lighting fixtures, other than lamp receptacles and drop cords.

D. Exposed: Screw-joint type, with gasketed weatherproof covers in locations exposed to the weather.

E. Tile Boxes: Rectangular in shape with square corners and straight sides for receptacles and switches mounted in furniture cabinets or in glazed tile, concrete.
block, marble, brick, stone or wood walls. Install with tile rings.
F. Wall-Mounted Switch, Receptacle and Signal Boxes: Unless otherwise noted or specified, not less than 4 inches square by 1-1/2 inches deep for two devices and multi-gang boxes for more than two devices. Boxes for switches and receptacles on unfinished walls may be screw-joint type with covers to fit the devices.

G. Light Fixture Boxes: 4-inch diameter by 1-1/2 inch deep minimum for ceiling and interior bracket fixtures with concealed conduits. Plaster covers for bracket fixtures to have 3-inch diameter openings. Screw-joint boxes with canopy seat for ceiling and interior bracket fixtures with exposed conduits.

PART 3 - EXECUTION

3.01 OUTLET BOXES

A. Installation: Unless otherwise specified or shown on the drawings, outlet boxes shall be flush mounted and the front edges of the boxes or plaster covers shall be flush with the finished wall or ceiling line, or if installed in walls and ceilings of incombustible construction, not more than 1/4-inch back of same. Mount boxes with the long axis of devices vertical. Boxes in plastered walls and ceilings shall be provided with plaster covers. Box extensions and/or covers will not be permitted. Install in a rigid and satisfactory manner with suitable metal bar hangers, box cleats, adjustable box hangers, etc. Use wood screws on wood, expansion shields on masonry and machine screws on steel work.

B. Mounting Heights: The mounting height of a wall-mounted outlet box shall be construed to mean the height from the finished floor to the horizontal center line of the cover plate. On exposed tile, block, or brick construction, mount outlet boxes at the nearest bed joint to the mounting height indicated. Verify with Architect.

C. Wall-Mounted Switch, Receptacle and Signal Outlets: On columns, pilasters, etc., mount so the centers of the columns are clear for future installation of partitions. Install outlet boxes near doors or windows close to the trim. Install outlet boxes near the doors on the lock sides as shown on architectural drawings, unless other locations are approved by the Architect.

D. Back-To-Back: Outlets shown on the drawings "back-to-back" are to be installed with a minimum of 6 inches lateral separation between outlets for minimum sound transmission. "Through-the-wall" type boxes are not permitted.

E. Box extensions shall be prohibited on new construction and one per existing box will be allowed on remodel work only. Install a new 6 x 6 box to cover the existing box if one extension is not sufficient to flush out the existing box. The relocated device can then be mounted in a close nipple standard box.
F. Provide "Bell" or FS boxes for surface installations in all high traffic areas such as corridors, circulation spaces, exterior colonnades, plazas, etc.

G. Boxes mounted on metal partitions shall have back side supports.

3.02 FIXTURE CONNECTIONS

A. Recessed or surface light fixtures in lay-in or accessible ceilings shall be connected with minimum 3/8-inch flexible metallic conduit, 4 to 6 feet long, with grounding provisions.

3.03 IDENTIFICATION

A. Identify all junction and pull boxes as follows:

1. Fire Alarm - red
2. Emergency - yellow
3. Telephone - green
4. Television - violet
5. Computer & data - blue
6. 277/480V - orange

END OF SECTION
PART 1 - GENERAL

1.01 RELATED WORK IN OTHER SECTIONS

A. Section 16010 General Provisions; Section 16450 Grounding.

1.02 RELATED DOCUMENTS

A. Drawings, general provisions of the Contract between the Construction Manager/General Contractor and the University of Colorado, any General and Supplementary Conditions to the Contract, provisions of applicable Subcontractor Agreements, and other Division 1 Specification sections apply to work of this section.

PART 2 - PRODUCTS

2.01 SNAP SWITCHES

A. Unless otherwise specified, each switch (Quiet, Quick Make & Break) shall be of the A.C specification grade type for mounting in a single-gang spacing, fully rated 20 amperes minimum at 120/277 volts, conforming to minimum requirements of the latest revision of the Federal Spec. #W-S-896E, standard Quiet Switches and further requirements herein specified. Switches shall be spec grade, heavy duty, single-pole, 3-way or 4-way, of the maintained, momentary, or lock type as indicated on the drawings with grounding screw. Switches shall operate in any position and shall be fully enclosed cup type with entire body molded phenolic, urea or melamine. Fibre, paper or similar insulating material shall not be used for body or cover, ivory color handles unless otherwise indicated on the drawings. Silver or silver alloy contacts. A.C. 120/277 volt general use snap switches shall be capable of withstanding tests as outlined in NEMA Publication, and shall be as follows unless otherwise noted:

Hubbell #1221-I, 1223-I or 1224-I.

2.02 RECEPTACLES

A. General: Configuration and requirements for all connector or outlet receptacles shall be in accordance with NEMA Publications. Fire-resistant, non-absorptive, hot-welded, phenolic composition or equal bodies and bases with metal plaster ears (integral with the supporting member) and 20 amp minimum. Single or duplex as shown or noted on drawings. Ivory color unless otherwise noted on the drawings.
Double grip contacts for each prong. Receptacles shall comply with Federal Spec. #W-C-596E.

B. Grounding Type: All receptacles shall be grounding type with a green colored hexagonal equipment ground screw of adequate size to accommodate an insulated grounding jumper the same size as the phase conductor. Grounding terminals of all receptacles shall be internally connected to the receptacle mounting yoke.

C. Unless otherwise noted, receptacles shall be as follows:

Hubbell #5362-I or 5362-GF for ground fault.

2.03 DEVICE PLATES

A. General: Provide device plates for each switch, receptacle and special purpose outlet. Do no use sectional gang plates. Provide multi-gang outlet plates for multi-gang boxes. Plates shall be smooth lexan, of spec. grade, ivory color, as manufactured by Hubbell, Leviton, Arrow-Hart, Daniel Woodhead or Eagle. Each coverplate for all receptacles and switches shall be provided with an adhesive Brady label on the outside of the coverplate with the panel and circuit identified. If the existing building has metal plates (stainless steel) the new coverplates shall be the same to match.

B. Exposed: Plates for exposed jointed fittings shall match the fittings with edges of plates flush with edges of fittings. Heavy cadmium plated steel with gasket. Plates for cast type boxes at locations subject to wet or rain conditions shall be of the cast, vapor-tight type. Provide hinged lift covers for devices.

PART 3 - EXECUTION

A. Install wall switches 48 inches above floor to the center of the device, OFF position down.

B. Install convenience receptacles vertically at 18 inches above floor to the center of the device, or horizontally at 6 inches above counters, or backsplash, with grounding pole to right.

C. Install specific-use receptacles at heights shown on Contract Drawings.

D. Install galvanized steel plates on outlet boxes and junction boxes in unfinished areas, above accessible ceilings, and on surface-mounted outlets.

E. Install devices and wall plates flush and level.
F. Install with alignment tolerance of one-sixteenth inch and all edges in continuous contact with wall surfaces.

END OF SECTION
PART 1 - GENERAL

1.01 RELATED WORK IN OTHER SECTIONS

A. Section 16010 General Provisions; Section 16110 Raceways; Section 16120 Conductors; Section 16130 Boxes and Fittings; Section 16140 Wiring Devices and Plates; Section 16470 Panelboards.

PART 2 - PRODUCTS

A. Materials, equipment, and devices related to the grounding system are specified under other sections of these specifications.

PART 3 - EXECUTION

3.01 GENERAL

A. Install grounding conductors as shown on the drawings.

B. Provide a grounding conductor in all power and lighting branch circuits above 50 volts.

3.02 EQUIPMENT GROUNDING SYSTEM

A. Ground Bar: Provide an uninsulated copper equipment ground bar, separate from any insulated neutral bar, in all switchboards, panelboards, transformers, motor control centers, starters, disconnect switches, cabinets, etc., for grounding the enclosure and for connecting other equipment ground conductors. The ground bar shall be an integrally mounted and braced bus bar in switchboards, or a separately mounted bar adequately braced or bolted to the enclosure of other types of equipment. The ground bar shall be adequately braced or bolted to the enclosure after thoroughly cleaning both surfaces to assure good contact. Provide solderless pressure connectors for all conductor terminations. Number and size of pressure connectors on equipment grounding bars as required for the termination of equipment grounding conductors. In addition to the active circuits, provide pressure connectors for all three-phase spares and spaces.

B. Conduits: Where metallic conduits terminate without mechanical connection to a
metallic housing of electrical equipment by means of lock nut and bushings provide ground bushing connected with a bare copper conductor to the ground bar in the electrical equipment. Metallic conduits containing ground wiring only shall be bonded to the grounding wire at both conduit entrance and exit. Install grounding conductor in all conduits except those used for telephone, sound, or low-voltage signals, and in all flexible conduit. Bond the conductor at both ends to the equipment grounding system.

C. Feeders and Branch Circuits: Provide a separate green insulated equipment grounding conductor for each single or three-phase feeder and each branch circuit. Install a grounding conductor in the common conduit or raceway with the related phase and/or neutral conductors and connect to the box or cabinet grounding terminal. Where there are parallel feeders installed in more than one raceway, each raceway shall have a full sized green insulated equipment ground conductor.

D. Devices: Install a minimum No. 12 green insulated equipment bonding conductor from a grounding terminal in the respective outlet or junction box to the green ground terminal of all receptacles and through flexible conduit to all light fixture housings.

E. Motors: Install a separate green insulated equipment grounding conductor from the equipment ground bar in the motor control center or separate starter through the conduit and flexible conduit to the ground terminal in the connection box mounted on the motor. Install the grounding conductor in the common conduit or raceway with the related motor circuit conductors.

3.03 GROUND CONNECTIONS

A. Clean surfaces thoroughly before applying ground lugs or clamps. If surface is coated, the coating must be removed down to the bare metal. After the coating has been removed, apply a noncorrosive approved compound to cleaned surface and install lugs or clamps. Where galvanizing is removed from metal, it shall be painted or touched up with "Galvanox", or equal.

3.04 TESTS

A. Test the completed grounding system with a megger at the service ground bar and submit a written report to the Engineer for approval. The service shall not be energized if the test shows more than 5 ohms unless approved by the Engineer.

END OF SECTION
PART 1 - GENERAL

1.01 RELATED WORK IN OTHER SECTIONS

A. Section 16010 General Provisions; Section 16450 Grounding.

1.02 RELATED DOCUMENTS

A. Drawings, general provisions of the Contract between the Construction Manager/General Contractor and the University of Colorado, any General and Supplementary Conditions to the Contract, provisions of applicable Subcontractor Agreements, and other Division 1 Specification sections apply to work of this section.

1.03 SUBMITTALS

A. Submit for approval complete shop drawings, catalog cuts, special installation instructions, photometric data and descriptive literature. When fixtures are proposed for substitution and prior approval has not been issued in the form of an addenda they will not be reviewed.

PART 2 - PRODUCTS

2.01 GENERAL

A. Furnish all lighting fixtures throughout of the type indicated on the drawings, complete with lamps, sockets, wiring, fitters, hangers, plaster rings, canopies, etc., as required.

2.02 LAMPS

A. Fluorescent: 3500 degree Kelvin, energy saving, green end cap lamps, T8 as noted in the fixture schedule.

B. Incandescent: As specified on the drawings in the fixture schedule.

C. Manufacturers: General Electric, Sylvania or Philips.

2.03 BALLASTS
A. Fluorescent Ballasts - Electronic;
1. Provide rapid start electronic ballasts with series circuiting for all four foot rapid start T-5 and T-8 lamps with voltage as indicated on the plans and fixture schedule. The ballast shall deliver normal lamp life and must be interchangeable with electromagnetic ballasts. The light output shall not vary in response to an input voltage variance of less than 10% rated voltage. Drive output shall be greater than 25 KHz with lamp flicker less than 2%.

2. The ballast Total Harmonic Distortion shall be less than 20% with the third harmonic (180 Hz) distortion less than 8%.

3. The ballast shall have a power factor of 0.98 or higher and shall have a ballast efficiency of 90% or higher.

4. The ballast shall be UL listed Class P and with a sound rating better than A.

5. The manufacturer shall provide a full three year warranty beginning at time of substantial completion. The manufacturer shall replace any and all failed ballasts within 48 hours of notification. The manufacturer shall provide the labor for warranty replacements.

6. The ballasts shall be by Advance, Magna-Tek or Sylvania. All other manufacturers shall request prior approval and supply test data from an independent testing laboratory to substantiate compliance with specifications.

B. All compact fluorescent fixtures shall utilize high power factor electronic ballasts.

2.04 FLUORESCENT FIXTURES

A. All fixtures, ballasts and supports shall be quiet in operation. Louvers, shields, reflectors and all sections of the channel structure shall be securely held in position. Fixtures shall not be mounted in such a way that ballast hum will be amplified or transmitted into work areas.

2.05 FINISH

A. Bonderized or equal treatment on all steel parts prior to applying finish. Metal parts shall be aluminum, brass, copper, bronze or steel, with baked white enamel finish unless otherwise noted on the drawings.

2.06 FLUORESCENT LAMPHOLDERS

A. Designed so lamps will be held firmly in place, electrically and mechanically permitting easy insertion or removal of lamps. Provide corrosion resistant, silver-plated lamp pin contacts.
2.07 CEILING TRIM

A. Furnish proper ceiling frames for the ceiling materials in which recessed fixtures are to be installed. Verify that the ceiling type to be installed is as noted on the fixture schedule prior to ordering the fixtures.

2.08 HOUSING

A. Not less than 20 gauge steel with baked white enamel finish applied over corrosion-resistant primer unless otherwise specifically approved.

PART 3 - EXECUTION

3.01 SUPPORTS

A. Support ceiling fixtures by anchorage to the ceiling only where the ceiling is concrete or masonry units. For ceilings of other construction, anchor ceiling fixtures to metal or wood supports provided for that purpose, of suitable strength and stability, adequately attached to and supported by joists, trusses or other structural members, unless other methods of support are specifically approved by the Architect. Where lay-in construction is used, fixtures shall be of the lay-in type. Coordinate supports for lay-in fixtures with ceiling contractor.

3.02 CEILING TRIM AND MEANS OF SUPPORT

A. The ceiling trim and means of support of recessed fixtures shall be coordinated with the type of ceiling to be installed to insure proper installation.

3.03 CLEAN-UP

A. At final inspection the fixtures and lighting equipment shall be in first class operating order, in perfect condition as to finish, free from defects, completely lamped, clean and free from dust, plaster or paint spots, and complete with the required glassware, reflectors, side panels, louvers, or other components necessary to complete the fixtures.

END OF SECTION