PROJECT MANUAL

FOR

ECEE - 2B80 Room Renovation
University of Colorado
Project No. PR005329
Boulder, Colorado

PREPARED FOR:

University of Colorado at Boulder
Research Lab No. 2
Boulder, CO 80309

PREPARED BY:

Engineered Solutions, Inc.
5181 Ward Road
Suite 201
Wheat Ridge, CO 80033
303-421-1116

September 3, 2010
# Project Manual

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**PR005329 – ECEE – 2B80 Room Renovation**

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ADVERTISEMENT FOR BIDS
State of Colorado
University of Colorado
Notice Number: 10-30

Project No: PR 005329
Project Title: ECEE - 2B80 Room Renovation
Estimated Construction Cost: $160,000.00
*ARRA Funding?: No

Settlement Notices
For all projects with a total dollar value above $50,000 Notice of Final Settlement is required by C.R.S. 38-26-107.
Final Settlement, if required, will be advertised via: Electronic Media

Project Description
Remodel existing 400 s.f. computer server room, including wall/ceiling modifications, installation of new CRAC unit, raised floor, electrical transformer, electrical PDU, and fire sprinkler modifications.

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 from:

   http://www.colorado.edu/facilitiesmanagement/pdc/construction/open.html

   There will not be a charge for contact documents downloaded from the website.

4. A Deposit of $50.00 will be required for each complete set of Contract Documents. Contact Scott Reichert at el.sid@comcast.net if you prefer to pickup a hard copy at the pre-bid meeting. 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.

8. Contractor's Registration Requirement deleted as of 11/2/09.

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**Pre-Bid Meeting**

A mandatory Pre-Bid Meeting will be held **10/28/2010 10:00 AM** at ECEE - 2B80 Room Renovation – 1111 Engineering Drive, Boulder, Colorado.

**Sealed Bids will be received from qualified contractors until this date and time at this location:**

Date & Time: **11/05/2010 02:00 PM**

Address: Department of Facilities Management  
Research Laboratory No. 2  
1540 30th Street, Third Floor  
Boulder, CO 80309-0453

**Point of Contact**

Name: Scott Reichert, Project Coordinator  
Agency: University of Colorado at Boulder  
Phone: 720-890-8974  
Fax: 720-890-8978  
Email: el.sid@comcast.net

This Notice is also available on the web at [www.colorado.gov/dpa/dfp/sbrep](http://www.colorado.gov/dpa/dfp/sbrep)
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 from the date of the Notice to Proceed to Substantial Completion in calendar days, and in addition, the bidder is required to indicate the period of time to finally complete the project from Substantial Completion to Final Acceptance, also in calendar days. Bids indicating times for Substantial Completion and Final Acceptance in excess of the number of days indicated in the Advertisement for Bids for completion of the entire Project 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 #** PR 005329
- **Project Name** ECEE – 2B80 – Room Renovation
- **Name and Address of Bidder** ___________________________
- **Date of Opening** 11/05/10
- **Time of Opening** 2:00 PM

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.

2. **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.

3. **UNAUTHORIZED IMMIGRANTS:** Note that the Special Provisions of the General Conditions of the Contract includes the following language: **PUBLIC CONTRACTS FOR SERVICES - CRS 8-17.5-101 and PUBLIC CONTRACTS WITH NATURAL PERSONS - 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 Employment. If the Contractor fails to comply with any requirement of this provision or CRS 8-17.5-101 et seq., the State may terminate this contract for breach and the Contractor shall be liable for actual and consequential damages to the State.

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.

4. **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.

5. **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.

6. **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.

7. **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.
9. **NOTICE OF CONTRACTOR’S SETTLEMENT** – Agencies/institutions must indicate in the initial Solicitation (Advertisement for Bids, Documented Quotes, or Requests for Proposals) whether settlement will be advertised in newspapers or electronic media.

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)

10. **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 $200,000.00 (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 $1,000,000.00 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
         - Fire Protection

      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.

11. **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:

   Scott Reichert, Project Coordinator
   University of Colorado at Boulder
   Department of Facilities Management
   (303) 720-890-8974

12. **BID SCHEDULE:**

   Publication date: 10/21/10
   Plans specification available: 10/28/10 at pre-bid meeting
   Mandatory pre-bid conference: 10/28/10 10:00 AM @ jobsite
   Last day for questions: 11/01/10 4:00 PM
   Last day for addenda issue: 11/03/10 4:00 PM
   Bid date: 11/05/10 2:00 PM

END
City of Boulder  
Sales/Use Tax Division  
303-441-3050

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:__________________________________________
Project Address:________________________________________

   A. __________________________
   B. __________________________
   C. __________________________

"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
Project Name: ECEE – 2B80 – Room Renovation

Project No. PR 005329

Project Coordinator: Scott Reichert
Phone: 720-890-8974
Email: el.sid@comcast.net

Architect/Engineer: Engineered Solutions
5181 Ward Road, Suite 201
Wheat Ridge, CO 80033
303-421-1116
Email: nthomas@eng-sol-inc.com

October 2010

This is a project specific qualification form. Contractor must fill this out on each project.
INDEX OF DOCUMENTS

• INFORMATION FORM Page 3
• TYPES OF WORK Page 4
• IDENTIFICATION FORM Page 5
• PERSONNEL OF ORGANIZATION FORM Page 7
• PROJECT EXPERIENCE FORM Page 8
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• CORPORATION / CO-PARTNERSHIP FORM Page 11
• AFFIDAVIT FOR CORPORATION Page 12
• AFFIDAVIT FOR CO-PARTNERSHIP Page 13
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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>
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<tr>
<td>4. Electrical</td>
<td></td>
</tr>
<tr>
<td>5. Excavating and Grading</td>
<td></td>
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<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 Location License No.
the name of (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>
</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>
## 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>
</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>


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 __________________________________
(Official 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. __________________________________
(Officer 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 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)

_________________________________________ (Remaining members of Firm sign here) (Name of Firm)

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

END
STATE OF COLORADO
OFFICE OF THE STATE ARCHITECT
STATE BUILDINGS PROGRAMS

BID

Institution/Agency: University of Colorado at Boulder
Project No./Name: PR 005329 / ECEE – 2B80 – Room Renovation

Bidder Acknowledges Receipt of Addenda Numbers:

<table>
<thead>
<tr>
<th>Base Bid</th>
<th>$</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Refer to Bid Alternate Form SC-6.13.1 Attached, If Applicable)</td>
<td></td>
</tr>
</tbody>
</table>

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. Total Time of Completion of Entire Project (a + b): | 55 Calendar days |

1. BID: Pursuant to the advertisement by the State of Colorado dated 10/18/10 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 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 and Affidavit Regarding Unauthorized Immigrants.

5. TIME OF COMPLETION: The bidder agrees to achieve Substantial Completion of the Project from the date of the Notice to Proceed within the number of calendar days entered above, and in addition, further agrees that the period between Substantial Completion and Final Acceptance of the Project will not exceed the number of calendar days noted above. If awarded the Work, the bidder agrees to begin performance 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, bidder must execute the required Agreement and furnish the required Performance Bond, Labor and Material Payment Bond, Insurance Policy and Certificates of Insurance and Affidavit Regarding Unauthorized Immigrants 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 SBP-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.

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

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

Dated this __________ Day of ______________________ . 2010

THE BIDDER:

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. If a sole proprietorship or a partnership is submitting the Bid, the Bid shall so indicate and be properly signed.

State Form SBP-6.13
Rev. 7/2010
STATE OF COLORADO
OFFICE OF THE STATE ARCHITECT
STATE BUILDINGS PROGRAMS

BID ALTERNATES FORM

Institution/Agency: University of Colorado at Boulder
Project No./Name: PR 005329 / ECEE – 2B80 – Room Renovation

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 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.

Alternate No. 1: Furnish and install new hot aisle containment curtain per Drawing 2/A200, Flag Note 2 and Specification Section 11500.
Add $________________________

Alternate No. 2: Contractor shall remove existing raised floor at new construction area and discard. Contractor shall furnish and install new raised floor system with standard vinyl tile at new construction area per Specification Section 10270.
Add $________________________

Alternate No. 3: Contractor shall remove existing raised floor at new construction area and discard. Contractor shall furnish and install new raised floor system with ESD tile at the new construction area per Specification Section 10270.
Add $________________________

THE BIDDER:

Company Name

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

BID BOND

Institution/Agency: University of Colorado at Boulder  
Project No./Name: PR 005329 / ECEE – 2B80 – Room Renovation

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  

Company Name  

Address (including city, state and zip)  

Phone number:  

Name (Print)  
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

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

Base Bid $  
Add Alternate No. 1 $  
Add Alternate No. 2 $  
Add Alternate No. 3 $  
Total Contract Amount $  *

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, and Certification and Affidavit Regarding Unauthorized Immigrants within ten (10) days from the date of this Notice, the State Controller is entitled to retain the amount of the Proposal Guaranty submitted with your Proposal as Liquidated Damages. In this event, the right is reserved to consider all of your rights arising out of the acceptance of your Proposal as abandoned and to award the work covered by your Proposal to another, or to re-advertise the Project, or otherwise dispose thereof.

By ________________________________  By ________________________________

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

When completely executed, this form is to be sent by certified mail to the Contractor by the Principal Representative or by any other means to which the parties agree.
STATE OF COLORADO
OFFICE OF THE STATE ARCHITECT
STATE BUILDINGS PROGRAMS

University of Colorado at Boulder

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

CONTRACT ID NUMBER:

AGENCY IDENTIFICATION NUMBER:

PROJECT NUMBER: PR 005329

PROJECT NAME: ECEE – 2B80 – Room Renovation

PROJECT MANAGER: Scott Reichert

CONTRACTOR:

November 2010
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<th>SECTION</th>
<th>Page(s)</th>
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<tbody>
<tr>
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<td>1</td>
</tr>
<tr>
<td><strong>ARTICLE 1.</strong> Performance of the Work</td>
<td>1</td>
</tr>
<tr>
<td><strong>ARTICLE 2.</strong> Provisions of the Contract Documents</td>
<td>1</td>
</tr>
<tr>
<td><strong>ARTICLE 3.</strong> Time of Completion</td>
<td>1</td>
</tr>
<tr>
<td><strong>ARTICLE 4.</strong> Essential Condition</td>
<td>1</td>
</tr>
<tr>
<td><strong>ARTICLE 5.</strong> Contract Sum</td>
<td>1</td>
</tr>
<tr>
<td><strong>ARTICLE 6.</strong> Contract Documents</td>
<td>1</td>
</tr>
</tbody>
</table>

## SIGNATURE APPROVALS

2

Attachment – Notice of Award

**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  Certification and Affidavit Regarding Unauthorized Immigrants (required at contract signing prior to commencing work)
F  Contract Management Information Construction Contractor
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 referred to as the Principal Representative, and having its offices at 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 Contractor for any performance hereunder or be bound by any provision hereof prior to the Effective Date.

WHEREAS, the Principal Representative intends to remodel the existing 400 sf computer server room, 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 / Account Number PR00529, Contract Encumbrance Number TBD, and

WHEREAS, this is a phase one waived contract, waiver number 156 Contractors Agreement for Capital Construction Form SC6.21.

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

ARTICLE 1. PERFORMANCE OF THE WORK
The Contractor shall perform all of the Work required for the complete and prompt execution of everything described or shown in, or reasonably implied from the Contract Documents for the above referenced Project.

ARTICLE 2. PROVISIONS OF THE CONTRACT DOCUMENTS
The Contractor agrees to perform the Work to the highest industry standards and to the satisfaction of the State of Colorado and its Architect/Engineer in strict accordance with the provisions of the Contract Documents.

ARTICLE 3. TIME OF COMPLETION
The Contractor agrees to Substantially Complete the Project within 45 calendar days from the date of the Notice to Proceed, in addition, the Contractor agrees to finally complete the Project from Substantial Completion to Final Acceptance within 10 calendar days for a total time of completion of the entire Project of 55 calendar days. The Contractor shall perform 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 Construction Contract SC-6.23 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 Construction Contract SC-6.23, the sum of Hundred and Thousand, Hundred and no/100 Dollars* ($ * )

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base Bid</td>
<td>$</td>
</tr>
<tr>
<td>Add Alternate No. 1</td>
<td></td>
</tr>
<tr>
<td>Add Alternate No. 2</td>
<td></td>
</tr>
<tr>
<td>Add Alternate No. 3</td>
<td></td>
</tr>
<tr>
<td>Total Contract Amount</td>
<td>$</td>
</tr>
</tbody>
</table>

ARTICLE 6. CONTRACT DOCUMENTS
The Contract Documents, as enumerated in Article 1 of The General Conditions of the Construction Contract Sc-6.23, 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.”
SIGNATURE APPROVALS:

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**

Project Name/Number:  
PR 005329 / ECEE – 2B80 – Room Renovation

Contract ID No.

THE CONTRACTOR

Legal Name of Contracting Entity

By:  
Ronald. R. Ried, Director
Facilities Management Business Services

Date:  

*Signature

By  
Name (print)  Title

Date:  

STATE OF COLORADO, acting by and through:
The Regents of the University of Colorado
A Body Corporate

By:  
Paul M. Leef, AIA, LEED TM AP
Campus Architect / Director, Planning, Design & Construction

Date:  

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

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)

By:  
Date:  

APPROVED:
STATE OF COLORADO
Department of Law / Attorney General (or authorized Delegate)

By:  
Date:  

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PR005329 / ECEE – 2B80 – Room Renovation

Rev. 8/2010
SC-6.21
STATE OF COLORADO
CONTRACTOR'S AGREEMENT DESIGN/BID/BUILD
(STATE FORM SC-6.21)

EXHIBIT B - PR 005329 – ECEE – 2B80 – Room Renovation

PERFORMANCE BOND (Form SC-6.22)
STATE OF COLORADO
CONTRACTOR’S AGREEMENT DESIGN/BID/BUILD
(STATE FORM SC-6.21)

EXHIBIT C - PR 005329 – ECEE – 2B80 – Room Renovation

LABOR AND MATERIAL PAYMENT BOND (Form SC-6.221)
EXHIBIT D - PR 005329 – ECEE – 2B80 – Room Renovation

INSURANCE CERTIFICATE(S) (attached)
Exhibit E - PR 005329 – ECEE – 2B80 – Room Renovation

Certification and Affidavit Regarding Unauthorized Immigrants (required at contract signing prior to commencing work) (UI-1, attached)
STATE OF COLORADO
OFFICE OF THE STATE ARCHITECT
STATE BUILDINGS PROGRAMS

PERFORMANCE BOND

Institution/Agency: University of Colorado at Boulder
Project No./Name: PR 005329 – ECEE – 2B80 – Room Renovation

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

ECEE – 2B80 – Room Renovation

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

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

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

IN WITNESS WHEREOF said Principal and Surety have executed this Bond, this __________ day of ________________, A.D. 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: PR 005329 – ECEE – 2B80 – Room Renovation

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 [insert state] are held and firmly bound unto the STATE OF COLORADO acting by and through the Regents of the University of Colorado at Boulder, 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 [insert amount] 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 ________________, 2010 for the construction of a PROJECT described as ECEE – 2B80 – Room Renovation

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 shall also fully indemnify and save harmless the State of Colorado and the Principal Representative to the extent of any and all expenditures which either or both of them may be required to make by reason of any failures or defaults by the Principal or any subcontractor in connection with such payments; then this obligation shall be null and void, otherwise it shall remain in full force and effect.

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

IN WITNESS WHEREOF, the Principal and the Surety have executed this Bond, this _________ day of ________, A.D., 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
(STATE FORM SC-6.23)

Project Name        ECEE – 2B80 – Room Renovation
Project No.          PR 005329
Project Coordinator  Scott Reichert
Date                October 2010
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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.
ARTICLE 1. DEFINITIONS

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

1. Agreement; (SC-6.21);
2. Performance Bond (SC-6.22) and Labor and Material Payment Bond (SC-6.221);
3. General Conditions of the Construction Contract (SC- 6.23) and if applicable, Supplementary General Conditions;
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.
7. Authorization to Bid (SBP-6.10)
8. Information for Bidders (SBP-6.12);
9. Bid (SBP-6.13);
10. Bid Bond (SBP-6.14);
11. Notice of Award (SBP-6.15);
12. Builder's risk insurance certificates of insurance (ACORD 25-S);
13. Liability and workers' compensation certificates of insurance;
14. Notice to Proceed (Design/Bid/Build) (SBP-6.26);
15. Notice of Approval of Occupancy/Use (SBP-01);
16. Notice of Partial Substantial Completion (SBP-071);
17. Notice of Substantial Completion (SBP-07);
18. Notice of Partial Final Acceptance (SC-6.27);
19. Notice of Final Acceptance (SBP-6.271);
20. Notice of Partial Contractor's Settlement (SC-7.3);
21. Notice of Contractor's Settlement (SBP-7.31);
22. Application and Certificate for Contractor's Payment (SBP-7.2);
23. 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 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.

B. DEFINITIONS OF WORDS AND TERMS USED
1. AGREEMENT. The term "Agreement" shall mean the written agreement entered into by the State of Colorado acting by and through the Principal Representative and the Contractor for the
2. 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 therefrom. The term “Contract” shall be interchangeable with this latter meaning of the term Agreement.

3. ARCHITECT/ENGINEER. The term “Architect/Engineer” shall mean either the architect of record or the engineer of record under contract to the State of Colorado for the Project identified in the Contract Documents.

4. 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.

5. 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.

6. 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.

7. 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.

8. 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.

9. 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.

10. 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.

11. 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.

12. 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.
13. OWNER. The term “Owner” shall mean the Principal Representative.

14. 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.

15. 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.

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

17. 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.

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

19. 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).

20. 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).

21. 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.

22. 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.

23. 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.

24. 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.

25. 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.

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

27. 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 Form s
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 included in 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 ensure 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 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 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 therefrom. 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:

- Material, which shall include the cost of material actually built into the Project plus any local sales or use tax paid thereon; and,
- 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 bring it to their attention in writing at the time the submittals are made, and any subsequent change in the Contract sum or the Contract time shall be limited to cost, time and impacts so identified.

D. 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, cofferdam work or caisson 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.

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 notwithstanding 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 contract 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>10%</td>
<td>5%</td>
<td></td>
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<td></td>
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<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>5%</td>
<td></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 an Emergency Field Change Order form (SC-6.31E).

If the amount of the adjustment of the Contract price and time for completion can be determined at the time of issuance of the Emergency Field Change Order, those adjustments shall be reflected on the face of the Emergency Field Change Order. Otherwise, the Emergency Field Change Order shall reflect a not to exceed (NTE) amount for any schedule adjustment (increasing or decreasing the time for completion) and an NTE amount for any adjustment to Contract sum, which NTE amount shall represent the maximum amount of adjustment to which the 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 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) after receipt of the Contractor’s Notice of claim regarding such instructions or alleged act or omission, 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

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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 corrected or completed, 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).

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 checklist (SBP-05) have been completed, the Notice of Acceptance issued, and the Notice of Contractors Settlement published. If the work shall be substantially completed, but Final Acceptance and completion thereof shall be prevented through delay in correction of minor defects, or unavailability of materials or other causes beyond the control of the 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 therefrom, 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
Provided this Agreement can be executed and performance of the obligations of the Parties accomplished within its intent, the provisions hereof are severable and any provision that is declared invalid or becomes inoperable for any reason shall not affect the validity of any other provision hereof, provided that the Parties can continue to perform their obligations under this Agreement in accordance with its intent.
C. SECTION HEADINGS
The captions and headings in this Agreement are for convenience of reference only, and shall not be used to interpret, define, or limit its provisions.

D. AUTHORITY
Each person executing the Agreement and its Exhibits in a representative capacity expressly represents and warrants that he or she has been duly authorized by one of the parties to execute the Agreement and has authority to bind said party to the terms and conditions hereof.

E. INTEGRATION OF UNDERSTANDING
This Contract is intended as the complete integration of all understandings between the parties and supersedes all prior negotiations, representations, or agreements, whether written or oral. No prior or contemporaneous addition, deletion, or other amendment hereto shall have any force or 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
All suits or actions related to this Agreement shall be filed and proceedings held in the State of Colorado and exclusive venue shall be in the City and County of Denver.

G. NO THIRD PARTY BENEFICIARIES
Enforcement of this Agreement and all rights and obligations hereunder are reserved solely to the Parties. Any services or benefits which third parties receive as a result of this Contract are incidental to the Contract, and do not create any rights for such third parties.

H. WAIVER
Waiver of any breach under a term, provision, or requirement of this Agreement, or any right or remedy hereunder, whether explicitly or by lack of enforcement, shall not be construed or deemed as a waiver of any subsequent breach of such term, provision or requirement, or of any other term, provision, or requirement.

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 Architect/Engineer under this Contract is $100,000 or greater, either on the Effective Date or at anytime thereafter, this section shall apply.

Architect/Engineer agrees to be governed, and to abide, by the provisions of CRS 24-102-205, 24-102-206, 24-103-601, 24-103.5-101, 24-105-101, and 24-105-102 concerning the monitoring of vendor performance on state contracts and inclusion of contract performance information in a statewide contract management system.
Architect/Engineer’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 Architect/Engineer’s performance shall be part of the normal contract administration process and Architect/Engineer’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 Architect/Engineer’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 Architect/Engineer’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. Architect/Engineer 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 Architect/Engineer 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 Principal Representative, and showing of good cause, may debar Architect/Engineer and prohibit Architect/Engineer from bidding on future contracts. Architect/Engineer 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 Architect/Engineer, by the Executive Director, upon a 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 Two Hundred Fifty and no/100 ($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.

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: _______________________________
______________________________________________________________
______________________________________________________________
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Rev. 7/2010
SC-6.23  50
Supplementary General Conditions
University of Colorado at Boulder

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**
- General Aggregate $2,000,000
- Products/Completed Operations Aggregate $2,000,000
- Each Occurrence Limit $1,000,000
- Personal/Advertising Injury $1,000,000
- Fire Damage (Any One Fire) $50,000
- Medical Payments (Any One Person) $5,000

**Excess/Umbrella Liability (as required-See Coverages #3)**
- General Aggregate Limit $5,000,000
- Products/Completed Operations Aggregate $5,000,000

**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)

<table>
<thead>
<tr>
<th>Type</th>
<th>Amount</th>
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<tbody>
<tr>
<td>Per Loss</td>
<td>$1,000,000</td>
</tr>
<tr>
<td>Aggregate</td>
<td>$1,000,000</td>
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</tbody>
</table>

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 an 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: PR 005329 – ECEE – 2B80 – Room Renovation
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)
## Change Order Proposal

<table>
<thead>
<tr>
<th>Description of Work:</th>
</tr>
</thead>
<tbody>
<tr>
<td>University of Colorado at Boulder</td>
</tr>
<tr>
<td>PR 005329 – ECEE – 2B80 – Room Renovation</td>
</tr>
</tbody>
</table>

### PART I - WORK PERFORMED BY CONTRACTOR

<table>
<thead>
<tr>
<th>Line</th>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Direct Labor Costs</td>
<td>$</td>
</tr>
<tr>
<td>2.</td>
<td>Labor Overhead (Direct Labor Burdens)</td>
<td>$</td>
</tr>
<tr>
<td>3.</td>
<td>Total Contractor's Labor Costs</td>
<td>$</td>
</tr>
<tr>
<td>4.</td>
<td>Direct Materials Costs</td>
<td>$</td>
</tr>
<tr>
<td>5.</td>
<td>Materials Overhead (Delivery Costs &amp; Taxes)</td>
<td>$</td>
</tr>
<tr>
<td>6.</td>
<td>Total Materials Costs</td>
<td>$</td>
</tr>
<tr>
<td>7.</td>
<td>Total Equipment Costs</td>
<td>$</td>
</tr>
<tr>
<td>8.</td>
<td>PART I - TOTAL CONTRACTOR'S L, M &amp; E COSTS</td>
<td>$</td>
</tr>
</tbody>
</table>

### PART II - WORK PERFORMED BY SUBCONTRACTOR

<table>
<thead>
<tr>
<th>Line</th>
<th>Description</th>
<th>Amount</th>
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</thead>
<tbody>
<tr>
<td>9.</td>
<td>Direct Labor Costs</td>
<td>$</td>
</tr>
<tr>
<td>10.</td>
<td>Labor Overhead (Direct Labor Burdens)</td>
<td>$</td>
</tr>
<tr>
<td>11.</td>
<td>Total Subcontractor's Labor Cost</td>
<td>$</td>
</tr>
<tr>
<td>12.</td>
<td>Direct Materials Costs</td>
<td>$</td>
</tr>
<tr>
<td>13.</td>
<td>Materials Overhead (Delivery Costs &amp; Taxes)</td>
<td>$</td>
</tr>
<tr>
<td>14.</td>
<td>Total Subcontractor's Materials Costs</td>
<td>$</td>
</tr>
<tr>
<td>15.</td>
<td>Total Subcontractor's Equipment Costs</td>
<td>$</td>
</tr>
<tr>
<td>16.</td>
<td>Subcontractor's Overhead (Indirect Costs)</td>
<td>$</td>
</tr>
<tr>
<td>17.</td>
<td>Subcontractor's Profit</td>
<td>$</td>
</tr>
<tr>
<td>18.</td>
<td>PART II - TOTAL SUBCONTRACTOR'S COSTS</td>
<td>$</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Line</th>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>20.</td>
<td>Contractor’s Overhead (Indirect Costs)</td>
<td>$</td>
</tr>
<tr>
<td>21.</td>
<td>Contractor’s Profit</td>
<td>$</td>
</tr>
<tr>
<td>22.</td>
<td>PART III - TOTAL CONTRACTOR OVERHEAD &amp; PROFIT</td>
<td>$</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Line</th>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>23.</td>
<td>Contractor’s Commission on Subcontractor</td>
<td>$</td>
</tr>
<tr>
<td>24.</td>
<td>Contractor’s Profit on Subcontractor</td>
<td>$</td>
</tr>
<tr>
<td>25.</td>
<td>PART IV - TOTAL CONTRACTOR MARKUP ON SUBCONTRACTOR</td>
<td>$</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>PART V (Subtotal)</td>
<td>$</td>
</tr>
</tbody>
</table>

### PART VI - CONTRACTOR’S BOND COST

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>PART VI</td>
<td>$</td>
</tr>
</tbody>
</table>

### PART VII - GRAND TOTAL CHANGE ORDER PROPOSAL

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grand Total</td>
<td>$</td>
</tr>
</tbody>
</table>

### PART VIII - CONTRACT TIME

Completion Date is 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

<table>
<thead>
<tr>
<th>Firm</th>
<th>Date</th>
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<tbody>
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</tbody>
</table>

**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.

<table>
<thead>
<tr>
<th>Firm</th>
<th>Date</th>
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<tbody>
<tr>
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</table>

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

**PRINCIPAL REPRESENTATIVE**

(Institution or Agency)

<table>
<thead>
<tr>
<th>Date</th>
</tr>
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<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

**STATE BUILDINGS PROGRAMS**

(or Authorized Delegate)

<table>
<thead>
<tr>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>
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>
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<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.

Line 3. Total Labor Costs: Fill in total of Lines 1 and 2.

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.

Line 11. Total Subcontractor’s Labor Costs: Fill in total of lines 9 and 10.

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.
STATE OF COLORADO
OFFICE OF THE STATE ARCHITECT
STATE BUILDINGS PROGRAMS

CHANGE ORDER

Change Order No: _______________ Contract ID No. N/A Date _______________
Contractor: ____________________________________________________________________________________
Institution or Agency: University of Colorado at Boulder
Project No./Name: PR 005329 – ECEE – 2B80 – Room Renovation

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

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

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

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

<table>
<thead>
<tr>
<th>Description of Work/Date</th>
<th>Time of Completion/Calendar Days Extended/Reduced</th>
<th>Dollar Amounts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Original Contract (Exhibit A)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Change Order #1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Change Order #2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current Totals</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
*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.**

<table>
<thead>
<tr>
<th>Architect/Engineer Firm</th>
<th>Name and Title (print)</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Signature</td>
<td></td>
</tr>
<tr>
<td>Contractor (Name of Firm)</td>
<td>Name and Title (print)</td>
<td>Date</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Signature</td>
<td></td>
</tr>
<tr>
<td>University of Colorado</td>
<td>Ronald L. Ried, Director, Facilities Management Business Services</td>
<td></td>
</tr>
<tr>
<td>Institution or Agency</td>
<td>Name and Title (print)</td>
<td>Principal Representative (Signature)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**CONTRACT STATUS**

<table>
<thead>
<tr>
<th>Original Contract Value</th>
<th>STATE BUILDINGS PROGRAMS</th>
<th>DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(or Authorized Delegate)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Paul M. Leef, AIA, LEED TM AP</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Director, Planning, Design &amp; Construction</td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Previous increases by CO/Amend</th>
<th>STATE CONTROLLER</th>
<th>DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(or Authorized Delegate)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Steve McNally, Associates Vice Chancellor &amp; Controller</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Value After Prior CO’s/Amend</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>This CO/Amend</td>
<td>Increases ☐ Decreases ☐</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CURRENT CONTRACT VALUE</th>
<th>(Verification)</th>
</tr>
</thead>
</table>
REQUEST FOR INFORMATION
(RFI # 01)

Project No. Project Name: PR005329 – ECEE – 2B80 – Room Renovation

Date: 
To: 
From: 
Sent Via: 

Drawing Ref.: Spec. Ref.: 

Subject: 

Proposed Solution: 

<table>
<thead>
<tr>
<th>NO</th>
<th>YES</th>
<th>Schedule Impact</th>
<th>Cost Impact</th>
<th>Date Response Required</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

E-mail

Signature: Company: 

Response:

Response Date: Person Responding:

Further Action Required:

Other Documents This RFI Refers to:

<table>
<thead>
<tr>
<th>Letters</th>
<th>RFP</th>
<th>PCO</th>
<th>CO</th>
<th>Other</th>
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</thead>
<tbody>
<tr>
<td></td>
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</table>
### ENVIRONMENTAL SITE ASSESSMENT FORM

<table>
<thead>
<tr>
<th>Building &amp; Location</th>
<th>Job Description</th>
<th>Work Order / Project Number</th>
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</thead>
<tbody>
<tr>
<td>CAMP</td>
<td>Description of work that will be done</td>
<td>MY010905</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Follow-up required for:</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASBESTOS MATERIALS</td>
</tr>
<tr>
<td>RADIOACTIVE MATERIALS</td>
</tr>
<tr>
<td>ENVIRONMENTAL COMPLIANCE</td>
</tr>
<tr>
<td>LEAD MATERIALS</td>
</tr>
<tr>
<td>LASER OR X-RAY</td>
</tr>
<tr>
<td>HAZARDOUS MATERIALS</td>
</tr>
</tbody>
</table>

**Suspect Building Components, Materials, and Site Conditions:**

Lists all suspect materials for asbestos and/or lead-based paint. Also describes any other environmental and safety conditions, e.g. laboratory, hazardous materials, radiation issues, etc. Will address other conditions of the building being worked in, e.g. classroom, offices, laboratories, or other uses.

**SAMPLE REPORT ONLY**

**Samples / Results:**

Lists all know results of suspect materials or environmental monitoring results. Where suspect materials are not known, lists these as presumed positive.

**SAMPLE REPORT ONLY**

**REQUIRED ACTION:**

Identifies any action that may be required by all parties for the project, conditions that shall be followed, and all other notations relevant to the project. Explains further steps that must be taken for the project and responsibilities of key project staff, e.g. Project Managers, Contractors, EH&S, etc.

**SAMPLE REPORT ONLY**

---

**EH&S Inspector:** Certified CDPHE Inspector  
**Date Inspected:** 1/9/2005

**EH&S Manager:** Michael Yanker  
**Date Reviewed:** 1/9/2005

This report based upon conditions, regulations, policies at time of inspection and is valid for 90 days. Changing scope of work requires 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 appropriate EH&S manager. No new materials containing asbestos may be used for any part of the construction 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 / Project Manager**

**Contractor Name:** Contractor  
**Phone Number:**

**Contractor Representative:** (signature) Foreman or Superintendent  
**Date Signed:**
STATE OF COLORADO
OFFICE OF THE STATE ARCHITECT
STATE BUILDINGS PROGRAMS

NOTICE TO PROCEED (DESIGN/BID/BUILD CONTRACT)

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

Date/Description of Contract Documents: 

Institution/Agency: University of Colorado at Boulder
Project No./Name: PR 005329 / ECEE – 2B80 – Room Renovation

To:

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

The completion date of the Project is ______________ (M/D/YYYY).

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

When completely executed, this form is to be sent by certified mail to the Contractor by the Principal Representative; or by any other means to which the parties agree.
STATE OF COLORADO
OFFICE OF THE STATE ARCHITECT
STATE BUILDINGS PROGRAMS

CERTIFICATION AND AFFIDAVIT REGARDING UNAUTHORIZED IMMIGRANTS

Institution/Agency: University of Colorado at Boulder
Project No./Name: PR 005329 / ECEE – 2B80 – Room Renovation

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 knowingly employ or contract with an 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
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: PR 005329 / ECEE – 2B80 – Room Renovation

TO: Scott Reichert, 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.
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.

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<tr>
<th></th>
<th>DATE COMPLETED</th>
<th>A/E SIGNOFF</th>
<th>REMARKS</th>
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<tbody>
<tr>
<td>1.</td>
<td>The Notice of Approval of Occupancy/Use has been fully executed <strong>and the Inspection Cards are completely signed-off.</strong></td>
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<td>2.</td>
<td>On the Pre-Acceptance Punch List (Form SBP-06) the final punch list items are noted by the Architect/Engineer.</td>
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<td>3.</td>
<td>Schedule for corrections, deficiencies, and items to be supplied are established by Contractor.</td>
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<td>4.</td>
<td>Final Change Orders are processed (must be completed prior to Notice of Acceptance).</td>
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<td>5.</td>
<td>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>
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<td>6.</td>
<td>Permanent keying, keys and keying instructions have been performed.</td>
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<td>7.</td>
<td>Extra materials as per specifications are delivered to Principal Representative.</td>
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<td>8.</td>
<td>As-built drawings have been submitted to Architect/Engineer.</td>
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<td>9.</td>
<td>Guarantee/Warranty documentation requirements are met.</td>
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<td>10.</td>
<td>Removal of Contractor’s temporary work including cleanup and debris removal.</td>
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<td>11.</td>
<td>State personnel are instructed in system and equipment operations as required by contract.</td>
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<td>12.</td>
<td>All Instructions, manuals, guides, and charts have been transmitted to Principal Representative.</td>
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</table>

Architect/Engineer: Engineered Solutions

Contractor: [Name]

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

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

Date of Notice of Acceptance: ____________________________

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

Institution/Agency: University of Colorado at Boulder

Project No./Name: PR 005329 / ECEE – 2B80 – Room Renovation

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.

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

Principal Representative Date
Ronald L. Ried, Director
Facilities Management Business
Services

*When completely executed, this form is to be sent by certified mail to the Contractor by the Principal Representative.
NOTICE OF CONTRACTOR’S SETTLEMENT

Institution/Agency: University of Colorado at Boulder
Notice Number: Notice 10-30
Project No./Title: PR 005329 / ECEE – 2B80 – Room Renovation

Notice is hereby given that on , 2010 at Department of Facilities Management, 1540 30th Street, Room 303, Campus Box 453 UCB, Boulder, CO 80309, 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 as referenced above.

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

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

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

Authorized Facility Manager or Authorized Individual

Name: __________________________
Approval Date: __________________________
Agency: University of Colorado at Boulder
Phone: __________________________
Fax: 303-492-4082
Email: __________________________ (project manager)

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.
Notice to Contractors:  
ENVIRONMENTAL RESPONSIBILITIES

Given To:  
PR 005329  
Contractor:  
ECEE 2B80 Room Renovation  
Project No.  
Project Name  
Signature / Date  

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!

On the reverse side of this flyer you will find examples of the kinds of environmental and safety issues and practices that often require attention at construction sites.

Questions, Comments or Concerns? – Please Contact:  
Environmental Health and Safety    303-492-6025.
STATE OF COLORADO
OFFICE OF THE STATE ARCHITECT
STATE BUILDINGS PROGRAMS

NOTICE OF APPROVAL OF OCCUPANCY/USE

Date of Occupancy: ____________________________
   [Date to be inserted by the Architect/Engineer after consultation with Principal Representative]

Institution/Agency: University of Colorado at Boulder

Project No./Name: PR005329 / ECEE – 2B80 – Room Renovation

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. 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>
<td></td>
</tr>
<tr>
<td>2a. Notification has been made to the local Fire Department concerning which portion(s) of the building will be occupied and the date(s).</td>
<td></td>
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<tr>
<td>2b. Fire alarms, smoke detection systems and building fire sprinkler systems have been fully checked and are operable.</td>
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<tr>
<td>2c. The building’s fire connections must be installed and operable, if applicable.</td>
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</tr>
<tr>
<td>3. Coordination for final utility and service connections and meters (water, gas, sewer, electricity and telecommunication) has been made and systems are in full operating order.</td>
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<tr>
<td>4. Sterilization of plumbing systems has been performed.</td>
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<tr>
<td>5. Operational test of systems and equipment has been performed as required.</td>
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<tr>
<td>6. Systems adjustments such as balancing, equipment operations, etc., have been performed. Reports have been submitted to the Architect/Engineer for approval.</td>
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<tr>
<td>7. Principal Representative furnished equipment and furnishings are coordinated and placed.</td>
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<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>
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<td>9.</td>
<td>All restroom facilities must be fully functional and operable.</td>
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<tr>
<td>10.</td>
<td>All light fixtures must be installed and operable.</td>
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<tr>
<td>11.</td>
<td>All exit lights and emergency lighting systems have been checked and are operable.</td>
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<tr>
<td>12.</td>
<td>All windows have been glazed and hardware is available for ventilation purposes.</td>
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<tr>
<td>13.</td>
<td>All routes of egress must be clear of construction materials and debris at all times.</td>
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<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.

Architect/Engineer
Engineered Solutions

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

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

Contractor

Date

Date

Date
Post Construction Warranty Report

Project: ECEE – 2B80 Room Renovation
Warranty Contractor: ________________________________
Date Warranty Begins: _______________ Date Warranty Expires: _______________
Facilities Management (F/M) FAX No. 303-492-4082 Reported By: ________________________________
Campus Box 453 UCB, Boulder, CO 80309-0453 F/M Rep. Informed: ________________________________

Date Reported: ________________________________ Taken By: ________________________________

Extended Warranty Item:

Description of Warranty Item:

Date Reported to Contractor: ________________________________

Contractor Response:

Date of Resolution: ________________________________

Note:

Post construction warranty rpt
## CERTIFICATE FOR CONTRACTOR'S PAYMENT

**PAY APPLICATION #:**

**FROM:**

**TO:**

**P.O. NO.:**

**CONTRACTOR:**

**AGENCY/INSTITUTION:** University of Colorado at Boulder

**PROJECT #/TITLE:** PR005329 ECEE - 2B80 Room Renovation

**DATE:**

### AMENDMENTS/CHANGE ORDER SUMMARY

<table>
<thead>
<tr>
<th>Prior amendments / Change Orders CO#s:</th>
<th>Deductions (L)</th>
<th>Additions (M)</th>
<th>Total</th>
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</thead>
<tbody>
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</table>

Application is made for Progress for work completed and in place and stored on site on the above Project. As indicated on the following page(s).

**ORIGINAL CONTRACT SUM (K/E):** $0.00

**NET CHANGE FROM AMENDMENTS/CHANGE ORDERS (L + M/E):** $0.00

**PRESENT CONTRACT TOTAL (N/E):** $0.00

### Current to Date Total Amount

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

<table>
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<tr>
<th>Earned</th>
<th>Retainage</th>
<th>Prior Payments Less Retainage</th>
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### This Payment Total Amount

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<th>Earned</th>
<th>Retainage</th>
<th>This Payment Less Retainage</th>
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**Total Approved this Period:** $0.00 $0.00

**Warrant Amount:** $0.00

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

| $0.00 | $0.00 |

**Architects/Engineer’s Certification:**

Contractor certifies that all work and materials included in this estimate complies with the terms and conditions of the conditions construction contract and authorized changes thereto.

In accordance with the Contract and this Application for Payment, the above Contractor is entitled to a payment of: $0.00

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

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

**Contractor:**

**Date:**

**Architect/Engineer:**

**Date:**

---

State Form SBP-7.2
Rev. 2/2008
### CONTRACTOR’S APPLICATION FOR PAYMENT

#### Detail of Schedule of Values

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Description of Work</th>
<th>Material</th>
<th>Labor and Other</th>
<th>Totals (C + D)</th>
<th>Materials On-Site</th>
<th>WORK IN PLACE</th>
<th>Total Amount Due to Date (F+G+H)</th>
<th>% Complete and in Place (I / E)</th>
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#### Totals of Work Completed and Stored to Date

<p>| (K) ORIGINAL CONTRACT TOTALS (SUM) | $0.00 | $0.00 | $0.00 | $0.00 | $0.00 | $0.00 | $0.00 | #DIV/0! |
| (L) AMENDMENTS/CHANGE ORDER DEDUCTIONS | $0.00 |     |     |     |     | $0.00 |     | #DIV/0! |
| (M) AMENDMENTS/CHANGE ORDER ADDITIONS | $0.00 |     |     |     |     | $0.00 |     | #DIV/0! |
| (N) PRESENT CONTRACT TOTALS | $0.00 | $0.00 | $0.00 | $0.00 | $0.00 | $0.00 | $0.00 | #DIV/0! |</p>
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<th>Spec. Section No.</th>
<th>Sub No.</th>
<th>Contr No.</th>
<th>Description</th>
<th>Contr/ SUB Contr</th>
<th>Submit Date</th>
<th>Date Rec From Contr</th>
<th>No. of Copies Rec</th>
<th>Date Returned to Architect</th>
<th>Action</th>
<th>Date Returned to Contractor</th>
<th>Distribution copies-Transmitted</th>
<th>DAYS OUT TO Architect</th>
<th>DAYS OUT TO Contractor</th>
</tr>
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</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:

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

END OF SECTION
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 September 3, 2010. Drawing list is as follows:

<table>
<thead>
<tr>
<th>Sheet No.:</th>
<th>Titled:</th>
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</thead>
<tbody>
<tr>
<td>G001</td>
<td>TITLE SHEET</td>
</tr>
<tr>
<td>G002</td>
<td>CODE REVIEW SHEET</td>
</tr>
<tr>
<td>A100</td>
<td>DEMO FLOOR AND REFLECTED CEILING PLANS</td>
</tr>
<tr>
<td>A200</td>
<td>FIT UP FLOOR AND REFLECTED CEILING PLANS</td>
</tr>
<tr>
<td>A300</td>
<td>ARCH SECTIONS AND DETAILS</td>
</tr>
<tr>
<td>A301</td>
<td>ARCH DETAILS AND SCHEDULES</td>
</tr>
<tr>
<td>M001</td>
<td>MECHANICAL SCHEDULES, LEGEND, AND CONTROLS</td>
</tr>
<tr>
<td>M101</td>
<td>MECHANICAL DEMOLITION PLAN</td>
</tr>
<tr>
<td>M201</td>
<td>MECHANICAL FIT UP PLAN</td>
</tr>
<tr>
<td>M202</td>
<td>MECHANICAL ROOM PLAN</td>
</tr>
<tr>
<td>FP201</td>
<td>FIRE PROTECTION PLAN</td>
</tr>
<tr>
<td>E100</td>
<td>ELECTRICAL COVER SHEET</td>
</tr>
<tr>
<td>E200</td>
<td>OVERALL ELECTRICAL FLOOR PLAN</td>
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<tr>
<td>E201</td>
<td>ELECTRICAL DEMOLITION PLAN</td>
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<tr>
<td>E202</td>
<td>ELECTRICAL LIGHTING PLAN</td>
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<td>E203</td>
<td>ELECTRICAL POWER PLAN</td>
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<tr>
<td>E204</td>
<td>ELECTRICAL GROUNDING PLAN</td>
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<tr>
<td>E300</td>
<td>ONE-LINE DIAGRAM</td>
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<tr>
<td>E301</td>
<td>ELECTRICAL DETAILS AND SCHEDULES</td>
</tr>
</tbody>
</table>


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

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

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

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

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

E. 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.

F. 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.

G. 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 photographs on a CD to the Owner and retain one set of photographs 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 temporary protection around openings through and at floors, roofs, and other openings.
3. 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.

4. 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.

5. 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.

6. 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. 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) thence 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.

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 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.
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. Alternate 1: Furnish and install new hot aisle containment curtain per Drawing 2/A200, Flag Note 2 and Specification Section 11500.

B. Alternate 2: Contractor shall remove existing raised floor at new construction area and discard. Contractor shall furnish and install new raised floor system with standard vinyl tile at new construction area per Specification Section 10270.

C. Alternate 3: Contractor shall remove existing raised floor at new construction area and discard. Contractor shall furnish and install new raised floor system with ESD tile at the new construction area per Specification Section 10270.

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</td>
<td></td>
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<tr>
<td>Starter/contractors:</td>
<td></td>
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<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>
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<tr>
<td>In Motor Control Centers</td>
<td>16</td>
<td>16</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>Manually Controlled</td>
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<tr>
<td>Starter/Contractors:</td>
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<td>Separate</td>
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<tr>
<td>Factory Mounted &amp; Wired</td>
<td>15</td>
<td>15</td>
<td>16</td>
<td>15</td>
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<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>
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<tr>
<td>Contactors</td>
<td>16</td>
<td>16</td>
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<td>-</td>
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<tr>
<td>Thermal Overload (Note 1) Switches</td>
<td>16</td>
<td>16</td>
<td>16</td>
<td>-</td>
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<tr>
<td>Manual Operation (Note 2)</td>
<td>16</td>
<td>16</td>
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<td>-</td>
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<tr>
<td>Switches</td>
<td>16</td>
<td>16</td>
<td>16</td>
<td>-</td>
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<tr>
<td>Control Relays (Note 2)</td>
<td>15</td>
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<td>-</td>
<td>15</td>
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<tr>
<td>Control Transformers</td>
<td>15</td>
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<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>
<tr>
<td>ITEM</td>
<td>FURNISHED UNDER</td>
<td>SET IN PLACE UNDER</td>
<td>POWER WIRING UNDER</td>
<td>CONTROL WIRING UNDER</td>
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<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) Controls: Integral with Equipment Directly Applied to Ducts, Pipes, etc.</td>
<td>15</td>
<td>15</td>
<td>16</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>
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<tr>
<td>Fire Sprinkler Alarm</td>
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<td>16</td>
<td>-</td>
<td>16</td>
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<tr>
<td>Firestats</td>
<td>16</td>
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<td>-</td>
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</tr>
<tr>
<td>Smoke Detectors Including Relays for Fan Control</td>
<td>16</td>
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<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.

3. 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 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:
http://fm.colorado.edu/firesafety/hotwork.html
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 or 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 an 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 work site. 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.
3. Do not expose fire alarm devices to water or extreme temperatures.
4. 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](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
      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/ES 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.

B. Number of Submittals Required:
   1. Shop Drawings: Submit one reproducible transparency and four opaque reproductions. Three copies will be retained by the Consultant.
   2. Product Data: Submit seven copies, three of which will be retained by the Consultant.
   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.

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.

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.

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.
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 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.
JohnsWax: Freedom
Butchers: Time Buster
Airkeim: Air Strip

Full Impact

Sealers: Over & Under Iron Stone Laser, Gemini Technique

Sealers: Over & Under Iron Stone Laser, Gemini Technique

Finishes: Show Place 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.
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 of 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.

END OF SECTION
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,
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
PART 1 GENERAL

1.01 SUMMARY

A. Provide all labor, materials and related items necessary to complete the Work shown on the Drawings and specified herein. Items to be removed include, but shall not be limited to:
   1. Remove utilities not scheduled for reuse.
   2. Remove partitions, walls and suspended acoustical ceilings not scheduled for reuse.
   3. Remove doors and frames.
   4. Remove light fixtures and abandoned conduit.
   5. Remove wall-mounted telecom communication backboards.
   6. Remove miscellaneous framing and blocking not scheduled for reuse.
   7. Remove access floor system and accessories.
   8. Remove wood framed drywall walls as noted.
   9. Remove access floor system, RE: Alternates.

B. Items to be relocated are shown on the Drawings.

C. Related Requirements
   1. Section 01010: Summary of Work.
   2. Section 01045: Cutting and Patching.
   3. Division 15: Mechanical.
   4. Division 16: Electrical.

1.02 SUBMITTALS

A. Submit the following:
   1. Permits and notices authorizing demolition.
   2. Certificates of severance of utility services.
   3. Proposed methods, schedule and sequence of operations for selective demolition and proposed method of leaving existing facilities operational.

1.03 JOB CONDITIONS

A. Occupancy: Owner and public will be continuously occupying areas immediately adjacent to areas of selective demolition.
   1. Conduct selective demolition work in manner that will minimize need for disruption of normal operations.
   2. Provide minimum of 72 hours advance notice of demolition activities and utility outages.

B. Protection of persons and property: Provide temporary barricades and other forms of protection as required.

C. Traffic: Conduct selective demolition operations and debris removal in a manner to ensure minimum interference with roads, streets, walks and other adjacent occupied or used facilities.

D. Utility services: Maintain existing utilities indicated to remain, keep in service, and protect against damage during demolition operations.
E. Explosives: Use of explosives is not permitted.

F. Environmental controls: Use water sprinkling, temporary enclosures, and other suitable methods to limit dust and dirt rising and scattering in air to lowest practical level. Comply with EPA requirements pertaining to environmental protection. Keep dust and dirt from entering building.

1.04 SALVAGE

A. The Owner reserves first salvage rights including items of historic or archaeological significance or value, construction materials or products and mechanical and electrical equipment and materials.

B. Notify the Owner for review of material to be stored or selected for salvage.

C. Items indicated to be removed but of salvageable value to Contractor may be removed from structure as work progresses.

D. Transport salvaged items from site as they are removed.

E. Storage or sale of removed items on site is not permitted.

PART 2 PRODUCTS

2.01 MATERIALS

A. For patch, repair, finishing of areas affected by demolition or replacement of work removed: Comply with specifications for type of work to be done and use materials which are identical to existing materials in workmanship, appearance and performance in order to match products, materials, finishes, tolerances, profiles and otherwise all construction of adjacent surfaces.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that areas to be demolished are unoccupied and discontinued in use. Do not commence work until conditions are acceptable to Owner.

B. If suspected hazardous materials are encountered during selective demolition, stop all selective demolition work and notify the Owner.

3.02 PREPARATION

A. Provide required shoring, bracing, or support.

B. Cover and protect existing facilities, equipment and fixtures.

C. Erect and maintain dust-proof and weatherproof partitions and closures as required.

D. Locate, identify, stub-off and disconnect utility services that are indicated to be removed.

E. Note on Project Record Documents locations of utilities found during demolition.

F. Stockpile and protect materials intended for salvage and reuse. Protect and deliver to Owner's representative items designated to be turned over to Owner.
3.03 DEMOLITION

A. Remove all materials in a systematic manner as shown on Drawings or as required to prepare for new construction.
   1. Do not cut or alter any structural member without authorization of the Architect.
   2. Sprinkle debris and use temporary enclosures to control dust and protect existing facilities to remain.

B. Remove materials to conform to new finish elevations, profiles and sizes. Comply with specified tolerances, finishes.

C. Saw cut or otherwise isolate materials to be removed to minimize area of demolition.

D. Remove existing exposed and buried piping, wiring, conduit to be abandoned. Cut and remove $\frac{1}{2}''$ into existing construction, fill and finish to match existing or proposed finish.

E. Remove all waste from site and dispose of legally.

3.04 CONSTRUCTION

A. Patch, repair and otherwise rebuild and/or construct any work left unfinished as a result of selective demolition so that all existing exposed construction is finished matching adjacent new or existing surfaces. In no case is any existing surface to be left in a raw, marred or unfinished condition.

B. Be responsible for any damage done to any permanent work, new or existing, adjacent surfaces or work of others and repair same to totally functional and finished state.

END OF SECTION
SECTION 05500
METAL FABRICATIONS

PART 1 GENERAL

1.01 SUMMARY

A. All steel shapes, cast iron materials, metal accessories and factory fabricated metal and iron products are included in this section. Such miscellaneous items that are not defined herein but are shown on the Drawings shall also be furnished and installed.

B. The types of miscellaneous metal items include, but are not limited to the following:
   1. Miscellaneous framing and supports
   2. Bearing and leveling plates
   3. Carpenter's iron work
   4. Steel handrails
   5. Metal Stairs

C. Related requirements.
   1. Section 06100: Rough Carpentry.

1.02 QUALITY ASSURANCE

A. Codes and Standards
   1. AISC "Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings,"
      and including "Commentary of the AISC Specifications."
   2. AISC "Specification for the Design of Cold-Formed Steel Structural Members."
   3. AWS "Code for Welding In Building Construction."
   4. ASTM A-6 "General Requirements for Delivery of Rolled Steel Plates, Shapes, Sheet Piling and Bars for Structural Use."


C. Field measurements: Take field measurements prior to fabrication to ensure proper fitting of the work. Allow for trimming and fitting wherever the taking of field measurements before fabrication might delay the work.

1.03 SUBMITTALS

A. Product Data: Submit data for products used in miscellaneous metal fabrications, including manufactured railing or stair systems, paint, railing wall brackets and other similar manufactured items.

B. Shop Drawings: Submit drawings detailing fabrication and erection of each metal fabrication indicated. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items. Indicate welded connections using standard AWS welding symbols. Clearly indicate net weld lengths, sizes and welding sequences.

C. Submit copies of welder's certifications and paint testing certification.
D. Provide finish samples when requested.

1.04 JOB CONDITIONS, STORAGE AND HANDLING

A. Store materials in a dry area off the ground or floor. Do not leave materials exposed to the weather.

B. Protect existing construction at all times from potential damage caused by construction operations, including delivery of materials, construction traffic, and installation. Patch, repair and refinish damage to the satisfaction of the Architect.

PART 2 PRODUCTS

2.01 MATERIALS

A. General

1. Material shall be the same as specified for structural steel by the AISC Specification and shall conform to ASTM Specification A307 or A36.
2. The as-fabricated straightness tolerances of members not to exceed one-half of the standard camber and sweep tolerances in ASTM A-6.
3. Specific tolerances on the Drawings shall take precedence over Specifications.
4. For the fabrication of miscellaneous metal work which will be exposed to view, use only materials which are smooth and free of surface blemishes including pitting, seam marks, roller marks, rolled trade names and roughness.

B. Structural steel plates, shapes and bars:

1. Shapes and Plates (except Plates to be bent or Cold-Formed: ASTM A 36).
2. Steel Plates to be Bent or Cold-Formed: ASTM A 283, Grade C.
4. Steel Tubing: Cold-Formed: ASTM A 500, Grade A.
5. Steel Pipe: ASTM A 53; black finish, type f, standard weight, schedule 40, unless otherwise indicated.
6. Uncoated Structural Steel Sheet: Cold-Rolled; ASTM A 611, Grade A, unless otherwise indicated or required by design loading.
7. Uncoated Steel Sheet: Commercial quality, Cold-Rolled; ASTM A 366.
8. Galvanized Steel Sheet: Structural Quality; ASTM A 466, Grade A, unless otherwise required by design loading, with G-90 coating.

C. Fasteners: Provide zinc-coated fasteners for exterior use or where built into exterior walls. Select fasteners for type, grade, and class required.

1. Bolts and Nuts: Regular hexagon head type, ASTM A307, Grade A.
2. Lag Bolts: Square head type, FS FF-B-561.
7. Lock Washers: Helical spring type carbon steel, FS FF-W-84.
8. Stainless-steel bolts and nuts: ASTM F593, Type 303 or 304, with minimum yield strength of 30,000 psi and minimum tensile strength of 70,000 psi.
10. Washers: Same material and alloy as found in bolts and nuts.
2.02 PAINT

A. Metal Primer Paint: Provide fast curing, lead free, universal modified alkyd primer, complying with performance requirements of FS TT-P-645. Provide primer that is compatible with finish paint systems specified in Division 9.

B. Metal primer paint; Zinc chromate primer paint, low-moisture sensitivity, FS TT-P-1751; or zinc chromate primer for aluminum surfaces, FS TT-P-6663. Provide primer compatible with finish paint systems specified in Division 9.

2.03 GROUT

A. Nonshrink Nonmetallic Grout: Premixed, factory packaged, nonstaining, noncorrosive, nongaseous grout complying with CE CRD-C 621. Provide as recommended by manufacturer for interior or exterior use.

B. Anchoring Cement: Factory prepackaged, nonshrink, nonstaining, hydraulic controlled expansion cement. Provide product formulated for exterior use to resist erosion from water exposure without need for waterproof coating. "Ankertite Cement" as manufactured by Dayton Superior or equivalent.

2.04 FABRICATION - GENERAL

A. General:
   1. Clean and free of mill scale, flake rust and rust pitting.
   2. Use materials of size and thickness shown or, if not shown, of required size and thickness to produce strength and durability in finished product.
   3. Fabricate to dimensions shown or accepted on the shop drawings, using proven details of fabrication and support.
   4. Fabricate exposed work true to line and level with accurate angles and smooth surfaces and straight sharp edges.
   5. Connections: Weld corners and seams connections continuously, complying with AWS recommendations. At exposed welds grind flush and smooth to match and blend with adjoining surfaces. Do not use screws or bolts where it can be avoided. Where used, provide phillips flat head (countersunk) screw or bolt. Secure nut or bolt head tightly and nick threads to prevent loosening.
   6. Edges: Ease exposed edges to a radius of approximately 1/32" unless otherwise shown. Form bent metal corners to smallest radius possible without causing grain separation or otherwise impairing the work.
   7. Fabricate joints which when exposed to weather will exclude water. Provide weep holes where water can accumulate.

B. Castings: Uniform quality, free from flowholes, porosity, hard spots, shrinkage distortion or other defects. Castings: smooth and well cleaned by shot blasting. Machined horizontal bearing surfaces and covers subject to street or foot traffic and as indicated.

C. Connections: Welded unless otherwise indicated. Exposed welds shall be continuous and ground to smooth even finish.

D. Concrete Anchors:
   1. Simpson Titen HD 3/8" x 3".

E. Finishes:
   1. General: Comply with NAAMM "Metal Finishes Manual" for recommendations relative to application and designations of finishes.
2. Shop Primer Paint Finish: Shop paint miscellaneous ferrous metal work, except members or portions of members to be embedded in concrete or masonry, surfaces and edges to be field welded, and galvanized surfaces, unless otherwise specified.
3. Interior items: SSPC SP-7, "Brush-Off Blast Cleaning".
   a. Painting: Provide dry paint film thickness of 2 mils minimum. Spray apply paint to items exposed to view. Provide one shop coat of Primer except that provide an additional coat where surfaces will be inaccessible after erection.

2.05 STEEL PIPE HANDRAILS

A. Fabricate to designs, dimensions, details and patterns as shown on the Drawings and to conform to applicable codes and as required to support structural loads. Fabricate to meet requirements of ASTM E985. Galvanize all steel pipe and components at exterior locations.
1. Square or angled intersections: Cut, miter and weld joints. Fill, grind and smooth. Interconnect railing and handrail members by butt welding or welding with internal connectors. At tee and cross intersections, notch ends of intersecting members to fit contour of pipe to which end is joined and weld all around.
2. Radius intersections: Provide where shown on the Drawings. Additionally provide radius returns at ends of wall mounted handrails.
   a. Small Radius: Provide prefabricated radius fittings for all small radius intersections.
   b. Large Radius: Form simple and compound curves by bending pipe in jigs to produce uniform curvature. Maintain cylindrical cross section of pipe throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of pipe.
3. Ends: Close ends of pipes by welding 3/16" thick steel plate in place or use prefabricated fittings.

2.06 STEEL FRAMED STAIRS

A. General: Bolt or weld construction. Use bolted fabrication only when these connections will be concealed from view or noted otherwise on the Drawings.
B. Stair Framing: Fabricate stringers and headers of structural steel channels and provide miscellaneous steel framing as shown on the Drawings. Provide steel plate closure at risers.

PART 3 EXECUTION

3.01 INSPECTION

A. Examine substrates to which construction attaches or abuts, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of construction of the work of this section.
B. Report conditions contrary to contract requirements that would prevent a proper installation. Do not proceed with the installation until unsatisfactory conditions have been corrected.
C. Failure to call attention to defects or imperfections will be construed as acceptance and approval of substrate conditions. Installation indicates acceptance of substrates with regard to conditions existing at the time of installation.
D. Start of the work of this section indicates acceptance of substrate conditions and full responsibility for completed work.
3.02 PREPARATION

A. Provide anchors, setting drawings, diagrams, templates, instructions, and directions for installation of anchors, concrete inserts, sleeves, anchor bolts, and miscellaneous items having integral anchors that are to be embedded in concrete or masonry construction. Coordinate delivery of items to the site.

B. Field Measurement: Check actual locations of walls, floors, and all other construction to which metal fabrications must fit by accurate field measurement prior to fabrication. Show recorded measurements on final shop drawings.

C. Dimensions shown of existing construction are approximate. Field verify dimensions prior to submittal of shop drawings and fabrication of all work.

3.03 ERECTION

A. Fastening to In-Place Construction: Provide appropriate type and size of anchorage devices and fasteners where necessary for securing fabrications to in-place construction to support anticipated loads. Provide blocking and bracing within frame wall construction to support fabrications.

1. Install expansion/adhesive anchoring systems in strict accordance with manufacturer’s installation instructions. Provide embedment, spacing between anchors and edge distance as required to assure that anchor meets working loads.

B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installation of fabrications. Set accurately in location, alignment, and elevation. Set with edges and surfaces level, plumb, true, and free of rack.

1. Maximum variation in straightness, elevation, plumb, level, line or true: 1/4” in 10'-0”.

C. Connections: Fit exposed connections accurately together to form tight hairline joints. Weld connections which are not to be left as exposed joints, but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade the surfaces of exterior units receiving hot-dip galvanizing after fabrication and are intended for bolted or screwed field connections.

D. Field Welding: Comply with AWS Code for procedures of manual shielded metal-arc welding, appearance and quality of welds made, and methods used in correcting welding work, and the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base materials.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing and contour of welded surface matches those adjacent.

E. Expansion and contraction: Design and fabricate aluminum and metal work and anchor so that work will not be distorted nor fasteners over stressed from expansion and contraction of metal and aluminum.

F. Touch Up: After erection, all damaged and abraded spots including any unpainted or galvanized areas, welds, etc., shall be touched up with one coat of Primer or Galvanizing Repair Paint.

G. Temporary protection: Suitably protect aluminum surfaces requiring protection against lime mortar stains, discoloration, surface abrasion, and other construction abuses. Remove protection 1 week before start up and demonstration of project.
3.04 CLEAN UP

A. Leave all work furnished and installed under this section undamaged, touched up and clean. Protect work until completion of the project.

B. Collect and remove all debris and rubbish from the site and legally dispose of.

END OF SECTION
SECTION 06100
ROUGH CARPENTRY

PART 1 GENERAL

1.01 SUMMARY

A. Provide all labor, material and equipment required to complete all items of carpentry work shown on Drawings and as specified herein, and do all work ordinarily done by carpenters, whether or not specifically mentioned.

B. Do carpentry work in cooperation with the work of all other trades and subsystems to produce an efficient building operation.

C. Related requirements
   1. Section 05500: Metal Fabrications
   2. Section 08710: Finish Hardware

1.02 MISCELLANEOUS CARPENTRY WORK

A. Work includes construction of miscellaneous backing and temporary construction involving wood.

B. Work necessary to expedite and protect the Work. Brace metal door frames and bucks, metal sash frames, etc., to hold them securely in place until permanently built into adjacent construction.

C. Blocking for support of wall mounted hardware, wall mounted fire extinguishers, signs with greater than normal weight, visual display boards, and similar items that are wall mounted and require bolt, screw or nail fastening to the wall.

D. Blocking to prepare substrates at perimeters of openings; doors, windows, louvers, to provide adequate substrate condition and nailer for fastening items that require bolt, screw or nail fastening.

1.03 SECTION INCLUDES

A. Miscellaneous framing, blocking, and furring.

1.04 STORAGE

A. Stack lumber and plywood in a manner to insure ventilation, and in a place to insure protection from weather damage. Store trusses off the ground in such a manner as to prevent twisting or warping. Cover with water proof covering.

1.05 REFERENCES

A. AITC - American Institute of Timber Construction.

B. ALSC - American Lumber Standards Committee: Softwood Lumber Standards.


E. AWPA - American Wood Preservers’ Association.

G. UL - Underwriters' Laboratories, Inc.

H. WCLIB - West Coast Lumber Inspection Bureau: Standard Grading Rules for West Coast Lumber.

I. WWPA - Western Wood Products Association.

J. FSC – Forest Stewardship Council.

1.06 QUALITY ASSURANCE

A. Lumber Grading Agency: Certified by ALSC.

B. Plywood Grading Agency: Certified by APA.

1.07 SUBMITTALS

A. Submit product data for all manufactured products including but not limited to fasteners, adhesives, anchors, underlayment.

PART 2 PRODUCTS

2.01 LUMBER MATERIALS

A. Lumber: Grade stamp containing symbol of grading agency, rules under which graded, mill number or name, grade of lumber, species or species grouping and condition of seasoning.

B. Non-structural light framing and blocking: Douglas Fir-larch, 19 percent maximum moisture content. Construction grade, kiln dried to 15 percent average.

2.02 PLYWOOD MATERIALS

A. Plywood backing panels: Standard grade plywood, treated, thickness as required.

2.03 ACCESSORIES

A. General anchors and fasteners: Provide products with allowable design loads, as published by manufacturer, that meet or exceed those indicated. Manufacturer’s published values shall be determined from empirical data or by rational engineering analysis, and demonstrated by comprehensive testing performed by a qualified independent testing agency.

B. Fasteners (nails, screws, bolts): Hot dipped galvanized steel for exterior and treated wood locations, plain finish elsewhere. Select size and type of fastener as required for proper installation and to rigidly secure members in place.

C. Structural adhesive appropriate for condition to fasten carpentry to support or to fasten items to carpentry when mechanical fastening can not be accomplished.
PART 3  EXECUTION

3.01  INSPECTION

A. Examine substrates to which construction attaches or abuts, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of construction of the work of this section.

B. Report conditions contrary to contract requirements that would prevent a proper installation. Do not proceed with the installation until unsatisfactory conditions have been corrected.

C. Failure to call attention to defects or imperfections will be construed as acceptance and approval of substrate conditions. Installation indicates acceptance of substrates with regard to conditions existing at the time of installation and full responsibility for completed work.

3.02  GENERAL

A. Use only sound, thoroughly seasoned, well-manufactured materials of the longest practical lengths and sizes to minimize jointing. Use materials free from warp which cannot be easily corrected by anchoring and attachment. Sort out and discard warped material and material with other defects which would impair the quality of the Work.

B. Securely attach carpentry work to substrates by anchoring and fastening as shown and as required by recognized standards. Provide washers under bolt heads and nuts in contact with wood. Nail plywood to comply with the recommendations of the American Plywood Association. Countersink nail heads on exposed carpentry work and fill holes.

C. When using structural adhesive, follow installation instructions, using product within working time and allowing for setup time.

D. Set carpentry work accurately to required levels and lines with members plumb and true and accurately cut and fitted. Shim with metal or slate for full-bearing on concrete substances.

E. Install rough carpentry in accordance with IBC 2003 edition, unless otherwise shown or specified.

F. COORDINATION

G. Obtain measurements and verify dimensions shown and shop drawing details before proceeding with carpentry work, wherever possible. Correlate location of furring, nailers, blocking and similar supports so that attached work will comply with design requirements. Fit carpentry work to other work. Scribe and cope as required for accurate fit. Coordinate installation of all wood members and wood materials.

3.03  ATTACHMENT AND ANCHORAGE

A. Use common wire nails, except as otherwise shown or specified herein. Use finishing nails for finish work. Do not wax or lubricate fasteners that depend on friction for holding power.

B. Select fasteners of size that will not penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting of wood; predrill as required. Do not drive threaded friction type fasteners; turn into place. Tighten bolts and lag screws at installation and retighten as required for tight connections prior to closing in or at completion of Work.
3.04 WOOD NAILERS AND BLOCKING

A. Provide wherever shown and where required for attachment of other work. Form to shapes as shown and cut as required for true line and level of work to be attached.

B. Coordinate location with other work involved; refer to Shop Drawings of such work.

C. Attach to substrate securely with anchor bolts and other attachments devices and materials indicated in Part 2 as required to support applied loading. Countersink bolts and nuts flush with surfaces, unless otherwise shown.

D. Provide 2x6 nominal non-comb wood blocking in stud framing.

3.05 WORKMANSHIP AND INSTALLATION

A. Protect all carpentry, woodwork, metal work, hardware, and other materials from damage of any character during the progress of the work. Store materials in accordance with manufacturer's recommendations.

B. Furnish and install all rough hardware required, such as nails, screws, anchor bolts and devices (except those occurring in structural steel), shot anchors, similar devices. All rough hardware shall be of the proper type and size for the use intended. Provide adequate hardware to achieve substantial and positive anchorage. Nailing into wood plugs is not acceptable for any work.

C. Where mechanical attachment can not be achieved using fasteners, use construction adhesive over entire area of items to be secured to achieve substantial and positive connection to substrate.

END OF SECTION
SECTION 07270
FIRESTOPPING

PART 1  GENERAL

1.01  SUMMARY

A.  Section Includes
   1.  Through-penetration firestopping in fire rated construction.
   2.  Construction gap firestopping at connections of the same or different materials in fire rated
       construction.
   3.  Construction gap firestopping occurring within fire rated wall, floor or floor-ceiling assemblies.
   4.  Construction gap firestopping occurring at the top of fire rated walls.
   5.  Through-penetration smoke stopping in smoke partitions.
   6.  Construction gap smokestopping in smoke partitions.

B.  Related Requirements
   1.  Section 07900: Sealants
   2.  Division 15: Mechanical.
   3.  Division 16: Electrical

1.02  REFERENCES

A.  Underwriters Laboratories
   1.  U.L. Fire Resistant Directory
      a.  Through-penetration Firestop Devices (XHCR)
      b.  Fire Resistance Ratings (BXUV)
      c.  Through-penetration Firestop Systems (XHEZ)
      d.  Fill, Void or Cavity Material (XHHW)

B.  American Society for Testing and Materials Standards

1.03  DEFINITIONS

A.  Assembly:  Particular arrangement of materials specific to given type of construction described or
      detailed in referenced documents.

B.  Barriers:  Time rated fire walls, smoke barrier walls, time rated ceiling/floor assemblies and
      structural floors.

C.  Firestopping:  Methods and materials applied in penetrations and unprotected openings to limit
      spread of heat, fire, gasses and smoke.

D.  Penetration:  Opening or foreign material passing through or into barrier or structural floor such that
      full thickness of rated materials is not obtained.

E.  Construction Gaps:  Gaps between adjacent sections of walls, exterior walls, at wall tops between
      top of wall and ceiling, and structural floors or roof decks; and gaps between adjacent sections of
      structural floors.
F. System: Specific products and applications classified and numbered by Underwriters Laboratories, Inc., to close specific barrier penetrations.

G. Sleeve: Metal fabrication or pipe section extending through thickness of barrier and used to permanently guard penetration. Sleeves are described as part of penetrating system in other sections and may or may not be required.

1.04 SYSTEM DESCRIPTION

A. Design Requirements at Fire-rated construction: Maintain barrier and structural floor fire resistance rating including resistance to cold smoke at all penetrations, connections with other surfaces or types of construction, at separations required to permit building movement and sound or vibration absorption, and at other construction gaps.

B. Smoke barrier construction: Maintain barrier and structural floor resistance to cold smoke at all penetrations, connections with other surfaces and types of construction and at all separations required to permit building movement and sound or vibration absorption, and at other construction gaps.

1.05 SUBMITTALS

A. Submit in accordance with Section 01300, unless otherwise indicated.

B. Product data: Manufacturer's specifications and technical data including the following:
   1. Firestopping products.
   2. Detailed specification of construction and fabrication.
   3. Manufacturer's installation instructions.

C. Shop drawings: Provide drawings indicating locations of penetrations through walls or floors. Key each penetration to coordinate with a table that indicates:
   1. Penetration key number.
   2. Wall or floor construction.
   3. Penetrating item size and type.
   4. U.L. approved design. (e.g. Metacaulk 835+CW-1 for EMT penetrating a concrete wall for a 2 Hour rating)
      a. Manufacturer or manufacturer's representative shall provide qualified engineering judgments and drawings relating to nonstandard applications as needed.

<table>
<thead>
<tr>
<th>Penetration Key Number</th>
<th>Wall/Floor Construction</th>
<th>Penetration Item Size &amp; Type</th>
<th>U.L. Design</th>
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1.06 QUALITY ASSURANCE

A. Submit forms or acceptance for proposed assemblies not conforming to specific UL Firestop System numbers, or UL classified devices.

B. Materials shall have been tested to provide fire rating at least equal to that of the construction.
1.07 DELIVERY, STORAGE AND HANDLING

A. Packing and shipping
   1. Deliver products in original unopened packaging with legible manufacturer’s identification.
   2. Coordinate delivery with scheduled installation date, allow minimum storage at site.

B. Storage and protection: Store materials in a clean, dry, ventilated location. Protect from soiling, abuse, moisture and freezing when required. Follow manufacturer's instructions.

1.08 PROJECT CONDITIONS

A. Existing conditions
   1. Verify existing conditions and substrates before starting work. Correct unsatisfactory conditions before proceeding.
   2. Proceed with installation only after penetrations of the substrate and supporting brackets have been installed.

B. Environmental requirements
   1. Furnish adequate ventilation if using solvent.
   2. Furnish forced air ventilation during installation if required by manufacturer.
   3. Keep flammable materials away from sparks or flame.
   4. Provide masking and drop cloths to prevent contamination of adjacent surfaces by firestopping materials.
   5. Comply with manufacturing recommendations for temperature and humidity conditions before, during and after installation of firestopping.
   6. Post MSDS at project site.

PART 2 PRODUCTS

2.01 MANUFACTURERS


PART 3 EXECUTION

3.01 EXAMINATION

A. Verification of conditions: Examine areas and conditions under which work is to be performed and identify conditions detrimental to proper or timely completion.
   1. Verify barrier penetrations are properly sized and in suitable condition for application of materials.
   2. Do not proceed until unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Clean surfaces to be in contact with penetration seal materials of dirt, grease, oil, loose materials, rust or other substances that may affect proper fitting, adhesion or the required fire resistance.

3.03 INSTALLATION

A. Install penetration seal materials in accordance with printed instructions of the U.L. Fire Resistance Directory and in accordance with manufacturer's instruction.
B. Seal holes or voids made by penetrations to ensure an effective smoke barrier.

C. Where floor openings without penetrating items are more than four inches in width and subject to traffic or loading, install firestopping materials capable of supporting same loading as floor.

D. Protect materials from damage on surfaces subject to traffic.

E. Place firestopping in annular space around fire dampers before installation of damper's anchoring flanges which are installed in accordance with fire damper manufacturer's recommendations.

F. Where large openings are created in walls or floors to permit installation of pipes, ducts, cable tray, bus duct or other items, close unused portions of opening with firestopping material tested for the application.

G. Install smoke stopping as specified for firestopping.

3.04 FIELD QUALITY CONTROL

A. Examine penetration sealed areas to ensure proper installation before concealing or enclosing areas.

B. Keep areas of work accessible until inspection by applicable code authorities.

C. Perform under this section patching and repairing of firestopping caused by cutting or penetration by other trades.

3.05 ADJUSTING AND CLEANING

A. Clean up spills of liquid components.

B. Neatly cut and trim materials as required.

C. Remove equipment, materials and debris, leaving area in undamaged, clean condition.

END OF SECTION
PART 1 GENERAL

1.01 SUMMARY

A. Furnish all labor, material, tools, equipment and services necessary for and reasonably incidental to the execution of caulking and sealant, and work shown on the drawings and specified herein, or as required to seal interior and exterior moving and non-moving joints in order to prevent penetration of light, air, and moisture.

B. Related requirements.
   1. Section 07270: Firestopping

C. Work to be caulked as a minimum as scheduled below, system as specified in Part 2.
   1. Interior:
      a. Perimeters of interior frames, as detailed or noted. (1a, 1b)
      b. Joints between dissimilar materials. (1a, 1b)

1.02 QUALITY ASSURANCE

A. Installer Qualifications: Installer who has successfully completed within the last 3 years at least 3 joint sealer and applications similar in type and size to that of this Project.

B. Mixing and application of sealing compound shall be in strict accordance with the manufacturer's printed directions.

C. Field Testing: Prior to installation of joint sealants, field-test their adhesion to joint substrates:
   1. Locate test joints where indicated or, if not indicated, as directed by the Architect.
   2. Install joint sealants in five-foot lengths using same materials and methods required for completed work. Allow sealants to cure before testing. Test adhesion to joint substrates by manually trying to pull joint sealant out of joint.
   3. Perform field tests for each type of elastomeric sealant and joint substrate application.
   4. Perform tests in presence of the Sealant Representative and Architect.

D. Comply with Underwriters Laboratories Fire Resistant Directory for smoke and firestop devices and systems, fire resistance ratings and fill, void or cavity materials.

E. Comply with South Coast Air Quality Management District requirements for VOC component limits.

1.03 SUBMITTALS

A. Product Data: Submit information regarding: performance, use, service temperature range, Shore A hardness, tensile strength at break, tensile elongation, 100% modulus, tear strength, and adhesion in peel.

B. Warranty: Submit required Warranty.
1.04 DELIVERY, STORAGE AND HANDLING

A. Deliver caulking and sealing compounds to the job in unbroken, sealed containers bearing the manufacturer's name, labels, product identification, batch numbers and mixing directions. Store materials in sealed containers in a dry protected area above the ground or floor.

B. Protect caulking materials before, during, and after installation. Protect the installed work of other trades during installation.

C. Do not use caulking materials that have been stored for a period of time exceeding the maximum recommended shelf life of the materials.

1.05 WARRANTY

A. Submit 5-year warranty agreeing to repair or replace joint sealers which fail to perform:
   1. As air-tight and water-tight joints
   2. Fail in joint adhesion, cohesion, abrasion resistance, weather resistance, extrusion resistance, migration resistance, stain resistance, or general durability
   3. 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.

B. Provide warranty signed by the Installer and Contractor.

1.06 JOB CONDITIONS

A. Temperature Conditions: Do not proceed with the installation of sealants under adverse weather conditions when joint to be sealed is damp, wet or frozen, or when ambient and substrate temperatures are below or above the manufacturer's recommended limitations for installation or below 40 deg. F. (4.4 deg. C.) Consult the manufacturer for specific instructions before proceeding.

B. Environmental Conditions: Do not apply material if it is raining or snowing, or if they appear to be imminent. Contractor assumes all risks for weather-related product failure after commencing application.

PART 2 PRODUCTS

2.01 MATERIALS

A. Sealants:
   1. Polyurethane Base
      a. 1A - POLYURETHANE BASE (Elastomeric), self leveling. Provide Sikaflex - 2C-SL; 2 component, chemical cure, joint movements of 50±; conforming to Fed. Spec. # TT-S-00227E, Type I, Class A. Equivalent by different manufacturer only by meeting this specification and specifically must meet 50%± joint movement requirement.
      b. 1B - POLYURETHANE BASE (Elastomeric), non-sag. Provide Sikaflex - 2C-NS, Mameco Vulkem 922-NS, or Pecora Dynatrol 2; 2 component chemical cure, joint movements of 50±; conforming to Fed. Spec. # TT-S-00227E, Type II, Class A, or equivalent substitute.

B. Joint Backing: Provide sealant backings of material and type which are non-staining: are compatible with joint substrates, sealants, primers and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
   1. Plastic Foam Joint Fillers: Provide preformed compressible, resilient, non-waxing, non-extruding, non-staining strips of flexible, non-gassing plastic foam. Provide material
nonabsorbent to water and gas; and of size, shape and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

a. Either open-cell polyurethane foam or closed-cell polyethylene foam, unless otherwise indicated and subject to approval of sealant manufacturer for intended sealant to be used.

C. Sealant Primer: Contractor shall determine need for primer. If required, it shall be suitable for substrate surfaces as recommended by the sealant/primer manufacturer. Determination if the primer is staining or non-staining must be made prior to application.

D. Bond Breaker: Where joint space does not provide space for foam joint fillers, provide polyethylene tape or other plastic tape as recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure.

E. Cleaning Agent: As recommended by sealant manufacturer.

F. Through penetration and construction gap firestopping of fire rated construction: Approved systems listed in and identical to systems in the U.L. Fire Resistance Directory conforming to the construction and fire rating type, penetrant type, annular space requirements and fire rating involved in each separate instance, and that the system be symmetrical for wall applications. All firestopping products used as components in a single system must be from the same manufacturer.

1. Additional requirements: Withstand the passage of cold smoke either as an inherent property of the system or by use of a separate product included as part of the U.L. system and designed to perform this function.

PART 3 EXECUTION

3.01 EXAMINATION

A. Inspect the joint configuration, the joint surfaces and backing forming the sealant rabbet (where applicable). Report, in writing, any and all detrimental conditions which may affect the performance of the product.

B. Do not proceed with the installation of sealant if the joint width is less than indicated on the drawings or less than allowed by the joint sealer manufacturer for the application intended. Beginning of work means acceptance of existing conditions by installer and full responsibility for the work.

C. Surface Condition: Joint surfaces to receive a sealant shall be sound, smooth, clean, dry and free of all visible contaminants. Review with installer of substrate regarding application of non visible coatings.

3.02 PREPARATION OF SURFACES

A. Where an irregular surface or sensitive joint border exists apply masking tape at the edge of the joint to insure joint neatness and protection. Remove tape after sealant is applied.

B. Primer: Thoroughly clean joints and apply primer, if recommended by sealant manufacturer, to dry surfaces. Apply primer prior to application of joint backing, bond breaker or sealants. Protect adjacent surfaces from staining or discoloration.

C. Joint Backing: Install joint fillers to support sealants during applications and at position required to produce the cross-sectional shapes and depths of installed sealants relative to joint widths which allow optimum sealant movement capability.

ECEE 2B80 Remodel 07900-3 Sealants
PR005329 September 2010
1. Install joint backing with approximately 30% compression.
2. Do not stretch, twist, puncture or tear joint backing. Butt joint backing at intersections.
3. Remove open-cell joint fillers which have become wet prior to sealant application and replace with dry material.

D. Bond Breaker Tape: Install bond breaker tape smoothly at back of joint where joint backing is not required or cannot be installed. (Sealant shall adhere only to the sides and not to the back of the joint so as to eliminate three-sided adhesion).

3.03 INSTALLATION

1. Use hand guns or pressure equipment, with proper nozzle size, on clean, dry, properly prepared substrates. Force sealant into joint and against sides of joint to make uniform. Avoid pulling of the sealant from the sides. Fill sealant space completely with sealant.

B. Joints:
1. Install sealants to depths as recommended by the sealant manufacturer, but within the following general limitations, measured at the center (thin) section of the bead:
   a. For sidewalks, pavements and similar joints sealed with elastomeric sealants and subject to traffic and other abrasion and indentation exposures, fill joints to a depth equal to 75% of joint width, but neither more than 0.625" deep nor less than 0.375" deep.
   b. For normal moving joints sealed with elastomeric sealants, but not subject to traffic, fill joints to a depth equal to 50% of joint width, but neither more than 0.5" deep nor less than 0.25" deep.
   c. For joints sealed with non-elastomeric sealants and caulking compounds, fill joints to a depth in the range of 75% to 125% of joint width.
   d. At joints in vertical planes on exterior of building and interior face of through expansion or control joints, provide non-sag type polyurethane.
   e. At joints in horizontal planes on interior and exterior of building, provide self-leveling type polyurethane.
   f. At joints on interior of building, except as indicated in item A above, provide polyurethane type sealant.
2. Install sealant into the prepared joints when the joints are at the midpoint of their designed expansion and contraction cycle.

C. Tooling: Tooling is required to ensure firm full contact with the interfaces of the joint. Tool joints to form smooth, uniform beads with slightly concave surfaces. Finish joints shall be straight, uniform, smooth and neatly finished. Remove any excess sealant from adjacent surfaces of joint, leaving the work in a neat, clean condition. Tooling agents should only be used if recommended by the sealant manufacturer.
1. Except as otherwise indicated, fill sealant recess to slightly below adjoining surfaces. Where horizontal joints are between a horizontal surface and vertical surface, fill joint to form a slight cove, so that the joint will not trap moisture and dirt.

D. Set all thresholds in full bed of polyurethane based sealant.

3.04 CLEANING

A. Clean off excess compound or smears with cleaning material recommended by the manufacturer of the compound. Leave work in a condition satisfactory to the Architect.
SECTION 08100
METAL DOORS AND FRAMES

PART 1 GENERAL

1.01 SUMMARY

A. Furnish and install the hollow metal doors and frames of sizes and to details as shown on the Drawings and specified herein.

B. Related requirements.
   1. Section 08710: Finish Hardware

1.02 SUBMITTALS

A. Door Schedule: For each opening-
   1. Use same reference numbers as those shown on the Drawings.
   2. Identify opening location
   3. Indicate door and frame elevations, size, gauge of construction, frame section, wall anchors, swing, and label if any.

B. Shop Drawings:
   1. Shop drawings must be provided by the manufacturer. Shop drawings drawn by and provided by a broker door supplier will not be accepted.
   2. Show conformance with these specifications for internal door and frame reinforcement, door edge closure, floor anchorage, hardware reinforcement and location, finish and window glazing at doors.
   3. Door and frame elevations with location of cut-outs for openings.
   4. Frame sections with dimensions for each frame/wall conditions.

1.03 QUALITY ASSURANCE

A. National Association of Architectural Metal Manufacturer’s (NAAMM) Hollow Metal Manuals HMMA 861-96 and HMMA 830-96 for fabrication, hardware preparation and installation unless other specific requirements are noted herein.

B. Underwriter’s Laboratories: Labeled doors and frames bearing permanent labels establishing testing and approval of U.L., Inc.
   1. Provide fire-rated hollow metal doors and frames investigated and tested as a fire door assembly, complete with type of fire door hardware to be used.
   2. Identify each fire door and frame with UL labels indicating applicable fire rating of both door and frame.
   3. Construct and install assemblies to comply with NFPA Standard No. 80.

C. References: This section contains references to the following documents. They are a part of this section as specified and modified. In case of conflict between the requirements of this section and those of the listed documents, the requirements of this section shall prevail.

<table>
<thead>
<tr>
<th>Reference</th>
<th>Title</th>
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</thead>
<tbody>
<tr>
<td>ASTM A1008</td>
<td>Steel, Carbon, Cold-Rolled Sheet, Commercial Quality.</td>
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</table>

ECEE 2B80 Remodel 08100-1 Hollow Metal Doors and Frames
PR005329 September 2010
ASTM A1011  Steel, Carbon, Hot-Rolled Sheet and Strip, Commercial Quality.
ASTM A653  Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Commercial Quality.
HMMA 800  Introduction to Hollow Metal.
HMMA 801  Glossary of Terms for Hollow Metal Doors and Frames.
HMMA 802  Manufacturing of Hollow Metal Doors and Frames.
HMMA 830  Hardware Preparations and Locations for Hollow Metal Doors and Frames.
HMMA 840  Installation and Storage of Hollow Metal Doors and Frames.
HMMA 850  Fire Rated Hollow Metal Doors and Frames.
NFPA 80  Fire Doors and Fire Windows.

PART 2  PRODUCTS

2.01 MANUFACTURERS

A. Metal doors and frames: Manufactured by West Central Manufacturing, Rapid City, South Dakota, 800-297-2738, Rocky Mountain Metals, Raton, NM, 505-445-2756, Stiles Custom Metal, Ceres, CA, 209-538-DOOR, or equivalent substitute in compliance with this specification.

2.02 MATERIALS

A. Steel: Commercial quality, cold rolled steel conforming to ASTM A1008 or hot rolled, pickled and oiled steel conforming to ASTM A1011 free of scale, buckle or surface defects.

2.03 FABRICATION

A. Hollow Metal Doors and Panels
1. Doors and Panels: 1-3/4" thick, constructed of 2 sheets of 16 gage cold rolled stretcher leveled steel. Provide 16 gage stainless steel sheet when stainless steel doors are required in the door schedule. Provide 20 gage vertical stiffeners spaced not over 6" on centers, extending full height of door or panel and spot-welded to face sheets 4" on center, constructed so as to interlock both face sheets. Provide channel or zee type stiffeners at exterior doors to allow for maximum insulation in door core. Continuously welded vertical closure between the face sheets, ground and dressed smooth to provide a seamless edge. Continuous one-piece 16 gage channels extending the full width of the door or panel, top and bottom, and continuous one-piece 14 gage channel for the lock rail.
2. Filling: Fill doors solid between vertical stiffeners with mineral or glass wool of batt type and of minimum 3½ inch thick compressed to 1 3/4 inches. No loose or blown-in filling materials will be accepted.
3. Hardware Reinforcement: Mortised reinforce, drill and tap at the factory for mortised template hardware only, in accordance with the approved hardware schedule. Provide reinforcing plates where surface mounted is to be applied. Drilling and tapping for surface hardware shall be done by others.
   a. Factory reinforce all doors and surface applied closers and hold-open devices as an integral part of the door structure. Reinforce not less than 12 gage internally sufficient in size to accommodate surface applied door closers, and hold-open devices.
b. Fabricate reinforcements for hinges from not less than 7 gage steel plate 9" long, securely welded to continuous 16 gage interior edge channels. Drill and tap. Use of coined or extruded holes is unacceptable.

c. Fabricate reinforcements for locks, latches, push and pulls and panic devices from 12 gage steel spot welded to 16 gage interior edge channels and designed to provide adequate support and reinforcement for required hardware.

d. Correct any inaccurate preparations for hardware. Template all hinged and doors per templates supplied by hardware supplier.

e. Field weld, finish grind and dress smooth all splice joints.

f. All doors shall be factory prepared to accept all required security hardware, including latch guards and door position switches, prior to jobsite delivery.

B. Hollow Metal Frames

1. Frames: Units formed to the profile as indicated on the drawings. Fabricate exterior and over 3'-4" wide frames from 14 gage cold rolled steel. Fabricate all other frames from 16 gage cold rolled steel. Provide stainless steel frames when required in the door schedule. Continuously electric weld all frames at all joints, miters and stops. Miter and weld corners full length of joints and grind smooth. Prepare the stop side of interior door frames for rubber silencers specified in Finish Hardware Schedule.

2. Hardware Reinforcement: Properly cut, mortise, reinforce, drill and tap for hinges, strikes, holders and closers where required. (Do not drill and tap for surface mounted closers and brackets.) Reinforce per HMMA standards, except as follows:
   a. Butt hinges: 7 gage 12" long full width of the frame profile less the width of one backbend.
   b. Closer: 10 gage full width of frame trim 12" long.
   c. Strikes, flush bolts, all other surface mounted hardware: 12 gage.
   d. The reinforcing plate is to be a one-piece integral unit, bent for flush mounting of hinges and is not to be built up nor are pieces to be welded together to make up the reinforcing plate.

   Provide cover boxes in back of all hardware cutouts. Provide flush removable access plates where shown or required. Correct any inaccurate preparation for hardware.

3. Anchors: UL rated at fire rated assemblies.
   a. Steel stud anchor: Provide frames anchored to steel studs with 16 gauge Z-shaped anchors shall be the same width as the stud by 2" deep. Anchors shall be securely spot welded into frame.

   1.) Four per jamb for frames to 7'-6" high.
   2.) Five per jamb for frames to 8'-0" high.

   b. Bolt Anchors: Provide frames anchored into existing conditions or into concrete walls. Anchor spacer angle shall be the full depth of frame face and stop dimension long by 2" high by 12 gage securely welded to frame and provided with a countersunk hole to receive a 3/8" flat head bolt. Bolts, expansion shields and anchor bolts to be provided by others.

   1.) Four per jamb for frames to 7'-6" high.
   2.) Five per jamb for frames to 8'-0" high.

4. Floor Clips: Provide at all frames securely welded to each jamb member. Provide floor clips with a minimum thickness of 14 gauge and with two holes for proper anchorage to the floor. Where floor clips cannot be installed and where sidelights occur adjacent to a door, provide a continuous 14 gage sub-channel secured to the floor for a positive means of preventing movement of the frame at the sill. Provide vertical leg of channel 3" high at 4" high sill frames and 1" high at 2" high sill frames.

5. Head stiffener: Provide 12 gage steel channel stiffener welded into frame head at all frames wider than 4'-0" where installed in masonry and concrete walls or structural steel frame.

6. Spreaders: Before shipment, install a temporary spreader at bottom of frames. Remove spreader before frames are secured in place.
2.04 FINISH

A. Interior doors and frames:
   1. Before assembly, clean all inaccessible surfaces thoroughly cleaned and then spray with a rust-
      inhibiting primer paint.
   2. After complete assembly remove all oil, dirt, rust and impurities. Fill, dress and sand doors as
      required to produce a smooth surface. Chemically treat doors to insure maximum paint
      adhesion and prime coat all exposed surfaces with rust inhibited primer fully cured before
      shipment.

2.05 CLEARANCES

A. Provide the following clearances:
   1. Edge clearances between doors and frames: 1/8 inch.
   2. At door sills with threshold: 1/4 inch maximum between door and threshold.

PART 3 EXECUTION

3.01 INSPECTION

A. Examine substrates to which construction attaches or abuts, with Installer present, for compliance
   with requirements for installation tolerances and other conditions affecting performance of
   construction of the work of this section.

B. Report conditions contrary to contract requirements that would prevent a proper installation. Do not
   proceed with the installation until unsatisfactory conditions have been corrected.

C. Failure to call attention to defects or imperfections will be construed as acceptance and approval of
   substrate conditions. Installation indicates acceptance of substrates with regard to conditions
   existing at the time of installation and full responsibility for completed work.

3.02 PREPARATION

A. Repair scratches or damage, clean and prime materials delivered to the site.

B. Store materials vertically above ground, covered with wrappings removed in a dry location.

C. Prior to installation verify that all units are of correct size, swing, squareness and alignment in
   accordance with HMMA 861-87.

3.03 INSTALLATION

A. Install doors and frames with all hardware left in proper working order. Installation shall be done by
   a competent door and frame erector and in accordance with manufacturer's instructions. Do not
   exceed the following permissible installation tolerances:
   1. Squareness: Plus or minus 1/16", measured on a line, 90 deg. from one jamb at the upper
      corner of the frame to the other jamb.
   2. Alignment: Plus or minus 1/16", measured on jambs on a horizontal line parallel to the plan of
      the wall.
   3. Twist: Plus or minus 1/16", measured at face corners of jambs on parallel lines perpendicular to
      the plane of the wall.
   4. Plumbness: Plus or minus 1/16", measured on the jamb at the floor.
5. Anchor frame to floor with two 3/8 inch diameter expansion anchors per jamb.
6. Locate wall anchors in jambs at hinge and strike levels.
7. Install doors and panels with clearances and tolerances per HMMA 861-87.
8. Prepare and install hardware per HMMA 830-87.

END OF SECTION
PART 1 GENERAL

1.01 SUMMARY

A. Provide all labor, material and equipment necessary for finish hardware and related items as shown on the Drawings and specified herein.

B. Related requirements
   1. Section 08100: Metal Doors and Frames.

1.02 SUBMITTALS

A. Furnish a complete detailed hardware schedule within 20 days after Notice of Award. Include the following information:

   1. Name and description of each opening. Include:
      Door Numbers
      Location
      Frame/Door Materials
      Size and Thickness of Door
      Hand of Door
      Degree of maximum door opening
   2. Complete description of hardware provided, including manufacturer’s name and catalog number and quantities.

B. Documentation that the supplier meets the requirements for Paragraph 1.03 A below.

C. Operation and Maintenance Data:
   1. Furnish Maintenance Manuals covering the finish hardware for this job. Each manual shall consist of printed sheets from the hardware manufacturer. Include the following information in the Maintenance Manuals:
      1.) Name, address and phone number of hardware supplier.
      2.) Maintenance instruction and parts list for each type of operating hardware listed including:
         a.) Locks
         b.) Closers
   Furnish wrenches and tools required for hardware maintenance.

1.03 QUALITY ASSURANCE

A. Hardware Supplier: Company specializing in supplying builders hardware for not less than three years approved by manufacturer with an Architectural Hardware Consultant certified by the Door and Hardware Institute on staff.

B. NFPA Standard No. 80 and Underwriters Laboratories for fire rated openings.


D. Builders Hardware Manufacturer’s Association (BHMA):
   1301-1982 Materials and Finishes
1.04 COORDINATION

A. Coordinate work of this section with other directly affected sections that require integral reinforcement for door hardware.

1.05 DELIVERY, STORAGE AND HANDLING

A. Templates: Deliver hardware templates for hollow metal doors and frames to the door supplier immediately on receipt of the approved schedule of finish hardware. Deliver hardware templates for other openings to jobsite with hardware.

B. Hardware
   1. Delivery: Deliver hardware to job site only after proper provision for secured storage has been made.
   2. Labels: Properly package and label each item to indicated exact location for intended use.
   3. Check-In: Hardware supplier’s representative shall be present when finish hardware is delivered to site. Check in each item and turn over to Contractor.

1.06 KEYS AND KEYING SYSTEM

A. Construction Cores: Provide construction cores for construction phase keying. Construction cores will be returned to the contractor once permanent cores are installed.

B. Permanent Cores: Owner to provide Medeco cylinders. Owner’s departmental client to arrange for keying with CU Access Services.

C. Keying Schedule: Be responsible to schedule meeting with Owner to obtain Owner’s keying requirements.

1.07 WARRANTY

A. Mechanical failure on door closers for 5 years.

B. Failure on parts of all hardware except closers for 2 years.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. In addition to the products specified in the hardware schedule, the following manufacturers may furnish equivalent products:
   1. Locksets: No substitutions will be considered.
   2. Hinges: Stanley, Hager or McKinney.
   3. Closers: LCN
2.02 HARDWARE

A. General: Provide all necessary hardware (of suitable size, type and finish) for proper hardware installation.

B. Closers:
   1. Sized for each door appropriate for use and weather conditions with adjustable back check, latching and closing speed. Adjust to comply with the American's with Disabilities Act (ADA).
   2. Based upon location of adjacent walls or equipment provide maximum hold open or stop point for any given door having a hold open or stop designation.
   3. Provide through-bolt (TB) installation for all closers.
   4. Standard painted powder coated finish: dull brass

C. Silencers: Rubber, three for each door for all doors installed in metal frames or wood frames.

D. Locksets:
   1. Of same manufacturer style, finish core and keyway unless otherwise specified.
   2. Manufacturer: Schlage
   3. Series/Model: L Series
   4. Lever Style: Sparta
   Strike: Provide appropriate strike for door and frame construction.
   Cores: Use construction cores to maintain security during construction. Owner to provide permanent Medeco cylinders.

2.03 FINISH

A. General: Provide hardware with one finish unless noted otherwise in the schedule.

B. Finish: Provide 612 (US10) finish for all hardware except for closer covers where a painted aluminum finish is required to match hardware finish.

2.04 KEYING

A. Coordinate keying with the Owner and provide keyed cores matching Owner's keying system to the Owner. Install final cores at completion of the project.

PART 3 EXECUTION

3.01 EXAMINATION AND PREPARATION

A. Verify that doors and frames are ready to receive work and dimensions are as indicated and required by the manufacturer.

B. Verify that each package of hardware is correct for its intended opening and use and that all necessary screws and fasteners are provided for proper installation.

C. Examine substrates to which construction attaches or abuts, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of construction of the work of this section.

D. Report conditions contrary to contract requirements that would prevent a proper installation. Do not proceed with the installation until unsatisfactory conditions have been corrected.
E. Failure to call attention to defects or imperfections will be construed as acceptance and approval of substrate conditions. Installation indicates acceptance of substrates with regard to conditions existing at the time of installation and full responsibility for completed work.

3.02 INSTALLATION

A. Install hardware in accordance with manufacturer's instructions, use templates provided with hardware.

B. Conform to the hardware mounting height requirements of NAAMM Standard CHM-1-74. Adjustments to these standard heights may be made during review of submittals.

C. Completely fit hardware before final coat of paint or other finish application. Remove hardware for final finishes. Neatly mortise and cut doors and frames to prepare for hardware. Conceal evidence of cutting in the finished work. Permanently install hardware after finishing operations are complete.

D. Attach hardware such as door closers, forearm shoes of closers and holding devices mounted on metal doors or panels with machine screws.

E. Prior to final completion, install permanent cores, inspect and adjust all locks, closer adjustments and/or regulations and check all keying.

PART 4 SCHEDULE

4.01 FINISH HARDWARE SCHEDULE

KEY:

| L | LCN | P | Pemko | SC | Schlage | S | Stanley | T | Trimco | I | Ives |

<table>
<thead>
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<th>QTY.</th>
<th>ITEM</th>
<th>NUMBER</th>
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</thead>
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<tr>
<td>HW-1 Door 01 (New Pair 3'-0&quot; x 8'-0&quot; HM 1-Hr from Storage Room to Data Center 2B80)</td>
<td></td>
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<tr>
<td>3 Pr</td>
<td>Butts</td>
<td>FBB 179 4½ x 4½ US10</td>
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<td>2</td>
<td>Closers</td>
<td>P4041 CSN x TB x Alum (factory painted) with hold open</td>
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<td>Door seal</td>
<td>S88D</td>
</tr>
<tr>
<td>1</td>
<td>Lockset</td>
<td>L9070 03N 612</td>
</tr>
<tr>
<td>4</td>
<td>Kickplates (both sides)</td>
<td>8400 12” x 2” LDW US10</td>
</tr>
<tr>
<td>2</td>
<td>Manual Flush Bolts</td>
<td>3913 top and bottom, US10 with spring loaded strike covers</td>
</tr>
<tr>
<td>1</td>
<td>Threshold</td>
<td>276B x 6-feet</td>
</tr>
<tr>
<td>1</td>
<td>Meeting Stile Gasketing</td>
<td>305BN</td>
</tr>
</tbody>
</table>

| HW-2 Door 02 (existing door between south office area and north storage and server room areas) |
| 1 | Lockset | L9080 03N 612 |

ECEE 2B80 Remodel 08710-4 Finish Hardware
PR005329 July 2010
END OF SECTION
PART 1 GENERAL

1.01 SUMMARY

A. Provide labor, equipment, appliances and materials, and perform all operations required for the installation of steel stud framing and drywall as shown on the Drawings and specified herein.

B. Related Requirements
   1. Section 06100: Rough Carpentry
   2. Division 15: Mechanical.
   3. Division 16: Electrical.

1.02 QUALITY ASSURANCE


B. General: Perform Work in accordance with GA201 - Gypsum Board for Walls and Ceilings, ASTM C754-Specification for Installation of Steel Framing Members to Receive Screw Attached Gypsum Board, and GA216 - Recommended Specifications for the Application and Finishing of Gypsum Board.

C. Fire-Resistance Rating: Where indicated or required to comply with governing regulations, provide materials and construction which are identical to those assemblies whose fire resistance has been determined per ASTM E119 by a testing and inspecting organization acceptable to authorities having jurisdiction.

D. Framing at Metal Doors and Frames: GA219, Recommendations for Installation of Steel Door Frames in Steel Stud-Gypsum Board Fire Rated Partitions.

E. Definitions of Terms: GA505 - Gypsum Board Products Glossary of Terminology.

1.03 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to the jobsite in original unopened packaging, stored in a place protected from exposure and damage in accordance with referenced standards and manufacturer's recommendations whichever is more stringent.

1.04 PROJECT/SITE CONDITIONS

A. Temperature: Maintain a uniform ambient temperature in the range of 55 degrees F. to 70 degrees F. before commencing installation, during installation, and a minimum of 72 hours after completed installation. Subsequently maintain a minimum temperature of 55° F.

B. Ventilation: Provide ventilation to eliminate excessive moisture. Avoid drafts during application.
C. Lighting: Maintain lighting at a minimum uniform level of 50 foot candles where finish work is occurring.

1.05 SUBMITTALS

A. Manufacturer's product data for framing and furring; gypsum board types and accessories, joint treatment materials and miscellaneous materials.
   1. Certifications required.
      a. Certify that products furnished for this project are asbestos free.
      b. Certify that products meet or exceed specification requirements.

B. Indicate specified ratings with maximum stud height limitations.

1.06 SEQUENCING AND SCHEDULING

A. Coordinate installation and finishing of gypsum board systems with insulation, painting, wallcovering, mechanical and electrical or other sections whose work is dependent upon or related to gypsum board. Do not enclose walls or partitions until all required framing, insulation, mechanical and electrical inspections have been made and approved.

1.07 WARRANTY

A. Warrant all framing, gypsum board, accessory products and finishing to be free from defects in materials and workmanship for a period of not less than two years from the date of acceptance.

PART 2 PRODUCTS

2.01 GYPSUM BOARD SYSTEM

A. Manufacturers:
   1. Dietrich Metal Framing
   2. United States Gypsum Company.
   3. National Gypsum Company
   4. Gold Bond Building Products.
   5. Georgia Pacific.

B. Framing: GA201 and GA216, ANSI/ASTM C645, ASTM C-754, ICBO 4782P
   1. Steel studs: 25 gauge, galvanized sheet steel, except at door jambs and walls having a tile or heavy weight finish provide 20 gage or heavier as required to carry the additional weight. Provide with flange edges bent back 90 deg. and doubled over to form 3/16" minimum lip (return). Size as noted on Drawings.

C. Fasteners: GA 201 and GA 216.


E. All Gypsum Board Types: ASTM C 1396, 5/8 inch thick, maximum permissible length; ends square cut, tapered edges; unless noted otherwise in the following::
   1. Standard Type: C 36.
   2. Fire Rated Type: C 36, fire resistive UL rated, noted "Type "X" on Drawings.
2.02 ACCESSORIES, JOINT TREATMENT, AND MISCELLANEOUS MATERIALS

A. Metal Accessories: GA 201 and GA 216.
   1. Straight wall applications: Dura-A-Bead #103 Corner Reinforcement, Metal Edge Trim #200-B, Control Joint #093, or as required as manufactured by USG or equivalent’

B. Joint Materials: ANSI/ASTM C475, GA 201 and GA 216; reinforcing tape, joint compound, adhesive, and water.

C. Adhesive: GA 201 and GA 216.

D. Fasteners: Type and size recommended for substrate and application indicated as required by the Uniform Building Code. Use cadmium plated screws for exterior soffits. Conform to ASTM C1002 for screws.

E. Sound Attenuation Blankets: ASTM C655, Type I, semi-rigid mineral or glass fiber blanket without membrane, CSC certified for recycled material content and manufactured with no formaldehyde thermosetting resin. Provide 1.5” mineral fiber 3.0 lb. density or full thickness of 1.0 density glass fiber.


2.03 ELASTOMERIC SEALANTS

A. For sealants which will receive paint, provide sealants as specified in Section 07900: Sealants.

2.04 FINISHING MATERIALS

A. Joint Tape: Reinforced, perforated paper tape designed specifically for drywall joint treatment, as recommended by the gypsum board manufacturer, minimum 2” wide. Provide manufacturers recommended woven glass fiber joint tape at tile backer board.

B. Joint Compound: Premixed, vinyl based general purpose joint compound containing no asbestos, as recommended by the gypsum board manufacturer.

C. Finishing Compound: Premixed, vinyl based topping compound containing no asbestos, as recommended by gypsum board manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates to which drywall construction attaches or abuts, preset hollow metal frames, and structural framing, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of drywall construction.

B. Report conditions contrary to contract requirements that would prevent a proper installation. Do not proceed with the installation until unsatisfactory conditions have been corrected.
C. Failure to call attention to defects or imperfections will be construed as acceptance and approval of substrate conditions. Installation indicates acceptance of substrates with regard to conditions existing at the time of installation and full responsibility for completed work.

3.02 COORDINATION

A. Coordinate and install blocking where required. Repair gypsum board walls where blocking is required in existing walls.

B. Coordinate installation of framing for gypsum board walls and ceilings to accommodate installation of recessed lighting and mechanical air grilles and diffusers as shown and dimensioned on the Drawings.

3.03 INSTALLATION - FRAMING

A. General: In accordance with ASTM C754.
   1. Do not attach or support metal framing to ducts, pipes, or conduit.
   2. Do not bridge building expansion joints with support systems. Frame to both sides of joint and provide expansion joint as such locations.
   3. Provide framing, bracing and associated anchorage to allow for required differential building movement.
   4. Provide deep leg head track at top of walls extending to structure to allow for a minimum of 2” vertical movement. Back out screws from studs to head track after gypsum board panels have been installed.

B. Steel studs: Install at 16 inches on center in floor and ceiling tracks. Secure tracks to floor with powder driven pins at 24 inches on center. Securely attach ceiling track to structure.
   1. Bed track in 2 continuous 1/4” beads of acoustical sealant at sound rated walls and partitions.
   2. Spot grout jamb anchors for solid core doors over 2'-8” wide.

C. Reinforce openings in wall framing with double studs, runners and channel bracing.

D. Verify plumbness, alignment and spacing of framing members prior to beginning installation of drywall accessories.

E. Wall bracing: Provide diagonal bracing at head of studs that terminate above the ceiling level. Bend metal studs to V-shape and extend at 45 degrees from partition head to structure above. Locate bracing at 4'-0 maximum on center.

F. Openings and Block-Outs: Install double studs at all door jambs, and continuous track at door heads. Provide continuous framed support at all four sides of openings or block-outs for ducts or other penetrations through walls or partitions. Verify required sizes for all openings or block-outs, and provide space for shims as required.

G. Bracing and Support: Provide overhead or diagonal bracing as indicated or as required to secure framing plumb, rigid, and in alignment. Construct bracing from standard stud and track members at walls and rigid rod or 8 gage wire at suspended ceilings and soffits, unless otherwise indicated. Coordinate bracing with ductwork and other overhead systems or utilities to avoid conflicts.

H. Fire-Rated Partitions: Verify stud sizes, gauges, and widths at fire-rated partitions to ensure compliance with specified rating. Provide breakaway anchor clips at intermediate floor framing.
3.04 ACOUSTICAL INSULATION

A. Walls and Partitions: Install batts in longest practical lengths by friction-fitting between studs. Tightly butt joints between batts, and fit around conduits, switches, and outlet boxes to completely fill wall cavities.

3.05 INSTALLATION - GYPSUM BOARD

A. Install gypsum board in accordance with GA 201 and GA 216.

B. Apply gypsum board to metal studs with long dimension of board parallel to studs and end staggered and fasten using screws at 8" o.c. at vertical joints and 12 o.c. vertically at interior panel bearing points.

C. Fit gypsum board neatly around penetrations or over minor variations in the wall plane as required. Increase wall thickness as required to accommodate built-in items such as, but not limited to, electrical panel and structural columns. Coordinate with other work to insure proper placement of built in items.

1. Neatly cut wallboard at joints, intersections, wall openings, switches and outlet boxes. Excessive joint with or oversize cuts at openings (greater than 1/8") will be cause for rejection.

2. Locate fasteners not less than 3/8" from edges or ends. Set fasteners slightly below surface plane of wallboard, taking care not to cut or tear paper surface.

3. Insulation and sealants are integral components of some fire-rated partitions; coordinate drywall installation with insulation and sealant installers to ensure compliance with specified partition designs in order to achieve required fire rating.

D. Non-Rated Partitions: Apply wallboard to framing members horizontally or vertically, at Contractor's option with joints occurring over framing members. Space fasteners 12" o.c.

E. Fire-Rated Partitions: Apply Type 'X' wallboard in single or double layers as required to achieve the specified or required fire rating. Comply with GA Fire Resistance Design Manual regarding thickness orientation of wallboard, placement of joints, and spacing of fasteners.

F. Place control joints consistent with lines of building spaces as indicated.

G. Place corner beads at all external corners. Use longest practical length. Place edge trim where gypsum board abuts dissimilar materials.

3.06 DRYWALL ACCESSORIES

A. Edge Treatment: Install metal corner beads at all external corners. Unless otherwise indicated, install "L"-beads at exposed ends of wallboard panels and at abutting joints with other materials, leaving minimum 1/8" reveal for caulking.

B. Control Joints: Install metal control joints at approximately 30'-0" o.c. in large expanses of walls, at 50'-0" o.c. maximum in ceilings and at other locations indicated on the Drawings.

3.07 SOUND RATED WALLS

A. Comply with ASTM C919 and manufacturer’s recommendations for location of beads.
B. Where sound-rated walls are indicated with interior walls having full batt insulation, seal the wallboards at perimeters, control and expansion joints, openings and penetrations with a continuous bead of acoustical sealant. Seal both faces of partitions.

C. Close off sound-flanking paths around or through the work including sealing off partitions above acoustical ceilings.

3.08 JOINT TREATMENT

A. Finish gypsum board to a Level 4 finish in accordance with GA 201 and GA 216.

B. Tape, fill, provide third coat and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
   1. Interior Corners: Treat interior corners which do not terminate with "L"-beads by folding reinforcing tape to conform to adjacent surfaces and to true, straight angles. Embed tape in joint compound.
   2. Fasteners, Dents, and other Depressions: Fill dimples, gouges, and other depressions with joint compound, feathered smooth to match adjacent surfaces.

C. All joints and edges shall be allowed to dry thoroughly (minimum of 24 hours) between applications of cement.

D. Apply finish to conceal metal accessories in accordance with manufacturer's recommendations.

E. Apply final coat of joint cement on topping in a smooth uniform fashion, but need not be sanded in areas where it will not have an architectural finish or be seen (i.e., behind cabinets and above ceiling).

F. Skim Coat: After final sanding of joint and fastener treatment surfaces, apply thin skim coat over entire surface of wallboard to minimize suction and porosity or other variations between treated areas and face paper surfaces, and to improve fastener and joint concealment.

G. Sand coats after each application of joint cement or topping has dried. The final coat and subsequent sanding shall leave all gypsum board areas uniformly smooth and ready for finish.

3.09 TOLERANCES

A. Maximum Variation from True Flatness: 1/8 inch in 10 feet in any direction.

3.10 CLEANING

A. At the completion of installation of the partitions, all rubbish shall be removed from the building, leaving floors broom clean. Excess material, scaffolding, tools and other equipment shall be removed from the building and job site.

END OF SECTION
SECTION 09650
RESILIENT FLOORING – RUBBER BASE

PART 1 GENERAL

1.01 SUMMARY

A. Furnish and install rubber base as shown on the Drawings and specified herein.

1.02 REFERENCES AND QUALITY ASSURANCE

A. Federal Specifications.
   1. SS-W-40A: Wall Base, Rubber and Vinyl.

B. Fire Test Performance: Provide resilient flooring complying with the following fire test performance criteria.
   a. Flame spread - ASTM E 84 - 75 or less.
   b. NBS Smoke - ASTM E 662 - 450 or less.
   c. Smoke Developed - ASTM E 84 - 450 or less.
   d. Critical Radiant Flux - ASTM E 648 - Not less than 0.45 watts/cm².

C. Installer qualification: Minimum 3 years experience installing resilient floor covering material.

1.03 SUBMITTALS

A. Submit product data for base and adhesive and samples for color selection.
   1. Submit manufacturer’s data.
   2. Submit letter certifying that all products, including adhesives, provided under this specification section are asbestos free.
   3. Submit recommended maintenance practices for each type of resilient flooring and accessory used in Operations and Maintenance Manuals:

1.04 DELIVERY, STORAGE AND HANDLING

A. Deliver in manufacturer’s original, unopened protective packaging with labels intact and legible showing brand name, colors and patterns.

B. Store in accordance with manufacturer’s recommendations.

1.05 PROJECT/SITE CONDITIONS

A. Temperature: Maintain a minimum temperature of 70 degrees F. in space to receive flooring for 24 hours before and 48 hours after installation. Subsequently maintain 55°F minimum temperature.

B. Lighting: Maintain lighting at a minimum uniform level of 50 foot candles when the flooring system is being installed. Best results are provided when permanent lighting is in place during the installation.

C. Install rubber base after other finish operations, including painting, have been completed.
PART 2  PRODUCTS

2.01  MANUFACTURERS

A. Rubber Base and Accessories: Manufactured by Burke Flooring Products, Flexco Company, Roppe Rubber Corporation, or equivalent substitute.

2.02  MATERIALS

A. Rubber Base (RB): Cove type on exterior side of Server Room wall, straight base inside the Server Room. Standard color, FS SS-W-40A, Type I, 0.125" gage, 4" high.

2.03  ADHESIVES & COMPOUNDS

A. Cement or Adhesive: Provide types recommended by flooring manufacturer to suit material and substrate conditions.

PART 3  EXECUTION

3.01  EXAMINATION

A. Report conditions contrary to contract requirements that would prevent a proper installation. Do not proceed with the installation until unsatisfactory conditions have been corrected.

B. Failure to call attention to defects or imperfections will be construed as acceptance and approval of substrate conditions. Installation indicates acceptance of substrates with regard to conditions existing at the time of installation.

C. Start of the work of this section indicates acceptance of substrate conditions and full responsibility for completed work.

3.02  PREPARATION

A. Thoroughly clean all surfaces to receive base. Start of installation indicates acceptance of wakk surfaces and full responsibility for completed work.

3.03  INSTALLATION

A. Install all products in conformance with manufacturer's installation instructions.

B. Base: Lay and install base to maximize lengths between joints. Tightly bond base to backing throughout the length of each piece, with continuous contact at horizontal and vertical surfaces.

3.04  PROTECTION

A. Protect base against damage after installation.

END OF SECTION
PART 1 GENERAL

1.01 SUMMARY

A. Provide all labor, equipment, appliances, and materials, and perform all operations in connection with architectural interior and exterior painting as shown on the Drawings and specified herein. Furnish and install all supplementary or miscellaneous items incidental or necessary for sound and complete work, whether or not specifically specified.

1. Paint and finish all items and surfaces which are normally painted and finished in a project of this type and quality whether or not the item or surface is specifically called out and included in schedules and/or notes on drawings. Where an item or surface is not specifically mentioned, paint the same as similar adjacent materials or surfaces.

2. Work includes high performance coatings at structural steel exposed to public view and miscellaneous metals or metal fabrications scheduled to be finished.

B. Patch painting will not be acceptable; total affected area shall be finished. Terminate painting only at corners or joints.

C. Examine all surfaces to be painted prior to painting. Repair surfaces not suitable for receiving paint. Commencement of work indicates acceptance of surface. Surfaces scheduled for repainting must be properly prepared.

D. Unless otherwise indicated, paint all exposed interior and exterior panelboards, switchgear, transformers, conduit, piping, access doors, ladders, guardrails, and ductwork.

E. Priming or priming and finishing of certain surfaces may be specified to be factory applied or shop applied by fabricators. Carefully examine other Sections of these Specifications for priming or finishing work installed by other trades in order to avoid duplications or omissions; assume responsibility for painting or finishing all of the Work as scheduled or specified herein. Field touch up shop primed surfaces as required to repair primer prior to finishing.

F. Work Not Included

1. Unless otherwise indicated, do not paint surfaces in concealed or inaccessible area such as furred spaces, foundation spaces, pipe or duct chases, shafts, or utility tunnels.

2. Do not paint metal surfaces of anodized or prefinished aluminum, stainless steel, copper, bronze, brass and chromium plate.

3. Do not paint moving parts of operating equipment, mechanical or electrical moving parts, linkages, sensing devices, and motor shafts.

G. Related requirements.

1. Section 05500: Metal Fabrications

2. Section 07900: Flashing and Sheet Metal

3. Section 08100: Hollow Metal Doors and Frames

4. Section 09250: Gypsum Board

H. Reference: Steel Structures Painting Council (SSPC) Manuals, Volumes 1 and 2.
1.02 SUBMITTALS

A. Submit required information on a system by system basis. Assign a designation for each system that matches the designation in the Surface Finish Schedule at the end of this section. Provide a Paint System Data Sheet for each system stating:

<table>
<thead>
<tr>
<th>System Number, System Name</th>
<th>Coating Supplier</th>
<th>Surface Preparation</th>
<th>Paint Material (Generic)</th>
<th>Product Name/Number</th>
<th>Min. Coats/Coverage</th>
</tr>
</thead>
</table>

B. Material List/Product Data: Provide a report listing the brand and quality of each different material for use on the project. Provide data on all finishing products, including list describing proposed product for each surface, including manufacturer’s name, number and specification and performance test reports. Include composition of materials, preparation of substrates, application procedures, recommended mil thickness of finished coats. Include Volatile Organic Compound (VOC) values for each product.
1. Test Reports: Flame spread per ASTM E-84 for paints requiring rating per NFPA 101.
2. Certificates: Furnish manufacturers’ certificates indicating that materials comply with specification requirements.

C. Color Data: Provide complete fan deck, color card or actual color chips illustrating full range of color availability.

D. Samples: Submit 2 samples, 12 x 12 inch in size illustrating colors, glosses and textures for each surface finishing product scheduled.
1. For natural and stained finishes, provide samples on each type of specified wood.

E. Reference Panel: Before proceeding with work of this section finish one complete wall and item of each paint system and color required to show quality of workmanship, materials, finish, color, and texture. When approved, sample area and items shall serve at the standard of quality for subsequent work throughout the project.

F. O&M Manuals: Submit color number and formula for each color and type of paint.

1.03 ENVIRONMENTAL REQUIREMENTS

A. Deliver materials in manufacturers’ original containers, unopened except as required for premixing of colors, and with labels intact and legible. Clearly label each finish material with paint type and color name or number keyed to specified paint type and Architect’s color schedule.

B. Store and apply materials in environmental conditions with adequate ventilation required by manufacturer’s instructions. Designate a room or space to store and mix materials. Mix materials only in galvanized pans or containers.

C. Enforce good housekeeping and safety practices; remove all soiled or used rags, empty containers, trash, and waste materials at the end of each day. Take every precaution to avoid the danger of fire or combustion. Storage of on site material to be in area where the ambient temperature is maintained above 50 degrees F.
D. Work and storage areas must be free of dust during application of paint finishes. Spaces to receive finishes must be clean prior to finishing. Do not apply finishes in spaces with accumulated rubbish, dust or dirt or where construction activity is present.

1.04 QUALITY CONTROL

A. Paint thicknesses specified are minimum dry mil thicknesses. Painting coverage rates in gallon per square foot quoted are based on manufacturer's published theoretical coverage usage. In situations of discrepancy between mil thickness on surface and coverage rates applied, mil thickness governs.

B. Paint includes fillers, primers, sealers, emulsions, oils, alkyds, latex, enamels, thinners, stains, epoxies, vinyl, urethane, varnishes, and other applied coatings. For unspecified materials, such as turpentine or linseed oil provide best grade recommended by selected manufacturer.

C. Provide finish coats which are compatible with substrate materials or with prime coats specified in other sections.

D. First quality preparation, painting and finishing is required. Dirt, grit or dust in paint or finish, runs, sags or drips of paint or finish or irregularity of finish is cause for rejection. Remove rejected finishes, repair, reprime and refinish as required to achieve first quality finish.

E. Manufacturer's and Installer's Qualifications: Manufacturer shall have not less than five years experience in the manufacturing of the type s of products specified. Applicator shall have not less than three years successful experience in the application of similar types of specified systems.

F. Provide materials in compliance with Green Seal's Standard GS-11 for VOC and chemical component limits as follows:

<table>
<thead>
<tr>
<th>Type</th>
<th>VOC (g/l = grams/liter)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interior non-flat</td>
<td>150 g/l</td>
</tr>
<tr>
<td>Exterior non-flat</td>
<td>200 g/l</td>
</tr>
<tr>
<td>Interior flat</td>
<td>50 g/l</td>
</tr>
<tr>
<td>Exterior flat</td>
<td>100 g/l</td>
</tr>
<tr>
<td>All Types</td>
<td>Contains not more than 1.0% of wt. of the sum total of Aromatic Compounds</td>
</tr>
</tbody>
</table>

1.05 DEFINITIONS

A. Paint: The term "paint", as used herein, means coating systems materials including primers, sealers, fillers, emulsions, enamels, epoxy, stains, lacquers, varnishes, and other applied materials, whether used in prime coats, intermediate coats, or finish coats.

B. Sheen:
   1. All walls to be painted with a sheen of at least 16-32 @ 60 degrees.

PART 2 PRODUCTS

2.01 MATERIALS

B. Color: CU EGRET Kwal base 2810 satin mixed to C-6, L-12.

C. Coatings: Ready mixed, furnished through one manufacturer, except field catalyzed coatings, of good flow and brushing properties, capable of drying or curing free of streaks or sags. Provide field applied primers or undercoats produced by the same manufacturer as the finish coat or coats.
   1. Unless otherwise specified, provide manufacturer’s first line, commercial products. Provide thinners and solvents of the highest quality and purity, bearing the manufacturer’s identifying labels on the containers.

D. Accessory Materials: Linseed oil, shellac, turpentine, paint thinners, fillers, putty, primers, undercoats and other materials required to achieve the finishes specified.

E. Application Equipment: Provide and use only such equipment as recommended by paint manufacturer for application of the particular paint specified.

2.02 FINISHES

A. Refer to 3.07 at end of Section for surface finish schedule.

PART 3 EXECUTION

3.01 INSPECTION

A. Verify that substrate conditions are ready to receive Work. Should any surface be found to be unsuitable to produce a proper finish, notify in writing and do not apply material until the surfaces are made satisfactory. Application of paint to any surface shall be deemed to be acceptance of that surface and full responsibility shall be borne by the Contractor throughout the guarantee period.

B. Report conditions contrary to contract requirements that would prevent proper application. Do not proceed with the installation until unsatisfactory conditions have been corrected.

C. Failure to call attention to defects or imperfections will be construed as acceptance and approval of substrate conditions. Paint application indicates acceptance of substrates with regard to conditions existing at the time of installation.

D. Start of the work of this section indicates acceptance of substrate conditions and full responsibility for completed work.

3.02 PREPARATION

A. Do not apply finishes to surfaces which are wet or damp, when inclement weather is expected within the dry time or when temperatures are below 50 degrees F. Avoid painting surfaces exposed to direct sunlight. Remove scale, rust, dirt, dust, oil, loose paint and grease completely so that item and area to receive finishing is perfectly smooth and clean. Remove all signs, hardware, cover plates, light fixtures, accessories and similar items prior to finishing. Masking off in place removable items not scheduled to be painted is unacceptable, finish entire surface.

B. Furnish and lay drop cloths in all areas where painting is being done to protect floors and other work from damage during execution of this work. Where it becomes necessary, in order to execute the work, remove temporary coverings placed by other contractors, and replace them in the proper manner upon completion of painting.
C. Be responsible for any damage done to work of others and repair same to the satisfaction of the Architect. Protect prefinished and adjacent surfaces. Replace any material or construction damaged to such an extent that they cannot be restored to their original condition.

D. Correct minor defects back to sound materials or coatings and clean surfaces which affect Work of this Section. Make surfaces suitable to receive designated finishes.

E. Substrate Preparation
   1. General: Clean each surface to be painted prior to applying prime or finish coats. Remove all traces of oil, grease, loose or peeling paint, or other foreign substances. Schedule cleaning and painting so that dust or other contaminants from the cleaning process will not fall onto wet, newly painted surfaces.
   2. Wood Surfaces: Sand lightly; use varying grades of sandpaper to produce uniformly smooth and unmarred wood surface. Prime or countersink and putty nail heads. Seal knots and sap streaks. Do not proceed with priming and painting until moisture content of wood is 12% or less, as verified with approved moisture meter.
   3. Ferrous Metals: Clean surfaces using solvent cleaners recommended by paint manufacturer. Remove rust and mill scale by hand scraping, wire brushing, power scraping, or sandblasting. Remove loose prime coats or other applied coatings, and touch up as required prior to further priming or painting. Prime and/or reprime bare steel surfaces.
   4. Galvanized Metals: Remove dust and dirt with clean, dry rags. Remove oil, grease, or mill-applied protective coatings using solvent cleaners recommended by paint manufacturer. Remove white rust with hand or power brushes, taking care not to damage the galvanized coating.
   5. Concrete: Allow concrete to cure for not less than 28 days prior to application of paint. Acid-etch or light sandblast to remove all traces of oil, grease, or form release agents. Test for moisture content by taping a one-foot square of heavy gauge, clear polyethylene film to the surface of the concrete; leave in place overnight. If moisture condenses on the inner face of the film, or if the surface of the concrete under the film appears wet or darker in color, allow the concrete to dry longer.
   6. Gypsum Drywall: Allow joint treatment to thoroughly dry. Lightly sand joint treatments and topping compounds to produce uniformly smooth surface; wipe or brush free of all sanding dust. Prime exposed metal corner beads and other accessories with galvanized metal primer.
   7. Existing Painted Surfaces: Properly clean, scrape, prime and otherwise prepare existing painted surfaces scheduled for repainting. Flatten gloss paint with sandpaper.
   8. Prepare, prime and finish hidden surfaces or surfaces of built in elements prior to installation to ensure complete and protective coating.

F. Materials Preparation
   1. Mixing: Mix and prepare paint materials in strict accordance with manufacturer's recommendations.
   2. Storage: When materials are not in use, store in tightly covered containers.
   3. Stirring: Stir materials to produce mixture of uniform density prior to application. Remove surface films which form during storage; do not mix into the material. Strain materials if necessary to remove film.
   4. Thinning: Do not thin materials unless specifically directed by manufacturer's instructions. Use only the thinners recommended by the manufacturer, and use only to the recommended limits.

G. Properly clean, scrape, prime and otherwise prepare existing painted surfaces scheduled for repainting. Flatten gloss paint with sandpaper.

H. Prepare, prime and finish surfaces of built in elements prior to installation to assure complete and protective coating.
3.03 APPLICATION

A. Apply products in accordance with manufacturer's instructions. Use new and clean equipment. Comply with mixing, thinning, pot life, application procedure, equipment, coverage, curing, recoating and storage requirements.

B. Back prime interior and exterior woodwork scheduled to receive paint finish with primer paint or clear sealer where transparent finish is required.

C. Avoid contamination or damage to prepared or intercoat surfaces. Clean and re-repair as required.

D. Make measurements of paint dry film thickness with Mikrotest gauge calibrated against National Bureau of Standards "Certified Coating Thickness Calibration Standards". Provide wet film thickness gauges. Monitor work of painters and blasters. Provide temperature gauge and determine surface temperature of items to be blasted or painted. Provide humidity gauge to monitor humidity at all times.

E. Touch up shop applied prime coats as required to protect damaged or bare areas. Sand and dust between coats as required to remove visible surface defects.

F. Provide finish that is free of abrasions, dirt or other debris, and is uniform in color and appearance. Replace or repair work, materials or equipment not meeting these specifications.

G. Allow sufficient drying time between coats, as recommended by the paint manufacturer. Increase the drying time as required to suit adverse weather conditions.

H. Replace electrical plates, hardware, light fixture trim and fittings removed prior to finishing only after finishing has completely dried and hardened. Use workmen skilled in installation of items removed, install in a manner not to void warranties.

3.04 FINISHING MECHANICAL AND ELECTRICAL EQUIPMENT

A. Paint shop primed equipment.

B. Paint unfinished louvers, grilles, covers, and access panels. Paint dampers exposed behind louvers, grilles, convector and baseboard cabinets to match face panels.

C. Paint interior surfaces of air ducts and convectors that are visible through grilles and louvers with one coat of flat black paint, to limit of sight line. Paint exposed ductwork and piping in return air ceiling plenum above ceiling return air louvers.

D. Paint all electrical conduit, switchgear, panelboards, transformers, piping, access panels, ladders, guardrails and equipment exposed to view in any space unless noted otherwise on the drawings.

E. Size, prime, and paint pipe and duct insulation where exposed to view. Apply not less than one coat of flat latex paint. Remove bands or hangers before painting, and replace after painting is complete. Paint hangers and bands to match adjacent surfaces.

3.05 WORKMANSHIP

A. If surfaces are not in proper shape for painting, repair, rebuild or refinish before proceeding with the work. Assume responsibility for poor work caused by improper surface preparation. The application of the first coat does not relieve the responsibility for the base. Do not apply any coats on either damp or wet surfaces and in no case until the preceding coat is dry and hard.
B. Application: Spread materials evenly without runs or sags of materials and thoroughly brush out. Sand work between coats.
   1. Number of coats specified is the minimum to be applied. Apply additional coats when undercoats, stains, or other conditions show through final finish coat, until paint film is of uniform finish, color and appearance.

C. Roller Application: Where paint or enamel is rolled or sprayed on, use a fine nap roller to roll and backroll so a nearly flat or orange peel texture is achieved. Do not use a roller application on metal or wood surfaces.

D. Spray application: Apply with airless or air pressure spray equipment as recommended by paint manufacturer for particular product. Apply each coat in a uniform manner to provide the equivalent thickness of brush coats. Do not double back to build up film thickness of two coats in one pass. When sprayed, all walls shall be back rolled, except mechanical rooms, closets and storage areas.

E. Brush Application: Brush paint with equipment and technique required to achieve a flat and smooth surface without brush marks. Brush out and work paint onto the surfaces in a uniform, even film. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, and other surface imperfections are cause for rejection and will not be accepted.

3.06 CLEANING AND PROTECTION

A. As work proceeds, promptly remove spilled, splashed, or spattered finishes. Clean mixing area thoroughly upon completion of the work.

B. Protect work of other trades against damage by painting and finishing work. Leave all such work undamaged. Clean, repair or replace and repaint any damaged areas.

C. At completion of painting work, leave work and adjacent substrates clean. Remove and legally dispose of all related debris.

D. Remove temporary protective wrappings provided by others for protection of their work after completion of painting. Clean all window glass and other paint spattered surfaces. Remove spattered paint by proper methods of washing and scraping. Do not damage finished surfaces.

E. Protect and allow coated surfaces to cure prior to allowing other work to proceed. Repair damaged surfaces.

F. Clean all tools and equipment directly after use with cleaning agents as recommended by the manufacture.

G. Touch Up: Touch up surfaces damaged by the work of other trades as required to leave all finished surfaces in like new condition prior to final completion and acceptance of the Work.

3.07 SURFACE FINISH SCHEDULE

A. Finish interior surfaces as scheduled below. Note, paint types may not be numbered consecutively.

<table>
<thead>
<tr>
<th>PAINT TYPE</th>
<th>PAINT SYSTEM DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>PT-1 ALKYD ENAMEL, SEMI-GLOSS</td>
<td>Ferrous metals, including hollow metal work</td>
</tr>
<tr>
<td>Typical Use:</td>
<td>High solids, ferrous metal primer</td>
</tr>
<tr>
<td>First Coat:</td>
<td>High build alkyd enamel, semi-gloss</td>
</tr>
<tr>
<td>Second Coat:</td>
<td></td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>PAINT TYPE</th>
<th>PAINT SYSTEM DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Third Coat:</td>
<td>High build alkyd enamel, semi-gloss</td>
</tr>
<tr>
<td>PT-2 ALKYD ENAMEL, SEMI-GLOSS</td>
<td>Galvanized metal, including hollow metal, panelboards, switchgear, exposed conduit, etc.</td>
</tr>
<tr>
<td>Typical Use:</td>
<td>Acrylic galvanized metal primer</td>
</tr>
<tr>
<td>First Coat:</td>
<td>High build alkyd enamel, semi-gloss</td>
</tr>
<tr>
<td>Second Coat:</td>
<td>High build alkyd enamel, semi-gloss</td>
</tr>
<tr>
<td>Third Coat:</td>
<td></td>
</tr>
<tr>
<td>PT-3 ACRYLIC POLYURETHANE ENAMEL, SEMI-GLOSS</td>
<td>Ferrous and galvanized metal, including hollow metal, railings, etc.</td>
</tr>
<tr>
<td>Typical Use:</td>
<td>Acrylic galvanized or ferrous metal primer</td>
</tr>
<tr>
<td>First Coat:</td>
<td>Acrylic polyurethane enamel, semi gloss</td>
</tr>
<tr>
<td>Second Coat:</td>
<td>Acrylic polyurethane enamel, semi gloss</td>
</tr>
<tr>
<td>Third Coat:</td>
<td></td>
</tr>
<tr>
<td>PT-4 &quot;ONE COAT&quot; FINISH</td>
<td>Interior exposed overhead structure, ductwork, etc.</td>
</tr>
<tr>
<td>Typical Use:</td>
<td>Tnemec, Series 16 Uni-Bond one coat finish</td>
</tr>
<tr>
<td>First Coat:</td>
<td></td>
</tr>
<tr>
<td>PT-5 LATEX ENAMEL, EGGSHELL</td>
<td>Interior gypsum wallboard, washable finish</td>
</tr>
<tr>
<td>Typical Use:</td>
<td>Polyvinyl acetate-acrylic resin (PVA) primer</td>
</tr>
<tr>
<td>First Coat:</td>
<td>Polyvinyl acetate-acrylic resin, eggshell enamel</td>
</tr>
<tr>
<td>Second Coat:</td>
<td>Polyvinyl acetate-acrylic resin, eggshell enamel</td>
</tr>
<tr>
<td>Third Coat:</td>
<td></td>
</tr>
<tr>
<td>PT-6 EPOXY ENAMEL (use for all wall surfaces inside Data Center space)</td>
<td>Interior gypsum wallboard, potentially wet areas or scrubable finish</td>
</tr>
<tr>
<td>Typical Use:</td>
<td>Polyvinyl acetate-acrylic resin (PVA) primer</td>
</tr>
<tr>
<td>First Coat:</td>
<td>Two-part polyester-epoxy coating, high gloss</td>
</tr>
<tr>
<td>Second Coat:</td>
<td>Two-part polyester-epoxy coating, high gloss</td>
</tr>
<tr>
<td>Third Coat:</td>
<td></td>
</tr>
</tbody>
</table>

END OF SECTION
SECTION 10270
CONCRETE CORE ACCESS FLOOR SYSTEMS

PART 1  GENERAL

1.01  SUMMARY

A. Access floor contractor shall provide submittals, materials and installation of the stringerless access floor system as shown on the drawing and as specified in this document. Note the work in this section is an alternate. The alternate has two options. Pricing for each alternate to be indicated on Bid Form.
   1. Option ‘A’ includes a non-ESD HPL (high pressure laminate) surface on floor panels.
   2. Option ‘B’ includes a grounded ESD conductive vinyl floor tile on the floor panels.

B. Related Requirements
   1. Alternates.

1.02  RELATED WORK NOT INCLUDED

A. Contractor shall provide clear access, dry secure storage, and a clean subfloor area which is free of construction debris and other trades during installation of the access floor system. Area to receive the access floor shall be enclosed and maintained a temperature range of 40 °F to 90 °F and humidity range of 20% to 70% relative.

B. Electrical contractor shall provide necessary material and labor to electrically connect the access floor to the building ground. Re: Division 16 and Electrical Drawings.

1.03  REFERENCES

A. CISCA (Ceiling and Interior Systems Construction Association) – ”Recommended Test Procedures for Access Floors” shall only be used as a guideline when presenting load performance product information.

1.04  PERFORMANCE REQUIREMENT

A. Pedestals
   1. Axial load: Pedestal assembly shall provide an 8000 lb. Axial load without permanent deformation.
   2. Overturning Moment: Pedestal assembly shall provide an average overturning moment of 1000 in-lbs. when glued to a clean, sound, uncoated concrete surface.

B. Floor Panels
   1. Concentrated Load Performance:
      Panels shall be capable of supporting a concentrated load of 1,000 lbs. places on a one square inch area at any location on the panel with a maximum top surface deflection of 0.1”. Panel shall not exceed a permanent set of 0.010 “after the load is removed.
   2. Uniform Load Performance:
      Panel shall be capable of supporting a uniform load of 250 lbs. placed on a one square foot area at any location on the panel with a maximum top surface deflection of 0.040”. Panel shall not exceed a permanent set of 0.010”, after the load is moved. Note: The uniform load rating of an access floor panel as specified herein should not be confused with the “uniform live load” as specified in seismic zone applications.

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3. **Ultimate Load Performance:**
   Panels shall be capable of withstanding a load of 3200 lbs. onto a one square inch area at any location on the panel without failure. Failure is defined as the point at which the panel will no longer accept the load.

4. **Rolling Load Performance:**
   Panel and supporting understructure shall be able to withstand the following rolling loads at any location on the panel without developing a local and overall surface deformation greater than 0.04”. Note: wheel 1 and wheel 2 tests shall be performed on two separate panels.
   - **Wheel 1:** Size: 3” dia x 1 13/16” wide  Load: 800 lbs.  Passes: 10
   - **Wheel 2:** Size: 6” dia x 1 ½” wide  Load: 600 lbs.  Passes: 10,000

5. **Impact Load Performance:**
   Panels and supporting understructure shall be capable of supporting an impact load of 100 lbs. dropped from a height of 12” onto a one square inch area at any location on the panel with a maximum deformation of 0.06”, after which it shall continue to meet all load performance requirements as previously defined.

6. **Panel Drop Test:**
   Panel shall be capable of being dropped face up onto a concrete slab from a height of 36”, after which it shall continue to meet all load performance requirements as previously defined.

1.05 **DESIGN REQUIREMENTS**

A. Access floor system, where indicated on the design documents, shall consist of modular and removable cementitious field welded steel panels fastened onto, and supported by, adjustable height pedestal assemblies. Pedestal head and panel corner design must provide a positive location and lateral engagement of the panel to the understructure support system without the use of fasteners.

B. Panel shall be easily removed by one person with a lifting device and shall be interchangeable except where cut for special conditions.

C. Quantities, finished floor height and location of accessories shall be as specified on the drawing.

1.06 **SUBMITTALS FOR REVIEW**

A. Details sheets, for each proposed product type, which provide the necessary information to describe the product and its performance.

B. Test reports, by an independent testing laboratory, certifying that component parts perform as specified.

1.07 **SUBMITTALS FOR INFORMATION**

A. Manufacturer’s installation instructions and guidelines.

B. Manufacturer’s Owner Manual outlining recommended care and maintenance procedures.

C. Shop Drawings showing layout of floor system in the Server Room.
PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Access floor system shall be as manufactured by Tate Access Floors, Inc., ConCore 1000 Panel with Posilock understructure or approved equal.

2.02 MATERIAL

A. Floor Panels
1. Panels shall consist of a top steel sheet welded to a formed steel bottom pan filled internally by a lightweight cementitious material. Mechanical or adhesive methods for attachment of the steel top and bottom sheets are unacceptable.
2. Cementitious fill material shall be totally encased within the steel welded shall except where cut for special conditions.
3. Panel shall have an electrically conductive epoxy paint finish.
4. Corner of panel shall have a locating tab and integral shape designed to interface with the pedestal head for positive lateral retention and positioning with or without fasteners.
5. Fastening of panels to pedestal heads shall be accomplished by the use of a machine screw which is specially designed to be self-capturing within the body of the panel.
6. Top sheet of access floor panel shall have four 3/8” diameter locator holes positioned within the quarter quadrant of the panel. Holes shall be positioned to a ± 0.002” tolerance.
7. Fit between the pedestal head, panel, and screw shall enable an installation with an average panel-to-panel gap of 0.015”.

B. Support Components
1. Pedestals
   a. Pedestal assemblies shall be corrosive resistant, all steel welded construction, and shall provide an adjustment of ± 1” for finished floor heights of 6” or greater.
   b. Pedestal assemblies shall provide a means of leveling and locking the assembly at a selected height, which requires deliberate action to change height setting and prevents vibration displacement.
   c. Pedestal head shall be designed with locating tabs and integral shape to interface with the panel for positive lateral retention and positioning without fasteners.
   d. Galvanized steel pedestal head shall be welded to a threaded rod which includes a specially designed adjusting nut. The nut shall provide location lugs to engage the pedestal base assembly, such that deliberate action is required to change the height setting.
   e. Threaded rod shall provide a specially designed anti-rotation device, such that when the head assembly is engaged in the base assembly, the head cannot freely rotate.
   f. Pedestal base assembly shall consist of a formed galvanized steel plate with no less than 16” of bearing area, welded to a 7/8” square galvanized steel tube and shall be designed to engage the head assembly.

C. Floor Surface Covering
1. Option ‘A’: 24”x24” Nevamar or equal High Pressure Laminate available with perforations.
2. Option ‘B’: 24”x24” Conductile or equal ESD vinyl tile available with perforations.

D. Accessories
1. Brush-type floor openings to be provided and installed the access floor system contractor.
2. Provide (1) panel lifting devices.

E. Fabrication Tolerances
a. Floor panel flatness: 0.030” in any direction
b. Floor panel width or length from specified size: ± 0.010"

c. Floor panel squareness: ± 0.015"

PART 3 INSTALLATION

3.01 INSTALLATION

A. Qualification

Floor system and accessories to be installed by manufacturer’s authorized representative to maintain the integrity of the products and acceptable performance of the completed installation.

B. Inspection

1. Inspect the building to insure it is closed to the weather with the building environment controlled within 40 °F to 90 °F and 20% to 70% relative humidity 24 hours a day before starting installation, during and after installation.
2. Examine subfloor for unevenness, irregularities and dampness that would affect the quality and execution of the work.
3. Do not process with installation until subfloor surfaces are clean, dry, and clear of other trades and ready to receive access flooring.
4. Verify dimensions on drawings, including level of interfaces including abutting floor, ledges and doorsills.

C. Preparation and Installation

1. The access floor to be prepared and installed in accordance with the access floor manufacturer’s instructions covering preparation, layout, alignment and installation.
2. Installed access floor shall be level with in +/- 0.060” in 10 feet and +/- 0.10” over the entire area. Floor to be rigid and free of rocking panels.
3. Pedestal locations shall be established from approved Shop Drawings.
4. Installation of access floor shall be coordinated with other trades to maintain the integrity of the installed system. Traffic shall not be permitted on any floor area for 24 hours to allow the pedestal adhesive to set.
5. Floor system and accessories shall be installed under the supervision of the manufacturer’s authorized representative and according to the manufacturer’s recommendations.
6. No dust or debris producing operations by other trades shall be allowed in areas where access floor is being installed to ensure proper bonding of pedestals to subfloor.
7. Partially complete floors shall be braced against shifting to maintain the integrity of the installed system where required.
8. Additional pedestals as needed shall support panels where floor is disrupted by columns, walls and cutouts.
9. Understructure shall be aligned such that all uncut panels are interchangeable and fit snugly but do not bind when placed in alternate positions.
10. Finished floor shall be level, not varying more than 0.062” in ten feet or 0.100” overall.
11. If Option ‘B’ is selected provide grounding accessories and ground the system as required by manufacturer’s written specifications.

D. Adjust and Clean

1. Remove access floor installation debris as work progresses, maintaining area under finished floor in a clean condition.
2. Contractor to protect the finishes of the access floor from damage and misuse.
SECTION 10520
FIRE PROTECTION SPECIALTIES

PART 1 GENERAL

1.01 SUMMARY
   A. Furnish and install a fire extinguisher where shown on the drawings and as specified herein.

1.02 QUALITY ASSURANCE
   B. Provide new portable fire extinguishers which are U.L. listed and bear U.L. "Listing Mark" for type, rating and classification of extinguisher indicated.
   C. Provide extinguisher with U.L. listed and F.M. rated pressure indicating gauge.

1.03 SUBMITTALS
   A. Submit manufacturer's product data highlighting all information to show compliance with this specification. Include schedule indicating type, size and location of fire protection specialties.

1.04 PRODUCT HANDLING
   A. Use all means necessary to protect materials of this section before, during, and after installation and to protect installed work and materials of all other trades.

PART 2 PRODUCTS

2.01 MANUFACTURERS

2.02 FIRE EXTINGUISHERS AND CABINETS
   1. Provide multi-purpose fire extinguisher, 5 pound capacity, 2-A 40-BC, Class ABC dry chemical type with wall hanger.

PART 3 EXECUTION

3.01 INSPECTION
   A. Examine substrates to which construction attaches or abuts, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of construction of the work of this section.
   B. Report conditions contrary to contract requirements that would prevent a proper installation. Do not proceed with the installation until unsatisfactory conditions have been corrected.
C. Failure to call attention to defects or imperfections will be construed as acceptance and approval of substrate conditions. Installation indicates acceptance of substrates with regard to conditions existing at the time of installation and full responsibility for completed work.

D. Correct conditions detrimental to the proper and timely completion of the work.

3.02 INSTALLATION

A. Install the work of this section in strict accordance with the manufacturer's recommendations as approved by the Architect.

B. Anchor all components firmly into position for long life under hard use.

END OF SECTION
SECTION 11500
HOT AISLE CONTAINMENT CURTAIN

PART 1 GENERAL

1.01 SUMMARY
A. Provide and install hot aisle containment curtain and accessories.

1.02 SUBMITTALS
A. Submit manufacturer's printed description of items specified.

1.03 WARRANTY
A. Hot aisle containment curtain less track: 1-year warranty on parts and labor.

PART 2 PRODUCTS

2.01 MANUFACTURERS
A. Hot aisle containment curtain: Goff Enterprises, Inc., (1-800-234-0337), or equivalent substitute.

2.02 MATERIALS
1. Hot aisle containment curtain:
   a. 20-mil double polished clear polyvinylchloride curtain with bottom chain pocket. Factory install grommets with 3/8" openings at 4" o.c. at top edge of curtain.
   b. Bottom chain.

PART 3 EXECUTION

3.01 INSTALLATION
A. Install hot aisle containment curtain on perforated 1½" x 1½", 20 gage steel angle with holes at 4" o.c.

END OF SECTION
PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. http://fm.colorado.edu/construction/standards/v2005/elect/index.html University of Colorado at Boulder website for fire alarm testing and cabling requirements.

1.02 SUMMARY

A. Section Includes:

1. System smoke detectors.

2. Modification to existing fire alarm panel and associated annunciator panels.

1.03 DEFINITIONS

A. LED: Light-emitting diode.


1.04 SYSTEM DESCRIPTION

A. Noncoded addressable system, with automatic sensitivity control of smoke detectors and multiplexed signal transmission, dedicated to fire-alarm service only.

1.05 SUBMITTALS

A. General Submittal Requirements:

1. Submittals of fire alarm shop drawings shall comply with the UCB fire alarm requirements and shall utilize the UCB standard symbols.

2. Shop Drawings shall be prepared by persons with the following qualifications:

   a. Trained and certified by manufacturer in fire-alarm system design.

   b. NICET-certified fire-alarm technician, Level III minimum.

   c. Licensed or certified by authorities having jurisdiction.

B. Product Data: For each type of product indicated.

C. Shop Drawings: To be submitted within 30 days of award of contract and shall include the following:


   2. Include voltage drop calculations for notification appliance circuits.

   3. Include battery-size calculations.
4. Include performance parameters and installation details for each detector, verifying that each detector is listed for complete range of air velocity, temperature, and humidity possible when air-handling system is operating.

5. Include plans, sections, and elevations of heating, ventilating, and air-conditioning ducts, drawn to scale and coordinating installation of duct smoke detectors and access to them. Show critical dimensions that relate to placement and support of sampling tubes, detector housing, and remote status and alarm indicators. Locate detectors according to manufacturer's written recommendations.

6. Include floor plans to indicate final outlet locations showing address of each addressable device. Show size and route of cable and conduits.

7. A complete list of equipment to be furnished, including quantities of equipment, catalog cut sheets.

8. One line riser diagram for complete system, including device address, room numbers and existing fire alarm control panel and remote annunciator locations.

9. Wiring diagram for all devices of the fire alarm system which shall indicate wire quantities and type.

10. System operation narrative.

D. Qualification Data: For qualified Installer.

1.06 QUALITY ASSURANCE

A. Installer Qualifications: Installation shall be performed by a factory trained Simplex contractor and personnel.

B. Source Limitations for Fire-Alarm System and Components: Obtain fire-alarm system from single source from single manufacturer. Components shall be compatible with, and operate as, an extension of existing system.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

D. NFPA Certification: Obtain certification according to NFPA 72 by a UL-listed alarm company.

1.07 PROJECT CONDITIONS

A. Interruption of Existing Fire-Alarm Service: Do not interrupt fire-alarm service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary guard service according to requirements indicated:

1. Notify Construction Manager no fewer than two days in advance of proposed interruption of fire-alarm service.

2. Do not proceed with interruption of fire-alarm service without Construction Manager's written permission.
1.08 SEQUENCING AND SCHEDULING

A. Existing Fire-Alarm Equipment: Maintain existing equipment fully operational until new equipment has been tested and accepted. As new equipment is installed, label it "NOT IN SERVICE" until it is accepted. Remove labels from new equipment when put into service and label existing fire-alarm equipment "NOT IN SERVICE" until removed from the building.

B. Equipment Removal: After acceptance of new fire-alarm system, remove existing disconnected fire-alarm equipment and wiring.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. All new fire alarm devices shall be Simplex. No other manufacturers will be accepted.

2.02 SYSTEMS OPERATIONAL DESCRIPTION

A. The fire alarm system shall function as it presently does.

B. Circuits:

1. Initiating Device, Notification Appliance, and Signaling Line Circuits: NFPA 72, Class B.
   a. Initiating Device Circuits: Style B.
   b. Notification Appliance Circuits: Style Y.
   d. Install no more than 50 addressable devices on each signaling line circuit.

C. Smoke-Alarm Verification:

1. Initiate audible and visible indication of an "alarm-verification" signal at fire-alarm control unit.
2. Activate an NRTL-listed and -approved "alarm-verification" sequence at fire-alarm control unit and detector.
3. Sound general alarm if the alarm is verified.
4. Cancel fire-alarm control unit indication and system reset if the alarm is not verified.

D. Remote Smoke-Detector Sensitivity Adjustment: Controls shall select specific addressable smoke detectors for adjustment, display their current status and sensitivity settings, and change those settings. Allow controls to be used to program repetitive, time-scheduled, and automated changes in sensitivity of specific detector groups. Record sensitivity adjustments and sensitivity-adjustment schedule changes in system memory, and print out the final adjusted values on system printer.

2.03 SYSTEM SMOKE DETECTORS

A. General Requirements for System Smoke Detectors:

1. Simplex True alarm smoke detectors.
2. UL 268 listed with a pulsing power-on LED indicator which shall lock on in the event of an alarm.

3. Smoke detectors shall operate in temperature ranges of 32 degree – 100 degree Fahrenheit.

4. Detectors shall be four-wire type.

5. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.

6. Base Mounting: Detector and associated electronic components shall be mounted in a twist-lock module that connects to a fixed base. Provide terminals in the fixed base for connection to building wiring.

7. Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore them to normal operation.

8. Remote Control: Unless otherwise indicated, detectors shall be analog-addressable type, individually monitored at fire-alarm control unit for calibration, sensitivity, and alarm condition and individually adjustable for sensitivity by fire-alarm control unit.
   a. Fixed-temperature sensing shall be independent of rate-of-rise sensing and shall be settable at fire-alarm control unit to operate at 135 or 155 deg F (57 or 68 deg C).
   b. Provide multiple levels of detection sensitivity for each sensor.

B. Photoelectric Smoke Detectors:

1. Detector address shall be accessible from fire-alarm control unit and shall be able to identify the detector's location within the system and its sensitivity setting.

2. An operator at fire-alarm control unit, having the designated access level, shall be able to manually access the following for each detector:
   a. Primary status.
   b. Device type.
   c. Present average value.
   d. Present sensitivity selected.
   e. Sensor range (normal, dirty, etc.).

PART 3 - EXECUTION

3.01 EQUIPMENT INSTALLATION

A. Comply with NFPA 72 for installation of fire-alarm equipment.

B. Connecting to Existing Equipment: Verify that existing fire-alarm system is operational before making changes or connections.

1. Connect new equipment to existing control panel in existing part of the building.

2. Connect new equipment to existing monitoring equipment at the supervising station.
3. Expand, modify, and supplement existing [control] [monitoring] equipment as necessary to extend existing [control] [monitoring] functions to the new points. New components shall be capable of merging with existing configuration without degrading the performance of either system.

C. Remote Status and Alarm Indicators: Install outside of computer room to monitor the ceiling and below floor smoke detectors.

3.02 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Division 16 Section "Electrical Identification."

B. Wiring color shall be as indicated in the UCB "Labeling Guidelines for Fire Alarm Panels" found on the UCB website at address indicated at the beginning of this document.

3.03 FIELD QUALITY CONTROL

A. Field tests shall be witnessed as required by UCB Application for final acceptance test. This testing form and requirements can be found on the UCB website at address indicated at the beginning of this document.

B. Testing of fire alarm system shall be done per the UCB fire alarm testing procedure. Testing procedures and requirements can be found on the UCB website at address indicated at the beginning of this document.

END OF SECTION 13852
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
v 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 Conditioning and Refrigeration Institute (ARI)
2. Air Movement and Control Association, Inc. (AMCA)
3. American Gas Association (AGA)
4. American National Standards Institute (ANSI)
5. American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE)
6. American Society of Mechanical Engineers (ASME)
7. American Standard Code for Pressure Piping (ASCPP)
9. American Water Works Association (AWWA)
10. Compressed Gas Association (CGA)
11. Environmental Protection Agency (EPA)
12. Factory Mutual Laboratories (FM)
13. Manufacturer's Standards Institute (MSI)
14. National Certified Pipe Welding Bureau (NCPWB)
15. National Electrical Code (NEC)
16. National Electrical Manufacturer's Association (NEMA)
17. National Fire Protection Association (NFPA)
18. Sheet Metal and Air Conditioning Contractor's National Association (SMACNA)
20. Underwriters' Laboratories, Inc. (UL)
22. International Mechanical Code (IMC)
23. International Plumbing Code (IPC)

A. Comply with applicable state, and federal codes, rules, and regulations.

B. Comply with University of Colorado Standards.

C. As a minimum requirement, codes, rules and regulations take precedence over the drawings and specifications.

D. Where there are discrepancies between the UCB Standard requirements or other code requirements and those shown the drawings and specifications contact the Project Manager or Engineer. Contractor shall assume that the most stringent and demanding option will be installed unless directed otherwise.

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 WORKMANSHP

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
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. Supporting Steel
J. Thermometers
K. Unions
L. Valves
M. Piping Installation Procedures
N. Piping System Tests
O. Welding

1.04 SUBMITTALS

A. Comply with Section 15010.

B. Product Data:

1. Hangers and Supports
2. Pressure Gauges
3. Pressure and Temperature Plugs
4. Strainers
5. Thermometers
6. 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 pipe fitters.
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. Plastic piping shall be supported on continuous galvanized steel trough with clevis hanger spacings as indicated for metallic piping, or as recommended by supplier.

D. 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.

E. Thermal hanger shields at inserts: galvanized sheet metal.

F. 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
b. DeZurik
c. Fisher
d. Hammond
e. Jamesbury
f. Keystone
g. Milwaukee
h. Posi-Seal
i. Victaulic

1. Petcock Valves
   a. Powell 922

1. Needle Valve
   a. Hammond IB14

2. Drain Valve
   a. Apollo full port ball valve with hose end adapter, hose cap, and chain
   b. Milwaukee 148

1. Bronze Pressure-rated Valves: Comply with MSS-SP-80
   a. Crane
   b. Hammond
   c. Milwaukee
   d. Nibco
e. Powell
f. Stockham

2. Iron Body Pressure-rated Valves: Comply with MSS-SP-70
   a. Crane
   b. Kennedy
c. Lunkenheimer
d. Milwaukee
e. Mueller
f. Powell
g. Stockham
h. Walworth

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.

2.01 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

2.02 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.

2.01 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

2.01 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.

2.02 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.

2.03 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:
   1. H.O. Trerice Company
   2. U.S. Gage
   3. Weksler

2.04 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 snubby: Ray model 1, Operating and Maintenance Specialties

C. On steam service:
   1. Use 4” oil filled gauge with pig-tail anti-siphon tube and 1/4” ball valve for isolation.

D. Acceptable Manufacturers:
   1. Crosby
   2. Dwyer
   3. H.O. Trerice Company
   4. U.S. Gage
   5. Weksler

2.05 PRESSURE AND TEMPERATURE TEST PLUGS

A. Brass combination pressure and temperature test plugs with neoprene valve covers.
A. Plugs suitable for vacuum to 600 psig and temperatures of -20°F to 300°F with cap and extension for insulated pipe where required.

B. Acceptable Manufacturers:
   1. Peterson Equipment (Pete's Plug)
   2. H.O. Trerice Company
   3. Fairfax

2.06 MOTORS

A. Motors 1 hp and larger shall be Premium Efficient, complying with Xcel Energy Requirements; and where driven by VFDs, shall be rated for inverter-duty with an attached steel nameplate indicating Anverter-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 align-
   ment.
   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

2.01 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. Make direction changes with fittings, except for underground, copper water piping. Install underground, copper water piping with sweeping bends and without crimping or joints.

H. Do not hammer or pound piping joints or equipment.

I. Support piping independently at all equipment so that the piping weight is not supported by the equipment. Install piping without springing or forcing.

J. Do not cut building structure to facilitate piping installation.

K. Install piping to clear windows, doors, and other openings.

L. 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.

M. The use of wire or perforated metal strap to support piping is not permitted.

N. Provide shutoff valves and unions suitably located to isolate each item of equipment, branch circuit, or section of piping.

O. Burning of holes in piping is not allowed. Provide fittings or drilled taps.

P. 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>
<tr>
<td>3/4</td>
<td>5</td>
<td>5</td>
<td>0.375</td>
</tr>
<tr>
<td>1</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>0.375</td>
</tr>
<tr>
<td>1-1/2</td>
<td>8</td>
<td>8</td>
<td>0.5</td>
</tr>
<tr>
<td>2</td>
<td>8</td>
<td>8</td>
<td>0.5</td>
</tr>
</tbody>
</table>

1. Steel pipe

<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>
</tbody>
</table>

2. Copper tube

A. Suspend mains and branches from overhead construction with expansion type anchors or beam clamps with a minimum safety factor of 5.

B. 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.

C. 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 INCHES</th>
<th>INSULATION LENGTH INCHES</th>
<th>MINIMUM GAUGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/2 through 1-1/2</td>
<td>6</td>
<td>22</td>
</tr>
</tbody>
</table>
D. Locate piping supports and hangers to allow for expansion, contraction, structural settlement and vibration.

E. 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.

F. Provide roller type hangers/supports where pipe movement due to thermal expansion/contraction is expected.

G. Pipes on roofs shall be supported by roller supports of adjustable height. Wood blocks and straps are not acceptable for lengths greater than six feet.

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. Use gate valves in low and medium pressure steam piping.

E. Provide temperature control valves and balancing valves of sizes suitable for the application based on their CV rating.

F. Provide spring type check valves at discharge of pumps.

G. 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. 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 welding rings for butt welds. Rings shall be carbon steel with knock-off spacer pins. Tube Turns or approved equivalent.

G. Use factory manufactured fittings appropriate for the application. Do not use field fabricated fittings and do not alter factory manufactured units.

H. 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.
I. 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.

J. The Engineer will visually inspect welded joints with the Contractor's supervisory personnel. Chip out and reweld joints judged defective by the Engineer.

K. Coordinate welding occurrences with Owner to avoid fire alarm trips and spread of welding fumes throughout facility. Obtain "Hot Works Permit" as required.

3.01 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.

3.02 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.

A. 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.

3.03 FLASHING

A. Provide pitch pockets at piping penetrations through the roof. Be responsible for the exact locations of penetrations and coordinate location and sizes with General Contractor.

3.04 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.

3.01 PERFORMANCE TESTS - PIPING

A. After piping systems and equipment which is installed under Division 15 are put in service, perform operational and performance test for section back to upstream existing tee to ascertain that the systems and equipment are performing properly.

3.02 PERFORMANCE TESTS - DUCTWORK

A. All new ductwork shall be pressure-tested per SMACNA, from fans to terminal control devices (e.g. VAV boxes).

3.03 PIPING SYSTEM TESTS

A. Perform pipe testing of all new pipe sections, including:
   1. Domestic water piping.
   2. Chilled water piping
   3. Equipment drain 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. Pneumatic test pressures shall not exceed 110 percent of the design pressure of the piping system.

H. During tests, leave automatic control valves in the open position unless provided with a bypass which applies pressure to both sides of the valve.

I. 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.

J. 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.

K. Do not subject the following to test pressures:
   1. Level controllers and level switches with floats or placers
   2. Pressure gauges, pressure sensing instruments

L. Test all piping and joints. Repair leaks and retest until satisfactory results are obtained.

M. 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.

N. Provide written certification of the satisfactory completion of the testing. Owner's representative to sign off on testing. Include document in O & M Manual.

3.04 SUPPORTING STEEL

A. Provide structural steel supports for mechanical equipment.

3.05 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.

3.06 GUARDS AND RAILS

A. Provide removable guards and railings for all belt drives and rotating machinery.

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:. 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
180°F unless a 1” thick insulation band is first provided under marker for protection from the hot pipe.

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 of Inherently Low Hazard:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Liquid or Liquid Admixture:</td>
<td>Green</td>
<td>White</td>
<td></td>
</tr>
<tr>
<td>Chilled Water Supply</td>
<td>Green</td>
<td>White</td>
<td>CWS*</td>
</tr>
<tr>
<td>Chilled Water Supply</td>
<td>Green</td>
<td>White</td>
<td>CWR*</td>
</tr>
<tr>
<td>Domestic Cold Water</td>
<td>Green</td>
<td>White</td>
<td>W</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>

*or match existing

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.

A. Air Conditioning Equipment:

1. Equipment such as chillers, pumps, condensers, split systems or roof-top equipment shall be identified by stencils, or system nameplates. Labels of remote equipment shall also indicate the space(s) being served and the location of their electrical breaker (Panel ID, Room No. And Circuit).

2. Refrigeration equipment shall be labeled with the type and approximate quantity of refrigerant.

A. Terminal Units:

1. Identify all units with unique numbers corresponding to the drawings, and indicate the space being served.

B. 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
PHASE 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, duct, and equipment.

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.

PHASE 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. Armaflex
      2. Armstrong
      3. Certain-Teed
      4. Knauf
      5. Manson
6. NOMACO
7. Owens-Corning
8. Schuller (Johns-Manville)

B. Adhesives, Coatings, and Sealants:
   1. Foster
   2. Chiller 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.

C. Flexible Closed Cell
   1. Flexible, cellular, molded or sheet; conforming to ASTM C534
   2. K value: 0.28 at 75 degrees Fahrenheit
   3. Service temperature rating: Minimum of 220 degrees Fahrenheit
   4. Connection adhesive: Waterproof, vapor retarding, Rubatex R-373

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. Johns-Manville Zeston 3000 (outdoors)

B. Aluminum:
   1. 0.016-inch thick sheet with smooth or embossed finish, longitudinal slip-joints with 2-inch laps
   2. Fitting covers: Die shaped with factory attached protective liner

C. Paintable where required.

2.05 DUCT INSULATION

A. Flexible Fiberglass Blanket:
1. ASTM C553 type 1, class B-2
2. K value: 0.27 at 75 degrees Fahrenheit
3. Density: .75 pounds per cubic foot
4. Vapor barrier jacket: Aluminum foil reinforced with fiberglass yarn and laminated to fire-resistant Kraft (Foil Scrim Kraft)
5. Johns-Manville Microlite Type XG.

2.06 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

PHASE 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, ducts, and equipment have 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 and duct 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. 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 BLANKET INSULATION

A. Apply insulation with edges tightly butted. Overlap facing at least two inches at joints. Seal joint in vapor seal with fire-retardant adhesive. Secure insulation to duct with approximately four-inch wide fire-retardant adhesive spaced at 8 inches on center
B. For ducts which exceed 30 inches in width, provide mechanical fasteners at 18 inches on center for the underside insulation in addition to the adhesive. Cut off the protruding ends of the fasteners flush after speed clips are installed and seal with vapor tape or mastic.

C. For insulated ducts which convey air of a temperature which is less than the ambient temperature, provide vapor retardant jacket. Seal jacket seams and penetrations with UL listed tape or vapor retardant adhesive.

D. For insulated ducts which convey air of a temperature which is greater than the ambient temperature, bevel and seal ends of insulation where service access is required.

E. For ducts subject to physical abuse in mechanical equipment rooms and exposed ducts in finished spaces, finish with Johns-Manville Zeston 2000 PVC jacket or with aluminum jacket.

3.06 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.
### PIPE INSULATION SCHEDULE

<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>
</tbody>
</table>

**B. Domestic and Service Hot Water Systems including recirculation**

|                         |                                      | 105 and Greater | 100 | 1.0 | 1.0 | 1.5 | 1.5 | 1.5 |

**C. Cooling Systems: Chilled Water, Brine, and Refrigerant**

<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>Below 40</td>
<td>75</td>
<td>1.0</td>
</tr>
<tr>
<td>40-55</td>
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</tbody>
</table>

**D. Domestic Cold Water**

|                         |                                      | 1-1/2 | 1-1/2 | 2    | 2-1/2 | 2-1/2 |

### DUCT INSULATION SCHEDULE

<table>
<thead>
<tr>
<th></th>
<th>THICKNESS</th>
<th>FINISH</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Rectangular Supply ducts: Cooling systems</td>
<td>1&quot;</td>
<td>Permacoat Liner</td>
</tr>
<tr>
<td>B. Round Supply ducts: Cooling systems Flexible duct wrap</td>
<td>1-1/2&quot;</td>
<td>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 and General Requirements apply to this Section. Consult them for additional conditions and requirements.

1.02 SECTION INCLUDES

A. Modification to existing fire suppression systems

1.03 CONTENT SUMMARY

A. System Design
   B. Installation
   C. Pipe and fittings

1.04 SUBMITTALS

A. Product Data:
   1. Piping and fittings
   2. Sprinkler heads
   3. Provide annotated descriptive data to show specific model, type and size of each item. Each item proposed to be supplied shall be clearly identified.

B. 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.

C. Shop drawings
   1. Detailed shop drawings to include floor plan/layout drawings based upon the general arrangement shown on the drawings. Details and sections shall be included as required to define and clarify the design.
   2. Drawings shall be in strict compliance with NFPA #13 and drawn to commercial or engineering standard in compliance with CU CAD standards and be plotted to noted scale.
   3. A cross-section of the area is not required, provided the contractor will correct any violations to the requirements of NFPA 13 that may be discovered during construction.
   4. Acceptable drawing size is 8-1/2” x 11”.

D. Hydraulic Calculations are not required.

1.05 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. Owner’s representative, Engineer, and AHJ reserve the right to request proof of qualifications.

C. 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.
   f. All work shall be performed by bona-fide employees of the contractor.

2. Designer qualifications:
   a. Experienced NICET level IV 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. An individual with NICET level III or higher may be accepted if approved by AHF. Designers that are members of or meet the qualifications to be members of the national organization of the Society of Fire Protection Engineers are preferred.

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.

1.06 CODES AND REGULATIONS

A. In addition to the requirements set forth in this Section, comply with University of Colorado Standards. All responsibilities assigned to the “engineer” in the Standards apply to this contractor. Standards are accessed at http://www.colorado.edu/facilitiesmanagement/pdc/construction/standards/index.html. Alert Project Manager of any discrepancies between these requirements and the UCB Standards.

B. Comply with the following codes and the regulations of the authorities having jurisdiction.

1. IBC, 2006
2. IFC, 2009
3. IMC, 2006
4. IPC, 2009
5. UL Fire Resistance Directory
6. UL Fire Protection Equipment Directory
7. NFPA-13, 14, 20, 25, 72, 214, 231, and 231C
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
1.07 DESIGN

A. General Requirements for Pre-action System:

1. The existing preaction system comprised of a preaction valve, compressor, and alarm supervisory functions.
2. Sequence of operation is a double interlocked preaction system that admits water to sprinkler piping upon activation of both detection devices and automatic sprinklers.
3. There will be no change to existing sequence or equipment.
4. Coordinate work with Division 16.

B. General description

1. Work included in this Section requires relocating and replacing sprinkler heads for both wet pipe and preaction systems to accommodate new room configuration; the branch piping modifications to accommodate sprinkler head locations; and a test drain relocation to avoid conflict with furniture (racks).

C. Pipe sizing:

1. Use NFPA 13 pipe schedule system for pipe sizing.

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’ 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; ASTM A135.
B. Piping shall be USA manufactured with Antibacterial Formula – II (ABF-II) coating or approved equal.

C. Pipe 2” and smaller shall have threaded fittings with a threaded corrosion resistance ratio of 1.0 or greater.

D. Face bushings and hexagonal bushings are not permitted.

2.03 VALVES

A. General Requirements: All valves shall be suitable for a minimum of 175 psi working pressure unless the project requirements demand higher pressures.

B. Miscellaneous Valves: Ball drip valves shall be brass with 1/2-inch MNPT-rated for 175 psi or higher where necessary.

1. Inspector’s test valves shall be 1-inch brass, ball valves.
2. Main and sectional drain valves, and test valves shall be all-bronze gate valves.
3. Approved combination test/drain valves may be installed.
4. The valves used for the gauge assemblies shall be 1/4” globe or angle 3-way valves, with a working pressure of not less than one hundred seventy-five (175) psi. They shall have screwed bonnets and renewable composition discs.

2.04 AUTOMATIC SPRINKLER HEADS

A. Orifice size shall be 1/2-inch unless otherwise approved by the engineer. All sprinkler heads shall be the product of the same manufacturer. Temperature rating in accordance with NFPA.

B. Synthetic non-metallic o-rings are not acceptable.

C. Finished ceiling applications:

1. Temperature Rating: 165 degrees Fahrenheit for ordinary hazards. Higher ratings as required by NFPA.
2. Pendant type, chrome plated brass, with chrome ceiling escutcheon

D. Exposed areas: Ordinary temperature, upright type, standard brass

E. Areas with finished ceilings: Semi-recessed sprinklers.

F. Acceptable Manufacturers:

1. Viking
2. Globe
3. Reliable
4. Approved equal

G. New sprinklers shall match existing sprinklers for type and model in similar areas of the building. Where this requirement cannot be met due to order equipment, match the type and model in each room. Indicate reason and describe variances to this requirement in submittal.

2.05 DRAIN AND TEST LINES
A. The 2-inch main drain, sub-system drains and inspector's test connection drains shall be provided with the appropriate size valve.

PART 3 - EXECUTION

3.01 PIPING AND FITTINGS

A. Piping shall be sloped to facilitate drainage toward the point of the supply. Slope per NFPA 13 for dry systems.

B. Trapped sections and low points shall be provided with auxiliary drains, minimum 1” valve with plug.

C. Install sprinklers to prevent trapped water.

D. 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.

E. Provide unions at valves in pipes two inches and smaller. Unions are not required at flanged devices or in installations using grooved mechanical couplings.

F. 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.

G. Tighten Flange Bolts with Wrenches.
   1. In tightening joints, take care to ensure uniform pressure on the gasket and to avoid over-stressing the bolts or dishing or breaking the flanges.
   2. Flanged joints that have been made up and broken shall be remade with new gaskets.

H. The end of each cross main shall be equipped with a minimum of 1-1/4 inch threaded and capped connection to facilitate flushing per NFPA 13.

I. Ream and remove burrs and sharp edges from pipe outlets. Reaming shall be performed to the full internal diameter of the pipe.

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 VALVES

A. All valves shall be accessible and operable from the floor. All valves are to be above the necessary headroom of the area in which they are located.

3.04 SPRINKLER HEADS
A. Ensure that sprinkler heads are not painted, sprayed with fireproofing, or are not otherwise damaged. Replace damaged or impaired sprinkler heads.

B. Installations shall be in accordance with sprinkler listing and manufacturers recommended practices.

C. Coordinate sprinkler piping and head installations with mechanical, electrical fixtures, other components, and building structural elements.

D. Maintain the maximum height possible. Sprinkler heads installed below seven (7) feet - four (4) inches requires permission from UCB.

3.05 TESTING

A. General Requirements:

1. Prior to scheduling tests, ensure that all systems and equipment are functioning properly.

2. Final testing shall be accomplished in conjunction with the building fire alarm and detection system.

3. Schedule inspections per UCB Standards.

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. Testing 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.
   a. Air test shall maintain 40 psi for 24 hours without losing more than 1.5 psi during the test period.
   b. A functional test shall be conducted on all detection devices, valves, and drainage.
   c. Maximum dry valve trip time shall be 15 seconds
2. All piping shall be hydrostatically tested at not less than 200 psi or at 50 psi in excess of the maximum pressure, 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.
   a. 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.

3. 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.

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. Modifications to domestic water distribution system
B. Modifications to equipment drainage system

1.03 CONTENT SUMMARY

A. Installation
B. Pipe and fittings
C. Testing
D. Valves

1.04 SUBMITTALS

A. Comply with Section 15010.
B. Product Data:
   1. Valves

1.05 CODES AND REGULATIONS

A. Comply with requirements, rules, and regulations of:
   1. Colorado Energy Conservation Code
   2. International Plumbing 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.

A. 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.

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 water hammer arresters where required. Locate to be accessible or provide access panels.

F. Provide backflow preventer at connection of cold water make-up line to process cooling water, heating water, or any other non-potable system.

G. Provide ball valves and unions on all lines to equipment for isolation and removal.

H. Provide ball valves for isolation of branch lines. Provide ball valves in all domestic hot water and cold water supplies to plumbing fixture groups.

I. Provide pipe hangers of the same material as the piping system or use coated hangers.

J. Joints between copper tubing and fittings for below-grade locations shall be silver brazed. Minimize the number of below-grade connections.

K. Provide water tight sleeves at all floor penetrations. Sleeves shall extend 2 inches above floor, in all locations.

3.03 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. Valve off gas pressure regulators and gas burning equipment. Do not subject regulators and equipment to test.
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. 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 Measuring and Balancing Devices
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 MEASURING AND BALANCING DEVICES
A. Ports shall be on one side of valve, or shut off valve shall be provided on the pressure side of the valve. Balancing valves shall have full shut off capability and memory stop.
B. Obtain approval from balancing contractor for size and type of balancing devices.
C. Acceptable Manufacturers:
   1. Gerand
   2. Flow Design "Flowset"
   3. Nexus
   4. Nibco globe style with isolation valve
   5. Presco
   6. Griswold “Quickset”

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
A. 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

PART 3 - EXECUTION

3.01 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.

3.02 PIPE TESTING

A. All piping systems shall be tested and 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
   b. Steam/condensate return: 100 psig hydrostatic

F. Repair all leaks and retest the system.

END OF SECTION 15510
PART 1  - GENERAL

1.01 SECTION INCLUDES

A. Requirements for furnishing computer room air conditioning (CRAC) unit; DX type with water-cooled condensers.

1.02 CONTENT SUMMARY

A. Computer room air conditioning unit.

1.03 SUBMITTALS

A. Product Data:

1. Computer room air conditioning unit.
2. Drawings shall indicate components, assembly information, dimensions, weights and loadings, required clearances, and locations and sizes of field connections.
3. Include capacities, information on specialties and accessories, electrical requirements, controls, wiring diagrams, and manufacturer's operation and maintenance recommendations.
4. Manufacturer's installation requirements.
5. Optional components and features included.

1.04 WARRANTIES

A. Provide 4-year warranty on compressors and 2-year warranty on other parts. Warranty to commence upon completion of commissioning, with UCB approval accepting equipment.

PART 2  - PRODUCTS

2.01 COMPUTER ROOM AIR CONDITIONING UNIT

A. Each unit shall meet the following design/performance requirements:

1. Factory assembled unit with down-flow air delivery.
2. Total cooling capacity at altitude of at least 243,200 BTU/HR, with a sensible cooling capacity of 187,300 BTU/HR based on an entering air temperature of 72 °F dry bulb and 60 °F wet bulb.
3. Design condenser operation shall be based on a cooling water entering temperature of 65 °F with 23.8 gpm and 9.2 ft. water pressure drop.
4. The unit shall deliver 9000 cfm with a external static pressure of 0.5" wc.
5. The unit shall be supplied to operate with a single point 460 volt 3 ph 60 Hz electrical service connection, 55.6 total amps.
6. Humidifier capacity shall be 30 pounds per hour, 10.2 KW.
7. Reheat capacity shall be 76,835 btuh, 22 KW.

B. Unit Features:

1. 30% efficient 4" filter
2. Stainless steel drainpan
3. Blower motor shall be belt-driven with variable pitch drive with adjust motor slide base.
4. Steam generator humidifier with built-in air gap to prohibit back flow into domestic water.
5. Electric reheat

C. Environmental Control Processor

1. Standard features include backlit LCD screen, programmable settings, real time clock with battery back up, data base of unit and room conditions, humidity sensor, temperature sensor, power on status contact, self-test diagnostics, USB port for software upgrades, multi-level password access, factory programmed menus.

2. Operational features include automatic or manual restart, automatic reheat element rotation, adjustable mode and stage response time, compressor short cycle control, start time delay, automatic compressor rotation, humidity anticipation, sequential load activation dehumidification mode lockout.

3. Provide network card with BACnet protocol capable of full bi-directional communication for all available points for future connection to Andover system.

4. Diagnostic features: Alarms displayed in order of occurrence, programmable delays for optional alarms, programmable remote alarm contact, four programmable option alarm inputs, manual diagnostic program, adjustable alarm limits, select alarms optional disabled, selectable audio alarm tone, manual override for blower, cooling stage, humidification, reheat, and water valve.

5. Protective and safety features: Opto-coupler signal inputs, switching power supply watch dog timer, protected 24VAC power input, isolation transformer, fuses on all control boards.

6. Display conditions: Current percent of capacity utilized, current temperature, current humidity, current discharge air temperature, current chilled water temperature, temperature setpoint, humidity setpoint.

7. Functions displayed: Cooling stage, reheat stage, dehumidification, humidification

8. Alarms:
   a. High Temperature
   b. Low Temperature
   c. High Humidity
   d. Low Humidity
   e. Humidifier failure
   f. Humidifier auto flush
   g. Manual override
   h. Short cycle compressor
   i. High pressure/internal overload compressor (#1 and #2)
   j. Low pressure compressor (#1 and #2)
   k. Dirty filter
   l. Loss of Air Flow
   m. Loss of Power
   n. Low voltage
   a. Temperature sensor problem
   b. Maintenance required

9. Historical data: Equipment run times, high and low temperature during last 24 hours, average percent of capacity last hour, alarm history for last ten alarms, high and low humidity in last 24 hours.
10. Remote alarm condition shall be available through binary alarm contact.

D. Cooling System:

1. Unit shall be equipped with dual scroll compressors with four stage control. Design to include built-in discharge check valve to prevent liquid migration in the off compressor, specially designed oil and gas equalization lines for oil migration control.

2. Refrigerant shall be R-407C.

3. Water cooled condensers for each circuit shall be cleanable, shell-and-tube, counter flow with removable heads. Condensers shall be stamped A.S.M.E. for a maximum refrigerant pressure of 400 PSI at 200 deg. F.

4. Unit shall be pre-piped for contractor connection. Unit water circuits shall be designed for a maximum system water pressure of 150 PSIG.

E. Optional Components:

a. Disconnect Switch (Non-Locking Type). The non-automatic disconnect switch shall be accessible from outside of the unit. The high voltage panel compartment can be accessed with the switch in either on or off position.

b. Upsized blower motor (7.5 horsepower)

c. Modulating humidifier control

d. Three-way water regulating valve

e. Liqui-Tect Sensors: Provide solid state water sensor under the raised floor.

f. Floor Stand. The floor stand shall have adjustable legs (requirement is approximately 16-18” high) with vibration isolation pads.

F. Acceptable Manufacture:

1. DataAire DAWD-2034

2. Approved Equal.

PART 3 - EXECUTION

3.01 COMPUTER ROOM A/C INSTALLATION

A. Provide factory authorized unit start up. Include testing controls and demonstrate compliance with requirements with owner’s representative present.

B. Include 2 hour on site training with owner’s personnel.

C. Provide written documentation of start up and testing verification to include in owner’s Operation and Maintenance manual.

D. Complete UCB commissioning checklists.

END OF SECTION 15651
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. Variable Air Volume Box
D. Grilles, registers, and diffusers

1.03 CONTENT SUMMARY

A. Access panels
B. Dampers
C. Duct liner
D. Elbows and turning vanes
E. Grilles, registers and diffusers
F. HVAC ductwork
G. VAV box
H. Sealants

1.04 SUBMITTALS

A. Comply with Section 15010.

B. Product Data:

1. Access panels
2. VAV box
3. Dampers
4. Duct liner
5. Grilles, registers, diffusers
6. Sealants

PART 2 - PRODUCTS

2.01 ACCESS PANELS IN DUCTS AND EQUIPMENT

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:
<table>
<thead>
<tr>
<th>SIZE OF DUCT TO BE ACCESSED Inches</th>
<th>PANEL SIZE Inches</th>
<th>METAL FRAME</th>
<th>GAUGES OF DOOR</th>
<th>PAN</th>
<th>HINGES</th>
<th>LATCHES</th>
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<tr>
<td>6 - 8</td>
<td>6 x 8</td>
<td>24</td>
<td>26</td>
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<td>10 - 12</td>
<td>10 x 12</td>
<td>22</td>
<td>24</td>
<td>28</td>
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<td>1</td>
</tr>
<tr>
<td>12 - 16</td>
<td>12 x 16</td>
<td>20</td>
<td>24</td>
<td>28</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>18 and larger</td>
<td>16 x 24</td>
<td>20</td>
<td>22</td>
<td>28</td>
<td>3</td>
<td>2</td>
</tr>
</tbody>
</table>

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 hardware manufacturers:
   1. Ventfabrics Inc.
   2. Duro Dyne

2.02 VOLUME CONTROL DAMPERS

A. Fabricate in accordance with SMACNA HVAC Duct Construction Standards.

B. Frame shall be 16 gauge, galvanized steel, with 16 gauge galvanized steel blades.

C. Dampers shall have locking hand quadrants.

D. Provide with Oilite bronze bearings.

2.03 VARIABLE AIR VOLUME BOXES

A. Unit shall be capable of 5 inches static pressure.

B. Insulation in accordance with NFPA Standard 90A.

C. Volume control independent of pressure variations.

D. Unit shall be in full compliance with UL 181 and NFPA 90A and shall meet bacteriological standards of ASTM C665.

E. Manufacturers
   1. Anemostat
   2. Carnes
   3. Carrier
   4. Environmental Technologies
   5. Krueger
   6. Metal-Aire
   7. Tempmster
   8. Titus
   9. Trane

2.04 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.

2.05 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. 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.

2.06 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. Acceptable Manufacturers:
   1. Anemostat
   2. Carnes
   3. Krueger
   4. Metal Aire
   5. Price
   6. Titus
   7. Tuttle & Bailey

2.07 SHEET METAL DUCTWORK
A. Sheet metal used for duct and plenum construction shall be galvanized steel unless otherwise specified. Ducts shall be galvanized steel, ASTM A525 or ASTM A527 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.

2.08 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. Fire resistant per UL.

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 air flow. 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 or shall conform to the requirements of UMC Standard No. 10-1.

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:
APPLICATION | DUCTWORK REQUIREMENTS | SMACNA PRESSURE CLASS (Pos. or Neg., Note 1)
--- | --- | ---
1. Supply upstream of VAV box | Sheet metal | 1"
2. Supply downstream of VAV box | Lined sheet metal | 1"

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.

3.04 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.

3.05 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.

3.06 ACCESS PANELS

A. Install access panels for inspection, maintenance, and cleaning of all automatic dampers, fire and smoke dampers, duct turning vanes, before and after all coils, and at other locations where equipment will require service.

B. Access panels to fire dampers shall be labeled with letters not less than 1/2-inch in height reading “Fire Damper.” For locations where access panels are insulated, provide identifying labels on the exterior of the insulation.

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, 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.

I. 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.

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.

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. Siemen’s
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 Inflink, 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.

2.05 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.

2.06 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.

2.07 AUXILIARY DEVICES - ELECTRIC

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.

E. Control transformers shall be UL-listed, Class 2 current-limiting type, or shall be furnished with overcurrent 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.

PART 3 - EXECUTION

3.01 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 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.

3.02 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.

3.03 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.

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.).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 HVAC Shop for all installations where this cannot be achieved.

K. Averaging-type sensing elements shall be firmly supported in ductwork or air-handling units using 1/2" EMT or other auxiliary support.

L. 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.)
M. Layout of Points on Controllers: The points on controllers shall be coordinated for approval by the UCB HVAC Shop

N. 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.

3.04 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.

1.07 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.

3.05 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.

3.06 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.

3.07 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.

3.08 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>Parameter</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>
<tr>
<td>Humidity</td>
<td>5% RH</td>
</tr>
<tr>
<td>Fluid Pressure</td>
<td>2.0 psi range 1-150 psi</td>
</tr>
<tr>
<td></td>
<td>2.0&quot; w.g. range 0-50&quot; differential pressure</td>
</tr>
</tbody>
</table>

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.

3.09 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 Shutdowns - 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 Shutdowns - 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.

3.10 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.
3.11 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.

3.12 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.

3.13 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.

3.14 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:

1. ASHRAE.
2. 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. Proper operation of automatic control and smoke dampers.
   3. Manual control dampers, fire dampers, and air outlet dampers are wide open.
   4. Duct end caps installed and access doors closed.
   5. 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. Proper control valve installation and operation
   4. Proper system static pressure to assure a completely filled system
   5. Air in system eliminated.
   6. Proper flow, meter and check valve installation.
7. 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 shall include:
   1. Measurement and setting of airflows at new VAV box and connected devices.
   3. Balancing of chilled water flow for loop serving CRAC unit. Includes flow at compressors, pump, flow at CRAC, and main valves.

C. Balancing and adjusting shall include the following:
   1. Air balance:
      a. 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 system flow meters and contact pyrometers, this subcontractor shall adjust the inlet and outlet water temperatures and the quantity of fluid handled by each air-handling unit coil, zone reheating coil, heat exchanger, and other heat release equipment, as well as the corresponding media flows.
   b. Set flow to each zone or main circuit.
   c. Adjust flow through coils in each flow circuit.
   d. Recheck settings on pumps.
   e. Recheck pump motor amperage and recalculate brake horsepower if necessary.
   f. Reset or adjust controls to put the control system back into operation.
   g. Mark or score balancing cocks and gauges at their final set points.
   h. Record circulating pump flow rates, pressures, running amperage, and full load amperage at design flow and shutoff conditions.
   i. Determine pump impeller size by plotting no-flow pump differential pressure on pump curve. Plot new pump curve if necessary.
   j. The hydronic system shall be proportionally balanced. Ensure that the path to each terminal is fully open. Total system flow shall be adjusted at the pump by restricting the discharge balancing valve. If pump impellers require trimming, obtain approval from the Mechanical Engineer prior to proceeding with the work necessary to trim the impeller.
   k. When all hydronic balancing is done, all valves shall be marked or the locking rings set in a manner to allow the set position to be reestablished. Control valve bypass loops shall be set with the balancing valve to provide equal flow in either mode. Confirm in writing.

D. 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. Chilled water coils
   c. Pumps
   d. Hydronic piping and specialties (Heating water, Chilled water, Steam, Condensate)
   e. Ductwork
2. Functional performance verification (Refer to example of required functional performance check lists attached to this specification):
   a. Automatic Temperature Control System
   b. Air outlets
   c. Chilled water coils
   d. Pumps
   e. 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 piece of equipment. Sheet shall show in comparison final as-balanced versus design values.

12. Flow measuring and balancing devices (existing and new): include size, brand, and location on the project. Required and actual flow rates and pressure drops through the
meters. Valve settings for 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
PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 DESCRIPTION

A. Work Included

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

B. Work Not Included

1. Certain labor, materials, and equipment may be furnished under other sections of these specifications, by the Owner; when this is the case, the extent, source, and description of these items will be as indicated on the drawings or as described in the specification.

1.03 PROVISIONS

A. Work performed under this division of the specifications shall conform to the requirements of Division 1, the electrical drawings, and all items hereinafter specified.

1. Prior to any work being performed under this division, examine architectural and mechanical drawings and specifications. If any discrepancies occur between them and the electrical drawings and specifications, report discrepancies to the Architect in writing and obtain written instructions for the work.

2. Electrical drawings are diagrammatic, but shall be followed as closely as actual construction of the building will permit. All changes from drawings necessary to make the electrical work conform to the building as constructed shall be made without additional cost to the Owner.

3. Coordinate the electrical work with the General Contractor and be responsible to him for satisfactory progress of the same. Coordinate electrical work with all other trades on the project without additional cost to the Owner.

4. All work and materials covered by drawings and specifications shall be subject to review at any time by representatives of the Architect and Owner. If the Architect or Owner’s agent finds any materials or installation that does not conform to these drawings and specifications, Contractor shall remove the material from the premises and correct the installation to the satisfaction of the agent.
5. In acceptance or rejection of installed electrical systems, no allowance will be made for lack of skill on the part of the installers.

1.04 CODES AND STANDARDS

A. The latest editions of the following standards (including supplements and official interpretations) are minimum requirements:

1. NFPA 70 - National Electrical Code (NEC).
3. Conform to all applicable State and Local Codes.
6. Americans with Disabilities Acts (ADA) and American National Standards Institute (ANSI) 117.
7. National Electrical Manufacturer's Association (NEMA).
10. Insulated Cable Engineers Association (ICEA).
14. Institute of Electrical and Electronic Engineers (IEEE).

B. The complete installation shall comply with requirements of the utility and telephone companies furnishing service to this installation. The drawings and specifications take precedence when they are more stringent than codes, statutes, or ordinances in effect. Applicable codes, ordinances, standards and statutes take precedence when they are more stringent or conflict with the drawings and specifications.

1.05 SPECIAL REQUIREMENTS

A. Definitions: “Provide” shall mean “furnish and install”. “Furnish” means to supply all materials, labor, equipment, testing apparatus, controls, tests, accessories and all other items customarily required for the proper and complete application. “Install” means to join, unit, fasten, link, attach, set up or otherwise connect together before testing and turning over to Owner, complete and ready for regular operation. The words “accept” or “acceptable” denote only that the equipment items are in general conformance with the
design concept of the project.

B. Drawings:

1. The drawings indicate the general arrangement of circuits and outlets, locations of switches, panelboards and other work. Information shown on the drawings is schematic, however, re-circuiting will not be permitted without specific acceptance. Drawings and specifications are complementary to each other. What is called for by one shall be as binding as if called for by both. Data presented on these drawings is accurate as planning can be determined, but accuracy is not guaranteed and field verification of all dimensions, locations, levels, etc., to suit field conditions is directed. Review all Architectural, Structural and Mechanical Drawings and Specifications; adjust all work to conform to all conditions shown therein. The Architectural drawings shall take precedence over all other drawings.

2. Discrepancies between different plans, between plans and specifications, between specifications or regulations and codes governing this installation shall be brought to the attention of the Architect in writing before the date of bid opening. In the event such discrepancies exist, and the Architect is not so notified, the adjudication of responsibility shall be solely at the discretion of the Architect.

1.06 RECORD DRAWINGS

A. Maintain a current set of electrical drawings at the site. Neatly mark all changes and deviations from the original drawings. Use a color which contrasts with the prints. This shall be a separate set of drawings, not used for construction purposes, and shall be kept up to date as the job progresses and shall be made available for inspection by the Architect at all times. These updated progress drawings shall be used to produce the final record drawings that shall be in AutoCad electronic format media upon project completion.

B. Upon completion of the contract, both sets (electronic and hard copy drawings) of record drawings shall be delivered to the Architect.

C. The Contractor shall mark all record drawings on the front lower right hand corner with a stamp impression that reads ‘RECORD DRAWINGS’ or similar.

1.07 PROJECT/SITE CONDITIONS

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

B. Prior to submitting a bid, visit the site of job and ascertain all conditions affecting the proposed installation and adjust all work accordingly. Make provisions for these costs.

C. Coordinate the work with that of all other trades. Where conflicts of work occur and departure from the indicated arrangements are necessary, consult with other Contractors involved; come to agreement as to changed locations and elevations, etc., and obtain written acceptance from the Architect of proposed changes before proceeding with work.

D. All outages of electrical service shall be scheduled with the Owner five (5) days in advance of proposed outage. Include an overtime allowance in the bid for the performance of all work requiring outages at such time as it is approved by the Owner.
Outages shall be at a time and of such duration as accepted by the Owner. Electrical Contractor shall be responsible for any and all temporary power needs by the Owner during these electrical service outages.

1.08 SEQUENCING AND SCHEDULING

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

1.09 EXAMINATION OF BIDDING DOCUMENTS

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

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

1.10 SUBMITTALS

A. Submit under provision of Division 1.

B. Listing of Equipment: The Contractor shall submit, within thirty days after the award of the contract, a complete typewritten list of those items of equipment which will be furnished under this contract. Include the name or description of the item, name of manufacturer, model, type, and catalog number.

C. Submit five (5) copies of shop drawings, layouts, manufacturer’s data, wiring diagrams and material schedules that may be requested by the Architect for his review. The review by the Architect will not constitute concurrence with any deviation from the plans and specifications unless such deviations are specifically identified by the method described below, nor shall it relieve the Contractor of responsibility for errors or omissions in the submitted data.

D. Processed shop drawings shall not be construed as change orders. The shop drawings shall demonstrate that the Contractor understands the design concept, indicate which equipment and materials he intends to provide, and detail the fabrication and installation methods he intends to use. If deviations, discrepancies or conflicts between shop drawing submittals and the design drawings and specifications are discovered, the design drawings and specifications shall govern.

E. Contractor shall be responsible for dimensions (which he shall confirm and correlate at the job site), fabrication processes and techniques of construction and coordination of his work with that of other trades. The Contractor shall check and verify all measurements and review shop drawings before submitting them and sign a statement on the shop drawings which signifies that they comply with plans and specifications and that
equipment is dimensionally suitable for the application. If any deviations from the specified requirements for any item of material or equipment exist, such deviation shall be expressly stated in writing and incorporated with the submittal. The Owner's copies (two of each) of the reviewed submittals shall be retained by the Contractor until completion of the project and presented in bound form to the Owner.

F. Shop drawings and manufacturer's published data shall be submitted for:

1. All panelboards
2. Lighting fixtures (catalog cuts)
3. Fire alarm and detection system
4. TVSS

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

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

PART 2 - PRODUCTS

2.01 STANDARD FOR MATERIALS

A. All materials shall conform to current applicable industry standards. Workmanship and neat appearance shall be as important as the electrical and mechanical operation. Defective or damaged materials shall be replaced or repaired, prior to final acceptance, in a manner acceptable to the Architect or Owner at no additional cost to the Owner.

B. All electrical materials shall be acceptable for installation only if labeled or listed by a nationally recognized testing laboratory and if accepted by local authorities.

2.02 SUBSTITUTION AND APPROVALS (Prior Approvals)

A. Prior to Bidding: Where items of equipment or materials are specified by a manufacturer's name, type, model, or catalog number, only those items may be used in the base bid unless prior written acceptance of other material has been published by addendum.

1. Submit applications for this review in triplicate at least ten (10) calendar days prior to bid opening.

2. Applications for review shall be accompanied by a typewritten list of the specified manufacturer and catalog number and shall state all significant details in which each item differs from the item specified. Failure to list this information shall not relieve the Contractor from providing properly functioning or fitting materials regardless of the review action taken by the Architect. The Contractor will provide only materials which have been specified or accepted prior to bid opening, under his base bid.
3. Equipment and materials not listed as equivalents may be proposed as deductive alternates to specified items by submitting it as a separate line item from the base bid on the Bidder's letterhead.

4. Such substitution proposals shall not be substituted or included in the base bid. Substitution proposal must be accompanied by full descriptive data on the proposed equipment, together with a statement of the cost to be deducted for each item. If any such substitutions are considered, the Contractor shall submit a list of the proposed substitution items within 14 days of award of contract. The request for proposed substitutions shall not be accepted by the Engineer due to scheduling or delivery concerns.

B. Substitutions of Material after Award of Contract

1. Other items of material and equipment may be offered (at the Contractor's option) as alternates to specified items, either as provided for in the Proposal Forms or, if no provisions are made, by submitting it with his bid on the Bidder's letterhead.

2. Such alternate proposal shall not be included under the base bid and must be accompanied by full descriptive data on the proposed equipment, together with a statement of the cost to be added or deducted for each item. If any such alternate material proposals are considered, the Contractor shall submit a list of the proposed alternate substitution items in accordance with the requirements of "Review of Proposed Substitutions".

2.03 BID ALTERNATE(S)

A. Refer to Division 1 and all contract documents for additional information.

B. Alternate(s) for Material and Equipment

1. Equipment and material bid alternate(s) shall be proposed as additive or deductive alternate(s) to specified items by submitting it as a separate line item from the base bid on the Bidder's letterhead.

2. Such bid alternate proposals shall not be substituted or included in the base bid. Bid alternate proposal(s) must be accompanied by full descriptive data on the proposed equipment, together with a statement of the cost to be added or deducted for each item. The bid alternate shall include all materials, equipment, labor, electrical connections, coordination with all other trades, etc. for a complete and operational system.

3. The Contractor shall submit the bid alternates at the time the base bids are due.

PART 3 – EXECUTION

3.01 WORKMANSHIP AND COMPLETION OF INSTALLATION

A. Contractor's personnel and subcontractors selected to perform the work shall be well versed and skilled in the trades involved.

B. Coordinate electrical equipment and materials installation with other building components.
C. Sequence, coordinate, and integrate installations of electrical materials and equipment for efficient flow of the Work. Give particular attention to large equipment requiring positioning prior to closing-in the building.

D. Any changes or deviations from the drawings and specifications must be accepted in writing by the Architect/Engineer. All errors in installation shall be corrected at the expense of the Contractor. All specialties shall be installed as detailed on the drawings. Where detail or specific installation requirements are not provided, manufacturer’s recommendations shall be followed.

E. Upon completion of work, all equipment and materials shall be installed complete, thoroughly checked, correctly adjusted, and left ready for intended use or operation. All work shall be thoroughly cleaned and all residue shall be removed from surfaces. Exterior surfaces of all material and equipment shall be delivered in a perfect, unblemished condition.

F. Contractor shall provide a complete installation, including all required labor, material, cartage, insurance, permits, and taxes.

3.02 CHASES, OPENINGS, CUTTING, AND PATCHING

A. Carefully lay out all work in advance so as to eliminate where possible, cutting, channeling, chasing or drilling of floors, walls, partitions, ceilings and roofs. Any damage to the building, structure, piping, ducts, equipment or any defaced finish shall be repaired by skilled mechanics of the trades involved at no additional cost to the Owner and to the satisfaction of the Architect. Any necessary cutting, channeling, drilling or anchoring of raceways, outlets, or other electrical equipment shall be performed in a careful manner, and as accepted by the Architect.

B. All openings made in fire-rated walls, floors, or ceilings shall be patched and made tight in a manner to conform to the fire rating for the surface penetrated.

3.03 PROGRESS OF WORK

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

3.04 PERMITS AND INSPECTIONS

A. Obtain and pay for all permits and licenses required and furnish the Architect (for the Owner), a certificate of final inspection and approval from the authorities having jurisdiction over the electrical installation.

3.05 CUTTING AND PATCHING

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

3.06 DELIVERY AND STORAGE OF MATERIALS

A. Arrange and be held responsible for delivery and safe storage of materials and equipment for electrical installation.
B. Store materials and equipment for easy inspection and checking.

C. Carefully mark and store all materials.

D. Deliver materials to the job site in stages of the work that will expedite the work as a whole.

E. Carefully check materials furnished to this Contractor for installation, and provide receipt acknowledging acceptance of delivery and condition of the materials received. Thereafter, assume full responsibility for its safekeeping until the final installation has been reviewed and accepted.

3.07 PROTECTION OF WORK AND PROPERTY

A. Where there are existing facilities, be responsible for the protection thereof, whether or not such facility is to be removed or relocated. Moving or removing any facility must be done so as not to cause interruption of the work of Owner’s operation.

B. Close all conduit openings with caps or plugs during installation. Cover all fixtures and equipment and protect against injury. At the final completion, clean all work and deliver in an unblemished condition, or refinish and repaint at the discretion of the Architect.

C. Any equipment or conduit systems found to have been damaged or contaminated above “MILL” or “SHOP” conditions shall be replaced or cleaned to the Engineer’s satisfaction.

3.08 GUARANTEE

A. The entire electrical system installed under this Contract shall be left in proper working order. Replace, without additional cost, any work, material or equipment, which develops defects in design or workmanship within one (1) year from date of final acceptance.

3.09 FINAL ACCEPTANCE

A. Final acceptance by the Owner will not occur until all operating instructions are received and Owner’s personnel have been thoroughly indoctrinated in the maintenance and operation of all equipment.

B. Operating manual, parts lists, and indoctrination of operating and maintenance personnel: Furnish the services of a qualified representative of the supplier for each item or system itemized below who shall instruct specific personnel, as designated by the Owner, in the operation and maintenance of that item or system.

C. Deliver three (3) complete operating manuals and parts lists to the Owner (or his designated representative) at the time of the above required indoctrination. Fully explain the contents of the manuals as part of required indoctrination and instruct the Owner’s personnel in the correct procedure in obtaining service, both during and after the guarantee period. The operating manual and parts lists shall give complete information as to whom the Owner shall contact for service and parts, including the address and phone number. Furnish evidence that an authorized service organization regularly carries a complete stock of repair parts for these items (or systems), and that the organization is available for service. Service shall be furnished within twenty four (24) hours after requested.
D. Clean-up: Remove all materials, scrap, etc., relative to the electrical installation and leave the premises and all equipment, lamps, fixtures, etc. in a clean, orderly condition. Any costs to the Owner for clean-up of the site will be charged against the Contractor.

E. Acceptance Demonstration: Upon completion of the work, at a time to be designated by the Architect, the Contractor shall demonstrate for the Owner the operation of the entire installation, including all systems provided under this contract.

F. Operating and Acceptance Tests: Provide all labor, instruments, and equipment for the performance of tests as specified. Submit three (3) copies of a typewritten test report for the Architect for his approval.

1. Record the full load current in each phase or line at the main service entrance and for each feeder leaving the main distribution panelboard. Readings shall be taken with the maximum installed load connected and in operation.

2. Perform a careful inspection of the main switchboard bus structure and cable connections to verify that all connections are mechanically and electrically tight.

3. Measure the resistance to ground for the service ground, which shall not exceed ten (10) ohms under normal soil moisture conditions. If required, install additional ground provisions in a manner accepted by the Engineer at no additional cost to the Owner.

3.10 MECHANICAL EQUIPMENT WIRING AND CONNECTIONS

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

<table>
<thead>
<tr>
<th>ITEM</th>
<th>FURNISHED UNDER</th>
<th>SET IN PLACE OR MTD. UNDER</th>
<th>WIRED CONNECTED UNDER</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Equipment motors and thermal overload, resistance heaters. (3)</td>
<td>MD</td>
<td>MD</td>
<td>ED</td>
</tr>
<tr>
<td>2. Motor controllers, magnetic starters, reduced voltage starters and overload relays.</td>
<td>MD</td>
<td>ED(a)</td>
<td>ED</td>
</tr>
<tr>
<td>3. Disconnect switches, fused or unfused, h.p. rated switches, thermal overload switches and fuses, manual operating switches.</td>
<td>ED(a)</td>
<td>ED(a)</td>
<td>ED</td>
</tr>
<tr>
<td>4. Pushbutton stations, pilot lights, multi-speed switches, float switches, thermostats, control relays, time clocks, control transformers, control panels, motor valves,</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
5. Contactors, 120V control circuit outlets for control panels and for boiler controls and for fire protection controls and smoke detectors.

<table>
<thead>
<tr>
<th>Equipment Description</th>
<th>MD</th>
<th>MD(b)</th>
<th>MD(b)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duct Detectors, Fire/Smoke Dampers, and Elevator Vent Dampers.</td>
<td>ED</td>
<td>MD</td>
<td>ED(c)</td>
</tr>
</tbody>
</table>

MD=Mechanical, Division 15.
ED=Electrical, Division 16.

   a. If furnished as part of factory wired equipment, then wiring and connections only by ED.

   b. If float switches, line thermostats, p.e. switches, time switches, etc., carry the FULL LOAD CURRENT to any motor, the Mechanical Division shall furnish them. They shall be set in place and connected under the Electrical Division, except where such items are an integral part of the mechanical equipment, or directly attached to ducts, piping, etc., they shall be set in place under the Mechanical Division and connected by the Electrical Division. If they do not carry the full load current to any motor, they shall be furnished, set in place and wired under the Mechanical Division.

   c. Wiring from alarm contacts to alarm system by ED; all control function wiring by MD.

B. Provide electrical connections to mechanical equipment. Refer to the Mechanical specifications and plans covering sprinkler systems, motor interlocks, switching, etc. Provide wiring, conduit, outlets and final electrical connections to all equipment.

C. Where motor controllers are furnished by others, install controller and provide connections at line and load side of controllers.

D. Where reduced voltage, multiple speed, duplex, triplex, lead-lag, pony motor and other unusual controller types are utilized, coordinate specific requirements of motor(s) and controller and provide required wiring between motor(s) and controller.

3.11 OWNER PROVIDED EQUIPMENT

A. Provide electrical connections to owner furnished equipment.

B. Inspect owner furnished equipment for damage, defects, missing components, etc. Report deficiencies to the Owner immediately. Do not install or connect deficient equipment.

C. Provide supports, fastenings, and auxiliary hardware necessary for a complete installation in accordance with the finished building conditions.

3.12 EMERGENCY POWER OFF CONTROLS [COMPUTER ROOM]
A. Provide emergency power off controls for computer rooms.

B. Provide controls, relays, contactors, conduit and wire for the following functions:
   1. Disconnection of UPS, including battery disconnect.
   2. Shut down of air conditioning systems serving the computer room, including the closing of dampers to seal the room.

C. Provide an emergency power off switch at each exit door of computer room. Emergency power of switch shall be Allen-Bradley Bulletin 800T break-glass push button station NEMA type 13 with break-glass kit. Provide a legend plate for each unit with designation: COMPUTER ROOM SHUTDOWN.

3.13 REMODELING PROVISIONS

A. Existing systems and conditions shown on the drawings are provided for guidance only. The Electrical Contractor shall field check all existing conditions prior to bidding and shall include in his bid an allowance for the removal and relocation of existing conduits, wires, devices, fixtures, or other equipment as indicated on the plans or as required to coordinate and adapt new and existing electrical systems to all other work required for this project.

B. Connect new work to existing in a manner that will assure proper raceway grounding throughout in conformance with the National Electrical Code.

C. Remodel Work Cutting and Patching: The Contractor shall perform cutting, channeling, chasing, drilling, etc., as required to install or remove electrical equipment in areas of remodeling. This work shall be performed so as to minimize damage to portions of wall finishes, surfaces, plastering, or the structure which are to be reused, resurfaced, plastered or painted under another division of these specifications.

D. Carefully coordinate with the required remodeling work, cutting and patching etc., performed by the other trades. Remove or relocate existing electrical conduits, wires, devices, fixtures and other equipment as necessary.

E. All outages on portions of existing electrical systems shall be minimized and shall be at a time and of duration as accepted by the Owner.

3.14 ELECTRICAL DEMOLITION

A. Examination
   1. Verity field measurements and circuiting arrangements are as shown on drawings.
   2. Verify that abandoned wiring and equipment serve only abandoned facilities.
   3. Demolition drawings are based on casual field observation and existing record documents. Report discrepancies to Architect before disturbing existing installation.
   4. Beginning of demolition means installer accepts existing conditions.
B. Preparation

1. Disconnect electrical systems in walls, floors, and ceilings scheduled for removal.

2. Coordination outages with Architect/Owner.

3. Provide temporary wiring and connections to maintain existing systems in service during construction. When work must be performed on energized equipment or circuits, use personnel experienced in such operations.

C. Demolition and Extension of Existing Electrical Work

1. Demolish and extend existing electrical work under provisions of Division 1, Division 2, and this section.

2. Remove, relocate, and extend existing installations to accommodate new construction.

3. Remove abandoned wiring to source of supply.

4. Remove exposed abandoned conduit and associated conductors including abandoned conduit and conductors above accessible ceiling finishes. Cut conduit flush with walls and floors, and patch surfaces.

5. Disconnect abandoned outlets and remove devices. Remove abandoned outlets if conduit servicing them is abandoned and removed. Provide blank cover for abandoned outlets, which are not removed.

6. Disconnect and remove electrical devices and equipment serving utilization equipment that has been removed.

7. Repair adjacent construction and finishes damaged during demolition and extension work.

8. Maintain access to existing electrical installations, which remain active. Modify installation or provide access panel as appropriate.

9. Extend existing installations using materials and methods compatible with existing electrical installation, or as specified in individual section.

D. Cleaning and Repair

1. Clean and repair existing materials and equipment, which remain or are to be reused.

2. Panelboards: Clean exposed surfaces and check tightness of electrical connections. Replace damaged circuit breakers and provide closure plates for vacant positions. Provide typed circuit directory showing revised circuiting arrangement.

END OF SECTION 16010
PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes:

1. Cartridge fuses rated 600-V ac and less for use in enclosed switches.

2. Plug fuses rated 125-V ac and less for use in plug-fuse-type enclosed switches.

1.03 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material, dimensions, descriptions of individual components, and finishes for spare-fuse cabinets. Include the following for each fuse type indicated:

1. Ambient Temperature Adjustment Information: If ratings of fuses have been adjusted to accommodate ambient temperatures, provide list of fuses with adjusted ratings.

   a. For each fuse having adjusted ratings, include location of fuse, original fuse rating, local ambient temperature, and adjusted fuse rating.

   b. Provide manufacturer's technical data on which ambient temperature adjustment calculations are based.

B. Operation and Maintenance Data: For fuses to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 1 Section "Operation and Maintenance Data," include the following:

1. Ambient temperature adjustment information.

1.04 QUALITY ASSURANCE

A. Source Limitations: Obtain fuses, for use within a specific product or circuit, from single source from single manufacturer.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Comply with NEMA FU 1 for cartridge fuses.

D. Comply with NFPA 70.
1.05 COORDINATION

A. Coordinate fuse ratings with utilization equipment nameplate limitations of maximum fuse size and with system short-circuit current levels.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

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

1. Cooper Bussmann, Inc.
2. Edison Fuse, Inc.
3. Ferraz Shawmut, Inc.
4. Littelfuse, Inc.
5. Approved Equal.

2.02 CARTRIDGE FUSES

A. Characteristics: NEMA FU 1, nonrenewable cartridge fuses with voltage ratings consistent with circuit voltages.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine fuses before installation. Reject fuses that are moisture damaged or physically damaged.

B. Examine holders to receive fuses for compliance with installation tolerances and other conditions affecting performance, such as rejection features.

C. Examine utilization equipment nameplates and installation instructions. Install fuses of sizes and with characteristics appropriate for each piece of equipment.

D. Evaluate ambient temperatures to determine if fuse rating adjustment factors must be applied to fuse ratings.

E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 FUSE APPLICATIONS

A. Cartridge Fuses:

1. Motor Branch Circuits: Class RK1, time delay.
2. Other Branch Circuits: Class RK1, time delay.
3.03 INSTALLATION

A. Install fuses in fusible devices. Arrange fuses so rating information is readable without removing fuse.

3.04 IDENTIFICATION

A. Install labels complying with requirements for identification specified in Division 16 Section "Electrical Identification" and indicating fuse replacement information on inside door of each fused switch and adjacent to each fuse block, socket, and holder.

END OF SECTION 16491
PART 1 - GENERAL

1.01 RELATED DOCUMENTS
   A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY
   A. Section Includes:
      1. Electrical equipment coordination and installation.
      2. Sleeves for raceways and cables.
      3. Sleeve seals.
      4. Common electrical installation requirements.

1.03 DEFINITIONS
   A. EPDM: Ethylene-propylene-diene terpolymer rubber.
   B. NBR: Acrylonitrile-butadiene rubber.

1.04 SUBMITTALS
   A. Product Data: For sleeve seals.

1.05 COORDINATION
   A. Coordinate arrangement, mounting, and support of electrical equipment:
      1. To allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.
      2. To provide for ease of disconnecting the equipment with minimum interference to other installations.
      3. To allow right of way for piping and conduit installed at required slope.
      4. So connecting raceways, cables, wireways and cable trays will be clear of obstructions and of the working and access space of other equipment.

PART 2 - PRODUCTS

2.01 SLEEVES FOR RACEWAYS AND CABLES
   A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.
2.02 SLEEVE SEALS

A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Advance Products & Systems, Inc.
   b. Calpico, Inc.
   c. Metraflex Co.
   d. Pipeline Seal and Insulator, Inc.
   e. Approved equal.

2. Sealing Elements: EPDM interlocking links shaped to fit surface of cable or conduit. Include type and number required for material and size of raceway or cable.

3. Pressure Plates: Carbon steel. Include two for each sealing element.

4. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating of length required to secure pressure plates to sealing elements. Include one for each sealing element.

PART 3 - EXECUTION

3.01 COMMON REQUIREMENTS FOR ELECTRICAL INSTALLATION

A. Comply with NECA 1.

B. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items.

C. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.

D. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electrical equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.

E. Right of Way: Give to piping systems installed at a required slope.

3.02 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Electrical penetrations occur when raceways, cables, wireways, cable trays, or busways penetrate concrete slabs, concrete or masonry walls, or fire-rated floor and wall assemblies.
B. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.

C. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.

D. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.

E. Cut sleeves to length for mounting flush with both surfaces of walls.

F. Size pipe sleeves to provide 1/4-inch (6.4-mm) annular clear space between sleeve and raceway or cable, unless indicated otherwise.

G. Seal space outside of sleeves with grout for penetrations of concrete and masonry
   1. Promptly pack grout solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect grout while curing.

H. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in Division 7 Section "Joint Sealants."

I. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at raceway and cable penetrations. Install sleeves and seal raceway and cable penetration sleeves with firestop materials. Comply with requirements in Division 7 Section "Through-Penetration Firestop Systems."

3.03 SLEEVE-SEAL INSTALLATION

A. Install to seal exterior wall penetrations.

B. Use type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.04 FIRESTOPPING

A. Apply firestopping to penetrations of fire-rated floor and wall assemblies for electrical installations to restore original fire-resistance rating of assembly. Firestopping materials and installation requirements are specified in Division 7 Section "Through-Penetration Firestop Systems."

END OF SECTION 16051
PART 1 - GENERAL

1.01 RELATED DOCUMENTS
   A. Drawings and general provisions of the Contract, including General and Supplementary
      Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUBMITTALS
   A. Product Data: For each type of product indicated.
   B. Qualification Data: For testing agency and testing agency's field supervisor.
   C. Field quality-control test reports.

1.03 QUALITY ASSURANCE
   A. Testing Agency Qualifications: An independent agency, with the experience and
      capability to conduct the testing indicated, that is a member company of the InterNational
      Electrical Testing Association or is a nationally recognized testing laboratory (NRTL) as
      defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having
      jurisdiction.
      1. Testing Agency's Field Supervisor: Person currently certified by the InterNational
         Electrical Testing Association to supervise on-site testing specified in Part 3.
   B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in
      NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction,
      and marked for intended use.
   C. Comply with UL 467 for grounding and bonding materials and equipment.

PART 2 - PRODUCTS

2.01 CONDUCTORS
   A. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise
      required by applicable Code or authorities having jurisdiction.
   B. Bare Copper Conductors:
      4. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch (6 mm)
         in diameter.
      5. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
2.02 CONNECTORS

A. Listed and labeled by a nationally recognized testing laboratory acceptable to authorities having jurisdiction for applications in which used, and for specific types, sizes, and combinations of conductors and other items connected.

B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy, bolted pressure-type, with at least two bolts.
   1. Pipe Connectors: Clamp type, sized for pipe.

PART 3 - EXECUTION

3.01 APPLICATIONS

A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger, unless otherwise indicated.

B. Conductor Terminations and Connections:
   1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
   2. Connections to Structural Steel: Welded connectors.

3.02 EQUIPMENT GROUNDING

A. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70:
   1. Feeders and branch circuits.
   2. Lighting circuits.
   3. Receptacle circuits.
   5. Three-phase motor and appliance branch circuits.

B. Isolated Equipment Enclosure Circuits: For designated equipment supplied by a branch circuit or feeder, isolate equipment enclosure from supply circuit raceway with a nonmetallic raceway fitting listed for the purpose. Install fitting where raceway enters enclosure, and install a separate insulated equipment grounding conductor. Isolate conductor from raceway and from panelboard grounding terminals. Terminate at equipment grounding conductor terminal of the applicable derived system or service, unless otherwise indicated.
3.03 INSTALLATION

A. Grounding Conductors: Route along shortest and straightest paths possible, unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

B. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance, except where routed through short lengths of conduit.
   1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
   2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install so vibration is not transmitted to rigidly mounted equipment.

3.04 FIELD QUALITY CONTROL

A. Perform the following tests and inspections and prepare test reports:
   1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.

B. Report measured ground resistances that exceed the following values:
   1. Power and Lighting Equipment or System with Capacity 500 kVA and Less: 10 ohms.

C. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Architect promptly and include recommendations to reduce ground resistance.

END OF SECTION 16060
PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section includes the following:

1. Hangers and supports for electrical equipment and systems.

1.03 DEFINITIONS

A. EMT: Electrical metallic tubing.

B. IMC: Intermediate metal conduit.

C. RMC: Rigid metal conduit.

1.04 PERFORMANCE REQUIREMENTS

A. Design supports for multiple raceways capable of supporting combined weight of supported systems and its contents.

B. Rated Strength: Adequate in tension, shear, and pullout force to resist maximum loads calculated or imposed for this Project, with a minimum structural safety factor of five times the applied force.

1.05 SUBMITTALS

A. Product Data: For the following:

1. Steel slotted support systems.

B. Shop Drawings: Show fabrication and installation details and include calculations for the following:

1. Trapeze hangers. Include Product Data for components.

2. Steel slotted channel systems. Include Product Data for components.

3. Equipment supports.

1.06 QUALITY ASSURANCE

A. Comply with NFPA 70.

PART 2 - GENERAL
2.01 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

A. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Allied Tube & Conduit.
b. Cooper B-Line, Inc.; a division of Cooper Industries.
c. ERICO International Corporation.
d. GS Metals Corp.
e. Thomas & Betts Corporation.
f. Unistrut; Tyco International, Ltd.
g. Wesanco, Inc.
h. Approved equal.

2. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.

3. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.

4. Channel Dimensions: Selected for applicable load criteria.

B. Raceway and Cable Supports: As described in NECA 1 and NECA 101.

C. Conduit and Cable Support Devices: Steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.

D. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:

1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.

   a. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

      1) Hilti Inc.
      2) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
      3) MKT Fastening, LLC.
4) Simpson Strong-Tie Co., Inc.; Masterset Fastening Systems Unit.

5) Approved equal.

2. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel, for use in hardened portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.

a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1) Cooper B-Line, Inc.; a division of Cooper Industries.

2) Empire Tool and Manufacturing Co., Inc.

3) Hilti Inc.

4) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.

5) MKT Fastening, LLC.

6) Approved equal.

3. Concrete Inserts: Steel or malleable-iron, slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58.

4. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.

5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.

6. Toggle Bolts: All-steel springhead type.


2.02 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

A. Description: Bolted, structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.

PART 3 - GENERAL

3.01 APPLICATION

A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter.

B. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMT, IMC, and RMC as required by NFPA 70. Minimum rod size shall be 1/4 inch (6 mm) in diameter.
C. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.

1. Secure raceways and cables to these supports with two-bolt conduit clamps.

D. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2-inch (38-mm) and smaller raceways serving branch circuits and communication systems above suspended ceilings and for fastening raceways to trapeze supports.

3.02 SUPPORT INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this Article.

B. Raceway Support Methods: In addition to methods described in NECA 1, EMT may be supported by openings through structure members, as permitted in NFPA 70.

C. Support for conduit above accessible ceiling shall be attached to building structure and not supported from ceiling suspension wires.

D. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb (90 kg).

E. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:

1. To Existing Concrete: Expansion anchor fasteners.

2. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inches (100 mm) thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches (100 mm) thick.

3. To Steel: Beam clamps (MSS Type 19, 21, 23, 25, or 27) complying with MSS SP-69.

4. To Light Steel: Sheet metal screws.

5. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate.

F. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.

3.03 INSTALLATION OF FABRICATED METAL SUPPORTS

A. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.
3.04 PAINTING

A. Touchup: Comply with requirements in Division 9 painting Sections for cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal.

B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 16073
PART 1 - GENERAL

1.01 RELATED DOCUMENTS
   A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY
   A. This Section includes the following:
      1. Identification for raceway.
      2. Equipment identification labels.

1.03 QUALITY ASSURANCE
   B. Comply with NFPA 70.

1.04 COORDINATION
   A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
   B. Coordinate installation of identifying devices with location of access panels and doors.
   C. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.01 ELECTRONIC LABELS
   A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      1. Kroy.
      2. Brother
      3. Approved Equal.
   B. Labels shall indicate device source.
   C. Self adhesive with black letters on a clear background.
2.02 RACEWAY CABLE IDENTIFICATION MATERIALS

A. Color for Printed Legend:
   1. Power Circuits: Black letters on an orange field.
   2. Legend: Indicate system or service and voltage, if applicable.

B. Snap-Around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeves, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

C. Snap-Around, Color-Coding Bands: Slit, pretensioned, flexible, solid-colored acrylic sleeves, 2 inches (50 mm) long, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

D. Self-Adhesive Cloth: Colored, heavy duty, waterproof, fade resistant; 2 inches (50 mm) wide; compounded for outdoor use.

2.03 EQUIPMENT IDENTIFICATION LABELS

A. Engraved, three layer laminated plastic: Punched or drilled for screw mounting. Black letters on a white background. Identification shall be ½” high lettering with ¼” high voltage indication.

B. Labels shall indicate equipment designation on top line with system voltage on second line.

2.04 MISCELLANEOUS IDENTIFICATION PRODUCTS

A. Cable Ties: Fungus-inert, self-extinguishing, 1-piece, self-locking, Type 6/6 nylon cable ties.

1. Minimum Width: 3/16 inch (5 mm).
2. Tensile Strength: 50 lb (22.6 kg), minimum.
3. Temperature Range: Minus 40 to plus 185 deg F (Minus 40 to plus 85 deg C).
5. Interior Gypsum Board:
   a. Semigloss Acrylic-Enamel Finish: Two finish coat(s) over a primer.
      1) Primer: Interior gypsum board primer.
      2) Finish Coats: Interior semigloss acrylic enamel.

6. Interior Ferrous Metal:
   a. Semigloss Acrylic-Enamel Finish: Two finish coat(s) over a primer.
      1) Primer: Interior ferrous-metal primer.
2) Finish Coats: Interior semigloss acrylic enamel.

7. Interior Zinc-Coated Metal (except Raceways):
   a. Semigloss Acrylic-Enamel Finish: Two finish coat(s) over a primer.
      1) Primer: Interior zinc-coated metal primer.
      2) Finish Coats: Interior semigloss acrylic enamel.

B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.01 APPLICATION

A. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Comply with 29 CFR 1910.145 and apply self-adhesive warning labels. Identify system voltage with black letters on an orange background. Apply to exterior of door, cover, or other access.

   1. Equipment Requiring Workspace Clearance According to NFPA 70: Unless otherwise indicated, apply to door or cover of equipment but not on flush panelboards and similar equipment in finished spaces.

B. Electronic Labels: Install on all disconnect switches, wall switches, face of receptacle and pull and junction boxes.

C. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and Operation and Maintenance Manual.

   1. Equipment to Be Labeled:
      a. Panelboards, electrical cabinets, and enclosures.
      b. Disconnect switches.
      c. Receptacles.
      d. Junction and pull boxes.

3.02 INSTALLATION

A. Verify identity of each item before installing identification products.

B. Degrease and clean surface to receive nameplate and labels.

C. Install nameplates parallel to equipment lines.

D. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.
E. Attach nonadhesive signs and plastic labels with screws and auxiliary hardware appropriate to the location and substrate.

F. Color-Coding for Phase and Voltage Level Identification, 600 V and Less: Use the colors listed below for feeders, and branch-circuit conductors.

1. Color shall be factory applied.

2. Colors for 208/120-V Circuits:
   a. Phase A: Black.
   b. Phase B: Red.
   c. Phase C: Blue.
   d. Neutral White
   e. Ground Green

3. Colors for 480/277-V Circuits:
   b. Phase B: Orange.
   c. Phase C: Yellow.
   d. Neutral White
   e. Ground Green

4. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches (150 mm) from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.

END OF SECTION 16075
PART 1 - GENERAL

1.01 RELATED DOCUMENTS
   A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY
   A. This Section includes the following:
      1. Building wires and cables rated 600 V and less.
      2. Connectors, splices, and terminations rated 600 V and less.

1.03 DEFINITIONS
   A. EPDM: Ethylene-propylene-diene terpolymer rubber.
   B. NBR: Acrylonitrile-butadiene rubber.

1.04 SUBMITTALS
   A. Product Data: For each type of product indicated.
   B. Qualification Data: For testing agency.
   C. Field quality-control test reports.

1.05 QUALITY ASSURANCE
   A. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is a member company of the InterNational Electrical Testing Association or is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.
      1. Testing Agency's Field Supervisor: Person currently certified by the InterNational Electrical Testing Association or the National Institute for Certification in Engineering Technologies to supervise on-site testing specified in Part 3.
   B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
   C. Comply with NFPA 70.

PART 2 - PRODUCTS
2.01 CONDUCTORS AND CABLES

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

1. Alcan Products Corporation; Alcan Cable Division.
3. General Cable Corporation.
4. Senator Wire & Cable Company.
5. Southwire Company.
6. Approved Equal.

B. Conductor Insulation: Comply with NEMA WC 70 for Types THHN-THWN.

2.02 CONNECTORS AND SPLICES

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

2. O-Z/Gedney; EGS Electrical Group LLC.
3. 3M; Electrical Products Division.
4. Tyco Electronics Corp.
5. Approved Equal.

B. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

PART 3 - EXECUTION

3.01 CONDUCTOR MATERIAL APPLICATIONS

A. Feeders: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

B. Branch Circuits: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger. Minimum branch circuit conductor is #12 AWG.

C. All conductors shall be 600 volts.

3.02 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

A. Exposed Feeders: Type THHN-THWN, single conductors in raceway.
B. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspace: Type THHN-THWN, single conductors in raceway.

C. Feeders Installed below Raised Flooring: Type THHN-THWN, single conductors in raceway.

D. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN-THWN, single conductors in raceway.

E. Branch Circuits Installed below Raised Flooring: Type THHN-THWN, single conductors in raceway.

F. Branch Circuits in Cable Tray: Type THHN-THWN, single conductors in raceway.

G. Cord Drops and Portable Appliance Connections: Type SO, hard service cord with stainless-steel, wire-mesh, strain relief device at terminations to suit application.

H. Class 1 Control Circuits: Type THHN-THWN, in raceway.

I. Class 2 Control Circuits: Power-limited cable, concealed in building finishes.

3.03 INSTALLATION OF CONDUCTORS AND CABLES

A. Conceal cables in finished walls, ceilings, and floors, unless otherwise indicated.

B. All conductors to be installed in conduit shall be installed at the same time.

C. All conduits shall be swabbed clean prior to installation of conductors.

D. Use approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

E. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.

F. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.

G. Identify and color-code conductors and cables according to Division 16 Section "Electrical Identification."

3.04 CONNECTIONS

A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

B. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.

C. Wiring at receptacles, junction boxes and switches Install conductor at each location with at least 6 inches (1500 mm) of slack.
3.05 FIRESTOPPING

A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly according to Division 7 Section “Through-Penetration Firestop Systems.”

3.06 FIELD QUALITY CONTROL

A. Perform tests and inspections and prepare test reports.

B. Tests and Inspections:
   1. After installing conductors and cables and before electrical circuitry has been energized, test for compliance with requirements.


   3. Perform continuity and insulation (meggar) resistance testing of all feeders. Test shall yield a minimum of 4 meg.

C. Remove and replace malfunctioning units and retest as specified above.

END OF SECTION 16120
PART 1 - GENERAL

1.01 RELATED DOCUMENTS
A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY
A. This Section includes raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.

1.03 DEFINITIONS
A. EMT: Electrical metallic tubing.
B. ENT: Electrical nonmetallic tubing.
C. EPDM: Ethylene-propylene-diene terpolymer rubber.
D. FMC: Flexible metal conduit.
E. LFMC: Liquidtight flexible metal conduit.
F. LFNC: Liquidtight flexible nonmetallic conduit.
G. NBR: Acrylonitrile-butadiene rubber.
H. RNC: Rigid nonmetallic conduit.

1.04 SUBMITTALS
A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.
B. Shop Drawings: For the following raceway components. Include plans, elevations, sections, details, and attachments to other work.
   1. Custom enclosures and cabinets.
C. Qualification Data: For professional engineer and testing agency.
D. Source quality-control test reports.

1.05 QUALITY ASSURANCE
A. Electrical Components, Devices, and Accessories: Equipment, assemblies and material listed and labeled as defined in NFPA 70, Article 100, by Underwriters Laboratories (UL), and marked for intended use.
B. Comply with NFPA 70.
PART 2  - PRODUCTS

2.01 METAL CONDUIT AND TUBING

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

1. AFC Cable Systems, Inc.
2. Alflex Inc.
3. Allied Tube & Conduit; a Tyco International Ltd. Co.
4. Anamet Electrical, Inc.; Anaconda Metal Hose.
5. Electri-Flex Co.
7. Maverick Tube Corporation.
10. Approved Equal.

B. Rigid Steel Conduit: Galvanized steel with steel threaded fittings.

C. EMT: ANSI C80.3.

D. FMC: Zinc-coated steel.

E. LFMC: Flexible galvanized steel conduit with plastic jacket.

F. Fittings for Conduit (Including all Types and Flexible and Liquidtight), EMT, and Cable: NEMA FB 1; listed for type and size raceway with which used, and for application and environment in which installed.

G. Flexible Metal Conduits Galvanized steel with all steel fittings. Compression type fittings (squeeze type).

1. Fittings for EMT: Steel, set-screw type.

H. Joint Compound for Rigid Steel Conduit or IMC: Listed for use in cable connector assemblies, and compounded for use to lubricate and protect threaded raceway joints from corrosion and enhance their conductivity.

2.02 METAL WIREWAYS

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

1. Cooper B-Line, Inc.
2. Hoffman.

3. Square D; Schneider Electric.

4. Approved Equal.

B. Description: Sheet metal sized and shaped as indicated, NEMA 250, Type 1, unless otherwise indicated.

C. Fittings and Accessories: Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.

D. Wireway Covers: As indicated.

E. Finish: Manufacturer's standard enamel finish.

2.03 BOXES, ENCLOSURES, AND CABINETS

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

1. Cooper Crouse-Hinds; Div. of Cooper Industries, Inc.

2. EGS/Appleton Electric.


7. RACO; a Hubbell Company.


10. Spring City Electrical Manufacturing Company.


B. Sheet Metal Outlet and Device Boxes: NEMA OS 1.

C. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.

PART 3 - EXECUTION
3.01 RACEWAY APPLICATION

A. Comply with the following indoor applications, unless otherwise indicated:

1. Exposed, Not Subject to Physical Damage: EMT.

2. Exposed and Subject to Severe Physical Damage: Rigid steel conduit. Includes raceways in the following locations:
   a. Mechanical rooms.

3. Concealed in Ceilings and Interior Walls and Partitions: EMT.

4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.

5. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4, nonmetallic in damp or wet locations.

B. Minimum Raceway Size: 3/4-inch (24-mm) trade size.

C. Raceway Fittings: Compatible with raceways and suitable for use and location.
   1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings, unless otherwise indicated.

3.02 PULL AND JUNCTION BOX COVERFIELD PAINTING

A. Paint the cover of all pull and junction boxes as indicated:
   1. Fire Alarm: Red.
   2. 277/480 volt systems: Orange.
   3. Telephone: Green.

B. Painting shall comply with the requirements of Division 9.

3.03 INSTALLATION

A. Comply with NECA 1 for installation requirements applicable to products specified in Part 2 except where requirements on Drawings or in this Article are stricter.

B. Keep raceways at least 6 inches (150 mm) away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.

C. Complete raceway installation before starting conductor installation.

D. Paint all surface mounted conduit to match surface mounted upon. Use paint appropriate for conduit application.

E. Arrange stub-ups so curved portions of bends are not visible above the finished slab.
F. Install no more than the equivalent of three 90-degree bends in any conduit run except for communications conduits, for which fewer bends are allowed.

G. Conceal conduit and EMT within finished walls, ceilings, and floors, unless otherwise indicated.

H. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.

I. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors, including conductors smaller than No. 4 AWG.

J. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb (90-kg) tensile strength. Leave at least 12 inches (300 mm) of slack at each end of pull wire.

K. Flexible Conduit Connections: Use maximum of 72 inches of flexible conduit for recessed and semirecessed lighting fixtures. Use a maximum of 36 inches for equipment subject to vibration, noise transmission, or movement; and for transformers and motors.
   
   1. Use LFMC in damp or wet locations subject to severe physical damage.
   
   2. Use LFMC or LFNC in damp or wet locations not subject to severe physical damage.

3.04 PROTECTION

A. Provide final protection and maintain conditions that ensure coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.

   1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.

END OF SECTION 16130
1.01 RELATED DOCUMENTS
   A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY
   A. This Section includes steel cable trays and accessories.

1.03 SUBMITTALS
   A. Product Data: Include data indicating dimensions and finishes for each type of cable tray indicated.
   B. Shop Drawings: For each type of cable tray.
      1. Show fabrication and installation details of cable tray, including plans, elevations, and sections of components and attachments to other construction elements. Designate components and accessories, including clamps, brackets, hanger rods, splice-plate connectors, expansion-joint assemblies, straight lengths, and fittings.
   C. Field quality-control reports.
   D. Operation and Maintenance Data: For cable trays to include in emergency, operation, and maintenance manuals.

1.04 QUALITY ASSURANCE
   A. Source Limitations: Obtain cable tray components through one source from a single manufacturer.
   B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
   C. Comply with NFPA 70.

1.05 DELIVERY, STORAGE, AND HANDLING
   A. Store indoors to prevent water or other foreign materials from staining or adhering to cable tray. Unpack and dry wet materials before storage.

PART 2 - PRODUCTS

2.01 MANUFACTURERS
   A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
2. Cooper B-Line, Inc.
4. GS Metals Corp.; GLOBETRAY Products.
5. MONO-SYSTEMS, Inc.
6. MPHusky.
7. PW Industries.
8. Approved Equal.

2.02 MATERIALS AND FINISHES

A. Cable Trays, Fittings, and Accessories: Steel, complying with NEMA VE 1.
   1. Mill galvanized before fabrication, complying with ASTM A 653/A 653M, G90 (Z275) coating; with hardware galvanized according to ASTM B 633.

B. Cable Trays, Fittings, and Accessories: Aluminum, complying with NEMA VE 1, Aluminum Association's Alloy 6063-T6 for rails, rungs, and cable trays, and Alloy 5052-H32 or Alloy 6061-T6 for fabricated parts; with chromium-zinc, ASTM F 1136, splice-plate fasteners, bolts, and screws

2.03 CABLE TRAY ACCESSORIES

A. Fittings: Tees, crosses, risers, elbows, and other fittings as indicated, of same materials and finishes as cable tray.

B. Cable tray supports and connectors, including bonding jumpers, as recommended by cable tray manufacturer.

2.04 WARNING SIGNS

A. Lettering: 1-1/2-inch- (40-mm-) high, black letters on yellow background with legend "WARNING! NOT TO BE USED AS WALKWAY, LADDER, OR SUPPORT FOR LADDERS OR PERSONNEL."

B. Materials and fastening are specified in Division 16 Section "Electrical Identification."

2.05 SOURCE QUALITY CONTROL

A. Perform design and production tests according to NEMA FG 1.

PART 3 - EXECUTION

3.01 CABLE TRAY INSTALLATION

A. Comply with recommendations in NEMA VE 2. Install as a complete system, including all necessary fasteners, hold-down clips, splice-plate support systems, barrier strips, hinged horizontal and vertical splice plates, elbows, reducers, tees, and crosses.
B. Remove burrs and sharp edges from cable trays.

C. Fasten cable tray supports to building structure and install seismic restraints.
   1. Place supports a maximum of 8'-0" on center and at all intersections and angles.
   2. Construct supports from threaded rods. Arrange supports in trapeze or wall-bracket form as required by application.
   3. Support bus assembly to prevent twisting from eccentric loading.
   4. Locate and install supports according to NEMA FG 1.

D. Make connections to equipment with flanged fittings fastened to cable tray and to equipment. Support cable tray independent of fittings. Do not carry weight of cable tray on equipment enclosure.

E. Make changes in direction and elevation using standard fittings.

F. Make cable tray connections using standard fittings.

G. Workspace: Install cable trays with enough space to permit access for installing cables.

H. After installation of cable trays is completed, install warning signs in visible locations on or near cable trays.

3.02 CABLE INSTALLATION

A. Install cables only when cable tray installation has been completed and inspected.

B. Fasten cables on horizontal runs with cable clamps or cable ties as recommended by NEMA VE 2. Tighten clamps only enough to secure the cable, without indenting the cable jacket. Install cable ties with a tool that includes an automatic pressure-limiting device.

3.03 CONNECTIONS

A. Ground cable trays according to manufacturer's written instructions.

B. Install an insulated equipment grounding conductor with cable tray, in addition to those required by NFPA 70.

3.04 FIELD QUALITY CONTROL

A. After installing cable trays and after electrical circuitry has been energized, survey for compliance with requirements. Perform the following field quality-control survey:
   1. Visually inspect cable insulation for damage. Correct sharp corners, protuberances in cable tray, vibration, and thermal expansion and contraction conditions, which may cause or have caused damage.
   2. Verify that the number, size, and voltage of cables in cable tray do not exceed that permitted by NFPA 70. Verify that communication or data-processing circuits are separated from power circuits by barriers.
3. Verify that there is no intrusion of such items as pipe, hangers, or other equipment that could damage cables.

4. Remove deposits of dust, industrial process materials, trash of any description, and any blockage of tray ventilation.

5. Visually inspect each cable tray joint and each ground connection for mechanical continuity. Check bolted connections between sections for corrosion. Clean and retorque in suspect areas.

6. Check for missing or damaged bolts, bolt heads, or nuts. When found, replace with specified hardware.

7. Perform visual and mechanical checks for adequacy of cable tray grounding; verify that all takeoff raceways are bonded to cable tray.

B. Report results in writing.

3.05 PROTECTION

A. Protect installed cable trays.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by cable tray manufacturer.

END OF SECTION 16139
PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section includes the following:
   1. Receptacles, receptacles with integral GFCI, and associated device plates.
   2. Twist-locking receptacles.
   3. Snap switches and wall-box dimmers.

1.03 DEFINITIONS

A. EMI: Electromagnetic interference.
B. GFCI: Ground-fault circuit interrupter.
C. Pigtail: Short lead used to connect a device to a branch-circuit conductor.
D. RFI: Radio-frequency interference.

1.04 SUBMITTALS

A. Product Data: For each type of product indicated.
B. Shop Drawings: List of legends and description of materials and process used for premarking wall plates.
C. Field quality-control test reports.
D. Operation and Maintenance Data: For wiring devices to include in all manufacturers' packing label warnings and instruction manuals that include labeling conditions.

1.05 QUALITY ASSURANCE

A. Source Limitations: Obtain each type of wiring device and associated wall plate through one source from a single manufacturer. Insofar as they are available, obtain all wiring devices and associated wall plates from a single manufacturer and one source.
B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
C. Comply with NFPA 70.
1.06 COORDINATION

A. Receptacles for Owner-Furnished Equipment: Match plug configurations.

1. Cord and Plug Sets: Match equipment requirements.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers’ Names: Shortened versions (shown in parentheses) of the following manufacturers’ names are used in other Part 2 articles:

1. Cooper Wiring Devices; a division of Cooper Industries, Inc. (Cooper).
2. Hubbell Incorporated; Wiring Device-Kellems (Hubbell).
4. Pass & Seymour/Legrand; Wiring Devices & Accessories (Pass & Seymour).
5. Daniel Woodhead.

2.02 STRAIGHT BLADE RECEPTACLES

A. Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 configuration 5-20R, and UL 498.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Cooper; 5351 (single), 5352 (duplex).

b. Hubbell; HBL5351 (single), CR5352 (duplex).

c. Leviton; 5891 (single), 5352 (duplex).

d. Pass & Seymour; 5381 (single), 5352 (duplex).

e. Daniel Woodhead.

2.03 TWIST-LOCKING RECEPTACLES

A. Single Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 configuration L5-20R, and UL 498.

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

a. Cooper; L520R.

b. Hubbell; HBL2310.

c. Leviton; 2310.
d. Pass & Seymour; L520-R.

e. Daniel Woodhead.

2.04 SNAP SWITCHES

A. Comply with NEMA WD 1 and UL 20.

B. Switches, 120/277 V, 20 A; motor rated.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Cooper; 2221 (single pole), 2222 (two pole), 2223 (three way), 2224 (four way).

b. Hubbell; CS1221 (single pole), CS1222 (two pole), CS1223 (three way), CS1224 (four way).

c. Leviton; 1221-2 (single pole), 1222-2 (two pole), 1223-2 (three way), 1224-2 (four way).

d. Pass & Seymour; 20AC1 (single pole), 20AC2 (two pole), 20AC3 (three way), 20AC4 (four way).

2.05 WALL PLATES

A. Single and combination types to match corresponding wiring devices. With 3/4" plaster ring for all devices installed on 5/8" gypsum board walls.

1. Plate-Securing Screws: Metal with head color to match plate finish.

2. Material for Finished Spaces: Smooth Lexan, ivory 0.035-inch- (1-mm-) thick.

2.06 FINISHES

A. Color: Wiring device catalog numbers in Section Text do not designate device color.

1. Wiring Devices Connected to Normal Power System: Ivory, unless otherwise indicated or required by NFPA 70 or device listing.

2. Isolated-Ground Receptacles: Orange.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Comply with NECA 1, including the mounting heights listed in that standard, unless otherwise noted.

B. Coordination with Other Trades:

1. Take steps to insure that devices and their boxes are protected. Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against outside of the boxes.
2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.

C. Conductors:

1. Do not strip insulation from conductors until just before they are spliced or terminated on devices.

2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.

3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtailed.

D. Device Installation:

1. Replace all devices that have been in temporary use during construction or that show signs that they were installed before building finishing operations were complete.

2. Provide a separate green ground wire for all isolated ground receptacles.

3. All outlets shall be securely fastened to the outlet box so that device is not dependant on the device cover to prevent floating of the device in the wall opening.

4. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.

5. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.

6. Connect devices to branch circuits using pigtailed that are not less than 6 inches (152 mm) in length.

7. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, 2/3 to 3/4 of the way around terminal screw.

8. Use a torque screwdriver when a torque is recommended or required by the manufacturer.

9. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtailed for device connections.

10. Tighten unused terminal screws on the device.

11. When mounting into metal boxes, remove the fiber or plastic washers used to hold device mounting screws in yokes, allowing metal-to-metal contact.

E. Receptacle Orientation:

1. Install ground pin of vertically mounted receptacles up.
F. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.

G. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on top. Group adjacent switches under single, multigang wall plates.

3.02 IDENTIFICATION

A. Comply with Division 16 Section "Electrical Identification."

   1. Receptacles: Identify panelboard and circuit number from which served. Use hot, stamped or engraved machine printing with black-filled lettering on face of plate, and durable wire markers or tags inside outlet boxes.

3.03 FIELD QUALITY CONTROL

A. Perform tests and inspections and prepare test reports.

   1. Test Instruments: Use instruments that comply with UL 1436.

B. Tests for Convenience Receptacles:

   1. Line Voltage: Acceptable range is 105 to 132 V.

   2. Percent Voltage Drop under 15-A Load: A value of 6 percent or higher is not acceptable.

   3. Ground Impedance: Values of up to 2 ohms are acceptable.

   4. Using the test plug, verify that the device and its outlet box are securely mounted.

   5. The tests shall be diagnostic, indicating damaged conductors, high resistance at the circuit breaker, poor connections, inadequate fault current path, defective devices, or similar problems. Correct circuit conditions, remove malfunctioning units and replace with new ones, and retest as specified above.

END OF SECTION 16140
PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.


C. ANSI/IEEE C62.1 and C62.11

D. Federal Information Processing Standards Publication 94 (FIPS PUB 94)

E. National Electrical Manufacturers Association (NEMA LS1-1992 Guidelines)

F. National Fire Protection Association (NFPA 70, 75 and 78)

G. Underwriters Laboratories (UL 96, 198, 248-1, 489, 1283 and 1449-Second Edition)

1.02 SUMMARY

A. This Section includes TVSSs for low-voltage power, control, and communication equipment from the effects of lightning, utility switching events, temporary over voltages (TOV), and the impulses generated internally within a facility.

1.03 DEFINITIONS


B. SVR: Suppressed voltage rating.

C. TVSS: Transient voltage surge suppressor.

1.04 SUBMITTALS

A. Product Data: Provide complete product data detailing manufacturer’s model number, specifications, features and options. Substitute/alternate products require pre-approval, and shall only be considered if the TVSS Submittal Compliance Form is fully completed and submitted at least (14) days prior to bid. TVSS Submittal Compliance Form is found on the CU Boulder Design and Construction web site.

B. Test Data: Certified documentation shall be provided of the product’s UL 1449 Second Edition listing, clamping voltages (to include ratings with internal disconnects, if applicable), surge current fuse testing, independent test lab single pulse surge current capacity testing, and minimum repetitive surge current capacity testing.

C. Product Certificates: For transient voltage suppression devices, signed by product manufacturer certifying compliance with the following standards:

1. UL 1283.
2. UL 1449.

D. Qualification Data: For testing agency.

E. Operation and Maintenance Data: For transient voltage suppression devices to include in emergency, operation, and maintenance manuals.

F. Warranties: Special warranties specified in this Section.

1.05 QUALITY ASSURANCE

A. Testing Agency Qualifications: An independent testing agency, with the experience and capability to conduct the testing indicated, that is a member company of the InterNational Electrical Testing Association or is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.

1. Testing Agency's Field Supervisor: Person currently certified by the InterNational Electrical Testing Association or the National Institute for Certification in Engineering Technologies to supervise on-site testing specified in Part 3.

B. Source Limitations: Obtain suppression devices and accessories through one source from a single manufacturer.

C. Product Options: Drawings indicate size, dimensional requirements, and electrical performance of suppressors and are based on the specific system indicated. Refer to Division 1 Section "Product Requirements."

D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.


F. Comply with NEMA LS 1, "Low Voltage Surge Protection Devices."

G. Comply with UL 1283, "Electromagnetic Interference Filters," and UL 1449, "Transient Voltage Surge Suppressors."

1.06 PROJECT CONDITIONS

A. Service Conditions: Rate surge protection devices for continuous operation under the following conditions, unless otherwise indicated:

1. Maximum Continuous Operating Voltage: Not less than 115 percent of nominal system operating voltage.

2. Operating Temperature: 30 to 120 deg F (0 to 50 deg C).

3. Humidity: 0 to 85 percent, noncondensing.
4. Altitude: Less than 20,000 feet (6090 m) above sea level.

1.07 COORDINATION

A. Coordinate location of field-mounted surge suppressors to allow adequate clearances for maintenance.

B. Coordinate surge protection devices with Division 16 Section "Electrical Power Monitoring and Control."

1.08 WARRANTY

A. The manufacturer shall provide a fifteen (15) year limited warranty from the date of shipment against failure when installed in compliance with applicable national/local electrical codes and the manufacturer’s installation, operation and maintenance instructions.

1.09 LOCAL SERVICE SUPPORT

A. A dedicated support organization shall be located within 150 miles of the project location, and shall have experience supporting at least twenty other projects of similar complexity within the last three years. Personnel shall perform a start-up service to verify correct installation of the filters, perform transient voltage tests for reliability and performance using appropriate surge generating test equipment, and respond on-site to investigate user concerns.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

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

1. Current Technology, Inc model #TG-100 or approved equal.

2.02 SUPPRESSORS FOR ELECTRONIC-GRADE PANELBOARDS

A. Surge Protection Device Description: Sine-wave-tracking type, panel-mounted design with the following features and accessories:

1. LED indicator lights for power and protection status.

2. Audible alarm, with silencing switch, to indicate when protection has failed.

3. One set of dry contacts rated at 5 A and 250-V ac, for remote monitoring of protection status.

4. Arrangement with wire connections to phase buses, neutral bus, and ground bus.

B. Peak Single-Impulse Surge Current Rating: 100 kA per phase.

2.03 ENCLOSURES

A. NEMA 250, with type matching the enclosure of panel or device being protected.
2.04 MAXIMUM CONTINUOUS OPERATING VOLTAGE (MCOV)

1. The MCOV shall be greater than 115 percent (%) of nominal voltage, but no greater than 130 percent (%). Test and evaluation shall be as outlined in NEMA LS1-1992, paragraphs 2.2.6 and 3.6.

2.05 PROTECTION MODES

1. Per the definitions in NEMA LS 1-1992, paragraph 2.2.7, all modes shall be protected (e.g., line-to-line, line-to-neutral, line-to-ground and neutral to ground).

2.06 TESTED SINGLE PULSE SURGE CURRENT CAPACITY

1. The suppression filter system shall be single pulse surge current tested in all modes at rated surge currents by an industry-recognized test laboratory. Units with surge current capacities of 200,000 amps or less shall be tested as a unit, not individual modules. Due to industry test equipment limitations, units with surge current capacities greater than 200,000 amps shall be tested as a unit to 200,000 amps; and certified for surge current ratings above 200,000 amps by testing individual components or sub-assemblies within a mode. Units that sustain any component or overcurrent device failure or degradation are unacceptable.

2.07 MINIMUM REPETITIVE SURGE CURRENT CAPACITY


2.08 SUPPRESSION VOLTAGE RATING

1. Comply with NEMA LS 1-1992, paragraph 2.2.10 and 3.10.

2.09 HIGH FREQUENCY EXTENDED RANGE FILTER

1. EMI-RFI noise rejection/attenuation to comply with NEMA LS-1-1992 and MIL-STD-E220A 50 ohms insertion loss methodology.

2.10 REDUNDANT OVERCURRENT PROTECTION

1. Each suppression element shall utilize individual UL 248-1 recognized, 200 KAIC tested fuses to ensure that the failure of a single suppression component, or operation of any single fuse does not render the entire mode, phase or product deficient by more than ten percent (10%).

2.11 INTERNAL CONNECTIONS

1. Internal surge current paths shall utilize low-impedance copper bus bar. No plug-in modules or quick-disconnect terminals shall be used in the surge current-carrying paths.

2.12 BUILT-IN FIELD TEST CAPABILITY

1. The unit shall incorporate an integral test point for off-line diagnostic testing to verify operational integrity of the suppression filter system. Testing shall include
injection of an impulse at least two times the nominal system voltage, and provide metering to indicate the resultant clamping voltage. The unit shall also include an integral test point for a secondary test meter that displays the status of the internal fusing, to include indication of partial degradation of surge current capacity capability.

PART 3 – EXECUTION

3.01 INSTALLATION OF SURGE PROTECTION DEVICES

A. Install devices for panelboard and auxiliary panels with conductors or buses between suppressor and points of attachment as short and straight as possible. Do not exceed manufacturer's recommended lead length. Do not bond neutral and ground.

1. Provide multipole, 30-A circuit breaker as a dedicated disconnect for suppressor, unless otherwise indicated.

3.02 FIELD QUALITY CONTROL

A. Testing: Engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports:

B. Testing: Perform the following field tests and inspections and prepare test reports:

1. After installing surge protection devices, but before electrical circuitry has been energized, test for compliance with requirements.

2. Complete startup checks according to manufacturer's written instructions.

3. Perform each visual and mechanical inspection and electrical test stated in NETA ATS, "Surge Arresters, Low-Voltage Surge Protection Devices" Section. Certify compliance with test parameters.

C. Remove and replace malfunctioning units and retest as specified above.

3.03 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain transient voltage suppression devices. Refer to Division 1 Section "Closeout Procedures."

END OF SECTION 16289
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 this Section.

1.02 SUMMARY

A. Section Includes:

1. Fusible switches.
2. Enclosures.

1.03 DEFINITIONS

A. NC: Normally closed.
B. NO: Normally open.
C. SPDT: Single pole, double throw.

1.04 SUBMITTALS

A. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated. Include dimensioned elevations, sections, weights, and manufacturers' technical data on features, performance, electrical characteristics, ratings, accessories, and finishes.

1. Enclosure types and details for types other than NEMA 250, Type 1.
2. Current and voltage ratings.
3. Short-circuit current ratings (interrupting and withstand, as appropriate).
4. Include evidence of NRTL listing for series rating of installed devices.
5. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices, accessories, and auxiliary components.
6. Include time-current coordination curves (average melt) for each type and rating of overcurrent protective device; include selectable ranges for each type of overcurrent protective device.

B. Shop Drawings: For enclosed switches and circuit breakers. Include plans, elevations, sections, details, and attachments to other work.

1. Wiring Diagrams: For power, signal, and control wiring.

C. Qualification Data: For qualified testing agency.
D. Field quality-control reports.
   1. Test procedures used.
   2. Test results that comply with requirements.
   3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.

E. Manufacturer's field service report.

F. Operation and Maintenance Data: For enclosed switches and circuit breakers to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 1 Section "Operation and Maintenance Data," include the following:
   1. Manufacturer's written instructions for testing and adjusting enclosed switches and circuit breakers.
   2. Time-current coordination curves (average melt) for each type and rating of overcurrent protective device; include selectable ranges for each type of overcurrent protective device.

1.05 QUALITY ASSURANCE

A. Testing Agency Qualifications: Member company of NETA or an NRTL.
   1. Testing Agency's Field Supervisor: Currently certified by NETA to supervise on-site testing.

B. Source Limitations: Obtain enclosed switches and circuit breakers, overcurrent protective devices, components, and accessories, within same product category, from single source from single manufacturer.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

D. Comply with NFPA 70.

1.06 PROJECT CONDITIONS

A. Environmental Limitations: Rate equipment for continuous operation under the following conditions unless otherwise indicated:
   1. Ambient Temperature: Not less than minus 22 deg F (minus 30 deg C) and not exceeding 104 deg F (40 deg C).

1.07 COORDINATION

A. Coordinate layout and installation of switches, circuit breakers, and components with equipment served and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.
PART 2 - PRODUCTS

2.01 FUSIBLE SWITCHES

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

1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
4. Square D; a brand of Schneider Electric.
5. Approved Equal.

B. Type HD, Heavy Duty, Single Throw, 600-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, with clips or bolt pads to accommodate indicated fuses, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

C. Accessories:

1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
3. Class R Fuse Kit: Provides rejection of other fuse types when Class R fuses are specified.
4. Lugs: Compression type, suitable for number, size, and conductor material.

2.02 ENCLOSURES

A. Enclosed Switches and Circuit Breakers: NEMA AB 1, NEMA KS 1, NEMA 250, and UL 50, to comply with environmental conditions at installed location.

1. Indoor, Dry and Clean Locations: NEMA 250, Type 1.
2. Provide factory assembled grounding bus for all disconnects for termination of equipment grounds.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine elements and surfaces to receive enclosed switches and circuit breakers for compliance with installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.
3.02 INSTALLATION

A. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated.

B. Install fuses in fusible devices.

C. Comply with NECA 1.

3.03 IDENTIFICATION

A. Comply with requirements in Division 16 Section "Electrical Identification."

1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.

2. Label each enclosure with engraved metal or laminated-plastic nameplate.

3.04 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Manufacturer’s Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.

C. Perform tests and inspections.

1. Manufacturer’s Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

D. Acceptance Testing Preparation:

1. Test insulation resistance for each enclosed switch and circuit breaker, component, connecting supply, feeder, and control circuit.

2. Test continuity of each circuit.

E. Tests and Inspections:

1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.

2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

3. Test and adjust controls, remote monitoring, and safeties. Replace damaged and malfunctioning controls and equipment.

F. Enclosed switches and circuit breakers will be considered defective if they do not pass tests and inspections.
G. Prepare test and inspection reports, including a certified report that identifies enclosed switches and circuit breakers and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.05 ADJUSTING

A. Adjust moving parts and operable components to function smoothly, and lubricate as recommended by manufacturer.

END OF SECTION 16410
PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary
Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes:
   1. Distribution panelboards.
   2. Lighting and appliance branch-circuit panelboards.
   3. Electronic-grade panelboards.

1.03 DEFINITIONS

A. SVR: Suppressed voltage rating.

1.04 SUBMITTALS

A. Product Data: For each type of panelboard, switching and overcurrent protective device,
transient voltage suppression device, accessory, and component indicated. Include
dimensions and manufacturers' technical data on features, performance, electrical
characteristics, ratings, and finishes.

B. Shop Drawings: For each panelboard and related equipment.
   1. Include dimensioned plans, elevations, sections, and details. Show tabulations
      of installed devices, equipment features, and ratings.
   2. Detail enclosure types and details for types other than NEMA 250, Type 1.
   3. Detail bus configuration, current, and voltage ratings.
   4. Short-circuit current rating of panelboards and overcurrent protective devices.
   5. Detail features, characteristics, ratings, and factory settings of individual
      overcurrent protective devices and auxiliary components.
   6. Include wiring diagrams for power, signal, and control wiring.
   7. Include time-current coordination curves for each type and rating of overcurrent
      protective device included in panelboards. Submit on translucent log-log graft
      paper; include selectable ranges for each type of overcurrent protective device.

C. Qualification Data: For qualified testing agency.

D. Field Quality-Control Reports:
1. Test procedures used.

2. Test results that comply with requirements.

3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.

E. Panelboard Schedules: For installation in panelboards.

F. Operation and Maintenance Data: For panelboards and components to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 1 Section "Operation and Maintenance Data," include the following:

1. Manufacturer's written instructions for testing and adjusting overcurrent protective devices.

2. Time-current curves, including selectable ranges for each type of overcurrent protective device that allows adjustments.

1.05 QUALITY ASSURANCE

A. Testing Agency Qualifications: Member company of NETA or an NRTL.

1. Testing Agency's Field Supervisor: Currently certified by NETA to supervise on-site testing.

B. Source Limitations: Obtain panelboards, overcurrent protective devices, components, and accessories from single source from single manufacturer.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

D. Comply with NEMA PB 1.

E. Comply with NFPA 70.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Handle and prepare panelboards for installation according to [NEMA PB 1.

1.07 PROJECT CONDITIONS

A. Environmental Limitations:

1. Do not deliver or install panelboards until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above panelboards is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

2. Rate equipment for continuous operation under the following conditions unless otherwise indicated:
a. Ambient Temperature: Not exceeding minus 22 deg F (minus 30 deg C).

B. Service Conditions: NEMA PB 1, usual service conditions, as follows:
   1. Ambient temperatures within limits specified.
   2. Altitude not exceeding 6600 feet (2000 m).

1.08 COORDINATION

A. Coordinate layout and installation of panelboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, encumbrances to workspace clearance requirements, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

PART 2 - PRODUCTS

2.01 GENERAL REQUIREMENTS FOR PANELBOARDS

A. Enclosures: Surface-mounted cabinets.
   1. Rated for environmental conditions at installed location.
      a. Indoor Dry and Clean Locations: NEMA 250, Type 1.
   2. Hinged Front Cover: Entire front trim hinged to box and with standard door in door construction with interior door containing a flush lock all keyed alike. The university shall install the lock on the door in door exterior door.
   3. Finishes:
      a. Panels and Trim: Steel, factory finished immediately after cleaning and pretreating with manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat.
   4. Directory Card: Inside panelboard door, mounted in metal frame with transparent protective cover. Directory shall be typed with the loads served. Spares and spaces shall be written neatly in erasable pencil.

B. Incoming Mains Location: Top and bottom.

C. Phase, Neutral, and Ground Buses:
   1. Material: Copper.
   2. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment grounding conductors; bonded to box.
   3. Isolated Ground Bus: Adequate for branch-circuit isolated ground conductors; insulated from box.
4. Extra-Capacity Neutral Bus: Neutral bus rated 200 percent of phase bus and UL listed as suitable for nonlinear loads.

D. Conductor Connectors: Suitable for use with conductor material and sizes.
   1. Material: Copper.
   2. Main and Neutral Lugs: Compression type.
   3. Ground Lugs and Bus-Configured Terminators: Compression type.
   4. Feed-Through Lugs: Compression type, suitable for use with conductor material. Locate at opposite end of bus from incoming lugs or main device.
   5. Subfeed (Double) Lugs: Compression type suitable for use with conductor material. Locate at same end of bus as incoming lugs or main device.

E. Future Devices: Mounting brackets, bus connections, filler plates, and necessary appurtenances required for future installation of devices.


2.02 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
   4. Square D; a brand of Schneider Electric.

B. Panelboards: NEMA PB 1, lighting and appliance branch-circuit type.

C. Mains: Circuit breaker or lugs only.

D. Branch Overcurrent Protective Devices: Bolt-on circuit breakers, replaceable without disturbing adjacent units.

2.03 ELECTRONIC-GRADE PANELBOARDS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
4. Square D; a brand of Schneider Electric.

B. Main Overcurrent Protective Devices: Bolt-on thermal-magnetic circuit breakers.
C. Branch Overcurrent Protective Devices: Bolt-on thermal-magnetic circuit breakers.
D. Buses:
   1. Copper phase and neutral buses; 200 percent capacity neutral bus and lugs.
   2. Copper equipment and isolated ground buses.

2.04 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
   4. Square D; a brand of Schneider Electric.

B. Molded-Case Circuit Breaker (MCCB): Comply with UL 489, with interrupting capacity to meet available fault currents.
   2. Molded-Case Circuit-Breaker (MCCB) Features and Accessories:
      a. Standard frame sizes, trip ratings, and number of poles.
      b. Lugs: Compression style, suitable for number, size, trip ratings, and conductor materials.
      c. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge (HID) lighting circuits.

2.05 ACCESSORY COMPONENTS AND FEATURES

A. Accessory Set: Include tools and miscellaneous items required for overcurrent protective device test, inspection, maintenance, and operation.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Receive, inspect, handle, and store panelboards according to NEMA PB 1.1.
B. Examine panelboards before installation. Reject panelboards that are damaged or rusted or have been subjected to water saturation.

C. Examine elements and surfaces to receive panelboards for compliance with installation tolerances and other conditions affecting performance of the Work.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Install panelboards and accessories according to NEMA PB 1.1.

B. Mount top of trim 78 inches above finished floor unless otherwise indicated.

C. Mount panelboard cabinet plumb and rigid without distortion of box. Mount recessed panelboards with fronts uniformly flush with wall finish and mating with back box.

D. Install overcurrent protective devices and controllers not already factory installed.

E. Install filler plates in unused spaces.

F. Arrange conductors in gutters into groups and bundle and wrap with wire ties.

G. Comply with NECA 1.

3.03 IDENTIFICATION

A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs complying with Division 16 Section "Electrical Identification."

B. Create a directory to indicate installed circuit loads; incorporate Owner's final room designations. Obtain approval before installing. Use a computer or typewriter to create directory; handwritten directories are not acceptable. “Spare” shall be indicated in erasable pencil.

C. Panelboard Nameplates: Label each panelboard with a nameplate complying with requirements for identification specified in Division 16 Section "Electrical Identification."

D. Device Nameplates: Label each branch circuit device in distribution panelboards with a nameplate complying with requirements for identification specified in Division 16 Section "Electrical Identification."

3.04 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.

C. Perform tests and inspections.
1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

D. Acceptance Testing Preparation:

1. Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit.

2. Test continuity of each circuit.

E. Tests and Inspections:

1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.

2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

F. Panelboards will be considered defective if they do not pass tests and inspections.

G. Prepare test and inspection reports, including a certified report that identifies panelboards included and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.05 ADJUSTING

A. Adjust moving parts and operable component to function smoothly, and lubricate as recommended by manufacturer.

END OF SECTION 16442
SECTION 16511
INTERIOR LIGHTING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section includes the following:

1. Interior lighting fixtures, lamps, and ballasts.
2. Emergency lighting units.
3. Lighting fixture supports.

1.03 DEFINITIONS

A. BF: Ballast factor.
B. CRI: Color-rendering index.
C. CU: Coefficient of utilization.
D. HID: High-intensity discharge.
E. Luminaire: Complete lighting fixture, including ballast housing if provided.

1.04 SUBMITTALS

A. Product Data: For each type of lighting fixture, arranged in order of fixture designation. Include data on features, accessories, finishes, and the following:

1. Physical description of lighting fixture including dimensions.
2. Emergency lighting units including battery and charger.

B. Shop Drawings: Show details of nonstandard or custom lighting fixtures. Indicate dimensions, weights, methods of field assembly, components, features, and accessories.


C. Qualification Data: For agencies providing photometric data for lighting fixtures.

D. Field quality-control test reports.
E. Operation and Maintenance Data: For lighting equipment and fixtures to include in emergency, operation, and maintenance manuals.

1.05 QUALITY ASSURANCE

A. Luminaire Photometric Data Testing Laboratory Qualifications: Provided by manufacturers' laboratories that are accredited under the National Volunteer Laboratory Accreditation Program for Energy Efficient Lighting Products.

B. Luminaire Photometric Data Testing Laboratory Qualifications: Provided by an independent agency, with the experience and capability to conduct the testing indicated, that is an NRTL as defined by OSHA in 29 CFR 1910.7.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

D. Comply with NFPA 70.

1.06 WARRANTY

A. Special Warranty for Ballasts: Manufacturer's standard form in which ballast manufacturer agrees to repair or replace ballasts that fail in materials or workmanship within specified warranty period.

1. Warranty Period for Electronic Ballasts: Five years from date of Substantial Completion.

1.07 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Lamps: 10% of each type and rating installed.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Lighting Fixtures:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified on the Construction Drawings.

B. Lamps:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified on the Construction Drawings.

   1) General Electric
   2) Phillips
   3) OSRAM / Sylvania

C. Ballasts:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified on the Construction Drawings.
   1) Advanced
   2) Motorola

2.02 LIGHTING FIXTURES AND COMPONENTS, GENERAL REQUIREMENTS

A. Recessed Fixtures: Comply with NEMA LE 4 for ceiling compatibility for recessed fixtures.

B. Fluorescent Fixtures: Comply with UL 1598. Where LER is specified, test according to NEMA LE 5 and NEMA LE 5A as applicable.

C. Whips: Provide with a 6'-0” long flexible whip for connection to junction box

D. Metal Parts: Free of burrs and sharp corners and edges.

E. Sheet Metal Components: Steel, unless otherwise indicated. Form and support to prevent warping and sagging.

F. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.

G. Plastic Diffusers, Covers, and Globes:
   1. Acrylic Lighting Diffusers: 100 percent virgin acrylic plastic. High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
      a. Lens Thickness: At least 0.125 inch (3.175 mm) minimum unless different thickness is indicated.
      b. UV stabilized.

2.03 BALLASTS FOR LINEAR FLUORESCENT LAMPS

A. Electronic Ballasts: Comply with ANSI C82.11; rapid-start type, unless otherwise indicated, and designed for type and quantity of lamps served. Ballasts shall be designed for full light output unless dimmer or bi-level control is indicated.
   1. UL listed Class P with a sound rating better than A.
   2. Total Harmonic Distortion Rating: Less than 10 percent.
   3. Transient Voltage Protection: IEEE C62.41, Category A or better.
   4. Operating Frequency: 20 kHz or higher.
   5. Lamp Current Crest Factor: 1.5 or less.
   6. BF: 0.95 or higher.
   7. Power Factor: 0.98 or higher and ballast efficiency of 90% or higher.
8. Parallel Lamp Circuits: Multiple lamp ballasts shall comply with ANSI C 82.11 and shall be connected to maintain full light output on surviving lamps if one or more lamps fail.

B. Ballasts for Bi-Level Controlled Lighting Fixtures: Electronic type.

1. Operating Modes: Ballast circuit and leads provide for remote control of the light output of the associated lamp between high- and low-level and off.
   a. High-Level Operation: 100 percent of rated lamp lumens.
   b. Low-Level Operation: 30 percent of rated lamp lumens.

2. Ballast shall provide equal current to each lamp in each operating mode.

3. Compatibility: Certified by manufacturer for use with specific bi-level control system and lamp type indicated.

2.04 EMERGENCY FLUORESCENT POWER UNIT

A. Internal Type: Self-contained, modular, battery-inverter unit, factory mounted within lighting fixture body and compatible with ballast. Comply with UL 924.

1. Emergency Connection: Operate 1 fluorescent lamp(s) continuously at an output of 1100 lumens each. Connect unswitched circuit to battery-inverter unit and switched circuit to fixture ballast.

2. Night-Light Connection: Operate one fluorescent lamp continuously.

3. Test Push Button and Indicator Light: Visible and accessible without opening fixture or entering ceiling space.
   a. Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
   b. Indicator Light: LED indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.


5. Charger: Fully automatic, solid-state, constant-current type with sealed power transfer relay.

6. Integral Self-Test: Factory-installed electronic device automatically initiates code-required test of unit emergency operation at required intervals. Test failure is annunciated by an integral audible alarm and flashing red LED.

2.05 FLUORESCENT LAMPS

A. Low-Mercury Lamps: Comply with EPA's toxicity characteristic leaching procedure test; shall yield less than 0.2 mg of mercury per liter when tested according to NEMA LL 1.
B. T8 rapid-start low-mercury lamps, rated 28 W maximum, nominal length of 48 inches (1220 mm), 2800 initial lumens (minimum), CRI 73 (minimum), color temperature 3500 K, and average rated life 20,000 hours, unless otherwise indicated.

C. T8 rapid-start low-mercury lamps, rated 17 W maximum, nominal length of 24 inches (610 mm), 1300 initial lumens (minimum), CRI 73 (minimum), color temperature 3500 K, and average rated life of 20,000 hours, unless otherwise indicated.

2.06 LIGHTING FIXTURE SUPPORT COMPONENTS

A. Wires: ASTM A 641/A 641M, Class 3, soft temper, zinc-coated steel, 12 gage (2.68 mm).

PART 3 - EXECUTION

3.01 INSTALLATION

A. Lighting fixtures: Set level, plumb, and square with ceilings and walls. Install lamps in each fixture.

B. Support for Lighting Fixtures in or on Grid-Type Suspended Ceilings: Use grid as a support element.

1. Install a minimum of four ceiling support system rods or wires for each fixture. Locate not more than 6 inches (150 mm) from lighting fixture corners.

2. Support Clips: Fasten to lighting fixtures and to ceiling grid members at or near each fixture corner with clips that are UL listed for the application.

3. Install at least one independent support rod or wire from structure to a tab on lighting fixture. Wire or rod shall have breaking strength of the weight of fixture at a safety factor of 3.

C. Connect wiring according to Division 16 Section "Conductors and Cables."

3.02 FIELD QUALITY CONTROL

A. Prepare a written report of tests, inspections, observations, and verifications indicating and interpreting results. If adjustments are made to lighting system, retest to demonstrate compliance with standards.

END OF SECTION 16511