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**CP 005050 – UMC – Food Service Renovation**

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Division 1 through 27

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CLIENT TEAM

COMPANY UNIVERSITY OF COLORADO BOULDER
PLANNING, DESIGN & CONSTRUCTION
Address 1540 30th Street
Room 307
453 UCB
City/State Boulder, Colorado
ZIP code 80309
Phone 303.492.5511

ARCHITECT/INTERIOR DESIGN

COMPANY OZ ARCHITECTURE
Contact David Schafer
Address 1805 29th Street
Suite 2054
City/State Boulder, Colorado
ZIP code 80301
Office Phone 303.449.8900
Email dschafer@ozarch.com

FOODSERVICE DESIGN

COMPANY PORTER KHOUW
Contact David Porter
Address P.O. Box 4028
Suite 700
City/State Crofton, Maryland
Zip Code 21114
Office Phone 410.451.3617
Email dporter@porterkhouwconsulting.com

STRUCTURAL ENGINEERING

COMPANY MARTIN & MARTIN
Contact Ben Nelson
Address 12499 West Colfax Avenue
City/State Lakewood, Colorado
ZIP code 80215
Office Phone 303.431.6100
Email BNELSON@martinmartin.com

MECHANICAL AND ELECTRICAL ENGINEERING

COMPANY CATOR RUMA
Contact Bruce Appel
Address 896 Tabor Street
City/State Lakewood, Colorado
ZIP code 80401
Office Phone 303.232.6200
Email bappel@catorruma.com
LIGHTING DESIGN

COMPANY: HEFFERAN PARTNERSHIP
Contact: Steven Hefferan
Address: 205 Camden Place
City/State: Boulder, Colorado
ZIP code: 80302
Office Phone: 303.447.3566
Email: steven@hpild.com

TECHNOLOGY

COMPANY: RIMROCK GROUP
Contact: Travis McNair
Address: 2060 Briargate Parkway
City/State: Colorado Springs, Colorado
ZIP Code: 80920
Office Phone: 719.886.2447
Email: travis.mcnair@rimrockgroup.com

COST ESTIMATING

COMPANY: RIDER LEVITT BUCKNALL
Contact: Peter Knowles
Address: 1621 Eighteenth Street
City/State: Denver, Colorado
ZIP Code: 80202
Office Phone: 720.904.4810
Email: peter.knowles@us.rib.com

SIGNAGE AND BRANDING DESIGN

COMPANY: ART HOUSE
Contact: Marty Gregg
Address: 1888 Sherman Street
City/State: Denver, Colorado
Zip Code: 80203
Office Phone: 303.892.9816
Email: marty@arthousedenver.com
SPECIFICATIONS

COMPANY

Name
Kerry Sharrock
Michael Kerns

Address
100 Fillmore Street
5th Floor

City/State
Denver, Colorado

Zip Code
80206

Office Phone
303.320.9385

Fax Number
303.320.9387

Email
kerry@specbydesign.com
mike@specbydesign.com

End of Project Directory
ADVERTISEMENT FOR BIDS
State of Colorado
University of Colorado
Notice Number:

Project No: CP 005050
Project Title: UMC – Food Service Renovation
Estimated Construction Cost: $1.3 Million

Project Description
The University of Colorado at Boulder is upgrading and improving the University Memorial Center (UMC) Building Food Service cafeteria space of approximately 21,180 GSF of renovation work which will include two types of work: Upgrades to existing grill servery space totaling approximately 5,500 GSF; and renovation of seating areas adjacent to the servery of approximately 14,680 GSF. As the University Memorial Center (UMC) prepares to serve the next generation of CU students by improving the UMC Food Service retail area to accommodate improved traffic flow and opening up the front-of-house and entrances of the Alfred Packer Grill for visibility to the menu offerings. Specifically, the Alfred Packer Grill serving area, the surrounding dining seating areas, and Baby Doe’s are included in the scope of work.

Project Information
1. The Principal Representative has determined that the entire project shall be substantially complete within 138 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 168 calendar days, if applicable, from the date of substantial completion. In accordance with Article 46 of the General Conditions of the Contract, Time of Completion and Liquidated Damages, failure to complete the work within the agreed number of calendar days shall be considered breach of contract and subject the bidder to liquidated damages to the extent specified in Article 54D of the General Conditions of the Contract.

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

3. Bidders may procure Bidding Documents at

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

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

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

8. Requirements for bidding will include qualifying with Colorado State Buildings and Real Estate Programs for construction projects of $150,000 or more at least two (2) working days prior to bid opening. If you are not yet qualified with State Buildings, request instructions to locate the online form SC9.1, Contractors’ Registration form at the pre-submittal meeting or from the web site http://www.colorado.gov/dpa/dfp/sbrep (Click on the navigation button State Buildings, then Contractor's Qualification/Registration Form and then the hyperlink below the second paragraph - Contractor Registration Form). Complete the form and submit electronically to State Buildings and Real Estate Programs.

Pre-Bid Meeting

A mandatory Pre-Bid Meeting will be held on March 30, 2010 2:00 PM at the Department of Facilities Management, Research Laboratory No. 2, 1540 30th Street, Room 321, Boulder, CO 80309.

Comments:

Sealed Bids will be received from qualified contractors until this date and time at this location:
Date & Time:   April 15, 2010 2:00 PM
Address:  Department of Facilities Management, Research Laboratory No. 2, 1540 30th Street, Room 321, Boulder, CO 80309

Point of Contact

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

This Notice is also available on the web at www.colorado.gov/dpa/dfp/sbrep
STATE OF COLORADO
OFFICE OF THE STATE ARCHITECT
STATE BUILDINGS PROGRAMS

INFORMATION FOR BIDDERS

Institution or Agency: University of Colorado at Boulder
Project No./Name: CP 005050 / UMC Food Service Renovation

1. **CONTRACTOR QUALIFICATION:** State projects of $150,000 or more, and under supervision of State Buildings Programs, require the Contractor to be registered with State Buildings Programs. Projects under $150,000 do not require qualification. A Contractor, to be qualified with State Buildings Programs, must annually file State Form SC-9.1, Contractor Statement of Experience, and be qualified at least two (2) working calendar days prior to the date fixed for publicly opening sealed bids. This form can be obtained by accessing our website: www.colorado.gov/dpa/dfp/sbrep (Click on the navigation button State Buildings, then Contractor's Qualification/Registration Form and then the link below the second paragraph – Contractor Registration Form). Complete the form and submit electronically to State Buildings Programs.

NOTE: Vendors/Contractors who are registered with the State of Colorado, Department of Personnel & Administration/Division of Finance and Procurement/State Purchasing Office's Bid Information and Distribution System (BIDS) are eligible to bid on building maintenance projects less than $150,000 solicited through that system and are not eligible to bid on construction projects that are $150,000 or greater as publicly advertised unless they qualify with the Colorado State Buildings Programs as stated above.

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

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

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

<table>
<thead>
<tr>
<th>Project #</th>
<th>CP 005050</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Name</td>
<td>UMC – Food Service Renovation</td>
</tr>
<tr>
<td>Name and Address of Bidder</td>
<td></td>
</tr>
<tr>
<td>Date of Opening</td>
<td>April 15, 2010</td>
</tr>
<tr>
<td>Time of Opening</td>
<td>2:00 PM</td>
</tr>
</tbody>
</table>

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.

3. **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.
4. **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.

5. Note that the Special Provisions of the General Conditions of the Contract includes the following language: **UNAUTHORIZED IMMIGRANTS – PUBLIC CONTRACTS FOR SERVICES - CRS 8-17.5-101 and 24-76.5-101.** The Contractor certifies that the Contractor shall comply with the provisions of CRS 8-17.5-101 et seq. The Contractor shall not knowingly employ or contract with an illegal alien to perform work under this contract or enter into a contract with a subcontractor that fails to certify to the Contractor that the subcontractor shall not knowingly employ or contract with an illegal alien to perform work under this contract. The Contractor represents, warrants, and agrees that it (i) has verified that it does not employ any illegal aliens, through participation in the Basic Pilot Employment Verification Program administered by the Social Security Administration and Department of Homeland Security, and (ii) otherwise will comply with the requirements of CRS 8-17.5-102(2)(b). The Contractor shall comply with all reasonable requests made in the course of an investigation under CRS 8-17.5-102 by the Colorado Department of Labor and 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.

6. **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.

7. **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.

8. **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.

9. **METHOD OF AWARD - LOWEST RESPONSIBLE BIDDER:** If the bidding documents for this project require alternate prices, additive and/or deductible alternates shall be listed on the alternates bid form provided by the Principal Representative. Bidders should note the Method of Award is applicable to this Bid as stated below.
A. **DEDUCTIBLE ALTERNATES:** The lowest responsible Bid, taking into account the Colorado resident bidder preference provision of Colorado law, will be determined by and the contract will be awarded on the base bid combined with deductible alternates, deducted in numerical order in which they are listed in the alternates bid form provided by the Principal Representative. The subtraction of alternates shall result in a sum total within available funds. If this bid exceeds such amount, the right is reserved to reject all bids. An equal number of alternates shall be subtracted from the base bid of each bidder within funds available for purposes of determining the lowest responsible bidder.

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

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

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

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 $1,000,000 (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 $5,000,000 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:
- Flooring
- Millwork
- Specialties & Food Service
- Electrical
- Mechanical

b. For the trades listed (subcontractors) above, the apparent low bidder must submit, within 72 hours of receipt of bids except for holidays and weekends, the “University of Colorado Contractor’s Statement of Experience.”

c. In addition to the information requested in Item (1), the Subcontractor must meet the following minimum requirements and provide written information substantiating their qualifications for evaluation. A Bidder may be found to be non-responsive and their bid rejected if the minimum requirements are not met

(1) The firm must have been in business for the last five (5) years as trade proposed for this work.

(2) The firm must have successfully completed at least two (2) projects of similar size, type, and complexity in the last five (5) years. The information must include the following:
   (a) Building type description (function use)
   (b) Building gross square footage
   (c) Subcontract description (be specific)
   (d) Subcontract amount
   (e) Subcontract change orders
   (f) Building owner representative and current telephone number
   (g) Building architect name and current telephone number
   (h) General contract name and current telephone number

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

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

12. **BID SCHEDULE:**
Publication date: February 8, 2010
Plans specification available: March 29, 2010
Mandatory pre-bid conference: March 30, 2010 2:00 pm
Last day for questions: April 8, 2010
Last day for addenda issue: April 12, 2010
Bid date: April 15, 2010 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: __________________________  

<table>
<thead>
<tr>
<th>Full Contract price</th>
<th>A. __________________________</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multiply ‘A’ by 0.5</td>
<td>B. __________________________</td>
</tr>
<tr>
<td>Multiply ‘B’ by 0.0341</td>
<td>C. __________________________</td>
</tr>
</tbody>
</table>

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

Date received: __________________________  
City Authority Signature: __________________________

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

CONTRACTOR’S
STATEMENT OF EXPERIENCE

Project Name:   UMC – Food Service Renovation
Project No.   CP 005050

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

Architect/Engineer:   OZ Architecture
Phone: 303-449-8900

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

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• PERSONNEL OF ORGANIZATION FORM  Page 5 of 13
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UNIVERSITY OF COLORADO AT BOULDER
CONTRACTOR’S QUALIFICATION STATEMENT

INFORMATION FORM

STATEMENT OF ________________________________

(Contractor)

ADDRESS

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

TELEPHONE/FAX NO.

(telephone)    (fax)

DATE OF EXPERIENCE STATEMENT ________________

PRINCIPLE OWNER/OFFICER ________________________________

(Names(s) and Official Title(s))

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

Minority Business Enterprise (MBE) YES __    NO __

Justification: __________________________________________

______________________________

______________________________

Woman-Owned Business Enterprise (WBE) YES __    NO __

Justification: __________________________________________

______________________________

______________________________

Small Business Enterprise (SBE) YES __    NO __

Justification: __________________________________________

______________________________

______________________________

Disadvantaged Business Enterprise (DBE) YES __    NO __

Justification: __________________________________________

______________________________

______________________________
**UNIVERSITY OF COLORADO AT BOULDER**
**CONTRACTOR’S QUALIFICATION STATEMENT**

**TYPES OF WORK**

(1) If you are a General Contractor interested in bidding on all types of construction, mark “All Classes of Construction” only.

(2) If you are interested in contracting directly with the University for certain types of work only, mark in the column provided after the particular types of work on which you wish to bid.

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

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

LEGAL NAME ________________________________

PRINCIPAL OFFICE ____________________________
(Street or PO Box) (City) (State) (Zip)

_____ A Corporation _____ A Copartnership _____ An Individual _____ Combination

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

Licensed in ____________________________
the name of ____________________________
Location (City or State) License No. & 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.
UNIVERSITY OF COLORADO AT BOULDER
CONTRACTOR’S QUALIFICATION STATEMENT

PERSONNEL OF ORGANIZATION

1. Name the persons with whom you have been associated in business as partners or business associates in each of the last five (5) years.

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

<table>
<thead>
<tr>
<th>Individual’s Name</th>
<th>Present Position or Office in Your Organization</th>
<th>Years of Construction Experience</th>
<th>Magnitudes and Type of Work</th>
<th>In What Capacity</th>
</tr>
</thead>
<tbody>
<tr>
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</tbody>
</table>
UNIVERSITY OF COLORADO AT BOULDER
CONTRACTOR’S QUALIFICATION STATEMENT

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

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

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


UNIVERSITY OF COLORADO AT BOULDER
CONTRACTOR’S QUALIFICATION STATEMENT

CORPORATION / CO-PARTNERSHIP

CORPORATION:
(If a corporation, answer this:)

When Incorporated

In What State

President’s Name

Vice President’s Name

Secretary’s Name

Treasurer’s Name

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

Date of Organization

State whether partnership is general, limited, or association

Name and address of each partner:

(name)

(name)

(address)

(address)

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

AFFIDAVIT FOR CORPORATION

certifies and says: That he is

(Name of officer)

of the

(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
(Name of Firm)

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

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

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

The foregoing statement and affidavit are hereby offered.

________________________________________ (Member of Firm must sign here)

________________________________________ (Title)

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

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

AFFIDAVIT FOR INDIVIDUAL

___________________________ doing business ____________________
(Name of individual) (Name of Firm)
certifies and says: That he/she is the person submitting this statement of experience:
that he/she has read the same, and that the same is true of his/her own knowledge: that
the statement is for the purpose of inducing the University of Colorado to supply the
submitter 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)
UNIVERSITY OF COLORADO AT BOULDER
CONTRACTOR’S QUALIFICATION STATEMENT

BIDDING INFORMATION

QUALIFICATION

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

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

NOTIFICATION

The University of Colorado will, in writing, notify Contractors of their qualification or disqualification.
Instructions: Please answer the following questions as clearly and succinctly as possible. Each question will be graded on a 0-5 scale, but not all questions have equal weight. Instead, questions are divided into 5 sections, with the sections weighted as follows: Wages 10%; Health Care Benefits 25%; Retirement Benefits 10%; Apprenticeships & Training 30%; and Safety 25%.

Preliminary Question:
If awarded the contract for this project, what percentage of the work do you anticipate subcontracting? If you cannot yet estimate this, tell us what percentage of the work you typically subcontract on a project of this size and scope? The Evaluation Team reserves the right to request additional information regarding these sub-subcontractors.

A. Wages
(Answers to this section equal 10% of your total score)

1. Please give us a breakdown of the wages and specific fringe benefit contributions your company will be paying to the different classifications of craft employees you will employ on this project.

B. Health Care Benefits
(Answers to this section equal 25% of your total score)

Please answer the following questions regarding any health care benefits provided by your company to craft employees and their families or dependents. (Please answer the questions directly; do not simply include your company’s health care program materials in your submittal).

1. Briefly summarize the types of health care benefits and services available to craft employees through your plan. Please indicate whether your program should be categorized as comprehensive, limited, or catastrophic.

2. For health care coverage of your craft employees alone (i.e. not including family or dependents) what is the employer vs. employee contributions to the plan? What are the deductible amounts for different categories of care?

3. Is health care coverage of your craft employees (i.e. not including families or dependents) automatic or available on a voluntary (elected) opt-in basis?
4. Do you have a health care plan available to cover the families and dependents of craft employees? If so, what is the employer vs. employee contribution for family/dependent coverage? What are the deductible amounts for different categories of care? Please also indicate if the health care services available under family/dependent coverage differ substantially from that offered to craft employees themselves.

5. Is your family/dependent health care coverage automatic or available on a voluntary (elected) opt-in basis?

6. To what percentage of your craft employees, both full and part-time, is your health care plan available? Please describe the specific eligibility limitations governing employee access to your plan.

C. Retirement Benefits
(Answers to this section equal 10% of your total score)

Please answer the following questions regarding any retirement benefits provided by your company to craft employees. (Please answer the questions directly; do not simply include your company’s retirement package materials in your submittal).

1. What retirement plans do you offer to your craft employees? Please indicate if your company offers only one or several retirement options and give a brief description of each.

2. For each type of plan you offer, what is the breakdown of employer vs. employee contributions? What is the annual maximum possible contribution?

3. For each type of plan you offer, are eligible craft employees automatically enrolled, or is the plan available on a voluntary opt-in basis?

4. For each type of plan: To what percentage of your craft employees is the plan available? What are the specific eligibility limitations governing employee access to the plan? What are the specific vesting or probationary periods governing the plan?

If you believe there are important features or qualities of the retirement benefits you offer to your craft employees that have not been covered by the above questions, please add a brief description of such features or qualities.

D. Apprenticeships & Training
(Answers to this section equal 30% of your total score)

Please answer the following questions regarding any job skills or apprentice training programs developed or maintained by your company or in which your company participates.

1. Briefly describe the types of skills and apprentice training programs you provide. Are your programs registered and certified by the U.S. Department
of Labor, Bureau of Apprenticeship and Training? How long has your training program been in existence in its current form?

2. Briefly describe the qualifications, credentials, and length of experience of the various instructors responsible for carrying out your training program.

3. What is the total number of classroom hours and on-the-job training hours required for apprentices to graduate from your program? What are the specific accreditations and/or certifications earned upon completion of your apprentice training program?

4. What is the annual dollar amount you have invested in your training program over the past 5 years? What is the annual cost to trainees for participation in your training program?

5. Do you incorporate on-the-job training of apprentices into your project work? What is the journeyman-to-apprentice ratio you employ to staff your work and provide on-the-job training?

6. What is the graduation rate of your apprentice training program over the past 5 years (expressed as the total number of graduated apprentices over the total number of initial enrollees in your program)? What is the participation rate of your craft workforce in your training program (expressed as the percentage of the total workforce that participated in the program)?

E. Safety
(Answers to this section equal 25% of your total score)

Please answer the following questions regarding any safety programs your company will have in place or implement on this project.

1. Briefly describe any safety training or incident avoidance programs used by your company for both management and craft personnel, including OSHA courses and standards, substance abuse programs, etc. Indicate whether these programs are voluntary or mandatory.

2. Please give us the number of OSHA violations your company has received for each year over the past 5 years. Please describe and give us the final resolution or result of each violation.

3. Provide your company’s experience modification rating (EMR) for the past 3 years.
   
   2009: __________
   2008: __________
   2007: __________

Company Name:__________________________________________
Signature:________________________ Date:_______________
QUALIFICATIONS SCORE SHEET

Name of Firm: ____________________________________________________________

Evaluator: ___________________________________ Date: ___________________

Each answer should be scored on a 0-5 scale on the following basis:

5 = Excellent
4 = Good
3 = Satisfactory
2 = Marginal
1 = Unsatisfactory
0 = Insufficient Response

The sum of scores in each section is divided by the total possible score in that section, then multiplied by the percentage weight of that section. The total scores for the five sections are summed, then multiplied by 100 for a final total evaluation score out of 100.

A. Wages
   1. Value of Wage & Benefit Package
      ________
      ________/5 x 10% = ________

B. Health Care Benefits
   1. Plan & Coverage
      ________
   2. Employer/Employee Costs & Deductible
      ________
   3. Employee Plan, Automatic vs. Opt-in
      ________
   4. Family Plan, Costs and Deductible
      ________
   5. Family Plan, Automatic vs. Opt-in
      ________
   6. Plan Availability & Limitations
      ________

      ________/30 x 25% = ________

C. Retirement Benefits
   1. Retirement Plan Options
      ________
   2. Employer/Employee Contributions & Limits
      ________
   3. Plan Automatic vs. Opt-in
      ________
   4. Plan Availability, Limitations, & Vesting
      ________
D. Apprenticeships & Training
1. Programs, BAT Certification, Longevity
2. Instructor Qualifications
3. Length, Classroom Hours, & Accreditations
4. Employer Investment & Enrollee Costs
5. Journeyman/Apprentice Ratios
6. Graduation & Participation Rates

______/30  x 30% = ______

C. Safety
1. Program & Courses / Mandatory vs. Voluntary
2. OSHA Violations and Rectification
3. EMR Record

______/15  x 25% = ______

Sum of Section Scores: ______

x 100 = TOTAL EVALUATION SCORE: ______

Draft of possible final ranking process:

BVC Evaluation Criteria Score ______ x .3 = ______
Prequalification Score ______ x .3 = ______
Price Score ______ x .4 = ______

FINAL SCORE ______
BID

Institution/Agency: University of Colorado at Boulder
Project No./Name: CP 05050 / UMC – Food Service Renovation

Bidder Acknowledges Receipt of Addenda No.s:

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

<table>
<thead>
<tr>
<th>Bidder’s Time of Completion</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Time Period from Notice to Proceed to Substantial Completion:</td>
<td>151 days</td>
</tr>
<tr>
<td>b. Time Period from Substantial completion to Final Acceptance:</td>
<td>30 days</td>
</tr>
<tr>
<td>c. Time of Completion of Entire Project (a + b):</td>
<td>181 days</td>
</tr>
</tbody>
</table>

1. **BID:** Pursuant to the advertisement by the State of Colorado dated April 8, 2010 the undersigned bidder hereby proposes to furnish all the labor and materials and to perform all the work required for the complete and prompt execution of everything described or shown in or reasonably implied from the Bidding Documents, including the Drawings and Specifications, for the work and for the base bid indicated above. Bidders should include all taxes that are applicable.

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

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

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

5. **TIME OF COMPLETION:** The bidder agrees to achieve substantial completion of the entire project within the number of calendar days entered above, and if applicable, further agrees that the period between the date of substantial completion and the date of final acceptance of the entire project will not exceed the number of calendar days noted above. If awarded this work, the bidder agrees to begin work within ten (10) days from the date of the Notice to Proceed subject to Article 46, Time of Completion and Liquidated Damages of The General Conditions of the Contract, and agrees to prosecute the work with due diligence to completion. The bidder represents that Article 54D has been reviewed to determine the type and amount of any liquidated damages that may be specified for this contract.

State Form SBP-6.13
Rev. 9/2006
6. **EXECUTION OF DOCUMENTS:** The bidder understands that if this Bid is accepted, he must execute the required Agreement and furnish the required Performance Bond, Labor and Material Payment Bond, Insurance Policy and Certificates of Insurance within ten (10) days from the date of the Notice of Award, and that the bidder will be required to sign to acknowledge and accept the Contract Documents, including the Drawings and Specifications.

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

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

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

Dated this _____ Day of ______________________, 2010

(Corporate Seal)

THE BIDDER:

Company Name

ATTEST

Secretary

Address (including city, state and zip)

Phone number:

Signature

Name (Print) and Title

Print Email address: ________________________________

SIGNATURES: If the Bid is being submitted by a Corporation, the Bid should be signed by an officer, i.e., President or Vice-President. The signature of the officer shall be attested to by the Secretary and properly sealed. If a sole proprietorship or a partnership is submitting the Bid, the Bid shall so indicate and be properly signed.
Additive alternates will not be used if deductible alternates are used and deductible alternates will not be used if additive alternates are used.

Additive Alternates (If Applicable)
Refer to specification section 01030 for descriptions of add alternates. If the add alternates are accepted, the base bid would be modified by the amount entered by the bidder.

<table>
<thead>
<tr>
<th>A.A. No.</th>
<th>Add</th>
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<tbody>
<tr>
<td>A.A. No. 1</td>
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<td>A.A. No. 9</td>
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<tr>
<td>A.A. No. 10</td>
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Deductive Alternates (If Applicable)
Refer to specification section _______ for descriptions of the deductive alternates. If the deductive alternates are accepted, the base bid would be modified by the amount entered by the bidder.

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<tr>
<th>D.A. No.</th>
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<td>D.A. No. 1</td>
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<td>D.A. No. 10</td>
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Bidder Date
STATE OF COLORADO
OFFICE OF THE STATE ARCHITECT
STATE BUILDINGS PROGRAMS

MINORITY/WOMEN BUSINESS ENTERPRISE PARTICIPATION REPORT

Institution/Agency: University of Colorado at Boulder
Project No./Name: CP 005050 / UMC – Food Service Renovation

TO BE ELIGIBLE FOR AWARD OF THIS CONTRACT, EACH CONTRACTOR (INCLUDING
ARCHITECT/ENGINEER/CONSULTANT/CONTRACTOR) IS REQUESTED TO COMPLY WITH THESE REQUIREMENTS.

I. The undersigned Architect/Engineer/Consultant/Contractor hereby certifies that the (company) (joint venture) (is) (is not)* a minority enterprise as defined in this report. The undersigned Architect/Engineer/Consultant/Contractor hereby certifies the (company) (joint venture) (is) (is not)* a woman-owned business enterprise as defined. (*Strike out where inapplicable.)

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

ARCHITECT/ENGINEER/CONSULTANT/CONTRACTOR

Legal Name of Contracting Entity

*Signature

By: ________________________________ Title: ________________________________

Date: ________________________________

II. It is the general policy of the State of Colorado to be as inclusive as possible to all member communities when spending taxpayer dollars.

III. REQUIREMENTS

A. Minority Business Enterprise (MBE) means, for the purpose of this report, a business enterprise at least 51 percent that is owned and controlled by minority group members, or, in the case of a publicly owned business, at least 51 percent of the stock of which is owned and controlled by minority group members. Eligible persons are expected to be engaged full time in the day-to-day operation and management of the business. Minority group members are ethnic minorities including African American, Hispanic American, Native American or Asian/Pacific American.

B. Women Business Enterprise (WBE) means, for the purpose of this report, a business enterprise of at least 51 percent of which is owned and controlled by a woman or women, or, in the case of a publicly-owned business, at least 51 percent of the stock of which is owned and controlled by women. Women are expected to be engaged full time in the day-to-day operation and management of the business.

C. The State of Colorado does not have a certification process nor does it require MBE's and WBE's to be certified EXCEPT for certain contracts for highway and bridge construction administered by the Colorado Department of Transportation.

D. The percentages of minority and women-owned business participation will be determined by dollar value of the work subcontracted to or joint ventured with minority and women-owned firms, as compared to the total dollar value of the bid amount for all work bid under this contract.
E. Prior to the award of this contract, the contractor will be required to provide to the Principal Representative a list of M/WBE enterprises, stipulating the dollar amount of each subcontract or supplier of materials on page 2 of this Minority and Women Business Enterprises Participation Report.

F. The contractor will retain records and documents showing the level of participation for two years following completion of this contract. These records and documents, or copies thereof, will be made available at reasonable times and places for inspection by an authorized representative of the Principal Representative, or its designated representatives, and will be submitted to such representatives upon written request.

| MBE: Yes | WBE: Yes | No | No |

Total Contract Amount: $______________

<table>
<thead>
<tr>
<th>Name and Address of M/WBE Subcontractors and/or Suppliers and/or Self-Performed Work by M/WBE Primes*</th>
<th>MBE Contract Amounts</th>
<th>WBE Contract Amounts</th>
<th>Type of Work</th>
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</table>

*Indicate ethnicity based on Paragraph III. A. above.

Total MBE Contracts: $________________
Total WBE Contracts: $________________
Total MBE %: _______________________
Total WBE %: _______________________

State Form MWBE-1
Rev. 10/2008
STATE OF COLORADO
OFFICE OF THE STATE ARCHITECT
STATE BUILDINGS PROGRAMS

BID BOND

Institution/Agency: University of Colorado at Boulder
Project No./Name: CP 005050 / UMC – Food Service 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 __________________________

Secretary  Attorney-in-Fact

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

State Form SBP-6.14
Rev. 9/2006
NOTICE OF AWARD

Date of Notice: ____________________________

Institution/Agency: University of Colorado at Boulder

Project No./Name: CP 005050 / UMC – Food Service Renovation

TO:

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

Your Proposal, deemed to be in the best interest of the State of Colorado, in the amount of ____________________________ and no/100 Dollars ($ ______.00*) is hereby accepted, pending final execution of the Agreement.

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

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

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

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

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

CONTRACT ROUTING NO.

AGENCY IDENTIFICATION NO.

PROJECT NO.     CP 005050

PROJECT NAME:   UMC – Food Service Renovation

PROJECT MANAGER: Gil Fike

CONTRACTOR:

DATE:          April 2010

Rev. 8/2009
SC-6.21
STATE OF COLORADO  
OFFICE OF THE STATE ARCHITECT  
STATE BUILDINGS PROGRAMS  

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

PR 005050 / UMC – Food Service Renovation  

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| Time of Completion | 1 |
| Essential Condition | 1 |
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| Article 6. | 1 |
| Contract Documents | 1 |
| Safety and Security | 1 |
| SIGNATURE APPROVALS | 2 |

Signed Notice of Award  
GC Agreement  

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

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

WHEREAS, the Principal Representative intends to upgrade and improve the UMC building service cafeteria, hereinafter called the Project; and

WHEREAS, authority exists in Law and Funds have been budgeted, appropriated, and otherwise made available, and a sufficient unencumbered balance thereof remains available for payment in Fund Number 410, Speed Type / Account Number, 17192918-515192; Contract Encumbrance Number TBD,

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

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

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

ARTICLE 3. TIME OF COMPLETION
The Contractor agrees to substantially complete the entire Project within 138 calendar days from the date of the Notice to Proceed, and, if applicable, the Contractor agrees to complete the final punch list and finally complete the Project within 168 calendar days. The Contractor shall prosecute the work with due diligence to completion.

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

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

ARTICLE 6. CONTRACT DOCUMENTS
The Contract Documents, as enumerated in Article 1 of The General Conditions of the Contract, are all essential parts of this Agreement and are fully incorporated herein.

ARTICLE 7. SAFETY and SECURITY - Contractor understands that concern for the safety and well-being of University students and staff is of particular importance to the University. Contractor expressly acknowledges that it is Contractor’s duty to take reasonable precautions to protect the University’s students and staff. The extent of such precautions will depend on the particular circumstances of the work to be performed. However, to the extent that work to be performed involves security-sensitive functions or security-sensitive areas (e.g. unsupervised access to minors or work involving access to security-sensitive data), such precautions may include, but are not limited to, conducting criminal history checks on employees or agents assigned to such work at the University.”
THE PARTIES HERETO HAVE EXECUTED THIS CONTRACT

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

THE CONTRACTOR

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

By: ____________________________
Date: __________________________

Legal Name of Contracting Entity

*Signature

By ____________________________
Name (print) Title

Date: __________________________

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

By: ____________________________
Date: __________________________

ALL CONTRACTS MUST BE APPROVED BY THE STATE CONTROLLER:

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

APPROVED:
STATE OF COLORADO
STATE CONTROLLER'S OFFICE
State Controller (or authorized Delegate)
Steve McNally, Associate Vice Chancellor & Controller

By: ____________________________
Date: __________________________

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

By: ____________________________
Date: __________________________

___approved by DJ
___approved by GF
STATE OF COLORADO
OFFICE OF THE STATE ARCHITECT
STATE BUILDINGS PROGRAMS

PERFORMANCE BOND

Institution/Agency: University of Colorado at Boulder
Project No./Name: CP 005050 / UMC – Food Service 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 UMC – Food Service 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 submission 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

Note: This bond is issued simultaneously with another bond conditioned for the full and faithful payment for all labor and material of the contract.
KNOW ALL PERSONS BY THESE PRESENTS:

That the Contractor

as Principal and hereinafter called "Principal,"

and

as Surety and hereinafter called "Surety," a corporation organized and existing under the laws of

__________________________________________, are held and firmly bound unto the STATE OF COLORADO acting by

and through The Regents of the University of Colorado, a body corporate, hereinafter called "Principal Representative," and to all subcontractors and any others who have supplied or furnished or shall supply or furnish materials, rental machinery, tools, or equipment actually used in the performance of the hereinafter

identified Contract, or who have performed or shall perform labor in the performance of or in connection with

said Contract, hereinafter called "Obligees" in the sum of ________________________________

__________________________________________ Dollars ($ ________________)

together with interest at the rate of eight per cent (8%) per annum on all payments becoming due in accordance

with said Contract, from the time such payments shall become due until such payment shall be made, for the

payment of which, well and truly made to the Obligees, the Principal and the Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly, by these presents.

WHEREAS, the Principal and the State of Colorado acting by and through the Principal Representative have entered into a certain Contract, hereinafter called "Contract," dated ________________________________ for the

construction of a PROJECT described as UMC – Food Service 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 it said Principal shall duly and promptly pay all his subcontractors the sums due them for any and all materials, rental machinery, tools, or equipment and labor that have been or shall be furnished, supplied, performed or used in connection with performance of said Contract, and shall also fully indemnify and save harmless the State of Colorado and the Principal Representative to the extent of any and all expenditures which either or both of them may be required to make by reason of any failures or defaults by the Principal or any subcontractor in connection with such payments; then this obligation shall be null and void, otherwise it shall remain in full force and effect.

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

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

(Corporate Seal)

THE PRINCIPAL

ATTEST:

By: __________________________

Title: __________________________

Secretary

(Corporate Seal)

SURETY

By: __________________________

Attorney-in-fact

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

Note: This bond is issued simultaneously with another bond conditioned for the full and faithful performance of the contract.
THE GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT
DESIGN/BID/BUILD STANDARD FORMAT
(STATE FORM SC-6.23)

Project Name: UMC – Food Service Renovation
Project No. CP 005050
Project Manager Gil Fike
Date March 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:
1. Agreement; (SC-6.21);
2. Performance Bond (SC-6.22) and Labor and Material Payment Bond (SC-6.221);
3. General and Supplementary General Conditions of the Contract (SC-6.23);
4. Detailed Specification Requirements, including all addenda issued prior to the opening of the bids; and,
5. Drawings, including all addenda issued prior to the opening of the bids.
6. Change Orders (SC-6.31) and Amendments (SC-6.0), if any, when properly executed.

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

C. DEFINITIONS OF WORDS AND TERMS USED
1. AGREEMENT. The term “Agreement” shall mean the written agreement entered into by the State of Colorado acting by and through the Principal Representative and the Contractor for the performance of the Work and payment therefore, on State Form SC-6.21. The term Agreement when used without reference to State Form SC-6.21 may also refer to the entirety
2. **ARCHITECT/ENGINEER.** The term “Architect/Engineer” shall mean either the architect of record or the engineer of record under contract to the State of Colorado for the Project identified in the Contract Documents.

3. **OCCUPANCY.** The term “Occupancy” means occupancy taken by the State as Owner after the Date of Substantial Completion at a time when a building or other discrete physical portion of the Project is used for the purpose intended. The Date of Occupancy shall be the date of such first use, but shall not be prior to the date of execution of the Notice of Approval of Occupancy/Use. Prior to the date of execution of a Notice of Approval of Occupancy/Use, the state shall have no right to occupy and the project may not be considered safe for occupancy for the intended use.

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

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

6. **CONTRACTOR.** The word “Contractor” shall mean the person, company, firm, corporation or other legal entity entering into a contract with the State of Colorado acting by and through the Principal Representative.

7. **DAYS.** The term “days” whether singular or plural shall mean calendar days unless expressly stated otherwise. Where the term “business days” is used it shall mean business days of the State of Colorado.

8. **DRAWINGS.** The term “Drawings” shall mean all drawings approved by appropriate State officials which have been prepared by the Architect/Engineer showing the work to be done, except that where a list of drawings is specifically enumerated in the Supplementary General Conditions or division 1 of the Specifications, the term shall mean the drawings so enumerated, including all addenda drawings.

9. **EMERGENCY FIELD CHANGE ORDER.** The term “Emergency Field Change Order” shall mean a written change order for extra work or a change in the work necessitated by an emergency as defined in Article 35C executed on State form SC 6.31 and identified as an Emergency Field Change Order. The use of such orders is limited to emergencies and to the amounts shown in Article 35C.

10. **FINAL ACCEPTANCE.** The terms “final acceptance” or “finally complete” mean the stage in the progress of the work, after substantial completion, when all remaining items of work have been completed, all requirements of the Contract Documents are satisfied and the Notice of Acceptance can be issued. Discrete physical portions of the Project may be separately and partially deemed finally complete at the discretion of the Principal Representative when that portion of the Project reaches such stage of completion and a partial Notice of Acceptance can be issued.

11. **NOTICE.** The term “Notice” shall mean any communication in writing from either contracting party to the other by such means of delivery that receipt cannot properly be denied. Notice shall be provided to the person identified to receive it in Article 54E, Notice Identification, or to such other person as either party identifies in writing to receive Notice. Notice by facsimile transmission where proper transmission is evidence shall be adequate where facsimile numbers are included in Article 54E. Notwithstanding an email delivery or return receipt, email Notice shall not be adequate. Acknowledgment of receipt of a voice message shall not be deemed to waive the requirement that Notice, where required, shall be in writing.
12. OWNER. The term "Owner" shall mean the Principal Representative.

13. PRINCIPAL REPRESENTATIVE. The term "Principal Representative" shall be defined, as provided in § 24-30-1301(11), C.R.S., as the governing board of a state department, institution, or agency; or if there is no governing board, then the executive head of a state department, institution, or agency, as designated by the governor or the general assembly and as specifically identified in the Contract Documents, or shall have such other meaning as the term may otherwise be given in § 24-30-1301(11), C.R.S., as amended. The Principal Representative may delegate authority. The Contractor shall have the right to inquire regarding the delegated authority of any of the Principal Representative’s representatives on the project and shall be provided with a response in writing when requested.

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

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

16. REASONABLY INFERABLE: The phrase "reasonably inferable" means that if an item or system is either shown or specified, all material and equipment normally furnished with such items or systems and needed to make a complete installation shall be provided whether mentioned or not, omitting only such parts as are specifically excepted, and shall include only components which the Contractor could reasonably anticipate based on his or her skill and knowledge using an objective, industry standard, not a subjective standard. This term takes into consideration the normal understanding that not every detail is to be given on the Drawings and Specifications. The phrase shall not, however, be construed to make the Contractor, rather than the Architect/Engineer, responsible for producing the Drawings and Specifications.

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

18. SC. The term "SC" means "State Contract" which is used in connection with labeling applicable State form documents (e.g., "SC 6.23" is the State form number for these General Conditions of the Contract).

19. SBP. The term "SBP" means "State Buildings", which is used in connection with labeling applicable State form documents (e.g., "SBP-01" is the form number for Notice of Approval of Occupancy/Use).

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

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

22. STATE BUILDINGS PROGRAMS. The term "State Buildings Programs" is the shortened name of the division of State Buildings Programs. It shall refer to the division of the executive department of State government responsible for project administration, review, approval and coordination of plans, construction procurement policy, contractual procedures, and code compliance and inspection of all buildings, public works and improvements erected for state purposes; except public roads and highways and projects under the supervision of the division of wildlife and the division of parks and outdoor recreation as provided in § 24-30-1301, et seq, C.R.S. The term State Buildings Programs shall also mean that individual within a State Department agency or institution, including institutions of higher education, who has signed an agreement accepting delegation to perform all or part of the responsibilities and functions of State Buildings Programs.

23. SUBMITTALS. The term "submittals" means drawings, lists, tables, documents and samples prepared by the Contractor to facilitate the progress of the work as required by these General Conditions or the Drawings and Specifications. They consist of Shop Drawings, Product Data, Samples, and various administrative support documents including but not limited to lists of subcontractors, construction progress schedules, schedules of values, applications for
24. **SUBSTANTIAL COMPLETION.** The terms “substantial completion” or “substantially complete” mean the stage in the progress of the work when the construction is sufficiently complete, in accordance with the Contract Documents as modified by any Change Orders, so that the Work, or at the discretion of the Principal Representative, any designated portion thereof, is available for its intended use by the Principal Representative and a Notice of Substantial Completion can be issued. Portions of the Project may, at the discretion of the Principal Representative, be designated as substantially complete.

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

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

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

**A. EXECUTION**

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

1. Execute the Agreement, State Form SC-6.21;
2. Furnish fully executed Performance and Labor and Material Payment Bonds on State Forms SC-6.22 and SC-6.221; and
3. Furnish certificates of insurance evidencing all required insurance on standard Acord forms designed for such purpose.
4. Furnish certified copies of any insurance policies requested by the Principal Representative.

**B. CORRELATION**

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

**C. INTENT OF DOCUMENTS**

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

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

Where a conflict occurs between or within standards, Specifications or Drawings, which is not resolved by reference to the precedence between the Contract Documents, the more stringent or higher quality requirements shall apply so long as such more stringent or higher quality requirements are reasonably inferable. The Architect/Engineer shall decide which requirements will provide the best installation. With the exception noted in the following paragraph, the precedence of the Contract Documents is in the following sequence:
1. The Agreement (SC-6.21);
2. The Supplementary General Conditions, if any;
3. The General Conditions (SC-6.23); and
4. Drawings and Specifications, all as modified by any addenda.

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

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

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

D. PARTNERING, COMMUNICATIONS AND COOPERATION

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

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

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

ARTICLE 3. COPIES FURNISHED

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

ARTICLE 4. OWNERSHIP OF DRAWINGS

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

The Contractor may retain the Contractor’s Contract Document set, copies of Drawings and Specifications used to contract with others for any portion of the Work and a marked up set of as-built drawings.
ARTICLE 5. ARCHITECT/ENGINEER’S STATUS
The Architect/Engineer is the representative of the Principal Representative for purposes of administration of the Contract, as provided in the Contract Documents and the Agreement. In case of termination of employment or the death of the Architect/Engineer, the Principal Representative will appoint a capable Architect/Engineer against whom the Contractor makes no reasonable objection, whose status under the Contract shall be the same as that of the former Architect/Engineer.

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

A. DECISIONS
The Architect/Engineer shall, within a reasonable time, make decisions on all matters relating to the execution and progress of the Work or the interpretation of the Contract Documents, and in the exercise of due diligence shall be reasonably available to the Contractor to timely interpret and make decisions with respect to questions relating to the design or concerning the Contract Documents.

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

The Architect/Engineer shall make judgments regarding whether directed work is extra or outside the scope of Work required by the Contract Documents at the time such direction is first given. If, in the Contractor’s judgment, any performance directed by the Architect/Engineer is not required by the Contract Documents or if the Architect/Engineer does not make the judgment required, it shall be a condition precedent to the filing of any claim for additional cost related to such directed work that the Contractor, before performing such work, shall first obtain in writing, the Architect/Engineer’s written decision that such directed work is included in the performance required by the Contract Documents. If the Architect/Engineer’s direction to perform the work does not state that the work is 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 insure that no part of any structure of any description is loaded beyond its carrying capacity with anything that will endanger its safety at any time during the execution of this Contract; and provide for the adequacy and safety of all scaffolding and hoisting equipment. The Contractor shall not permit open fires within the building enclosure. The Contractor shall construct and maintain all necessary temporary drainage and do all pumping necessary to keep excavations and floors, pits and trenches free of water. The Contractor shall be solely responsible for all construction means, methods, techniques, sequences and procedures, and for coordinating all portions of the Work, except as otherwise noted.

The Contractor shall take due precautions when obstructing sidewalks, streets or other public ways in any manner, and shall provide, erect and maintain barricades, temporary walkways, roadways, trench covers, colored lights or danger signals and any other devices necessary or required to assure the safe passage of pedestrians and automobiles.
C. EMERGENCIES
In an emergency affecting the safety of life or of the Work or of adjoining property, the Contractor without special instruction or authorization from the Architect/Engineer or Principal Representative, is hereby permitted to act, at his or her discretion, to prevent such threatened loss or injury; and he or she shall so act, without appeal, if so authorized or instructed. Provided the Contractor has no responsibilities for the emergency, if the Contractor incurs additional cost not otherwise recoverable from insurance or others on account of any such emergency work, the Contract sum shall be equitably adjusted in accordance with Article 35, Changes In The Work.

ARTICLE 11. DRAWINGS AND SPECIFICATIONS ON THE WORK
The Contractor shall keep on the job site one copy of the Contract Documents in good order, including current copies of all Drawings and Specifications for the Work, and any approved Shop Drawings, Product Data or Samples, and as-built drawings. As-built drawings shall be updated weekly by the Contractor and Subcontractors to reflect actual constructed conditions including dimensioned locations of underground work and the Contractor's failure to maintain such updates may be grounds to withhold portions of payments otherwise due in accordance with Article 33, Payments Withheld. All such documents shall be available to the Architect/Engineer and representatives of the State. In addition, the Contractor shall keep on the job site one copy of all approved addenda, Change Orders and requests for information issued for the Work.

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

ARTICLE 12. REQUESTS FOR INFORMATION AND SCHEDULES
A. REQUESTS FOR INFORMATION
The Architect/Engineer shall furnish additional instructions with reasonable promptness, by means of drawings or otherwise, necessary for the proper execution of the Work. All such drawings and instructions shall be consistent with the Contract Documents and reasonably inferable there from. The Architect/Engineer shall determine what additional instructions or drawings are necessary for the proper execution of the Work.

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

B. SCHEDULES
1. SUBMITTAL SCHEDULES
Prior to filing the Contractor’s first application for payment, a schedule shall be prepared which may be preliminary to the extent required, fixing the dates for the submission and initial review of required Shop Drawings, Product Data and Samples for the beginning of manufacture and installation of materials, and for the completion of the various parts of the Work. It shall be prepared so as to cause no delay in the Work or in the work of any other contractor. The schedule shall be subject to change from time to time in accordance with the progress of the Work, and it shall be subject to the review and approval by the Architect/Engineer. It shall fix the dates at which the various Shop Drawings Product Data and Samples will be required from the Architect/Engineer. The Architect/Engineer, after review and agreement as to the time provided for initial review, shall review and comment on the Shop Drawings, Product Data and Samples in accordance with that schedule. The schedule shall be finalized, prepared and submitted with respect to each of the elements of the Work in time to avoid delay, considering reasonable periods for review, manufacture or installation.
At the time the schedule is prepared, the Contractor, the Architect/Engineer and Principal Representative shall jointly identify the Shop Drawing, Product Data and Samples, if any, which the Principal Representative shall receive simultaneously with the Architect/Engineer for the purposes of owner coordination with existing facility standards and systems. The Contractor shall furnish a copy for the Principal Representative when so requested. Transmittal of Shop Drawings and Product Data copies to the Principal Representative shall be solely for the convenience of the Principal Representative and shall neither create nor imply responsibility or duty of review by the Principal Representative.

The Contractor may also, or at the direction of the Principal Representative at any time shall, prepare and maintain a schedule, which may also be preliminary and subject to change to the extent required, fixing the dates for the initial responses to requests for information or for detail drawings which will be required from the Architect/Engineer to allow the beginning of manufacture, installation of materials and for the completion of the various parts of the Work. The schedule shall be subject to review and approval by the Architect/Engineer. The Architect/Engineer shall, after review and agreement, furnish responses and detail drawings in accordance with that schedule. Any such schedule shall be prepared and approved in time to avoid delay, considering reasonable periods for review, manufacture or installation, but so long as the request for information schedule is being maintained, it shall not be deemed to transfer responsibility to the Contractor for errors or omissions in the Contract Documents where circumstances make timely review and performance impossible.

The Architect/Engineer shall not unreasonably withhold approval of the Contractor’s schedules and shall inform the Contractor and the Principal Representative of the basis of any refusal to agree to the Contractor’s schedules. The Principal Representative shall attempt to resolve any disagreements.

2. SCHEDULE OF VALUES
Within twenty-one (21) calendar days after the date of the Notice to Proceed, the Contractor shall submit to the Architect/Engineer and Principal Representative, for approval, and to the State Buildings Programs when specifically requested, a complete itemized schedule of the values of the various parts of the Work, as estimated by the Contractor, aggregating the total price. The schedule of values shall be in such detail as the Architect/Engineer or the Principal Representative shall require, prepared on forms acceptable to the Principal Representative. It shall, at a minimum, identify on a separate line each division of the Specifications including the general conditions costs to be charged to the Project. The Contractor shall revise and resubmit the schedule of values for approval when, in the opinion of the Architect/Engineer or the Principal Representative, such resubmittal is required due to changes or modifications to the Contract Documents or the Contract sum.

The total cost of each line item so separately identified shall, when requested by the Architect/Engineer or the Principal Representative, be broken down into reasonable estimates of the value of:

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

b. Labor and other costs.

The cost of subcontracts shall be incorporated in the Contractor’s schedule of values, and when requested by the Architect/Engineer or the Principal Representative, shall be separately shown as line items.

The Architect/Engineer shall review the proposed schedules and approve it after consultation with the Principal Representative, or advise the Contractor of any required revisions within ten (10) days of its receipt. In the event no action is taken on the submittal within ten days, the
Contractor may utilize the schedule of values as its submittal for payment until it is approved or until revisions are requested.

When the Architect/Engineer deems it appropriate to facilitate certification of the amounts due to the Contractor, further breakdown of subcontracts, including breakdown by labor and materials, may be directed.

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

3. CONSTRUCTION SCHEDULES
Within twenty-one (21) calendar days after the date of the Notice to Proceed, the Contractor shall submit to the Architect/Engineer and the Principal Representative, and to the State Buildings Programs when specifically requested, on a form acceptable to them, an overall timetable of the construction schedule for the Project. Unless the Supplementary General Conditions or the Specifications allow scheduling with bar charts or other less sophisticated scheduling tools, the Contractor’s schedule shall be a critical-path method (CPM) construction schedule. The CPM schedule shall start with the date of the Notice to Proceed and include submittals activities, the various construction activities, change order work (when applicable), close-out, testing, demonstration of equipment operation when called for in the Specifications, and acceptance. The CPM shall at a minimum correlate to the schedule of values line items and shall be cost loaded if requested by the Architect/Engineer or Principal Representative. The completion time shall be the time specified in the Agreement and all Project scheduling shall allocate float utilizing the full period available for construction as specified in the Agreement on State Form SC 6.13, without indication of early completion, unless such earlier completion is approved in writing by the Principal Representative and State Building Programs.

The time shown between the starting and completion dates of the various elements within the construction schedule shall represent one hundred per cent (100%) completion of each element.

All other elements of the CPM schedule shall be as required by the Specifications. In addition, the Contractor shall submit monthly updates of the construction schedule. These updates shall reflect the Contractor’s “work in place” progress.

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

When the testing of materials is required by the Specifications, the Contractor shall also prepare and submit to the Architect/Engineer 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

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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 contractor or any other person, persons or property except to the extent of coverage by a policy of insurance;
6. Failure to obtain necessary permits or licenses or to comply with applicable laws, ordinances, codes, rules or regulations or the directions of the Architect/Engineer;
7. Failure to submit a monthly construction schedule;
8. Failure of the Contractor to keep work progressing in accordance with the time schedule;
9. Failure to keep a superintendent on the work;
10. Failure to maintain as built drawings of the work in progress;
11. Unauthorized deviations by the Contractor from the Contract Documents; or
12. On account of liquidated damages.

In addition, the Architect Engineer, Principal Representative or State Buildings Programs may withhold or nullify the whole or any part of any application for any reason noted elsewhere in these General Conditions of the Contract. Nullification shall mean reduction of amounts shown as previously paid on the application. The amount withheld or nullified may be in such amount as the Architect/Engineer or the Principal Representative estimates to be required to allow the State to accomplish the Work, cure the failure and cover any damages or injuries, including an allowance for attorneys fees and costs where appropriate. When the grounds for such withholding or nullifying are removed, payment shall be made for the amounts thus withheld or nullified on such grounds.

ARTICLE 34. DEDUCTIONS FOR UNCORRECTED WORK
If the Architect/Engineer and the Principal Representative deem it inexpedient to correct work injured or not performed in accordance with the Contract Documents, the Principal Representative may, after consultation with the Architect/Engineer and ten (10) days’ Notice to the Contractor of intent to do so, make reasonable reductions from the amounts otherwise due the Contractor on the next application for payment. Notice shall specify the amount or terms of any contemplated reduction. The Contractor may during this period elect to correct or perform the work. If the Contractor does not elect to correct or perform the work, an equitable deduction from the Contract sum shall be made by Change Order, in accordance with Article 35, Changes In The Work, unilaterally if necessary. If either party elects facilitation of this issue after Notice is given, the ten-day notice period shall be extended and tolled until facilitation has occurred.

ARTICLE 35. CHANGES IN THE WORK
The Principal Representative, or such other Procurement Officer as the Principal Representative may designate, without invalidating the Agreement, and with the approval of State Buildings Programs and the State Controller, may order extra work or make changes with or without the consent of the Contractor as hereafter provided, by altering, adding to or deducting from the Work, the Contract sum being adjusted accordingly. All such changes in the Work shall be within the general scope of and be executed under the conditions of the Contract, except that any claim for extension of time made necessary due to the change or any claim of other delay or other impacts caused by or resulting from the change in the Work shall be presented by the Contractor and adjusted by Change Order to the extent known at the time such change is ordered and before proceeding with the extra or changed work. Any claims for extension of time or of delay or other impacts, and any costs associated with extension of time, delay or other impacts, which are not presented before proceeding with the change in the Work, and which are not adjusted by Change Order to the extent known, shall be waived.

The Architect/Engineer shall have authority to make minor changes in the Work, not involving extra cost, and not inconsistent with the intent of the Contract Documents, but otherwise, except in an emergency endangering life or property, no extra work or change in the Contract Documents shall be made unless by 1) a written Change Order, approved by the Principal Representative, State Buildings Programs, and the State Controller prior to proceeding with the changed work; or 2) by an Emergency Field Change Order approved by the Principal Representative and State Buildings Programs as hereafter provided in Article 35C, Emergency Field Ordered Changed Work; or 3) by an allocation in writing of any allowance already provided in the encumbered contract amount, the Contract sum being later adjusted to decrease the Contract sum by any unallocated or unexpended amounts remaining in such allowance. No change to the Contract sum shall be valid unless so ordered.
A. THE VALUE OF CHANGED WORK

1. The value of any extra work or changes in the Work shall be determined by agreement in one or more of the following ways:
   a. By estimate and acceptance of a lump-sum amount;
   b. By unit prices specified in the Agreement, or subsequently agreed upon, that are extended by specific quantities;
   c. By actual cost plus a fixed fee in a lump sum amount for profit, overhead and all indirect and off-site home office costs, the latter amount agreed upon in writing prior to starting the extra or changed work.

2. Where the Contractor and the Principal Representative cannot agree on the value of extra work, the Principal Representative may order the Contractor to perform the changes in the Work and a Change Order may be unilaterally issued based on an estimate of the change in the Work prepared by the Architect/Engineer. The value of the change in the Work shall be the Principal Representative’s determination of the amount of equitable adjustment attributable to the extra work or change. The Principal Representative’s determination shall be subject to appeal by the Contractor pursuant to the claims process in Article 36, Claims. The Principal Representative is the Procurement Officer for purposes of all of the remedies provisions of the Contract.

3. Except as otherwise provided in Article 35B, Detailed Breakdown, below, the Cost Principles of the Colorado Procurement Rules in effect on the date of this Contract, pursuant to § 24-107-101, C.R.S., as amended, shall govern all Contract changes.

B. DETAILED BREAKDOWN

In all cases where the value of the extra or changed work is not known based on unit prices in the Contractor’s bid or the Agreement, a detailed change proposal shall be submitted by the Contractor on a Change Order Proposal (SC-6.312), or in such other format as the State Buildings Program approves, with which the Principal Representative may require an itemized list of materials, equipment and labor, indicating quantities, time and cost for completion of the changed work.

Such detailed change proposals shall be stated in lump sum amounts and shall be supported by a separate breakdown, which shall include estimates of all or part of the following when requested by the Architect/Engineer or the Principal Representative:

1. Materials, indicating quantities and unit prices including taxes and delivery costs if any (separated where appropriate into general, mechanical and electrical and/or other Subcontractors’ work; and the Principal Representative may require in its discretion any significant subcontract costs to be similarly and separately broken down).
2. Labor costs, indicating hourly rates and time and labor burden to include Social Security and other payroll taxes such as unemployment, benefits and other customary burdens.
3. Costs of project management time and superintendence time of personnel stationed at the site, and other field supervision time, but only where a time extension, other than a weather delay, is approved as part of the Change Order, and only where such project management time and superintendence time is directly attributable to and required by the change; provided however that additional cost of on-site superintendence shall be allowable whenever in the opinion of the Architect/Engineer the impact of multiple change requests to be concurrently performed will result in inadequate levels of supervision to assure a proper result unless additional superintendence is provided.
4. Construction equipment (including small tools). Expenses for equipment and fuel shall be based on customary commercially reasonable rental rates and schedules. Equipment and hand tool costs shall not include the cost of items customarily owned by workers.
5. Workers’ compensation costs, if not included in labor burden.
6. The cost of commercial general liability and property damage insurance premiums but only to the extent charged the Contractor as a result of the changed work.
7. Overhead and profit, as hereafter specified.
8. Builder’s risk insurance premium costs.
9. Bond premium costs.
10. Testing costs not otherwise excluded by these General Conditions.
11. Subcontract costs.

Unless modified in the Supplementary General Conditions, overhead and profit shall not exceed the percentages set forth in the table below.

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

Overhead shall include: a) insurance premium for policies not purchased for the Project and itemized above, b) home office costs for office management, administrative and supervisory personnel and assistants, c) estimating and change order preparation costs, d) incidental job burdens, e) legal costs, f) data processing costs, g) interest costs on capital, h) general office expenses except those attributable to increased rental expenses for temporary facilities, and all other indirect costs, but shall not include the Social Security tax and other direct labor burdens. The term “work” as used in the proceeding table shall include labor, materials and equipment and the “Commission” shall include all costs and profit for carrying the subcontracted work at the tiers below except direct costs as listed in items 1 through 11 above if any.

On proposals for work involving both additions and credits in the amount of the Contract sum, the overhead and profit will be allowed on the net increase only. On proposals resulting in a net deduct to the amount of the Contract sum, profit on the deducted amount shall be returned to the Principal Representative at fifty percent (50%) of the rate specified. The inadequacy of the profit specified shall not be a basis for refusal to submit a proposal.

Except in the case of Change Orders or Emergency Field Change Orders agreed to on the basis of a lump sum amount or unit prices as described in paragraphs 35A1 and 35A2 above, The Value of Changed Work, the Contractor shall keep and present a correct and fully auditable account of the several items of cost, together with vouchers, receipts, time cards and other proof of costs incurred, summarized on a Change Order form (SC-6.31) using such format for supporting documentation as the Principal Representative and State Buildings Programs approve. This requirement applies equally to work done by Subcontractors. Only auditable costs shall be reimbursable on Change Orders where the value is determined on the basis of actual cost plus a fixed fee pursuant to paragraph 35A3 above, or where unilaterally determined by the Principal Representative on the basis of an equitable adjustment in accordance with the Procurement Rules, as described above in Article 35A, The Value Of Changed Work.

Except for proposals for work involving both additions and credits, changed work shall be adjusted and considered separately for work either added or omitted. The amount of adjustment for work omitted shall be estimated at the time it is directed to be omitted, and when reasonable to do so, the agreed adjustment shall be reflected on the schedule of values used for the next Contractor’s application for payment.

The Principal Representative reserves the right to contract with any person or firm other than the Contractor for any or all extra work; however, unless specifically required in the Contract Documents, the Contractor shall have no responsibility without additional compensation to supervise or coordinate the work of persons or firms separately contracted by the Principal Representative.
C. EMERGENCY FIELD CHANGE ORDERED WORK
The Principal Representative, without invalidating the Agreement, and with the approval of State Buildings Programs and without the approval of the State Controller, may order extra work or make changes in the case of an emergency that is a threat to life or property or where the likelihood of delays in processing a normal Change Order will result in substantial delays and or significant cost increases for the Project. Emergency Field Orders are not to be used solely to expedite normal Change Order processing absent a clear showing of a high potential for significant and substantial cost or delay. Such changes in the Work may be directed through issuance of an Emergency Field Change Order signed by the Contractor, the Principal Representative (or by a designee specifically appointed to do so in writing), and approved by the Director of State Buildings Program or his or her delegate. The change shall be directed using a State Change Order form (SC-6.31), modified with the words “Emergency Field Change Order” at the top.

If the amount of the adjustment of the Contract price and time for completion can be determined at the time of issuance of the Emergency Field Change Order, those adjustments shall be reflected on the face of the Emergency Field Change Order. Otherwise, the Emergency Field Change Order shall reflect a not to exceed (NTE) amount for any schedule adjustment (increasing or decreasing the time for completion) and an NTE amount for any adjustment to Contract sum, which NTE amount shall represent the maximum amount of adjustment to which the Contractor will be entitled, including direct and indirect costs of changed work, as well as any direct or indirect costs attributable to delays, inefficiencies or other impacts arising out of the change. Emergency Field Change Orders directed in accordance with this provision need not bear the approval signatures of the State Controller.

On Emergency Field Change Orders where the price and schedule have not been finally determined, the Contractor shall submit final costs for adjustment as soon as practicable. No later than seven (7) days after issuance, except as otherwise permitted, and every seven days thereafter, the Contractor shall report all costs to the Principal Representative and the Architect/Engineer. Weekly cost reports and the final adjustment of the Emergency Field Change Orders amount and the adjustment to the Project time for completion shall be prepared in accordance with the procedures described in Article 35A, The Value of Changed Work, and B, Detailed Breakdown, above. Unless otherwise provided in writing signed by the Director of State Buildings Programs to the Principal Representative and the Contractor, describing the extent and limits of any greater authority, individual Emergency Field Change Orders shall not be issued for more than $25,000, nor shall the cumulative value of Emergency Field Change Orders exceed an amount of $100,000.

D. APPROPRIATION LIMITATIONS - § 24-91-103.6, C.R.S., as amended
The amount of money appropriated, as shown on the Agreement (SC 6.21), is equal to or in excess of the Contract amount. No Change Order, Emergency Field Change Order, or other type of order or directive shall be issued by the Principal Representative, or any agent acting on his or her behalf, which directs additional compensable work to be performed, which work causes the aggregate amount payable under the Contract to exceed the amount appropriated for the original Contract, as shown on the Agreement (SC-6.13), unless one of the following occurs: (1) the Contractor is provided written assurance from the Principal Representative that sufficient additional lawful appropriations exist to cover the cost of the additional work; or (2) the work is covered by a contractor remedy provision under the Contract, such as a claim for extra cost. By way of example only, no assurance is required for any order, directive or instruction by the Architect/Engineer or the Principal Representative to perform work which is determined to be within the performance required by the Contract Documents; the Contractor’s remedy shall be as described elsewhere in these General Conditions.

Written assurance shall be in the form of an Amendment to the Contract reciting the source and amount of such appropriation available for the Project. No remedy granting provision of this Contract shall obligate the Principal Representative to seek appropriations to cover costs in excess of the amounts recited as available to pay for the work to be performed.
ARTICLE 36. CLAIMS

It is the intent of these General Conditions to provide procedures for speedy and timely resolution of disagreements and disputes at the lowest level possible. In the spirit of on the job resolution of job site issues, the parties are encouraged to use the partnering processes of Article 2D, Partnering, Communications and Cooperation, before turning to the more formal claims processes described in this Article 36, Claims. The use of non-binding dispute resolution, whether through the formal processes described in Article 39, Non-Binding Dispute Resolution – Facilitated Negotiations, or through less formal alternative processes developed as part of a partnering plan, are also encouraged. Where such process cannot resolve the issues in dispute, the claims process that follows is intended to cause the issues to be presented, decided and where necessary, documented in close proximity to the events from which the issues arise. To that end, and in summary of the remedy granting process that follows commencing with the next paragraph of this Article 36, Claims, the Contractor shall 1) first, seek a decision by the Architect/Engineer, and 2) shall second, informally present the claim to Principal Representative as described hereafter, and 3) failing resolution in the field, give Notice of intent to exercise statutory rights of review of a formal contract controversy, and 4) seek resolution outside the Contract as provided by the Procurement Code.

If the Contractor claims that any instructions, by detailed drawings, or otherwise, or any other act or omission of the Architect/Engineer or Principal Representative affecting the scope of the Contractor’s work, involve extra cost, extra time or changes in the scope of the Work under this Contract, the Contractor shall have the right to assert a claim for such costs or time, provided that before either proceeding to execute such work (except in an emergency endangering life or property), or filing a Notice of claim, the Contractor shall have obtained or requested a written decision of the Architect/Engineer following the procedures as provided in Article 6A and B, Architect/Engineer Decisions and Judgments, respectively; provided, however, that in the case of a directed change in the Work pursuant to Article 36A4, no written judgment or decision of the Architect/Engineer is required. If the Contractor is delayed by the lack of a response to a request for a decision by the Architect/Engineer, the Contractor shall give Notice in accordance with Article 38, Delays And Extensions Of Time.

Unless it is the Architect/Engineer’s judgment and determination that the work is not included in the performance required by the Contract Documents, the Contractor shall proceed with the work as originally directed. Where the Contractor’s claim involves a dispute concerning the value of work unilaterally directed pursuant to Article 35A4 the Contractor shall also proceed with the work as originally directed while his or her claim is being considered.

The Contractor shall give the Principal Representative and the Architect/Engineer Notice of any claim promptly after the receipt of the Architect/Engineer’s decision, but in no case later than three (3) business days after receipt of the Architect/Engineer’s decision (or no later than ten (10) days from the date of the Contractor’s request for a decision when the Architect/Engineer fails to decide as provided in Article 6). The Notice of claim shall state the grounds for the claim and the amount of the claim to the extent known in accordance with the procedures of Article 35, Changes In The Work. The period in which Notice must be given may be extended by the Principal Representative if requested in writing by the Contractor with good cause shown, but any such extension to be effective shall be in writing.

The Principal Representative shall respond in writing, with a copy to the Architect/Engineer, within a reasonable time, and except where a request for facilitation of negotiation has been made as hereafter provided, in no case later than seven (7) business days (or at such other time as the Contractor and Principal Representative agree) after receipt of the Contractor’s Notice of claim regarding such instructions or alleged act or omission. If no response to the Contractor’s claim is received within seven (7) business days of Contractor's Notice (or at such other time as the Contractor and Principal Representative agree) and the instructions have not been retracted, it shall be deemed that the Principal Representative has denied the claim.

The Principal Representative may grant or deny the claim in whole or in part, and a Change Order shall be issued if the claim is granted. To the extent any portion of claim is granted where costs are not clearly shown, the Principal Representative may direct that the value of that portion of the work be determined by
any method allowed in Article 35A, The Value Of Changed Work. Except in the case of a deemed denial, the Principal Representative shall provide a written explanation regarding any portion of the Contractor's claim that is denied.

If the Contractor disagrees with the Principal Representative’s judgment and determination on the claim and seeks an equitable adjustment of the Contract sum or time for performance, he or she shall give Notice of intent to exercise his or her statutory right to seek a decision on the contract controversy within ten (10) days of receipt of the Principal Representative’s decision denying the claim. A “contract controversy,” as such term is used in the Colorado Procurement Code, § 24-109-106, C.R.S., shall not arise until the initial claim process described above in this Article 36 has been properly exhausted by the Contractor. The Contractor's failure to proceed with work directed by the Architect/Engineer or to exhaust the claim process provided above in this Article 36, shall constitute an abandonment of the claim by the Contractor and a waiver of the right to contest the decision in any forum.

At the time of filing the Notice of intent to exercise his or her statutory right to seek a decision on the contract controversy, the Contractor may request that the Principal Representative defer a decision on the contract controversy until a later date or until the end of the Project. If the Principal Representative agrees, he or she shall so advise the Contractor in writing. If no such request is made, or if the Principal Representative does not agree to such a request, the Principal Representative shall render a written decision within twenty (20) business days and advise the Contractor of the reasons for any denial. Unless the claim has been decided by the Principal Representative (as opposed to delegates of the Principal Representative), the person who renders the decision on this statutory contract controversy shall not be the same person who decided the claim. To the extent any portion of the contract controversy is granted where costs are not clearly shown, the Principal Representative may direct that the value of that portion of the work be determined by any method allowed in Article 35A, The Value Of Changed Work. In the event of a denial the Principal Representative shall give Notice to the Contractor of his or her right to administrative and judicial reviews as provided in the Colorado Procurement Code, § 24-109-201 et seq, C.R.S., as amended. If no decision regarding the contract controversy is issued within twenty (20) business days of the Contractor's giving Notice (or such other date as the Contractor and Principal Representative have agreed), and the instructions have not been retracted or the alleged act or omission have not been corrected, it shall be deemed that the Principal Representative has ruled by denial on the contract controversy. Except in the case of a deemed denial, the Principal Representative shall provide an explanation regarding any portion of the contract controversy that involves denial of the Contractor's claim.

Either the Contractor or the Principal Representative may request facilitation of negotiations concerning the claim or the contract controversy, and if requested, the parties shall consult and negotiate before the Principal Representative decides the issue. Any request for facilitation by the Contractor shall be made at the time of the giving of Notice of the claim or Notice of the contract controversy. Facilitation shall extend the time for the Principal Representative to respond by commencing the applicable period at the completion of the facilitated negotiation, which shall be the last day of the parties’ meeting, unless otherwise agreed in writing.

Disagreement with the decision of the Architect Engineer, or the decision of the Principal Representative to deny any claim or denying the contract controversy, shall not be grounds for the Contractor to refuse to perform the work directed or to suspend or terminate performance. During the period that any claim or contract controversy decision is pending under this Article 36, Claims, the Contractor shall proceed diligently with the work directed.

In all cases where the Contractor proceeds with the work and seeks equitable adjustment by filing a claim and or statutory appeal, the Contractor shall keep a correct account of the extra cost, in accordance with Article 35B, Detailed Breakdown supported by receipts. The Principal Representative shall be entitled to reject any claim or contract controversy whenever the foregoing procedures are not followed and such accounts and receipts are not presented.

The payments to the Contractor in respect of such extra costs shall be limited to reimbursement for the current additional expenditure by the Contractor made necessary by the change in the work, plus a
reasonable amount for overhead and profit, determined in accordance with Article 35B, Detailed Breakdown, determined solely with reference to the additional work, if any, required by the change.

ARTICLE 37. DIFFERING SITE CONDITIONS
A. NOTICE IN WRITING
The Contractor shall promptly, and where possible before conditions are disturbed, give the Architect/Engineer and the Principal Representative Notice in writing of:

1. subsurface or latent physical conditions at the site differing materially from those indicated in or reasonably assumed from the information provided in the Contract Documents; and,
2. unknown physical conditions at the site, of an unusual nature, differing materially from those ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents.

The Architect/Engineer shall promptly investigate the conditions, and if it is found that such conditions do materially so differ and cause an increase or decrease in the Contractor’s costs of performance of any part of the work required by the Contract Documents, whether or not such work is changed as a result of such conditions, an equitable adjustment shall be made and the Contract sum shall be modified in accordance with Article 35, Changes In The Work.

If the time required for completion of the work affected by such materially differing conditions will extend the work on the critical path as indicated on the CPM schedule, the time for completion shall also be equitably adjusted.

B. LIMITATIONS
No claim of the Contractor under this clause shall be allowed unless the Contractor has given the Notice required in Article 37A, Notice In Writing, above. The time prescribed for presentation and adjustment in Articles 36, Claims and 38, Delays And Extensions Of Time, shall be reasonably extended by the State to the extent required by the nature of the differing conditions; provided, however, that even when so extended no claim by the Contractor for an equitable adjustment hereunder shall be allowed if not quantified and presented prior to the date the Contractor requests a final inspection pursuant to Article 41A, Notice Of Completion.

ARTICLE 38. DELAYS AND EXTENSIONS OF TIME
If the Contractor is delayed at any time in the progress of the Work by any act or neglect of the State of Colorado or the Architect/Engineer, or of any employee or agent of either, or by any separately employed Contractor or by strikes, lockouts, fire, unusual delay in transportation, unavoidable casualties or any other causes beyond the Contractor’s control, including weather delays as defined below, the time of Completion of the Work shall be extended for a period equal to such portion of the period of delays directly affecting the completion of the Work as the Contractor shall be able to show he or she could not have avoided by the exercise of due diligence.

The Contractor shall provide Notice in writing to the Architect/Engineer, the Principal Representative and State Buildings Programs within three (3) business days from the beginning of such delay and shall file a written claim for an extension of time within seven (7) business days after the period of such delay has ceased, otherwise, any claim for an extension of time is waived.

Provided that the Contractor has submitted reasonable schedules for approval when required by Article 12, Requests for Information and Schedules, if no schedule is agreed to fixing the dates on which the responses to requests for information or detail drawings will be needed, or Shop Drawings, Product Data or Samples are to be reviewed as required or allowed by Article 12B, Schedules, no extension of time will be allowed for the Architect/Engineer’s failure to furnish such detail drawings as needed, or for the failure to initially review Shop Drawings, Product Data or Samples, except in respect of that part of any delay in furnishing detail drawings or instructions extending beyond a reasonable period after written demand for such detailed drawings or instructions is received by the Architect/Engineer. In any event, any claim for an extension of time for such cause will be recognized only to the extent of delay directly caused by failure to furnish detail.
drawings or instructions or to review Shop Drawings, Product Data or Samples pursuant to schedule, after such demand.

All claims for extension of time due to a delay claimed to arise or result from ordered changes in the scope of the Work, or due to instructions claimed to increase the scope of the Work, shall be presented to the Architect/Engineer, the Principal Representative and State Buildings Programs as part of a claim for extra cost, if any, in accordance with Article 36, Claims, and in accordance with the Change Order procedures required by Article 35, Changes In The Work.

Except as otherwise provided in this paragraph, no extension of time shall be granted when the Contractor has failed to utilize a CPM schedule or otherwise identify the Project’s critical path as specified in Article 12, Requests for Information and Schedules, or has elected not to do so when allowed by the Supplementary General Conditions or the Specifications to use less sophisticated scheduling tools, or has failed to maintain such a schedule. Delay directly affecting the completion of the Work shall result in an extension of time only to the extent that completion of the Work was affected by impacts to the critical path shown on Contractor’s CPM schedule. Where the circumstances make it indisputable in the opinion of the Architect/Engineer that the delay affected the completion of the Work so directly that the additional notice of the schedule impact by reference to a CPM schedule was unnecessary, a reasonable extension of time may be granted.

Extension of the time for completion of the Work will be granted for delays due to weather conditions only when the Contractor demonstrates that such conditions were more severe and extended than those reflected by the ten-year average for the month, as evidenced by the Climatological Data, U. S. Department of Commerce, for the Project area.

Extensions of the time for completion of the Work due to weather will be granted on the basis of one and three tenths (1.3) calendar days for every day that the Contractor would have worked but was unable to work, with each separate extension figured to the nearest whole calendar day.

For weather delays and delays caused by events, acts or omissions not within the control of the Principal Representative or any person acting on the Principal Representative’s behalf, the Contractor shall be entitled to an extension of time only and shall not be entitled to recovery of additional cost due to or resulting from such delays. This Article does not, however, preclude the recovery of damages for delay by either party under other provisions in the Contract Documents.

ARTICLE 39. NON-BINDING DISPUTE RESOLUTION – FACILITATED NEGOTIATIONS
The Contractor and Principal Representative agree to designate one or more mutually acceptable persons willing and able to facilitate negotiations and communications for the resolution of conflicts, disagreements or disputes between them at the specific request of either party with regard to any Project decision of either of them or any decision of the Architect/Engineer. The designation of such person(s) shall not carry any obligation to use their services except that each party agrees that if the other party requests the intervention of such person(s) with respect to any such conflict, dispute or disagreement, the non-requesting party shall participate in good faith attempts to negotiate a resolution of the issue in dispute. If the parties cannot agree on a mutually acceptable person to serve in this capacity one shall be so appointed; provided, however, that either party may request the director of State Buildings Programs to appoint such a person, who, if appointed, shall be accepted for this purpose by both the Contractor and the Principal Representative.

The cost, if any, of the facilitative services of the person(s) so designated shall be shared if the parties so agree in any partnering plan; or in the absence of agreement the cost shall be borne by the party requesting the facilitation of negotiation.

Any dispute, claim, question or disagreement arising from or relating to the Contract or an alleged breach of the Contract may be subject to a request by either party for facilitated negotiation subject to the limitations hereafter listed, and the parties shall participate by consultation and negotiation with each other, as guided by the facilitator and with recognition of their mutual interests, in an attempt to reach an equitable solution satisfactory to both parties.
The obligation to participate in facilitated negotiations shall be as described above and elsewhere in these General Conditions, as by way of example in Article 36, Claims, or Article 34, Deductions for Uncorrected Work, and to the extent not more particularly described or limited elsewhere, each party’s obligations shall be as follows:

1. a party shall not initiate communication with the facilitator regarding the issues in dispute; except that any request for facilitation shall be made in writing with copies sent, faxed or delivered to the other party;
2. a party shall prepare a brief written description of its position if so requested by the facilitator (who may elect to first discuss the parties' positions with each party separately in the interest of time and expense);
3. a party shall respond to any reasonable request for copies of documents requested by the facilitator, but such requests, if voluminous, may consist of an offer to allow the facilitator access to the parties' documents;
4. a party shall review any meeting agenda proposed by a facilitator and endeavor to be informed on the subjects to be discussed;
5. a party shall meet with the other party and the facilitator at a mutually acceptable place and time, or, if none can be agreed to, at the time and place designated by the facilitator for a period not to exceed four hours unless the parties agree to a longer period;
6. a party shall endeavor to assure that any facilitation meeting shall be attended by any other persons in their employ that the facilitator requests be present, if reasonably available, including the Architect/Engineer;
7. each party shall participate in such facilitated face-to-face negotiations of the issues in dispute through persons fully authorized to resolve the issue in dispute;
8. each party shall be obligated to participate in negotiations requested by the other party and to perform the specific obligations described in paragraphs (1) through (10) this Article 39, Facilitated Negotiation, no more than three times during the course of the Project;
9. neither party shall be under any obligation to resolve any issue by facilitated negotiation, but each agrees to participate in good faith and the Principal Representative shall direct the Architect/Engineer to appropriately document any resolution or agreement reached and to execute any Amendment or Change Order to the Contract necessary to implement their agreement; and,
10. any discussions and documents prepared exclusively for use in the negotiations shall be deemed to be matters pertaining to settlement negotiations and shall not be subsequently available in further proceedings except to the extent of any documented agreement.

In accordance with State Fiscal Rules and Article 52F, Choice of Law; No Arbitration, nothing in this Article 39 shall be deemed to call for arbitration or otherwise obligate the State to participate in any form of binding alternative dispute resolution.

A partnering plan developed as described in Article 2D, Communications and Cooperation, may modify or expand the requirements of this Article but may not reduce the obligation to participate in facilitated negotiations when applicable. In the case of small projects estimated to be valued under $500,000, the requirements of this Article may be deleted from this Contract, by modification in Article 54, Optional Provisions And Elections. When so modified, the references to the parties’ right to elect facilitated negotiation elsewhere in these General Conditions shall be deleted.

ARTICLE 40. RIGHT OF OCCUPANCY
The Principal Representative shall have the right to take possession of and to use any completed or partially completed portions of the Work, even if the time for completing the entire Work or portions of the Work has not expired and even if the Work has not been finally accepted, and the Contractor shall fully cooperate with the Principal Representative to allow such possession and use. Such possession and use shall not constitute an acceptance of such portions of the Work.

Prior to any occupancy of the Project, an inspection shall be made by the Architect/Engineer, State Buildings Programs and the Contractor. Such inspection shall be made for the purpose of ensuring that the building is

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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). It shall not be authorized until the Pre-Acceptance punch list (SBP-06) shall have been prepared and approved containing no more than ten items of work remaining to be completed or repaired.

Where partial Notices of Substantial Completion have been issued, partial Notices of Final Acceptance may be similarly issued when appropriate for that portion of the Work. Partial Notice of Final Acceptance may also be issued to exclude the work described in Change Orders executed during late stages of the Project where a later completion date for the Change Ordered work is expressly provided for in the Contract as amended by the Change Order, provided the work can be adequately described to allow partial advertisement of any Notice of Partial Final Settlement to be issued without confusion as to the work included for which final payment will be made.

E. SETTLEMENT
Final payment and settlement shall be made on the date fixed and published for such payment except as hereafter provided. The Principal Representative shall not authorize final payment until all items on the Pre-Acceptance punch list (SBP-06) have been completed, the Notice of Acceptance issued, and the Notice of Contractors Settlement published. If the work shall be substantially completed, but Final Acceptance and completion thereof shall be prevented through delay in correction of minor defects, or unavailability of materials or other causes beyond the control of the Contractor, the Principal Representative in his or her discretion may release to the Contractor such amounts as may be in excess of three times the cost of completing the unfinished work or the cost of correcting the defective work, as estimated by the Architect/Engineer and approved by State Buildings Programs. Before the Principal Representative may issue the Notice of Contractor’s Settlement and advertise the Project for final payment, the Contractor shall have corrected all items on the punch list except those items for which delayed performance is expressly permitted, subject to withholding for the cost thereof, and shall have:

1. Delivered to the Architect/Engineer:
   a. All guarantees and warranties;
   b. All statements to support local sales tax refunds, if any;
   c. Three (3) complete bound sets of required operating maintenance instructions; and,
   d. One (1) set of as-built Contract Documents showing all job changes.

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

Upon completion of the foregoing the Project shall be advertised in accordance with the Notice of Contractor’s Settlement by two publications of Notice, the last publication appearing at least ten (10) days prior to the time of final settlement. Publication and final settlement should not be postponed or delayed solely by virtue of unresolved claims against the Project or the Contractor from Subcontractors, suppliers or materialmen based on good faith disputes; the resolution of the question of payment in such cases being directed by statute.

Except as hereafter provided, on the date of final settlement thus advertised, provided the Contractor has submitted a written Notice to the Architect/Engineer that no claims have been filed, and further provided the Principal Representative shall have received no claims, final payments and settlement shall be made in full. If any unpaid claim for labor, materials, rental machinery, tools, supplies or equipment is filed before payment in full of all sums due the Contractor, the Principal Representative and the State Controller shall withhold from the Contractor on the date established for final settlement, sufficient funds to insure the payment of such claim, until the same shall have been paid or withdrawn, such payment or withdrawal to be evidenced by filing a receipt in full or an order for withdrawal signed by the claimant or his or her duly authorized agent or assignee. The amount so withheld may be in the
The Contractor shall guarantee to remedy defects and repair or replace the Work for a period of one year from the date of the Notice of Substantial Completion or from the dates of any partial Notices of Substantial Completion issued for discrete physical portions of the Work. The Contractor shall remedy any defects due to faulty materials or workmanship and shall pay for, repair and replace any damage to other work resulting there from, which shall appear within a period of one year from the date of such Notice(s) of Substantial Completion. The Contractor shall also remedy any deviation from the requirements of the Contract Documents which shall later be discovered within a period of one year from the date of the Notice of Substantial Completion; provided, however, that the Contractor shall not be required to remedy deviations from the requirements of the Contract Documents where such deviations were obvious, apparent and accepted by the Architect/Engineer or the Principal Representative at the time of the Notice of Final Acceptance. The Principal Representative shall give
Notice of observed defects or other work requiring correction with reasonable promptness. Such Notice shall be in writing to the Architect/Engineer and the Contractor.

The one year guarantee of the Contractor’s work may run separately for discrete physical portions of the Work for which partial Notices of Substantial Completion have been issued, however, it shall run from the last Notice of Substantial Completion with respect to all or any systems common to the work to which more than one Notice of Substantial Completion may apply.

This one-year guarantee shall not be construed to limit the Contractor’s general warranty described in Article 42, General Warranty and Correction of Work After Acceptance, that all materials and equipment are new and of good quality, unless specified to the contrary, and that the Work shall in all respects be free from material defects not permitted by the Specifications and in accordance with the requirements of the Contract Documents.

B. SPECIAL GUARANTEES AND WARRANTIES
In case of work performed for which product, manufacturers or other special warranties are required by the Specifications, the Contractor shall secure the required warranties and deliver copies thereof to the Principal Representative through the Architect/Engineer upon completion of the work.

These product, manufacturers or other special warranties, as such, do not in any way lessen the Contractor’s responsibilities under the Contract. Whenever guarantees or warranties are required by the Specifications for a longer period than one year, such longer period shall govern.

ARTICLE 45. GUARANTEE INSPECTIONS AFTER COMPLETION
The Architect/Engineer, the Principal Representative and the Contractor together shall make at least two (2) complete inspections of the work after the Work has been determined to be substantially complete and accepted. One such inspection, the “Six-Month Guarantee Inspection,” shall be made approximately six (6) months after date of the Notice of Substantial Completion, unless in the case of smaller projects valued under $500,000 this inspection is declined in Article 54A, Modification of Article 45, in which case the inspection to occur at six months shall not be required. Another such inspection, the “Eleven-Month Guaranty Inspection” shall be made approximately eleven (11) months after the date of the Notice of Substantial Completion. The Principal Representative shall schedule and so notify all parties concerned, including State Buildings Programs, of these inspections. If more than one Notice of Substantial Completion has been issued at the reasonable discretion of the Principal Representative separate eleven month inspections may be required where the one year guarantees do not run reasonably concurrent.

Written punch lists and reports of these inspections shall be made by the Architect/Engineer and forwarded to the Contractor, the Principal Representative, State Buildings Programs, and all other participants within ten (10) days after the completion of the inspections. The punch list shall itemize all guarantee items, prior punch list items still to be corrected or completed and any other requirements of the Contract Documents to be completed which were not waived by final acceptance because they were not obvious or could not reasonably have been previously observed. The Contractor shall immediately initiate such remedial work as may be necessary to correct any deficiencies or defective work shown by this report, and shall promptly complete all such remedial work in a manner satisfactory to the Architect/Engineer, the Principal Representative and State Buildings Programs.

If the Contractor fails to promptly correct all deficiencies and defects shown by this report, the Principal Representative may do so, after giving the Contractor ten (10) days written Notice of intention to do so.

The State of Colorado, acting by and through the Principal Representative, shall be entitled to collect from the Contractor all costs and expenses incurred by it in correcting such deficiencies and defects, as well as all damages resulting from such deficiencies and defects.

ARTICLE 46. TIME OF COMPLETION AND LIQUIDATED DAMAGES
It is hereby understood and mutually agreed, by and between the parties hereto, that the date of beginning, rate of progress, and the time for completion of the Work to be done hereunder are ESSENTIAL
CONDITIONS of this Agreement, and it is understood and agreed that the Work embraced in this Contract shall be commenced at the time specified in the Notice to Proceed (SC-6.26).

It is further agreed that time is of the essence of each and every portion of this Contract, and of any portion of the Work described on the Drawings or Specifications, wherein a definite and certain length of time is fixed for the performance of any act whatsoever. The parties further agree that where under the Contract additional time is allowed for the completion of the Work or any identified portion of the Work, the new time limit or limits fixed by such extension of the time for completion shall be of the essence of this Agreement.

The Contractor acknowledges that subject to any limitations in the Advertisement for Bids, issued for the Project, the Contractor's bid is consistent with and considers the number of days to substantially complete the Project and the number of days to finally complete the Project to which the parties may have stipulated in the Agreement, which stipulation was based on the Contractor's bid. The Contractor agrees that work shall be prosecuted regularly, diligently and uninterruptedly at such rate of progress as will ensure the Project will be substantially complete, and fully and finally complete, as recognized by the issuance of all required Notices of Substantial Completion and Notices of Final Acceptance, within any times stipulated and specified in the Agreement, as the same may be amended by Change Order or other written modification, and that the Principal Representative will be damaged if the times of completion are delayed.

It is expressly understood and agreed, by and between the parties hereto, that the times for the Substantial Completion of the Work or for the final acceptance of the Work as may be stipulated in the Agreement, and as applied here and in Article 54D, Modifications of Article 46, are reasonable times for these stages of completion of the Work, taking into such consideration all factors, including the average climatic range and usual industrial conditions prevailing in the locality of the building operations.

If the Contractor shall neglect, fail or refuse to complete the Work within the times specified in the Agreement, such failure shall constitute a breach of the terms of the Contract and the State of Colorado, acting by and through the Principal Representative, shall be entitled to liquidated damages for such neglect, failure or refusal, as specified in Article 54D, Modification of Article 46.

The Contractor and the Contractor's Surety shall be jointly liable for and shall pay the Principal Representative, or the Principal Representative may withhold, the sums hereinafter stipulated as liquidated damages for each calendar day of delay until the entire Project is 1) substantially completed, and the Notice (or all Notices) of Substantial Completion are issued, 2) finally complete and accepted and the Notice (or all Notices) of Acceptance are issued, or 3) both. Delay in substantial completion shall be measured from the Date of the Notice to Proceed and delay in final completion and acceptance shall be measured from the Date of the Notice of Substantial Completion.

In the first instance, specified in Article 54D(1), Modification of Article 46, liquidated damages, if any, shall be the amount specified therein, for each calendar day of delay beginning after the stipulated number of days for Substantial Completion from the date of the Notice to Proceed, until the date of the Notice of Substantial Completion. Unless otherwise specified in any Supplementary General Conditions, in the event of any partial Notice of Substantial Completion, liquidated damages shall accrue until all required Notices of Substantial Completion are issued.

In the second instance, specified in Article 54D(2), Modification of Article 46, liquidated damages, if any, shall be the amount specified in Article 54D, Modification of Article 46, for each calendar day in excess of the number of calendar days specified in the Contractor’s bid for the Project and stipulated in the Agreement to finally complete the Project (as defined by the issuance of the Notice of Acceptance) after the final Notice of Substantial Completion has been issued.

In the third instance, when so specified in both Articles 54D(1) and (2), both types of liquidated damages shall be separately assessed where those delays have occurred.

The parties expressly agree that said amounts are a reasonable estimate of the presumed actual damages that would result from any of the breaches listed, and that any liquidated damages that are assessed have
been agreed to in light of the difficulty of ascertaining the actual damages that would be caused by any of these breaches at the time this Contract was formed; the liquidated damages in the first instance representing an estimate of damages due to the inability to use the Project; the liquidated damages in the second instance representing an estimate of damages due to the additional administrative, technical, supervisory and professional expenses related to and arising from the extended closeout period including delivery of any or all guarantees and warranties, the submittals of sales and use tax payment forms, the calling for the final inspection and the completion of the final punch list.

The parties also agree and understand that the liquidated damages to be assessed in each instance are separate and distinct, although potentially cumulative, damages for the separate and distinct breaches of delayed substantial completion or final acceptance. Such liquidated damages shall not be avoided by virtue of the fact of concurrent delay caused by the Principal Representative, or anyone acting on behalf of the Principal Representative, but in such event the period of delay for which liquidated damages are assessed shall be equitably adjusted in accordance with Article 38, Delays And Extensions Of Time.

ARTICLE 47. DAMAGES

If either party to this Contract shall suffer damage under this Contract in any manner because of any wrongful act or neglect of the other party or of anyone employed by either of them, then the party suffering damage shall be reimbursed by the other party for such damage. Except to the extent of damages liquidated for the Contractor’s failure to achieve timely completion as set forth in Article 46, Time of Completion and Liquidated Damages, the Principal Representative shall be responsible for, and at his or her option may insure against, loss of use of any existing property not included in the Work, due to fire or otherwise, however caused. Notwithstanding the foregoing, or any other provision of this Contract, to the contrary, no term or condition of this contract shall be construed or interpreted as a waiver, express or implied, of any of the immunities, rights, benefits, protection, or other provisions of the Colorado Governmental Immunity Act, Section 24-10-101, et seq., CRS, as now or hereafter amended. The parties understand and agree that liability for claims for injuries to persons arising out of negligence of the State of Colorado, its departments, institutions, agencies, boards, officials and employees is controlled and limited by the provisions of Section 24-10-101, et seq., CRS, as now or hereafter amended and the risk management statutes, Section 24-30-1501, et seq., CRS, as now or hereafter amended.

Notice of intent to file a claim under this clause shall be made in writing to the party liable within a reasonable time of the first observance of such damage and not later than the time of final payment, except that in the case of claims by the Principal Representative involving warranties against faulty work or materials Notice shall be required only to the extent stipulated elsewhere in these General Conditions. Claims made to the Principal Representative involving extra cost or extra time arising by virtue of instructions to the Contractor to which Article 36, Claims, applies shall be made in accordance with Article 36. Other claims arising under the Contract involving extra cost or extra time which are made to the Principal Representative under this clause shall also be made in accordance with the procedures of Article 36, whether or not arising by virtue of instructions to the Contractor; provided however that it shall not be necessary to first obtain or request a written judgment of the Architect/Engineer.

Provided written Notice of intent to file a claim is provided as required in the preceding paragraph, nothing in this Article shall limit or restrict the rights of either party to bring an action at law or to seek other relief to which either party may be entitled, including consequential damages, if any, and shall not be construed to limit the time during which any action might be brought. Nothing in these General Conditions shall be deemed to limit the period of time during which any action may be brought as a matter of contract, tort, warranty or otherwise, it being the intent of the parties to allow any and all actions at law or in equity for such periods as the law permits. All such rights shall, however be subject to the obligation to assert claims and to appeal denials pursuant to Article 36, Claims, where applicable.

ARTICLE 48. STATE’S RIGHT TO DO THE WORK; TEMPORARY SUSPENSION OF WORK; DELAY DAMAGES

A. STATE’S RIGHT TO DO THE WORK

If after receipt of Notice to do so, the Contractor should neglect to prosecute the Work properly or fail to perform any provision of the Contract, the Principal Representative, after a second seven (7) days’
advance written Notice to the Contractor and the Surety may, without prejudice to any other remedy the Principal Representative may have, take control of all or a portion of the Work, as the Principal Representative deems necessary and make good such deficiencies deducting the cost thereof from the payment then or thereafter due the Contractor, as provided in Article 30, Correction Of Work Before Acceptance and Article 33, Payments Withheld, provided, however, that the Architect/Engineer shall approve the amount charged to the Contractor by approval of the Change Order.

B. TEMPORARY SUSPENSION OF WORK
The State, acting for itself or by and through the Architect/Engineer, shall have the authority to suspend the Work, either wholly or in part, for such period or periods as may be deemed necessary due to:

1. Unsuitable weather;
2. Faulty workmanship;
3. Improper superintendence;
4. Contractor’s failure to carry out orders or to perform any provision of the Contract Documents;
5. Loss of, or restrictions to, appropriations;
6. Conditions, which may be considered unfavorable for the prosecution of the Work.

If it should become necessary to stop work for an indefinite period, the Contractor shall store materials in such manner that they will not become an obstruction or become damaged in any way; and he or she shall take every precaution to prevent damage to or deterioration of the Work, provide suitable drainage and erect temporary structures where necessary.

Notice of suspension of work shall be provided to the Contractor in writing stating the reasons therefore. The Contractor shall again proceed with the work when so notified in writing.

The Contractor understands and agrees that the State of Colorado cannot predict with certainty future revenues and could ultimately lack the revenue to fund the appropriations applicable to this Contract. The Contractor further acknowledges and agrees that in such event that State may, upon Notice to the Contractor, suspend the work in anticipation of a termination of the Contract for the convenience of the State, pursuant to Article 50, Termination For Convenience of State. If the Contract is not so terminated the Contract sum and the Contract time shall be equitably adjusted at the time the Principal Representative directs the work to be recommenced and gives Notice that the revenue to fund the appropriation is available.

C. DELAY DAMAGES
The Principal Representative and the State of Colorado shall be liable to the Contractor for the payment of any claim for extra costs, extra compensation or damages occasioned by hindrances or delays encountered in the work only when and to the limited extent that such hindrance or delay is caused by an act or omission within the control of the Principal Representative, the Architect/Engineer or other persons or entities acting on behalf of the Principal Representative. Further, the Principal Representative and the State of Colorado shall be liable to the Contractor for the payment of such a claim only if the Contractor has provided required Notice of the delay or impact, or has presented its claim for an extension of time or claim of other delay or other impact due to changes ordered in the work before proceeding with the changed work. Except as otherwise provided, claims for extension of time shall be Noticed and filed in accordance with Article 38, Delays and Extensions of Time, within three (3) business days of the beginning of the delay with any claim filed within seven (7) days after the delay has ceased, or such claim is waived. Claims for extension of time or for other delay or other impact resulting from changes ordered in the Work shall be presented and adjusted as provided in Article 35, Changes in the Work.

ARTICLE 49. STATE’S RIGHTS TO TERMINATE CONTRACT
A. GENERAL
If the Contractor should be adjudged bankrupt, or if he or she should make a general assignment for the benefit of his or her creditors, or if a receiver should be appointed to take over his affairs, or if he or
she should fail to prosecute his or her work with due diligence and carry the work forward in accordance with the construction schedule and the time limits set forth in the Contract Documents, or if he or she should fail to subsequently perform one or more of the provisions of the Contract Documents to be performed by him, the Principal Representative may serve written Notice on the Contractor and the Surety on performance and payment bonds, stating his or her intention to exercise one of the remedies hereinafter set forth and the grounds upon which the Principal Representative bases his or her right to exercise such remedy.

In such event, unless the matter complained of is satisfactorily cleared within ten (10) days after delivery of such Notice, the Principal Representative may, without prejudice to any other right or remedy, exercise one of such remedies at once, having first obtained the concurrence of the Architect/Engineer in writing that sufficient cause exists to justify such action.

B. CONDITIONS AND PROCEDURES

1. The Principal Representative may terminate the services of the Contractor, which termination shall take effect immediately upon service of Notice thereof on the Contractor and his or her Surety, whereupon the Surety shall have the right to take over and perform the Contract. If the Surety does not provide Notice to the Principal Representative of its intent to commence performance of the Contract within ten (10) days after delivery of the Notice of termination, the Principal Representative may take over the Work, take possession of and use all materials, tools, equipment and appliances on the premises and prosecute the Work to completion by such means as he or she shall deem best. In the event of such termination of his or her service, the Contractor shall not be entitled to any further payment under the Contract until the Work is completed and accepted. If the Principal Representative takes over the Work and if the unpaid balance of the contract price exceeds the cost of completing the Work, including compensation for any damages or expenses incurred by the Principal Representative through the default of the Contractor, such excess shall be paid to the Contractor. If, however, the cost, expenses and damages as certified by the Architect/Engineer exceed such unpaid balance of the contract price, the Contractor and his or her Surety shall pay the difference to the Principal Representative.

2. The Principal Representative may require the Surety on the Contractor’s bond to take control of the Work and see to it that all the deficiencies of the Contractor are made good, with due diligence within ten (10) days of delivery of Notice to the Surety to do so. As between the Principal Representative and the Surety, the cost of making good such deficiencies shall all be borne by the Surety. If the Surety takes over the Work, either by election upon termination of the services of the Contractor pursuant to Section B(1) of this Article 49, State’s Right To Terminate Contract, or upon instructions from the Principal Representative to do so, the provisions of the Contract Documents shall govern the work to be done by the Surety, the Surety being substituted for the Contractor as to such provisions, including provisions as to payment for the Work, the times of completion and provisions of this Article as to the right of the Principal Representative to do the Work or to take control of all or a portion of the Work.

3. The Principal Representative may take control of all or a portion of the Work and make good the deficiencies of the Contractor, or the Surety if the Surety has been substituted for the Contractor, with or without terminating the Contract, employing such additional help as the Principal Representative deems advisable in accordance with the provisions of Article 48A, State’s Right To Do The Work; Temporary Suspension Of Work; Delay Damages. In such event, the Principal Representative shall be entitled to collect from the Contractor and his or her Surety, or to deduct from any payment then or thereafter due the Contractor, the costs incurred in having such deficiencies made good and any damages or expenses incurred through the default of Contractor, provided the Architect/Engineer approves the amount thus charged to the Contractor.

If the Contract is not terminated, a Change Order to the Contract shall be executed, unilaterally if necessary, in accordance with the procedures of Article 35, Changes In The Work.
C. ADDITIONAL CONDITIONS

If any termination by the Principal Representative for cause is later determined to have been improper, the termination shall be automatically converted to and deemed to be a termination by the Principal Representative for convenience and the Contractor shall be limited in recovery to the compensation provided for in Article 50, Termination For Convenience Of State. Termination by the Contractor shall not be subject to such conversion.

ARTICLE 50. TERMINATION FOR CONVENIENCE OF STATE

A. NOTICE OF TERMINATION

The performance of Work under this Contract may be terminated, in whole or from time to time in part, by the State whenever for any reason the Principal Representative shall determine that such termination is in the best interest of State. Termination of work hereunder shall be effected by delivery to the Contractor of a Notice of such termination specifying the extent to which the performance of work under the Contract is terminated and the date upon which such termination becomes effective.

B. PROCEDURES

After receipt of the Notice of termination, the Contractor shall, to the extent appropriate to the termination, cancel outstanding commitments hereunder covering the procurement of materials, supplies, equipment and miscellaneous items. In addition, the Contractor shall exercise all reasonable diligence to accomplish the cancellation or diversion of all applicable outstanding commitments covering personal performance of any work terminated by the Notice. With respect to such canceled commitments, the Contractor agrees to:

1. settle all outstanding liabilities and all claims arising out of such cancellation of commitments, with approval or ratification of the Principal Representative, to the extent he or she may require, which approval or ratification shall be final for all purposes of this clause; and,
2. assign to the State, in the manner, at the time, and to the extent directed by the Principal Representative, all of the right, title, and interest of the Contractor under the orders and subcontracts so terminated, in which case the State shall have the right, in its discretion, to settle or pay any or all claims arising out of the termination of such orders and subcontracts.

The Contractor shall submit his or her termination claim to the Principal Representative promptly after receipt of a Notice of termination, but in no event later than three (3) months from the effective date thereof, unless one or more extensions in writing are granted by the Principal Representative upon written request of the Contractor within such three month period or authorized extension thereof. Upon failure of the Contractor to submit his or her termination claim within the time allowed, the Principal Representative may determine, on the basis of information available to him, the amount, if any, due to the Contractor by reason of the termination and shall thereupon pay to the Contractor the amount so determined.

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

Subject to the preceding provisions, the Contractor and the Principal Representative may agree upon the whole or any part of the amount or amounts to be paid to the Contractor by reason of the termination under this clause, which amount or amounts may include any reasonable cancellation charges thereby incurred by the Contractor and any reasonable loss upon outstanding commitments for personal services which he or she is unable to cancel; provided, however, that in connection with any outstanding commitments for personal services which the Contractor is unable to cancel, the Contractor shall have exercised reasonable diligence to divert such commitments to other activities and operations. Any such agreement shall be embodied in an Amendment to this Contract and the Contractor shall be paid the agreed amount.

The State may from time to time, under such terms and conditions as it may prescribe, make partial payments against costs incurred by the Contractor in connection with the termination portion of this contract.
Contract, whenever, in the opinion of the Principal Representative, the aggregate of such payments is within the amount to which the Contractor will be entitled hereunder.

The Contractor agrees to transfer title and deliver to the State, in the manner, at the time, and to the extent, if any, directed by the Principal Representative, such information and items which, if the Contract had been completed, would have been required to be furnished to the State, including:

a. completed or partially completed plans, Drawings and information; and,
b. materials or equipment produced or in process or acquired in connection with the performance of the work terminated by the Notice.

Other than the above, any termination inventory resulting from the termination of the Contract may, with written approval of the Principal Representative, be sold or acquired by the Contractor under the conditions prescribed by and at a price or prices approved by the Principal Representative. The proceeds of any such disposition shall be applied in reduction of any payments to be made by the State to the Contractor under this Contract or shall otherwise be credited to the price or cost of work covered by this Contract or paid in such other manners as the Principal Representative may direct. Pending final disposition of property arising from the termination, the Contractor agrees to take such action as may be necessary, or as the Principal Representative may direct, for the protection and preservation of the property related to this Contract which is in the possession of the Contractor and in which the State has or may acquire an interest.

Any disputes as to questions of fact, which may arise hereunder, shall be subject to the Remedies provisions of the Colorado Procurement Code, §§ 24-109-101, et seq., C.R.S., as amended.

ARTICLE 51. CONTRACTOR’S RIGHT TO STOP WORK AND/OR TERMINATE CONTRACT

If the Work shall be stopped under an order of any court or other public authority for a period of three (3) months through no act or fault of the Contractor or of any one employed by him, then the Contractor may on seven (7) days’ written Notice to the Principal Representative and the Architect/Engineer stop work or terminate this Contract and recover from the Principal Representative payment for all work executed, any losses sustained on any plant or material, and a reasonable profit. If the Architect/Engineer shall fail to issue or otherwise act in writing upon any certificate for payment within ten (10) days after it is presented and received by the Architect/Engineer, as provided in Article 31, Applications For Payments, or if the Principal Representative shall fail to pay the Contractor any sum certified that is not disputed in whole or in part by the Principal Representative in writing to the Contractor and the Architect/Engineer within thirty (30) days after the Architect/Engineer’s certification, then the Contractor may on ten (10) days’ written Notice to the Principal Representative and the Architect/Engineer stop work and/or give written Notice of intention to terminate this Contract.

If the Principal Representative shall thereafter fail to pay the Contractor any amount certified by the Architect/Engineer and not disputed in writing by the Principal Representative within ten (10) days after receipt of such Notice, then the Contractor may terminate this Contract and recover from the Principal Representative payment for all work executed, any losses sustained upon any plant or materials, and a reasonable profit. The Principal Representative’s right to dispute an amount certified by the Architect/Engineer shall not relieve the Principal Representative of the obligation to pay amounts not in dispute as certified by the Architect/Engineer.

ARTICLE 52. SPECIAL PROVISIONS

A. CONTROLLER’S APPROVAL CRS 24-30-202(1)

This Contract shall not be deemed valid until it has been approved by the Colorado State Controller or designee.

B. FUND AVAILABILITY CRS 24-30-202(5.5)

Financial obligations of the State payable after the current fiscal year are contingent upon funds for that purpose being appropriated, budgeted, and otherwise made available.
C. GOVERNMENTAL IMMUNITY
No term or condition of this contract shall be construed or interpreted as a waiver, express or implied, of any of the immunities, rights, benefits, protections, or other provisions, of the Colorado Governmental Immunity Act, CRS §24-10-101 et seq., or the Federal Tort Claims Act, 28 U.S.C. §§1346(b) and 2671 et seq., as applicable now or hereafter amended.

D. INDEPENDENT CONTRACTOR 4 CCR 801-2
Contractor shall perform its duties hereunder as an independent contractor and not as an employee. Neither Contractor nor any agent or employee of Contractor shall be deemed to be an agent or employee of the State. Contractor and its employees and agents are not entitled to unemployment insurance or workers compensation benefits through the State and the State shall not pay for or otherwise provide such coverage for Contractor or any of its agents or employees. Unemployment insurance benefits will be available to Contractor and its employees and agents only if such coverage is made available by Contractor or a third party. Contractor shall pay when due all applicable employment taxes and income taxes and local head taxes incurred pursuant to this contract. Contractor shall not have authorization, express or implied, to bind the State to any agreement, liability or understanding, except as expressly set forth herein. Contractor shall (a) provide and keep in force workers' compensation and unemployment compensation insurance in the amounts required by law, (b) provide proof thereof when requested by the State, and (c) be solely responsible for its acts and those of its employees and agents.

E. COMPLIANCE WITH LAW
Contractor shall strictly comply with all applicable federal and State laws, rules, and regulations in effect or hereafter established, including, without limitation, laws applicable to discrimination and unfair employment practices.

F. CHOICE OF LAW
Colorado law, and rules and regulations issued pursuant thereto, shall be applied in the interpretation, execution, and enforcement of this contract. Any provision included or incorporated herein by reference which conflicts with said laws, rules, and regulations shall be null and void. Any provision incorporated herein by reference which purports to negate this or any other Special Provision in whole or in part shall not be valid or enforceable or available in any action at law, whether by way of complaint, defense, or otherwise. Any provision rendered null and void by the operation of this provision shall not invalidate the remainder of this contract, to the extent capable of execution.

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

H. SOFTWARE PIRACY PROHIBITION. Governor's Executive Order D 002 00
State or other public funds payable under this contract shall not be used for the acquisition, operation, or maintenance of computer software in violation of federal copyright laws or applicable licensing restrictions. Contractor hereby certifies and warrants that, during the term of this contract and any extensions, Contractor has and shall maintain in place appropriate systems and controls to prevent such improper use of public funds. If the State determines that Contractor is in violation of this provision, the State may exercise any remedy available at law or in equity or under this contract, including, without limitation, immediate termination of this contract and any remedy consistent with federal copyright laws or applicable licensing restrictions.

I. EMPLOYEE FINANCIAL INTEREST/CONFLICT OF INTEREST CRS 24-18-201 & CRS 24-50-507
The signatories aver that to their knowledge, no employee of the State has any personal or beneficial interest whatsoever in the service or property described in this contract. Contractor has no interest and shall not acquire any interest, direct or indirect, that would conflict in any manner or degree with the performance of Contractor's services and Contractor shall not employ any person having such known interests.
J. VENDOR OFFSET CRS 24-30-202(1) & CRS 24-30-202.4
Subject to CRS §24-30-202.4 (3.5), the State Controller may withhold payment under the State’s vendor offset intercept system for debts owed to State agencies for: (a) unpaid child support debts or child support arrearages; (b) unpaid balances of tax, accrued interest, or other charges specified in CRS §39-21-101, et seq.; (c) unpaid loans due to the Student Loan Division of the Department of Higher Education; (d) amounts required to be paid to the Unemployment Compensation Fund; and (e) other unpaid debts owing to the State as a result of final agency determination or judicial action.

K. PUBLIC CONTRACTS FOR SERVICES. CRS §8-17.5-101. [Not Applicable to agreements relating to the offer, issuance, or sale of securities, investment advisory services or fund management services, sponsored projects, intergovernmental agreements, or information technology services or products and services] Contractor certifies, warrants, and agrees that it does not knowingly employ or contract with an illegal alien who will perform work under this contract and will confirm the employment eligibility of all employees who are newly hired for employment in the United States to perform work under this contract, through participation in the E-Verify Program or the Department program established pursuant to CRS §8-17.5-102(5)(c), Contractor shall not knowingly employ or contract with an illegal alien to perform work under this contract or enter into a contract with a subcontractor that fails to certify to Contractor that the subcontractor shall not knowingly employ or contract with an illegal alien to perform work under this contract. Contractor (a) shall not use E-Verify Program or Department program procedures to undertake pre-employment screening of job applicants while this contract is being performed, (b) shall notify the subcontractor and the contracting State agency within three days if Contractor has actual knowledge that a subcontractor is employing or contracting with an illegal alien for work under this contract, (c) shall terminate the subcontract if a subcontractor does not stop employing or contracting with the illegal alien within three days of receiving the notice, and (d) shall comply with reasonable requests made in the course of an investigation, undertaken pursuant to CRS §8-17.5-102(5), by the Colorado Department of Labor and Employment. If Contractor participates in the Department program, Contractor shall deliver to the contracting State agency, Institution of Higher Education or political subdivision a written, notarized affirmation, affirming that Contractor has examined the legal work status of such employee, and shall comply with all of the other requirements of the Department program. If Contractor fails to comply with any requirement of this provision or CRS §8-17.5-101 et seq., the contracting State agency, institution of higher education or political subdivision may terminate this contract for breach and, if so terminated, Contractor shall be liable for damages.

L. PUBLIC CONTRACTS WITH NATURAL PERSONS. CRS §24-76.5-101.
Contractor, if a natural person eighteen (18) years of age or older, hereby swears and affirms under penalty of perjury that he or she (a) is a citizen or otherwise lawfully present in the United States pursuant to federal law, (b) shall comply with the provisions of CRS §24-76.5-101 et seq., and (c) has produced one form of identification required by CRS §24-76.5-103 prior to the effective date of this contract.

ARTICLE 53. MISCELLANEOUS PROVISIONS
A. CONSTRUCTION OF LANGUAGE
The language used in these General Conditions shall be construed as a whole according to its plain meaning, and not strictly for or against any party. Such construction shall, however, construe language to interpret the intent of the parties giving due consideration to the order of precedence noted in Article 2C, Intent of Documents.

B. SEVERABILITY
If any covenant, term, condition, or provision contained in these General Conditions is held by a court of competent jurisdiction to be invalid, illegal, or unenforceable in any respect, such covenant, term, condition, or provision shall be severed or modified to the extent necessary to make it enforceable, and the resulting General Conditions shall remain in full force and effect, and such invalidity or other failure shall not affect the validity of any other covenant, term or provision hereof. Provided the same does not work a substantial injustice, these General Conditions shall be construed as if such invalid portion had not been inserted.
C. **SECTION HEADINGS**
The section or paragraph headings contained within these General Conditions are inserted for convenience only and shall not be construed to vary or add to the meaning of this Contract.

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

E. **INTEGRATION OF UNDERSTANDING**
This Contract is intended as the complete integration of all understandings between the parties and supersedes all prior negotiations, representations, or agreements, whether written or oral. No prior or contemporaneous addition, deletion, or other amendment hereto shall have any force or effect whatsoever, unless embodied herein in writing. No subsequent novation, renewal, addition, deletion, or other amendment hereto shall have any force or effect unless embodied in a written Change Order or Amendment to this Contract.

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

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

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

I. **INDEMNIFICATION**
Contractor shall indemnify, save, and hold harmless the State, its employees and agents, against any and all claims, damages, liability and court awards including costs, expenses, and attorney fees and related costs, incurred as a result of any act or omission by Contractor, or its employees, agents, subcontractors, or assignees pursuant to the terms of this contract.

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

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

Construction Manager understands that if the maximum amount payable to Construction Manager under this Contract is $500,000 or greater, either on the Effective Date or at anytime thereafter, the State shall have the additional responsibility to revise the Report date.

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

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

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

A. MODIFICATION OF ARTICLE 45. GUARANTEE INSPECTIONS AFTER COMPLETION
If the box below is marked the six month guarantee inspection is not required.

☐ _______ Principal Representative initial

B. MODIFICATION OF ARTICLE 27. LABOR AND WAGES
If the box is marked the Federal Davis-Bacon Act shall be applicable to the Project. The minimum wage rates to be paid on the Project shall be furnished by the Principal Representative and included in the Contract Documents.

☐ _______ Principal Representative initial

C. MODIFICATION OF ARTICLE 39. NON-BINDING DISPUTE RESOLUTION – FACILITATED NEGOTIATIONS
If the box is marked, and initialed by the State as noted, the requirement to participate in facilitated negotiations shall be deleted from this Contract. Article 39, Non-Binding Dispute Resolution – Facilitated Negotiations, shall be deleted in its entirety and all references to the right to the same where ever they appear in the contract shall be similarly deleted. The box may be marked only for projects with an estimated value of less than $500,000.

☐ _______ Principal Representative initial
D. MODIFICATION OF ARTICLE 46. TIME OF COMPLETION AND LIQUIDATED DAMAGES

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

1. For the inability to use the Project, for each day after the number of calendar days specified in the Contractor’s bid for the Project and the Agreement for achievement of Substantial Completion, until the day that the Project has achieved Substantial Completion and the Notice of Substantial Completion is issued, the Contractor agrees that an amount equal to Five Hundred Dollars and No/100 ($500.00) 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 Dollars 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. 8/2009
SC-6.23
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:
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) $ 100,000 Each Accident
Coverage B (Employers Liability) $ 100,000 Disease Ea. Employ
$ 500,000 Disease-Policy Limit

Contractors Pollution Liability (as required-See Coverages #7)

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

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

• This coverage is required for new buildings or additions to existing buildings.
• See the Builders Risk section (below) for required terms and conditions.

Installation Floater

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

ADDITIONAL INSURANCE REQUIREMENTS

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

Failure of the Contractor to fully comply with these requirements during the term of the Contract may be considered a material breach of contract and may be cause for immediate termination of the Contract at the option of the University. The University reserves the right to negotiate additional specific insurance requirements at the time of the contract award.
Non-Waiver
The parties hereto understand and agree that The University is relying on, and does not waive or intend to waive by any provision of this Contract, the monetary limitations or any other rights, immunities, and protections provided by the Colorado Governmental Immunity Act, 24-10-101 et seq., as from time to time amended, or otherwise available to the University or its officers, employees, agents, and volunteers.

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

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

Unless otherwise provided, the Contractor shall purchase and maintain, in a company or companies lawfully authorized to do business in the jurisdiction in which the project is located, Builder’s Risk Insurance in the amount of the initial contract amount as well as subsequent modifications for the entire project at the site on a replacement cost basis without voluntary deductibles. Such Builder’s Risk Insurance shall be maintained, unless otherwise provided in the contract documents or otherwise agreed in writing by all persons and entities who are beneficiaries of such insurance, until final payment has been made or until no person or entity other than the University has insurable interest in the property to be covered, whichever is earlier. The Builder’s Risk insurance shall include interests of the University of Colorado, the General Contractor, subcontractors and sub-tier contractors in the project.

Builders’ Risk Coverage shall be on a Special Covered Cause of Loss Form and shall include theft, vandalism, malicious mischief, collapse, false-work, temporary buildings and debris removal including demolition, increased cost of construction, architect’s fees and expenses, flood and earthquake, and all below and above ground structures, water and sewer mains. Other coverages may be required if provided in contract documents. Coverages shall be written for 100% of the completed value (replacement cost basis) of the work being performed. At the option of the University of Colorado, the University of Colorado may include Soft Costs (including Loss of Use)/Delay in Opening Endorsement under the builder’s risk policy. The University of Colorado agrees to provide the necessary exposure base information for quotation by the Builder’s Risk carrier. The University of Colorado agrees to pay the premium associated with the Soft Costs coverage, the University of Colorado decides to purchase this coverage.

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

- Waiver of Subrogation against all parties named as insured, but only to the extent the loss is covered.
- Beneficial Occupancy Clause. The policy shall specifically permit partial or beneficial occupancy at or before substantial completion or final acceptance of the entire work. Partial occupancy or use of the work shall not commence until the insurance company or companies providing insurance have consented to such partial occupancy or use. The University of Colorado and Contractor shall take reasonable steps to obtain consent of the insurance company or companies and agree to take no action, other than upon mutual written consent, with respect to occupancy or use of the work that could lead to cancellation, lapse or reduction of insurance.
- Equipment Breakdown Coverage (a.k.a. Boiler & Machinery) required by the Contract Documents or by law, which shall specifically cover insured equipment during installation and testing (including hot testing).
- Deletion of Coinsurance Provisions
- Replacement Costs Basis - including modification of the valuation clause to cover all costs needed to repair the structure or work (including overhead and profits) and will pay based on the values figured at the time of rebuilding or repairing, not at the time of loss
- Deletion of any exclusions pertaining to Law, Ordinance or Regulation
- Deletion of exclusions for design errors & omissions
• Modification of the electrical apparatus breakdown exclusions and the mechanical breakdown exclusion so that it does not apply to subsequent loss or damage
• Modify exclusion pertaining to damage to interior of building caused by 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
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

**PART I - WORK PERFORMED BY CONTRACTOR**

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

**PART II - WORK PERFORMED BY SUBCONTRACTOR**

<table>
<thead>
<tr>
<th>Line</th>
<th>Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.</td>
<td>Direct Labor Costs</td>
<td>$</td>
</tr>
<tr>
<td>10.</td>
<td>Labor Overhead (Direct Labor Burdens) ((%) X Line 9)</td>
<td>$</td>
</tr>
<tr>
<td>11.</td>
<td>Total Subcontractor’s Labor Cost (Lines 9 and 10)</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) ((%) X Line 12)</td>
<td>$</td>
</tr>
<tr>
<td>14.</td>
<td>Total Subcontractor’s Materials Costs (Lines 12 and 13)</td>
<td>$</td>
</tr>
<tr>
<td>15.</td>
<td>Total Subcontractor’s Equipment Costs</td>
<td>$</td>
</tr>
<tr>
<td>16.</td>
<td>Total Subcontractor’s L, M &amp; E Costs (Lines 11, 14 and 15)</td>
<td>$</td>
</tr>
<tr>
<td>17.</td>
<td>Subcontractor’s Overhead (Indirect Costs), ((%) X Line 16)</td>
<td>$</td>
</tr>
<tr>
<td>18.</td>
<td>Subcontractor’s Profit ((%) X Line 16) or (2 ½ % Deduct)</td>
<td>$</td>
</tr>
<tr>
<td>19.</td>
<td><strong>PART II - TOTAL SUBCONTRACTOR’S COSTS</strong> (Lines 16, 17 and 18)</td>
<td>$</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Line</th>
<th>Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>20.</td>
<td>Contractor’s Overhead (Indirect Costs), ((%) X Part I Total)</td>
<td>$</td>
</tr>
<tr>
<td>21.</td>
<td>Contractor’s Profit ((%) X Part I Total)</td>
<td>$</td>
</tr>
<tr>
<td>22.</td>
<td><strong>PART III - TOTAL CONTRACTOR OVERHEAD &amp; PROFIT</strong> (Lines 20 and 21)</td>
<td>$</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Line</th>
<th>Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>23.</td>
<td>Contractor’s Commission on Subcontractor ((%) X Part II Total)</td>
<td>$</td>
</tr>
<tr>
<td>24.</td>
<td>Contractor’s Profit on Subcontractor ((%) X Part II Total) or (2 ½ % Deduct)</td>
<td>$</td>
</tr>
<tr>
<td>25.</td>
<td><strong>PART IV - TOTAL CONTRACTOR MARKUP ON SUBCONTRACTOR</strong> (Lines 23 &amp; 24)</td>
<td>$</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Line</th>
<th>Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(Parts I and II and III and IV)</td>
<td>$</td>
</tr>
<tr>
<td></td>
<td><strong>PART V (Subtotal)</strong></td>
<td>$</td>
</tr>
</tbody>
</table>

**PART VI - CONTRACTOR’S BOND COST**

<table>
<thead>
<tr>
<th>Line</th>
<th>Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>$</td>
</tr>
<tr>
<td></td>
<td><strong>PART VI</strong></td>
<td>$</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Line</th>
<th>Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(Sum of Totals: Parts V and VI)</td>
<td>$</td>
</tr>
<tr>
<td></td>
<td><strong>Grand Total</strong></td>
<td>$</td>
</tr>
</tbody>
</table>

**PART VIII - CONTRACT TIME**

Completion Date (is) (is not) extended ___ calendar days as a result of this proposal.

**CONTRACTOR’S CERTIFICATE:**

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

**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.

*Date: ____________________________

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

**PRINCIPAL REPRESENTATIVE**

**STATE BUILDINGS PROGRAMS**

(Institution or Agency) ____________________________ (or Authorized Delegate) ____________________________ Date ________________

**Signature**: ____________________________

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

BULLETIN NUMBER/DATED: Insert C.O. Bulletin No. and Date Issued
LEFT HAND BOX: Fill in Contractor’s Name; State Project Number and Title
RIGHT HAND BOX: Fill in Description of Changes from Bulletin, noting exceptions that are listed in the Bulletin but are excluded; i.e., not priced on this form.

PART I - WORK PERFORMED BY CONTRACTOR:
Line 1. Direct Labor Costs: Fill in subtotal of direct labor costs, which includes base rates plus applicable fringe benefits.
   On Contractor’s letterhead/spreadsheet show costs as follows:
<table>
<thead>
<tr>
<th>Trade</th>
<th>Rate</th>
<th>Hours</th>
<th>Extended Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>$</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
   Direct Labor Costs = $ 

Line 2. Labor Overhead (Direct Labor Burdens, etc.): Fill in as a percentage of Line 1.
   On letterhead/spreadsheet, show direct materials costs as follows:
<table>
<thead>
<tr>
<th>Materials</th>
<th>Units</th>
<th>Unit Cost</th>
<th>Extended Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>$</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
   Direct Materials Costs = $ 

Line 5. Materials Overhead: Fill in as percentage cost of Line 4. Overhead costs include delivery, taxes, insurance costs, etc. (As mutually agreed upon at contract signing)
Line 6. Total Materials Costs: Fill in total of lines 4 and 5.
Line 7. Total Equipment Costs: Fill in total equipment costs including indirect overhead costs in hourly rate - except indirect labor costs.
   On letterhead/spreadsheet show total equipment costs as follows:
<table>
<thead>
<tr>
<th>Description</th>
<th>Rate</th>
<th>Hours</th>
<th>Extended Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>$</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
   Total Equipment Cost = $ 


PART II - WORK PERFORMED BY SUBCONTRACTOR:
Line 9. Direct Labor Costs: Fill in subtotal of direct labor costs, which includes base rates plus applicable fringe benefits.
   On Subcontractor’s letterhead/spreadsheet show costs by trade, rate, hours and extended costs. See Instructions for line 1.
Line 10. Labor Overhead (Direct Labor Burdens, etc.): Fill in as a percentage of Line 9.
   On letterhead/spreadsheet, show direct materials costs by materials, units, unit costs and extended costs. See Instructions for line 4.
Line 13. Materials Overhead: Fill In as a percentage of line 12. Overhead costs include delivery, taxes, insurance costs, etc.
Line 15. Total Subcontractor’s Equipment Costs: Fill in total equipment costs including indirect overhead costs in hourly rate - except indirect labor costs.
   On letterhead/spreadsheet show total equipment costs by description, rate, hours and extended costs. See Instructions for line 7.
Line 16. Total Subcontractor’s Labor, Materials and Equipment (L, M & E) Costs: Fill in total of lines 11, 14 and 15.
Line 17. Subcontractor’s Overhead (Indirect Costs): Fill in as percentage cost of line 16. See Article 35 of General Conditions.

PARTS III THROUGH VIII - Self-explanatory.

CERTIFICATIONS
A. The Contractor, who prepares this proposal form, certifies the cost/price data by signing, dating, and forwarding same to the Architect/Engineer (or Consultant) for further action.
B. The Architect/Engineer (or Consultant) reviews and analyzes the cost/price data for the requirements that these are: 1) currently prevalent, 2) reasonably fair, 3) factually applicable, and 4) equivalently competitive market selling prices. The Architect/Engineer (or Consultant) may negotiate—after receipt of the cost proposal—any or all of the cost elements of the proposal to support a recommendation of acceptance to the Principal Representative. Certification by the A/E (or Consultant) of the above requirements is made upon his signature. The Architect/Engineer (or Consultant) forwards the proposal with the supporting back-up to the Agency.
C. Authority for the Institution or Agency (usually the Principal Representative) reviews the proposal, signs, dates, and forwards to State Buildings Programs or Delegate for final action.
D. State Buildings Programs or Delegate reviews the cost proposal, with all supporting back-up, for technical and procedural requirements and, if in order, signs and dates the proposal.
STATE OF COLORADO
OFFICE OF THE STATE ARCHITECT
STATE BUILDINGS PROGRAMS

CHANGE ORDER

Change Order No: _____________________________ Date _____________

Contractor: ______________________________________________________________________________________________________

Institution or Agency: University of Colorado at Boulder

Project No./Name: CP 005050 / UMC – Food Service Renovation

Your Change Order Proposal(s), dated ____________ is/are hereby being designated for approval of the following work:
(Note: If more space is needed for description of work, attach additional 8-1/2” x 11” sheets hereto.)

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

Contract completion date is extended ☐ days ☐, is not extended ☐. New completion date is ____________ (Month/Day/Year)

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

Architect/Engineer Firm ____________________________________________________________________________________________

Name and Title (print) ____________________________________________________________________________________________ Date ____________

Signature ______________________________________________________________________________

Contractor (Name of Firm) ____________________________________________________________________________________________

Name and Title (print) ____________________________________________________________________________________________ Date ____________

Signature ______________________________________________________________________________

University of Colorado at Boulder ___________________________________________________________________________________

Institution or Agency ____________________________________________________________________________________________ Date ____________

Principal Representative (Signature) ________________________________________________________________________________ Date ____________

CONTRACT STATUS

Original Contract Value $ ________________

Previous increases by CO/Amend $ ________________

Previous decreases by CO/Amend $ ________________

Value After Prior CO’s/Amend $ ________________

This CO/Amend Increases ☐ Decreases ☐ $ _______________

CURRENT CONTRACT VALUE $ ________________

STATE BUILDINGS PROGRAMS
(or Authorized Delegate)
Paul M. Leef, AIA, LEED™ AP
Campus Architect &
Director, Planning, Design & Construction

STATE CONTROLLER
(or Authorized Delegate)
Steve McNally, Associate Vice Chancellor &
Controller

(Verification)

STATE OF COLORADO
OFFICE OF THE STATE ARCHITECT
STATE BUILDINGS PROGRAMS

State Form SC-6.31 Page 1 of 1
Rev. 4/2009
STATE OF COLORADO  
OFFICE OF THE STATE ARCHITECT  
STATE BUILDINGS PROGRAMS

NOTICE OF CONTRACTOR’S SETTLEMENT

Institution/Agency: University of Colorado at Boulder  
Project No./Name: CP 005050 / UMC – Food Service Renovation

Notice is hereby given that on the __________ day of __________, 2010 at Boulder, Colorado, final settlement will be made by the STATE OF COLORADO with __________, hereinafter called the "CONTRACTOR", for and on account of the contract for the construction of a PROJECT described as UMC – Food Service Renovation

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

2. All such claims shall be filed with Gil Fike, project manager, Department of Facilities Management, Campus Box 453 UCB, Boulder, CO 80309-0453.

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

Dated at Boulder, Colorado, this __________ day of __________, 2010.

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

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

MEDIA OF PUBLICATION:

PUBLICATION DATE:

NOTES TO EDITOR:

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

State Form SBP-7.3  
Rev. 9/2006
REQUEST FOR INFORMATION
(RFI # 01)

Project No. / Project Name: CP 005050 / UMC – Food Service Renovation

Date: ____________________________________________
To: ______________________________________________
From: ____________________________________________
Sent Via: __________________________________________

Drawing Ref.: ____________________________________ Spec. Ref.: ____________________________________

Subject: __________________________________________

___________________________________________________________________________________________

Proposed Solution:

___________________________________________________________________________________________

Schedule Impact: NO YES

Cost Impact:

 Estimated Cost $ __________________________

# Days __________________________

Date Response Required __________________________ E-mail __________________________

Signature: __________________________ Company: __________________________

Response:

___________________________________________________________________________________________

Response Date: __________________________ Sent Via: __________________________

Person Responding: __________________________ Signature: __________________________

Further Action Required:

___________________________________________________________________________________________

___________________________________________________________________________________________

Other Documents This RFI Refers to:

Letters RFP PCO CO Other

<table>
<thead>
<tr>
<th>Letters</th>
<th>RFP</th>
<th>PCO</th>
<th>CO</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
**Building & Location**

<table>
<thead>
<tr>
<th>UMC service area</th>
<th>Foodservice Renovation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Job Description**

<table>
<thead>
<tr>
<th>Suspect Building Components, Materials, and Site Conditions:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area of work are corridors, food services and book store within an student union, CU Book Store, meeting rooms, dining, shopping, entertainment, UCSU and club offices building. Glued down carpet/concrete substrate, floor tile/mastic/concrete substrate, ceiling tile, cove base and adhesive, plaster, drywall/joint compound, pipe insulation, painted CMU block, HVAC sealant, HVAC wrap, and HVAC flex connectors are presumed positive for asbestos. Buildings constructed prior to 1978 are presumed to contain lead based paint.</td>
</tr>
</tbody>
</table>

**Samples / Results:**

Pipe insulation and HVAC flex connectors are positive for asbestos. All other materials are negative for asbestos. Area of work is negative for lead based paint.

**Required Action:**

Renovation will disturb the asbestos pipe insulation and should not disturb the asbestos HVAC flex connector materials. Prior to work being performed asbestos pipe insulation materials which will be disturbed will require abatement using AHERA trained and certified personnel. Any work which will disturb the asbestos HVAC flex connector materials will proceed without further assessments and notification to the EH&S Asbestos Manager. All asbestos material work will be coordinated through the EH&S Asbestos Manager. Any work outside of the scope of work will require additional assessments. The contractor is required to provide appropriate signage during the construction informing pedestrians of safe walkways around the project during construction. Contractor shall ensure that controls are in place for all dust, odor, and vapor throughout all phases of the project. All employees of the Contractor and their subcontractors shall have, at a minimum, Class IV 2 Hour Asbestos OSHA Awareness Training while working in this building and on this project. Contractor will be responsible for notifying the building owner prior to mobilization of planned activities and schedule.

**Inspector:**

Michael W. Herron, Sr. #13788 Date Inspected: 1/8/2010

**EH&S Manager:**

Michael Yanker, #5731 Date Reviewed: 1/19/2010

This report is based upon conditions, regulations, policies at time of inspection and is valid for 100 days (per AS1M 1537 05). A change in the scope of work and/or expansion of this inspection will require a re-inspection. If exposed to hazardous materials (asbestos, chemicals, gases, bio hazards, radioactive materials or radiation) and/or involve laboratories, shops, bar exhausts, tanks, sewer drains or traps, storm or surface water, or other occupational hazards, work must be coordinated with the appropriate EH&S manager. New materials containing asbestos may be used for any part of this project. Project Rep must conform with all applicable codes & standards. Project Rep must submit to EH&S a Final Completion report and asbestos/chemical inventory list to determine additional requirements. Contractor and/or Project Rep must provide above information to employees, subcontractors and other relevant parties.

**University Representative:**

Gi Fike Phone Number:

**Contractor Name:**

Phone Number:

**Contractor Representative:**

(signature)
Institution/Agency: University of Colorado at Boulder
Project No./Name: CP 005050 / UMC – Food Service 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 knowing employ or contract with and unauthorized immigrant who will perform work under this contract, and that it will participate in either (i) the “E-Verify Program”, jointly administered by the United States Department of Homeland Security and the Social Security Administration, or (ii) the “Department Program” administered by the Colorado Department of Labor and Employment in order to confirm the employment eligibility of all employees who are newly hired to perform work under this contract.

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

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

4. If the Vendor is a sole proprietor, the undersigned hereby swears or affirms under penalty of perjury under the laws of the State of Colorado that (check one):
   - I am a United States citizen,
   - I am a Permanent Resident of the United States,
   - 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

______________________________
Signature of Authorized Representative

______________________________
Title
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: ________________________________

Project No./Name: CP 005050 / UMC – Food Service Renovation

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

To:

This is to advise you that your Performance Bond, Labor and Material Payment Bond, the requisite Builder’s Risk Insurance Policy or Certificate for same, and Certificates of Insurance have been received. Our issuance of this Notice does not relieve you of responsibility to assure that the bond and insurance requirements of the Contract Documents are met for the duration of the Agreement. The Agreement dated ________________ covering the above described work has been fully executed.

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

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

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

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

State Form SBP-6.26
Rev. 7/2008
NOTICE OF SUBSTANTIAL COMPLETION

Date of Substantial Completion: ____________________________

Institution/Agency: University of Colorado at Boulder

Project No./Name: CP 005050 / UMC – Food Service Renovation

TO: Gil Fike, Project Manager
    University of Colorado at Boulder
    Department of Facilities Management
    Campus Box 453 UCB
    Boulder, CO  80309-0453
    (Principal Representative)

And

(Contractor)

This is to advise you that the Work has been reviewed, inspected and determined, to the best knowledge, information and belief of the Architect/Engineer, to be substantially complete as of the date noted above in accordance with the criteria outlined in Article 41 of The General Conditions of the Contract and the Specifications, including without limitation a) suitable for occupancy, b) inspected for code compliance with Building Inspection Records signed by code officials for the State, 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.
**Pre-Acceptance Checklist**

<table>
<thead>
<tr>
<th>Institution or Agency:</th>
<th>University of Colorado at Boulder</th>
<th>Final Punch List Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Architect/Engineer:</td>
<td>OZ Architecture</td>
<td></td>
</tr>
<tr>
<td>Contractor:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Project No./Name:</td>
<td>CP 005050 / UMC – Food Service Renovation</td>
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</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>DATE COMPLETED</th>
<th>A/E SIGNOFF</th>
<th>REMARKS</th>
</tr>
</thead>
</table>

1. The Notice of Approval of Occupancy/Use has been fully executed and the Inspection Cards are completely signed-off.

2. On the Pre-Acceptance Punch List (Form SBP-06) the final punch list items are noted by the Architect/Engineer.

3. Schedule for corrections, deficiencies, and items to be supplied are established by Contractor.

4. Final Change Orders are processed (must be completed prior to Notice of Acceptance).

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

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

7. Extra materials as per specifications are delivered to Principal Representative.

8. As-built drawings have been submitted to Architect/Engineer.

9. Guarantee/Warranty documentation requirements are met.

10. Removal of Contractor’s temporary work including cleanup and debris removal.

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

12. All Instructions, manuals, guides, and charts have been transmitted to Principal Representative.

---

**Architect/Engineer**

OZ Architecture  

Date

**Contractor**  

Date

**State Buildings Programs**  

(or Authorized Delegate)  

Paul M. Leef, AIA, LEED™ AP  

Campus Architect &  

Director, Planning, Design & Construction  

Date

**Principal Representative**  

(Institution or Agency)  

Ronald L. Ried, Director  

Facilities Management Business Services  

Date
## Pre-Acceptance Punch List

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

**Architect/Engineer:** OZ Architecture  
**Contractor:** 

**Project No./Name:** CP 005050 / UMC – Food Service Renovation

---

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

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

---

**Architect/Engineer**  
OZ Architecture  
**Date**  

**Contractor**  
**Date**

---

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

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

---

State Form SBP-06  
Rev. 7/2008
STATE OF COLORADO
OFFICE OF THE STATE ARCHITECT
STATE BUILDINGS PROGRAMS

NOTICE OF CONTRACTOR’S SETTLEMENT

Institution/Agency: University of Colorado at Boulder
Project No./Name: CP 005050 / UMC – Food Service Renovation

Notice is hereby given that on the ______ day of ______, 2010 at Boulder, Colorado, final settlement will be made by the STATE OF COLORADO with ______, hereinafter called the "CONTRACTOR", for and on account of the contract for the construction of a PROJECT described as UMC – Food Service Renovation

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

2. All such claims shall be filed with Gil Fike, project manager, Department of Facilities Management, Campus Box 453 UCB, Boulder, CO 80309-0453.

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

Dated at Boulder, Colorado, this ______ day of ______, 2010.

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

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

MEDIA OF PUBLICATION:

PUBLICATION DATE:

NOTES TO EDITOR:

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

State Form SBP-7.3
Rev. 9/2006
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: CP 005050 / UMC – Food Service 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>
<td></td>
</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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<tr>
<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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<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>
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</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.

<table>
<thead>
<tr>
<th>Architect/Engineer</th>
<th>Date</th>
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<tbody>
<tr>
<td>OZ Architecture</td>
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</table>

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

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

<table>
<thead>
<tr>
<th>Contractor</th>
<th>Date</th>
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</thead>
</table>

State Form SBP-01  
Rev. 7/2008  
Page 2 of 2
Institution/Agency: University of Colorado at Boulder
Contractor: ____________________________  Final Punch List Date __________
Project No./Name: CP 005050 / UMC – Food Service Renovation

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

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

Contractor: OZ Architecture
Architect/Engineer: ____________________________  Date __________

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

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

State Form SBP-06
Rev. 9/2006
After Contractor or Construction Manager is satisfied that work is complete, a date for final review is established. Architect/Engineer inspection is made with Contractor(s) and Principal Representative and State Buildings Programs (SBP) present. Forms are processed as required.

<table>
<thead>
<tr>
<th>DATE COMPLETED</th>
<th>SIGNOFF INITIALS</th>
<th>REMARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1a. Final inspections have been made and permission to occupy Project is obtained through SBP Delegate. The <strong>Building Inspection Cards are</strong> completely signed off and attached.</td>
<td></td>
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<tr>
<td>1b. If Principal Representative wishes to occupy entire project or portions of Project before completion (Beneficial Occupancy) Project review of condition and responsibility is conducted and noted. (Fill out Form SBP-01 in addition to this form).</td>
<td></td>
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<tr>
<td>2. Notify the local fire department of the date the building will be occupied.</td>
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<tr>
<td>3. Coordination for final utility and service connections, meters, etc., has been made (water, gas, sewer, electricity and telecommunication) and 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 tests of systems and equipment have 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 Architect/Engineer and approved.</td>
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<tr>
<td>7. State personnel are instructed in system and equipment operations as required by contract.</td>
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<tr>
<td>8. Instructions, manuals, guides, charts, etc., are transmitted to Principal Representative.</td>
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<tr>
<td>9. Principal Representative furnish equipment and furnishing are coordinated and placed.</td>
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<tr>
<td>10. Review drawing, specifications, addenda, change orders, etc. for work to be done and note.</td>
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</tbody>
</table>
11. On the Contract Close-out Punch List (Form SBP-06) the final punch list items deficient or still required are made by the Architect and includes lists furnished by the consultants and promptly distributed to all parties.

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

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

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

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

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

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

18. Guarantee/Warranty requirements are met.

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

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

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

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

<table>
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<tr>
<th>DATE COMPLETED</th>
<th>SIGNOFF INITIALS</th>
<th>REMARKS</th>
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</table>

OZ Architecture
Architect/Engineer

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

Contractor

Ronald L. Ried, Director
Facilities Business Services
Vice Chancellor for Administration
Principal Representative
(Institution or Agency)
Date of Notice of Acceptance: ________________________________

Institution/Agency: University of Colorado at Boulder

Project No./Name: CP 005050 / UMC – Food Service 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.

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

By / Date
Ronald L. Ried, Director
Facilities Management Business Services
(Institution or Agency)

*When completely executed, this form is to be sent by certified mail to the Contractor by the Principal Representative.
Project: CP 005050 / UMC – Food Service 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 #:**

**CONTRACTOR:**

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

**PROJECT #/TITLE:** CP 005050 / UMC – Food Service Renovation

**AMENDMENTS/CHANGE ORDER SUMMARY**

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

<table>
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<tr>
<th>Number</th>
<th>Date</th>
<th>Total Approved this Period</th>
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<tbody>
<tr>
<td></td>
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<td>$0.00</td>
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</tbody>
</table>

| Net change by Amendments / Change Orders (L + M) | $0.00 |

**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 Earned (Due to Date (I))**: $0.00

**Current to Date Payment Less Retainage**: $0.00

**Prior Payments Total Amount Earned**: $0.00

**Prior Payments Less Retainage**: $0.00

**This Payment Total Amount Earned**: $0.00

**This Payment Less Retainage**: $0.00

**Warrant Amount**: $0.00

**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.**

**ARCHITECTS/ENGINEER’S CERTIFICATION**

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

**STATE BUILDINGS PROGRAMS (or Authorized Delegate)**

**CONTRACTOR**

**ARCHITECT/ENGINEER**
<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 But Not In Place</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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**Original Contract Totals (SUM)**

<table>
<thead>
<tr>
<th>Material</th>
<th>Labor and Other</th>
<th>Totals (C + D)</th>
<th>Materials On-Site But Not In Place</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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<tbody>
<tr>
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**Amendments/Change Order Deductions**

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<th>Labor and Other</th>
<th>Total Amount Due to Date (F+G+H)</th>
<th>% Complete and in Place (I / E)</th>
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**Amendments/Change Order Additions**

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<th>Total Amount Due to Date (F+G+H)</th>
<th>% Complete and in Place (I / E)</th>
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**Present Contract Totals**

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<th>Material</th>
<th>Labor and Other</th>
<th>Total Amount Due to Date (F+G+H)</th>
<th>% Complete and in Place (I / E)</th>
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</thead>
<tbody>
<tr>
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<td>$0.00</td>
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</table>

State Form SBP-7.2
Rev. 9/2006
The University of Colorado at Boulder (UCB) and the Boulder community are very sensitive to pollution issues. We endeavor to be leaders in promoting excellence in environmental stewardship and expect that all faculty, staff, students and contractors be aware of their environmental responsibilities and perform their activities in an environmentally responsible manner.

On the reverse side of this flyer you will find examples of the kinds of pollution systems that can impact our creeks and waterways. The storm sewer or surface water collection systems. These systems ultimately drain into our creeks and waterways.

Questions, Comments or Concerns? – Please Contact:
Environmental Health and Safety
303-492-6025.

Environmental & Safety REMINDERS at Construction Sites:

- **Container**
  - Containers must be secure, with secure lids.

- **Spray and Vapors**
  - Use smoke eaters, exhaust fans, ventilation systems.

- **Waste**
  - Hazardous: Confined space entry, MSDS, product identification & labeling, PPE, trenching and shoring, fall protection, welding vision screens, etc.

- **Assessment**
  - Assume all building materials are asbestos-containing unless written assessment report(s) indicate otherwise. A pre-construction environmental site assessment is required prior to beginning work - call EH&S Asbestos / Lead Management 303-492-6168.

- **Dust Control**
  - Use wet methods, exhaust fans, HEPA vacs, barriers, etc.; visible emissions are not permitted.

- **Hazards**
  - Includes paints and solvents, oils, fuels, coolants, corrosives, cleaners, pesticides, PCB light ballasts, mercury vapor lamps, smoke detectors, and many other materials and products. Do not place in the trash or down the drain without approval from EH&S.

- **Outdoor**
  - Use barriers, smoke eaters, exhaust fans, ventilation systems.

- **Security**
  - Stirrups and Smoking - No smoking or open flames in Contractors' work areas.

- **Utilities**
  - Always call the Utility Notification Center of Colorado (UNCC) 1-800-922-1987 before digging.}

**Environmental Health and Safety 303-492-6025.**

**Questions, Comments or Concerns? – Please Contact:**

Environmental Health and Safety
303-492-6025.

Please do your part to promote awareness and compliance!
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>Name</td>
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<td>---------</td>
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</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>
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<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>
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<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>
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<tr>
<td>FS</td>
<td>Federal Specification</td>
</tr>
<tr>
<td>MIA</td>
<td>Marble Institute of America</td>
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<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>
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<tr>
<td>NIOSH</td>
<td>National Institute of Occupational Safety and Health</td>
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<tr>
<td>NMWIA</td>
<td>National Mineral Wool Insulation Association</td>
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<tr>
<td>NPVLM</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>
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<tr>
<td>PCA</td>
<td>Portland Cement Association</td>
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<tr>
<td>PCI</td>
<td>Prestressed Concrete Institute</td>
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<tr>
<td>PEI</td>
<td>Porcelain Enamel Institute</td>
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<tr>
<td>PS</td>
<td>Product Standard (U.S. Department of Commerce)</td>
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<td>SCPI</td>
<td>Structural Clay Products Institute</td>
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<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>
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<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>SSPC</td>
<td>Steel Structures Painting Council</td>
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<tr>
<td>SWI</td>
<td>Steel Window Institute</td>
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</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.
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 March 2010. Drawing list is as follows:

<table>
<thead>
<tr>
<th>Sheet No.</th>
<th>Titled</th>
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<tbody>
<tr>
<td>T-1</td>
<td>Cover Sheet</td>
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</table>

**Architectural**
- A0.00 Building Code Plans & Analysis
- A0.01 Building Code Plans & Analysis
- A0.02 Building Code Plans & Analysis
- A0.03 Building Code Plans & Analysis
- A1.01 Demo Plan
- A1.02 Demo RCP
- A2.01 Floor Plan
- A3.01 RCP
- A4.01 Finish Plan
- A5.01 Furniture Plan
- A6.01 Enlarged Plan
- A7.01 Interior Elevations
- A7.02 Interior Elevations
- A9.01 Signage
- A9.02 Signage
- A10.01 Interior Details
- A10.02 Standard Partition Types

**Food Service**
- FS.01 FOODSERVICE EQUIPMENT FLOOR PLAN
- FS.02 FOODSERVICE EQUIPMENT SCHEDULE
- FS.03 FOODSERVICE EQUIPMENT UTILITY LOAD SCHEDULE
- FS.04 FOODSERVICE EQUIPMENT UTILITY LOAD SCHEDULE

**Structural**
- S0.1 Notes
- S2.01 Floor Plan

**Mechanical & Plumbing**
- M1.01 Mechanical Legends
- M1.02 Mechanical Schedule & Details
- MD2.01 First Floor HVAC Demo. Plan
- M2.01 First Floor HVAC Plan
- MD3.01 Basement Plumbing Demo Plan
- M3.01 Basement Plumbing Plan
- MD3.02 First Floor Plumbing Demo Plan
- M3.02 First Floor Plumbing Plan
**Electrical**

- E1.01 Electrical Legends and Schedules
- E1.02 Electrical One-Line Diagram
- E1.03 Electrical One-Line Diagram
- ED2.01 Partial First floor Lighting Demo Plan
- E2.01 Partial First Floor Lighting Plan
- ED3.01 Partial First Floor Power Demo Plan
- E3.01 Partial First Floor Power Plan
- ED4.01 Partial First Floor Fire Alarm Demo Plan
- E4.01 Partial First Floor Fire Alarm Plan

**IT/AV**

- ET1.01 Electrical Technology Title Sheet
- ET2.01 Electrical Technology Floor Plan
- T1.01 Technology Title Sheet
- T2.01 Technology Floor Plan


C. Addenda: All Addenda issued prior to bidding.

### 1.02 WORK COVERED BY CONTRACT DOCUMENTS

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

### 1.03 CONTRACTORS

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

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

### 1.04 PHASED CONSTRUCTION

A. The Work shall be conducted in two (2) phases, with each phase substantially complete as indicated:

   Phase 1: Work shall include renovation construction of the Servery, the North Dining Area and East Dining Area in accordance with the Construction Documents. During the period of construction for Phase 1, Contractors are permitted temporary use of the facilities as restricted to Phase 1 construction areas only, as indicated on the
Drawings, up until the end of the business day August 16, 2010. During the period of construction of Phase 1, food service operations shall be fully maintained and uninterrupted in Baby Does, Meat Panini and Slumgullion Grille Areas. During Phase 1, the Contractor shall provide temporary barriers and/or partitions in accordance with this Section and Division 1 “General Requirements.” Work of this phase shall commence the date of issuance of the Notice to Proceed on May 17, 2010. The Work of Phase 1 shall be substantially complete and ready for occupancy at time of Substantial Completion for the Work. The Date of Substantial Completion for Phase 1 is: August 16, 2010.

Phase 2: Work shall include renovation construction of the Baby Does, Meat Panini and Slumgullion Grille Areas in accordance with the Construction Documents. During the period of construction for Phase 2, Contractors are permitted temporary use of the facilities as restricted to Phase 2 construction areas only, as indicated on the Drawings, up until the end of the business day October 15, 2010. During Phase 2, the Contractor shall provide temporary barriers and/or partitions in accordance with this Section and Division 1 “General Requirements.” Work of this phase shall commence the date of issuance of the Notice to Proceed on August 17, 2010. The Work of Phase 2 shall be substantially complete and ready for occupancy at time of Substantial Completion for the Work. The Date of Substantial Completion for Phase 2 is: October 15, 2010.

a. Phase 1 - Time Period from Notice to Proceed to Substantial Completion: 92 days
b. Phase 1 - Time Period from Substantial Completion to Final Acceptance: 30 days (not factored into the total days for entire project)
c. Phase 2 - Time Period from Notice to Proceed to Substantial Completion: 59 days
d. Phase 2 - Time Period from Substantial Completion to Final Acceptance: 30 days
e. Time of Completion of Entire Project (a + c + d): 181 days

Before commencing Work of each phase, submit an updated copy of the Contractor's construction schedule showing the sequence, commencement and completion date, and move-out and -in dates of Owner’s personnel for both phases of the Work.

1.05 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. Conduct the work of this project in a manner that will minimize disruption of the Owner’s occupancy of adjacent areas. Adjacent food vendor spaces will be open during the renovation work. Coordinate work and noise to not interfere with vendor operations.

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

Provide eight (8) work days notice to the Owner of construction activities which will severely impact the occupancy and use of adjacent areas.
C. Provide temporary barriers and/or partitions as required to protect the occupants of the building and the general public from injury due to the work of this project; and/or to protect adjacent areas of the building from the spread of dust and dirt caused by the work or this project.

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

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

E. Maintain constant foodservice operations in the servery during construction with the construction of a temporary wall as indicated in the phasing plan on sheet A2.01.

F. Provide phasing plan prior to starting construction for floor areas to be made available for seating of customers of food service vendors. Provide temporary entry and exiting routes for access to food vendors at all times during construction.

E. All work shall occur during the hours of 3:00 p.m. to 5:00 a.m. Refer to the Scope of Work provided with the bid documents for project start and end dates and milestones.

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 on disk to the Owner and retain negatives and one set of prints for their records. Sufficient photos with adequate detail to thoroughly document the conditions surrounding the work shall be provided.

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

C. In addition to the requirements of the General Conditions of the Contract for Construction, the Contractor shall:
1. Notify, in writing, the Owner of University or private property which interferes with the work and arrange with them for disposition of such property.
2. Provide and maintain proper shoring and bracing to prevent earth from caving or washing into excavation. Provide temporary protection around openings through and at floors, roofs, and other openings.
3. Provide and maintain proper shoring and bracing for existing underground utilities, sewers, etc., encountered during excavation work, to protect them from collapse or other type of damage until such time as they are to be removed, incorporated into the work of this project, or can be properly back-filled upon completion of new work.
4. Weather Protection: Provide protection against rain, snow, wind, ice, storms, or heat so as to maintain work, materials, apparatus, and fixtures free from injury or damage. At the end of each day’s work, cover new work likely to be damaged.
5. Provide and maintain adequate protection of the work from damage due to freezing, especially freezing earth and soils. Risk of proceeding with the work on or with freezing or frozen materials will be the sole responsibility of the Contractor.

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

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

1.06 EXISTING FURNITURE AND EQUIPMENT

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

1.07 CONTRACTOR’S ACCESS PARKING AND STAGING AREAS

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

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

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

**General Staging Areas** are approved areas adjacent to the site when available or in University designated group staging yards. General Staging Areas may be used for any purpose, including employee parking, on a space available basis, but must be coordinated through the UCB Project Manager and PTS. Vehicles may not park outside of general staging areas except in areas coordinated and approved by PTS.

**Restricted Staging Areas** are approved areas near the site for the construction dumpster, off-loading of equipment, contractor’s work trailer, and materials that are soon to be incorporated into the work. No vehicles shall park in a restricted staging area for more than 20 minutes between the hours of 8:00 a.m. and 5:00 p.m. weekdays.

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

For employee parking the closest will be lot 308, which is off Regent Drive and Broadway.

**Prohibited Parking** are areas designated in the Contract Documents as No Parking areas. The contractor shall not allow any parking in areas so designated under any circumstance.
D. The restrictions in this Section are in addition to any other restrictions or rules provided by PTS. Fees shall be assessed for the use of any PTS facility for staging and construction activities.

E. **The designated staging area for this project shall be:**

General Staging area shall be the west side of the parking lot 230 south of the dock area using 5 parking spaces. The access through the parking lot will remain open at all times for loading dock access. Only one contractor vehicle will be allowed to park at staging area with valid parking pass.

F. The staging areas for this project are located near landscaped areas. The contractor shall protect all trees located near the staging areas to the drip line of the trees. Damaged sod and planting beds next the staging areas shall be restored to a “like-new” condition upon completion of the work. The staging area shall have a temporary chain link fence around the designated location and shall be kept free from debris and trash.

G. Vehicles parked on sidewalks or in landscape areas outside the designated staging areas cause damage to University property. The contractor shall reimburse the University $50.00 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.

1.11 A. AGREEMENT AND CONDITIONS FOR ISSUING MASTER KEYS TO CONTRACTORS

   A. General

   Security of University buildings and rooms is essential for the protection of individuals and University assets. To ensure security, University Access Services (Lock Shop) is responsible for issuing keys and installing and maintaining locks for University facilities and equipment. For the purposes of this policy the term Lock Shop shall include the University Access Services which is responsible for issuing keys for the Campus Buildings ensuring their return. All keys issued remain the property of The University Colorado. Keys for University facilities cannot be produced, duplicated, or obtained from any source other than University Lock Shop.

   A fee of $10,000 shall be assessed per set of master keys lost or not returned at the agreed time by the contractor at the end of the project. The contractor will take the necessary precautions to insure the keys are carefully secured and returned per the checkout agreement. In the event of lost master keys, the University shall deduct the penalty amount of $10,000 per set of master keys lost or not returned from the contract amount.

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.

END OF SECTION
1.01 GENERAL

Quantities indicated on the drawing or extra quantities specified shall be included in the Contractor's Base Bid. For Adding or Deducting from Base Bid quantities, the unit prices described in this section will be applied. The Contractor will be notified, in writing, of the quantities applicable for each unit price, and the Contract Price will be adjusted accordingly by Change Order.

All unit prices shall include all labor, materials, equipment, services, delivery to the project, overhead, profit, insurance, and all other incidental expenses to complete the work specified unless indicated otherwise. All work covered by unit prices shall be performed in accordance with requirements of the applicable sections of the Specifications.

1.02 UNIT PRICES

<table>
<thead>
<tr>
<th>ITEM</th>
<th>UNIT PRICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Carpet installation CPT-1(Prep Included)</td>
<td>$_____ s/yd</td>
</tr>
<tr>
<td>b. Ceiling Tile and Grid</td>
<td>$_____ s/ft</td>
</tr>
<tr>
<td>c. Painting P-1 (Prep Included)</td>
<td>$_____ s/ft</td>
</tr>
<tr>
<td>d. Painting P-2 (Prep Included)</td>
<td>$_____ s/ft</td>
</tr>
<tr>
<td>e. Painting P-3 (Prep Included)</td>
<td>$_____ s/ft</td>
</tr>
<tr>
<td>f. Painting P-4 (Prep Included)</td>
<td>$_____ s/ft</td>
</tr>
<tr>
<td>g. Wall Coverings (Prep Included)</td>
<td>$_____ s/ft</td>
</tr>
<tr>
<td>h. Partitions</td>
<td>$_____ l/ft</td>
</tr>
<tr>
<td>i. Resilient Floor Tile (Prep Included)</td>
<td>$_____ s/ft</td>
</tr>
<tr>
<td>Resilient Floor Base (Prep Included)</td>
<td>$_____ l/ft</td>
</tr>
<tr>
<td>j. Concrete Slab Demolition, 2” (W) by 2” (D) for New Conduit/Wire for North and East Dining Rooms</td>
<td>$_____ l/ft</td>
</tr>
</tbody>
</table>

END OF SECTION
PART 1 - GENERAL

1.01 GENERAL ALTERNATE REQUIREMENTS

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

1.02 SPECIFIC ALTERNATES

A. Alternate:

Alternate No. 1 – All Work at the servery line and associated Work as indicated on the Drawings at “Grille.”

The sum of ________________________________ Thousand, ________________________________ and no/100 Dollars*

($___________)*

B. Alternate:

Alternate No. 2 – All Work at the servery line and associated Work as indicated on the Drawings at “Meat Panini.”

The sum of ________________________________ Thousand, ________________________________ and no/100 Dollars*

($___________)*
C. Alternate:

Alternate No. 3 – All Work at the servery line and associated Work as indicated on the Drawings at “Mexican and Dessert.”

The sum of __________________________________________

__________________________ Thousand,

_________________________________________ and no/100 Dollars*

($___________)*

D. Alternate:

Alternate No. 4 – Work at North Dining and West Dining, including furniture.

The sum of ____________________________________________

__________________________ Thousand,

_________________________________________ and no/100 Dollars*

($___________)*

E. Deductive Alternates:

Deductive Alternate No. 5 - Change the work shift period to normal business hours between 6:00 am and 5:00 pm.

The sum of ____________________________________________

__________________________ Thousand,

_________________________________________ and no/100 Dollars*

($___________)*

END OF SECTION
PART 1 - GENERAL

1.01 SUMMARY

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

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

C. Related Requirements
   1. All Division 1 Sections.

1.02 CONSTRUCTION ORGANIZATION AND START-UP

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

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

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

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

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

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

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

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

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

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

1.04 CONTRACT CLOSEOUT

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

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

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

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

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

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

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

END OF SECTION
PART 1 - GENERAL

1.01 SUMMARY

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

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

<table>
<thead>
<tr>
<th>ITEM</th>
<th>FURNISHED UNDER</th>
<th>SET IN PLACE UNDER</th>
<th>POWER WIRING UNDER</th>
<th>CONTROL WIRING UNDER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equipment Motor</td>
<td>15</td>
<td>15</td>
<td>16</td>
<td>-</td>
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<tr>
<td>Automatically Controlled Starter/contractors:</td>
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<tr>
<td>Separate</td>
<td>15</td>
<td>16</td>
<td>16</td>
<td>15</td>
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<tr>
<td>Factory Mounted &amp; Wired</td>
<td>15</td>
<td>15</td>
<td>16</td>
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<tr>
<td>In Motor Control Centers</td>
<td>16</td>
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<td>16</td>
<td>16</td>
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<tr>
<td>Manually Controlled Starter/Contractors:</td>
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<td></td>
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<tr>
<td>Separate</td>
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<td>16</td>
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<td>15</td>
</tr>
<tr>
<td>Factory Mounted &amp; Wired</td>
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<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>
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<tr>
<td>Disconnect (Note 1) Switches</td>
<td>16</td>
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<tr>
<td>Contactors</td>
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<td>-</td>
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<tr>
<td>Thermal Overload (Note 1) Switches</td>
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<tr>
<td>Manual Operation (Note 2)</td>
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<td>-</td>
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<tr>
<td>Switches</td>
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<td>Control Relays (Note 2)</td>
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<td>Control Transformers</td>
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<tr>
<td>Control Circuit Outlets</td>
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<tr>
<td>Thermostats (Note 2)</td>
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<td>15</td>
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<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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<td>-----------------------------------------------------------</td>
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<td>Time Switches (Note 2) Not in C Panel</td>
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<td>Push Button Stations, Pilot Lights</td>
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<tr>
<td>Thermostats (Note 2) Controls: Integral with Equipment</td>
<td>15</td>
<td>15</td>
<td>16</td>
<td>15</td>
</tr>
<tr>
<td>Directly Applied to Ducts, Pipes, etc.</td>
<td></td>
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</tr>
<tr>
<td>Valve Motors, Damper Motors, Solenoid Valves, etc.</td>
<td>15</td>
<td>15</td>
<td></td>
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</tr>
<tr>
<td>EP Valves or Switches, P.E. Switches, etc.</td>
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<td>15</td>
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</tr>
<tr>
<td>Control Circuit Outlets</td>
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<td>Fire Alarm Systems</td>
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<td>Fire Sprinkler Alarm</td>
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<td>Firestats</td>
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<td>Smoke Detectors Including Relays for Fan Control</td>
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<tr>
<td>Control Air Compressor</td>
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<tr>
<td>Refrigerated Air Dryer</td>
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<tr>
<td>Equipment Interlocks</td>
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<td></td>
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<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 2-6 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.

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 contractor’s 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.htm

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

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

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

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

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

1.07 PERMITS

A. The contractor must obtain a no fee building permit prior to starting work from Office Manager, Facilities Management at (303) 492-2904 in the Planning, Design and Construction Office, Research Laboratory No. 2, 1540 30th Street, Boulder, Colorado. Building permits are required on all projects except the following:

1. Fences not over 6 feet high & general landscape work
2. Retaining walls which are not over 4 feet in height, unless supporting a surcharge of impounding Class I, II or III-A liquids
3. Platforms, walks and driveways not more than 30 inches above grade and not over any basement or story below.
4. Painting, papering, and similar finish work that meet the requirements of chapter 8 of UBC. (Uniform Building Code).
5. Temporary motion picture, television and theater stage sets and scenery. Review for fire-safety issues is required.

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

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

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

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

1.09 UNIVERSITY OF COLORADO SEXUAL HARASSMENT POLICY

A. Contractors should be aware of and review the University of Colorado at Boulder’s policies that prohibit discrimination and harassment on the basis of race, color, national origin, sex, age, disability, creed, religion, sexual orientation or veteran status. These policies are located on the web at: [http://www.colorado.edu/odh/](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 and 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 UTILITY LOCATES

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

END OF SECTION
PART 1 - GENERAL

1.01 SUMMARY

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

1.02 DESCRIPTION

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

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

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

PART 2 - PRODUCTS

Not used

PART 3 - EXECUTION

Not used

END OF SECTION
PART 1 - GENERAL

1.01 SUMMARY

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

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

1.02 SYSTEM DESCRIPTION

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

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

1.03 PROJECT/SITE CONDITIONS

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

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

PART 2 - PRODUCTS

Not Used
PART 3 - EXECUTION

3.01 REMODELING

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

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

3.02 CLEAN-UP

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

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

END OF SECTION
PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

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

1.02 SUMMARY:

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

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

1.03 WORK BY OWNER:

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

1.04 SUBMITTALS:

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

1.05 QUALITY ASSURANCE:

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

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

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

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

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

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

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

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

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

PART 2 - PRODUCTS (Not applicable)

PART 3 - EXECUTION

3.01 EXAMINATION:

A. Asbestos and Hazardous Materials Discovery:
   1. The Contractor is cautioned to be alert to the possibility that his work may uncover asbestos-containing or hazardous materials. If suspected materials are found, the Contractor shall notify the Owner and stop all work in the area immediately. If the suspected materials prove to contain asbestos or hazardous materials, the Owner will arrange to have the materials abated in a timely manner.
3.02 HAZARDOUS MATERIALS/EQUIPMENT REMOVAL:

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

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

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

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

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

3.03 ENVIRONMENTAL RESPONSIBILITIES

A. Environmental and Safety Issues and Practices.

Contractors working on the UCB campus are required to comply with all applicable University, City, State and Federal environmental regulations and safety standards. Hazardous and regulated materials must be managed and disposed of properly. Work sites must control dust, debris and run-off, and pay special attention to preventing any pollutants from entering the storm
sewer or surface water collection systems. These systems ultimately drain into our creeks and waterways.
B. Contractor will be required to sign an Environmental Responsibilities form. The contractor is responsible for notifying all subcontractors of the responsibilities identified on the form. A copy of this form must be posted, throughout the duration of the project, in a visible area for all workers to see.

END OF SECTION
PART 1 - GENERAL

1.01 REQUIREMENTS

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

Pre-construction meeting
Progress and Coordination meetings
Specially called meetings

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

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

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

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

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

1. Prepare agenda for meetings.
2. Distribute written notice of each meeting four days in advance of meeting date.
3. Make physical arrangements for meetings.
4. Preside at meeting.
5. Record the minutes; including significant proceedings and decisions.
6. Representatives of Contractors, Subcontractors, and Suppliers attending meetings shall be qualified and authorized to act on behalf of the entity each represents.
7. Use of Premises:
   Office, work, staging and storage areas
   Owner's requirements
8. Temporary construction Facilities, Utilities, Controls and Construction Aids
9. Safety, First-aid, Security and Housekeeping Procedures
10. Administrative Procedures and Documents as Required by Owner

1.02 PROGRESS AND COORDINATION MEETING

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

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

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

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

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

END OF SECTION
PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

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

1.02 QUALITY ASSURANCE

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

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

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

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

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

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

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

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

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

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

1.03 SUBMITTALS

A. Make submittals promptly in accordance with approved schedule and in such sequence as to cause no delay in the work. Submittals shall be packaged in entire CSI divisions for referencing related materials and equipment. All submittals are due no later than 30 days after contract date. A fee of $50 dollars per day will be assessed for each submittal not submitted when due.

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

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

D. Resubmission Requirements:
   1. Make any corrections or changes in the submittals required by the Consultant and resubmit until accepted.
   2. Shop drawings and product data:
      a. Revise initial drawings or data and resubmit as specified for initial submittal.
b. Indicate any changes that have been made, other than those requested by the Consultant.
3. Samples: Submit new samples as required for initial submittal.

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

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

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

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

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

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

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

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

   2. The Coordination drawings shall include sectional coordination documents. Identify
      elevations of systems A.F.F. (above finish floor) and component dimensions. Show
      elevations whenever component changes height.

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

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

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
### 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.
PART 1 - GENERAL

1.1 SUMMARY

A. Section includes general requirements and procedures for compliance with certain USGBC LEED prerequisites and credits needed for Project to obtain LEED-Certified certification based on the USGBC's "LEED 2009 for Commercial Interiors."

1. Other LEED prerequisites and credits needed to obtain LEED certification depend on product selections and may not be specifically identified as LEED requirements. Compliance with requirements needed to obtain LEED prerequisites and credits may be used as one criterion to evaluate substitution requests and comparable product requests.

2. Additional LEED prerequisites and credits needed to obtain the indicated LEED certification depend on Architect's design and other aspects of Project that are not part of the Work of the Contract.

3. A copy of the LEED Project checklist is attached at the end of this Section for information only.

B. Related Requirements:

1. Divisions 1 through 16 Sections for LEED requirements specific to the work of each of these Sections. Requirements may or may not include reference to LEED.

1.2 DEFINITIONS

A. Chain-of-Custody Certificates: Certificates signed by manufacturers certifying that wood used to make products was obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship." Certificates shall include evidence that manufacturer is certified for chain of custody by an FSC-accredited certification body.

B. Recycled Content: The recycled content value of a material assembly shall be determined by weight. The recycled fraction of the assembly is then multiplied by the cost of assembly to determine the recycled content value.

1. "Post-consumer" material is defined as waste material generated by households or by commercial, industrial, and institutional facilities in their role as end users of the product, which can no longer be used for its intended purpose.

2. "Pre-consumer" material is defined as material diverted from the waste stream during the manufacturing process. Excluded is reutilization of materials such as rework, regrind, or scrap generated in a process and capable of being reclaimed within the same process that generated it.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Respond to questions and requests from Architect and the USGBC regarding LEED credits that are the responsibility of the Contractor, that depend on product selection or product qualities, or that depend on Contractor's procedures until the USGBC has made its determination on the project's LEED certification application. Document responses as informational submittals.
1.4 ACTION SUBMITTALS

A. General: Submit additional LEED submittals required by other Specification Sections.

B. LEED submittals are in addition to other submittals. If submitted item is identical to that submitted to comply with other requirements, submit duplicate copies as a separate submittal to verify compliance with indicated LEED requirements.

C. LEED Documentation Submittals:

1. Credit MR 2: Comply with Division 1 Section "Construction Waste Management and Recycling."

2. Credit MR 4: Product data and certification letter indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.

3. Credit MR 5: Product data indicating location of material manufacturer for regionally manufactured materials. Include statement indicating cost for each regionally manufactured material and for each regionally extracted and manufactured material.
   a. Include statement indicating distance from manufacturer to Project for each regionally manufactured material.
   b. Include statement indicating location of and distance from Project to point of extraction, harvest, or recovery for each raw material used in regionally extracted and manufactured materials.


5. Credit IEQ 3.1:
   a. Construction indoor-air-quality management plan.
   b. Product data for temporary filtration media.
   c. Product data for filtration media used during occupancy.
   d. Construction Documentation: Six photographs at three different times during the construction period, along with a brief description of the SMACNA approach employed, documenting implementation of the indoor-air-quality management measures, such as protection of ducts and on-site stored or installed absorptive materials.

6. Credit IEQ 3.2:
   a. Signed statement describing the building air flush-out procedures including the dates when flush-out was begun and completed and statement that filtration media was replaced after flush-out.
   b. Product data for filtration media used during flush-out and during occupancy.
   c. Report from testing and inspecting agency indicating results of indoor-air-quality testing and documentation showing compliance with indoor-air-quality testing procedures and requirements.

7. Credit IEQ 4.1: Product data for adhesives and sealants used inside the weatherproofing system indicating VOC content of each product used.

8. Credit IEQ 4.2: Product data for paints and coatings used inside the weatherproofing system indicating VOC content of each product used.
9. **Credit IEQ 4.4**: Product data for products containing composite wood or agrifiber products or wood glues indicating that they do not contain urea-formaldehyde resin.

### 1.5 INFORMATIONAL SUBMITTALS

A. **Qualification Data**: For LEED coordinator.

B. **Project Materials Cost Data**: Provide statement indicating total cost for materials used for Project. Costs exclude labor, overhead, and profit. Include breakout of costs for the following categories of items:

1. Furniture.
2. Plumbing.
3. Mechanical.
4. Electrical.
5. Wood-based construction materials.

C. **LEED Action Plans**: Provide preliminary submittals within 14 days of date established for commencement of the Work indicating how the following requirements will be met:

1. **Credit MR 2**: Waste management plan complying with Division 1 Section "Construction Waste Management and Recycling."
2. **Credit MR 3.1 and Credit MR 3.2**: List of proposed salvaged, refurbished, and reused materials. Identify each material that will be salvaged, refurbished, or reused, including its source, cost, and replacement cost if the item was to be purchased new.
3. **Credit MR 4**: List of proposed materials with recycled content. Indicate cost, post-consumer recycled content, and pre-consumer recycled content for each product having recycled content.
4. **Credit MR 5**: List of proposed regionally manufactured materials and regionally extracted and manufactured materials.
   a. Identify each regionally manufactured material, including its source and cost.
   b. Identify each regionally extracted and manufactured material, including its source and cost.
5. **Credit MR 7**: List of proposed certified wood products. Indicate each product containing certified wood, including its source and cost of certified wood products.
6. **Credit IEQ 3.1**: Construction indoor-air-quality management plan.

D. **LEED Progress Reports**: Concurrent with each Application for Payment, submit reports comparing actual construction and purchasing activities with LEED action plans for the following:

1. **Credit MR 2**: Waste reduction progress reports complying with Division 1 Section "Construction Waste Management and Recycling."
2. **Credit MR 3.1 and Credit MR 3.2**: Salvaged, refurbished, and reused materials.
3. **Credit MR 4**: Recycled content.
4. **Credit MR 5**: Regionally manufactured materials and regionally extracted and manufactured materials.
5. **Credit MR 7**: Certified wood products.
1.6 QUALITY ASSURANCE

A. LEED Coordinator: Engage an experienced LEED-Accredited Professional to coordinate LEED requirements. LEED coordinator may also serve as waste management coordinator.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Provide products and procedures necessary to obtain LEED credits required in this Section. Although other Sections may specify some requirements that contribute to LEED credits, the Contractor shall determine additional materials and procedures necessary to obtain LEED credits indicated.

2.2 SALVAGED, REFURBISHED, AND REUSED MATERIALS

A. Credit MR 3.1 and Credit MR 3.2: Not less than 10 percent of building materials (by cost) shall be salvaged, refurbished, or reused materials.

2.3 RECYCLED CONTENT OF MATERIALS

A. Credit MR 4: Building materials shall have recycled content such that post-consumer recycled content plus one-half of pre-consumer recycled content for Project constitutes a minimum of 75 percent of cost of materials used for Project.

1. Cost of post-consumer recycled content plus one-half of pre-consumer recycled content of an item shall be determined by dividing weight of post-consumer recycled content plus one-half of pre-consumer recycled content in the item by total weight of the item and multiplying by cost of the item.

2. Do not include plumbing, mechanical and electrical components, and specialty items such as elevators and equipment in the calculation.

2.4 REGIONAL MATERIALS

A. Credit MR 5, Option 1: Not less than 20 percent of materials (by cost) shall be regionally manufactured materials.

B. Credit MR 5, Option 2: Not less than 10 percent of materials (by cost) shall be regionally extracted and manufactured materials.

2.5 CERTIFIED WOOD

A. Credit MR 7: Not less than 50 percent (by cost) of wood-based materials shall be produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."
1. Wood-based materials include, but are not limited to, the following materials when made from wood, engineered wood products, or wood-based panel products:
   a. Miscellaneous carpentry.
   b. Architectural woodwork.

2.6 LOW-EMITTING MATERIALS

A. Credit IEQ 4.1: For field applications that are inside the weatherproofing system, adhesives and sealants shall comply with the following VOC content limits when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

1. Wood Glues: 30 g/L.
2. Metal-to-Metal Adhesives: 30 g/L.
3. Adhesives for Porous Materials (Except Wood): 50 g/L.
4. Subfloor Adhesives: 50 g/L.
5. Plastic Foam Adhesives: 50 g/L.
6. Carpet Adhesives: 50 g/L.
7. Carpet Pad Adhesives: 50 g/L.
8. VCT and Asphalt Tile Adhesives: 50 g/L.
9. Cove Base Adhesives: 50 g/L.
10. Gypsum Board and Panel Adhesives: 50 g/L.
11. Rubber Floor Adhesives: 60 g/L.
12. Ceramic Tile Adhesives: 65 g/L.
13. Multipurpose Construction Adhesives: 70 g/L.
14. Fiberglass Adhesives: 80 g/L.
15. Contact Adhesive: 80 g/L.
16. Structural Glazing Adhesives: 100 g/L.
17. Wood Flooring Adhesive: 100 g/L.
18. Structural Wood Member Adhesive: 140 g/L.
19. Single-Ply Roof Membrane Adhesive: 250 g/L.
20. Special-Purpose Contact Adhesive (contact adhesive that is used to bond melamine covered board, metal, unsupported vinyl, rubber, or wood veneer 1/16 inch or less in thickness to any surface): 250 g/L.
21. Top and Trim Adhesive: 250 g/L.
22. Plastic Cement Welding Compounds: 250 g/L.
23. ABS Welding Compounds: 325 g/L.
24. CPVC Welding Compounds: 490 g/L.
25. PVC Welding Compounds: 510 g/L.
26. Adhesive Primer for Plastic: 550 g/L.
27. Sheet-Applied Rubber Lining Adhesive: 850 g/L.
30. Special-Purpose Aerosol Adhesive (All Types): 70 percent by weight.
31. Other Adhesives: 250 g/L.
32. Architectural Sealants: 250 g/L.
33. Nonmembrane Roof Sealants: 300 g/L.
34. Single-Ply Roof Membrane Sealants: 450 g/L.
35. Other Sealants: 420 g/L.
36. Sealant Primers for Nonporous Substrates: 250 g/L.
37. Sealant Primers for Porous Substrates: 775 g/L.
38. Modified Bituminous Sealant Primers: 500 g/L.
39. Other Sealant Primers: 750 g/L.
B. Credit IEQ 4.2: For field applications that are inside the weatherproofing system, paints and coatings shall comply with the following VOC content limits when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

1. Flat Paints and Coatings: VOC not more than 50 g/L.
2. Nonflat Paints and Coatings: VOC not more than 150 g/L.
3. Dry-Fog Coatings: VOC not more than 400 g/L.
4. Primers, Sealers, and Undercoaters: VOC not more than 200 g/L.
5. Anticorrosive and Antirust Paints Applied to Ferrous Metals: VOC not more than 250 g/L.
6. Zinc-Rich Industrial Maintenance Primers: VOC not more than 340 g/L.
7. Pretreatment Wash Primers: VOC not more than 420 g/L.
8. Clear Wood Finishes, Varnishes: VOC not more than 350 g/L.
9. Clear Wood Finishes, Lacquers: VOC not more than 550 g/L.
10. Floor Coatings: VOC not more than 100 g/L.
11. Shellacs, Clear: VOC not more than 730 g/L.
12. Shellacs, Pigmented: VOC not more than 550 g/L.
13. Stains: VOC not more than 250 g/L.

C. Credit IEQ 4.4: Composite wood, agrifiber products, and adhesives shall not contain urea-formaldehyde resin.

PART 3 - EXECUTION

3.1 CONSTRUCTION WASTE MANAGEMENT

A. Credit MR 2: Comply with Division 1 Section "Construction Waste Management and Recycling."

3.2 CONSTRUCTION INDOOR-AIR-QUALITY MANAGEMENT

A. Credit IEQ 3.1: Comply with SMACNA’s "SMACNA IAQ Guideline for Occupied Buildings under Construction."

1. If Owner authorizes use of permanent heating, cooling, and ventilating systems during construction period as specified in Division 1 Section "Temporary Facilities and Controls," install filter media having a MERV 8 according to ASHRAE 52.2 at each return-air inlet for the air-handling system used during construction.
2. Replace all air filters immediately prior to occupancy.

B. Credit IEQ 3.2: Comply with one of the following requirements:

1. After construction ends, prior to occupancy and with all interior finishes installed, perform a building flush-out by supplying a total volume of 14000 cu. ft. (4 300 000 L) of outdoor air per sq. ft. (sq. m) of floor area while maintaining an internal temperature of at least 60 deg F (16 deg C) and a relative humidity no higher than 60 percent.
2. If occupancy is desired prior to flush-out completion, the space may be occupied following delivery of a minimum of 3500 cu. ft. (1 070 000 L) of outdoor air per sq. ft. (sq. m) of floor area to the space. Once a space is occupied, it shall be ventilated at a minimum rate of 0.30 cfm per sq. ft. (1.52 L/s per sq. m) of outside air or the design minimum outside air rate determined in Prerequisite IEQ 1, whichever is greater. During
each day of the flush-out period, ventilation shall begin a minimum of three hours prior to occupancy and continue during occupancy. These conditions shall be maintained until a total of 14000 cu. ft./sq. ft. (4 300 000 L/sq. m) of outside air has been delivered to the space.

3. Air-Quality Testing:

a. Conduct baseline indoor-air-quality testing, after construction ends and prior to occupancy, using testing protocols consistent with the EPA's “Compendium of Methods for the Determination of Air Pollutants in Indoor Air,” and as additionally detailed in the USGBC's "LEED Reference Guide for Green Interior Design and Construction."

b. Demonstrate that the contaminant maximum concentrations listed below are not exceeded:

1) Formaldehyde: 27 ppb.
2) Particulates (PM10): 50 micrograms/cu. m.
3) Total Volatile Organic Compounds (TVOC): 500 micrograms/cu. m.
4) 4-Phenylcyclohexene (4-PH): 6.5 micrograms/cu. m.
5) Carbon Monoxide: 9 ppm and no greater than 2 ppm above outdoor levels.

c. For each sampling point where the maximum concentration limits are exceeded, conduct additional flush-out with outside air and retest the specific parameter(s) exceeded to indicate the requirements are achieved. Repeat procedure until all requirements have been met. When retesting noncomplying building areas, take samples from same locations as in the first test.

d. Air-sample testing shall be conducted as follows:

1) All measurements shall be conducted prior to occupancy but during normal occupied hours, and with building ventilation system starting at the normal daily start time and operated at the minimum outside air flow rate for the occupied mode throughout the duration of the air testing.

2) Building shall have all interior finishes installed including, but not limited to, millwork, doors, paint, carpet, and acoustic tiles. Nonfixed furnishings such as workstations and partitions are encouraged, but not required, to be in place for the testing.

3) Number of sampling locations varies depending on the size of building and number of ventilation systems. For each portion of building served by a separate ventilation system, the number of sampling points shall not be less than one per 25,000 sq. ft. (2300 sq. m) or for each contiguous floor area, whichever is larger, and shall include areas with the least ventilation and greatest presumed source strength.

4) Air samples shall be collected between 3 and 6 feet (0.9 and 1.8 m) from the floor to represent the breathing zone of occupants, and over a minimum four-hour period.
**LEED 2009 for Commercial Interiors**

### Project Checklist

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### Indoor Environmental Quality

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### Innovation and Design Process

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### Regional Priority Credits

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**Total Possible Points: 110**

Certified 40 to 49 points  Silver 50 to 59 points  Gold 60 to 79 points  Platinum 80 to 110
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 distributed by the testing laboratory as follows:

1 copy - Contractor
1 copy - Applicable supplier or subcontractor
1 copy - Owner
1 copy - Consultant
Other copies - as directed

1.03 QUALITY CONTROL SYSTEM

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

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

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

1.04 INDEPENDENT TESTING AGENCY SERVICES

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

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

2. Contractor shall provide and maintain, for the sole use of the Testing Agency, adequate
facilities for the safe storage and proper curing of concrete testing cylinders on the
project site for the first 24 hours after casting as required by ASTM C 31, Method of
Making and Curing Concrete Test Specimens in the field.

3. Contractor shall notify Testing Agency sufficiently in advance of operations to allow for
completion of initial tests and proper assignment of inspection personnel.

4. Contractor shall notify the testing agency sufficiently in advance of cancellation of
required testing operations. The Contractor shall assume responsibility for costs incurred
due to the failure to provide such notice.

END OF SECTION
PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 DESCRIPTION OF REQUIREMENTS

A. This section of the General Requirements outlines the basic requirements for temporary services, utilities, and facilities which will indirectly enable adequate construction progress and processes, and will accommodate other necessary activities at the project site except as otherwise indicated, the costs of providing and using temporary services are included in the Contract Sum.

1.03 QUALITY ASSURANCE

A. Comply with governing regulations and utility company regulations and recommendations for the construction of temporary facilities, including but not necessarily limited to, code compliance, permits, inspections, testing, and health and safety compliance.

1.04 SITE CONDITIONS

A. Provide Temporary facilities and services at the time first needed at the site and maintain, expand, and modify the facilities as needed throughout the construction period and do not remove until no longer needed.

PART 2 - EXECUTION

2.01 GENERAL

A. Use qualified tradesmen for the installation of temporary facilities. Locate facilities where they will serve the total project construction work adequately and result in minimum interference with performance of the work. Relocate, modify, and extend facilities as required during the course of the work to properly accommodate the entire work of the project.

2.02 TEMPORARY FACILITIES

A. Temporary Water: Connect to existing water source as designated by the Owner for construction operations.

B. Temporary Telephone: Provide, maintain and pay for telephone service to field office at time of project mobilization. If a mobile phone is designated as the field office phone then it shall be a local number.

C. Sanitary Facilities: Comply with governing regulations, including safety and health codes for the type, number, location, operation, and maintenance of fixtures and facilities. Install sanitary facilities in available locations which will best serve the needs of personnel at the project site. Toilet rooms in existing buildings or in new construction may not be used without written approval of the Owner.
D. Temporary Heat and Ventilation: Provide such OSHA approved heat and fuel, heating units, equipment as necessary to provide the required environmental conditions and to protect the work from damage due to cold. Maintain equipment in a clean, safe condition.

E. Fire Extinguisher:
   1. Except as otherwise indicated or required, comply with the applicable recommendations of NFPA No. 10 "Portable Fire Extinguisher" for each area of each construction activity whenever combustible materials, flammable liquids, and similar exposures to possible fires are present.
   2. Locate extinguisher where most convenient and effective for the intended purposes. Store combustible materials in recognized fire-safe locations and containers.

F. Protection
   1. Barricades, Warning Signs, and lights: Comply with recognized standards and code requirements for the erection of substantial and structurally adequate barricades wherever needed to prevent accidents and losses. Paint with appropriate colors, graphics and warning signs to inform personnel at the site and the general public where exposure exists of the hazard being protected. Provide lighting where appropriate and needed for the recognition of the facility, including flashing red lights where appropriate.

G. Temporary Enclosure: Wherever required, provide temporary enclosure of materials, equipment, work in progress, and completed portions of work, so as to afford protection for both the work and employees.

H. Miscellaneous Facilities:
   1. Provide ladders, ramps, and temporary stairs for access to all levels of the construction for general access by all trades. Individual contractors and subcontractors shall furnish their own stepladders, scaffolds, staging, work platforms, and other facilities for use of their workmen and as necessary for safety of all personnel.

I. Field Office:
   1. The Contractor shall provide and maintain a suitable temporary field office for his own use. Offices and all other temporary structures shall be removed from the site upon completion of the work.
   2. Temporary structures or storage used for storage and offices for contractors shall be located on the site in an orderly manner as determined by the Owner.

2.03 OPERATIONS AND TERMINATIONS

A. Supervision: Enforce strict discipline in the use of temporary facilities at the project site. Limit availability of facilities to essential and intended uses, so as to minimize waste and possibility of abuses and the resulting unsanitary and hazardous or dangerous conditions.
B. Maintenance: Operate and maintain temporary facilities in good operating condition through the time of use and until removal is authorized. Protect from damage by freezing temperatures and similar elements at the site.

C. Termination and removal: At the time the need has ended for each temporary facility, or when it has been replaced by authorized use of a permanent facility, or at the time of Substantial completion, promptly remove the facility unless requested by the Consultant to be retained for a longer period of time. Complete or restore permanent work which may have been delayed or otherwise affected by the temporary facility. Replace work which cannot be satisfactorily restored. Except as otherwise indicated, the materials and equipment of temporary facilities remain the property of the contractors.

END OF SECTION
PART 1 - GENERAL

1.01 SUMMARY

A. Section includes administrative and procedural requirements for the following:

1. Salvaging nonhazardous construction waste.
2. Recycling nonhazardous construction waste.
3. Disposing of nonhazardous construction waste.

B. Related Section: Division 1 Section “Sustainable Design Requirements – LEED for Commercial Interiors” for additional sustainable design requirements.

1.02 DEFINITIONS

A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.

B. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.

C. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.

D. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.

E. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.03 PERFORMANCE REQUIREMENTS

A. General: Achieve end-of-Project rates for salvage/recycling of 75 percent by weight of total non-hazardous solid waste generated by the Work. Practice efficient waste management in the use of materials in the course of the Work. Use all reasonable means to divert construction and demolition waste from landfills and incinerators. Facilitate recycling and salvage of materials, including the following:

1. Construction Waste:
   a. Site-clearing waste.
   b. Concrete.
   c. Wood sheet materials.
   d. Wood trim.
   e. Metals.
   f. Carpet.
   g. Gypsum board and other gypsum related products.
   h. Piping.
   i. Electrical conduit.
j. Packaging: Regardless of salvage/recycle goal indicated in paragraph above, salvage or recycle 100 percent of the following uncontaminated packaging materials:

1) Paper.
2) Cardboard.
3) Boxes.
4) Plastic sheet and film.
5) Polystyrene packaging.
7) Plastic pails.

1.04 ACTION SUBMITTALS

A. Construction Waste Management Plan: Submit plan within 7 days of date established for commencement of the Work.

1.05 INFORMATIONAL SUBMITTALS

A. Waste Reduction Progress Reports: Concurrent with each Application for Payment, submit report. Include the following information:

1. Material category/description.
2. Location and name of receiving agent company.
3. Generation point of waste.
4. Total quantity of waste in tons (tonnes).
5. Quantity of waste salvaged, both estimated and actual in tons (tonnes).
6. Quantity of waste recycled, both estimated and actual in tons (tonnes).
7. Total quantity of waste recovered (salvaged plus recycled) in tons (tonnes).
8. Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste.

B. Waste Reduction Calculations: Before request for Substantial Completion, submit calculated end-of-Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.

C. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.

D. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.

E. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

F. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
G. LEED Submittal: LEED letter template for Credit MR 2.1 and 2.2, signed by Contractor, tabulating total waste material, quantities diverted and means by which it is diverted, and statement that requirements for the credit have been met.

H. Qualification Data: For waste management coordinator.

1.06 QUALITY ASSURANCE

A. Waste Management Coordinator Qualifications: Experienced firm, with a record of successful waste management coordination of Projects with similar requirements, that employs a LEED Accredited Professional, certified by USGBC, as waste management coordinator.

B. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.

C. Waste Management Conference: Conduct conference at Project site to comply with requirements in "Project Coordination." Review methods and procedures related to waste management including, but not limited to, the following:
   1. Review and discuss waste management plan including responsibilities of waste management coordinator.
   2. Review requirements for documenting quantities of each type of waste and its disposition.
   3. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
   4. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
   5. Review waste management requirements for each trade.

1.07 WASTE MANAGEMENT PLAN

A. General: Develop a waste management plan according to ASTM E 1609 and requirements of this Section. Plan shall consist of waste identification, waste reduction work plan, identification of construction haulers and recyclers, and cost/revenue analysis. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.

B. Waste Identification: Indicate anticipated types and quantities of site-clearing and construction waste generated by the Work. Include estimated quantities and assumptions for estimates.

C. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.
   1. Salvaged Materials for Reuse: For materials that will be salvaged and reused in this Project, describe methods for preparing salvaged materials before incorporation into the Work.
   2. Salvaged Materials for Sale: For materials that will be sold to individuals and organizations, include list of their names, addresses, and telephone numbers.
   3. Salvaged Materials for Donation: For materials that will be donated to individuals and organizations, include list of their names, addresses, and telephone numbers.
4. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.

5. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.

6. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location on Project site where materials separation will be located.

D. Cost/Revenue Analysis: Indicate total cost of waste disposal as if there was no waste management plan and net additional cost or net savings resulting from implementing waste management plan. Include the following:

1. Total quantity of waste.
2. Estimated cost of disposal (cost per unit). Include hauling and tipping fees and cost of collection containers for each type of waste.
3. Total cost of disposal (with no waste management).
4. Revenue from salvaged materials.
5. Revenue from recycled materials.
7. Savings in hauling and tipping fees that are avoided.
8. Handling and transportation costs. Include cost of collection containers for each type of waste.
9. Net additional cost or net savings from waste management plan.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.01 PLAN IMPLEMENTATION

A. General: Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.

1. Comply with “Temporary Facilities” for operation, termination, and removal requirements.

B. Waste Management Coordinator: Engage a waste management coordinator to be responsible for implementing, monitoring, and reporting status of waste management work plan.

C. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work occurring at Project site.

1. Distribute waste management plan to everyone concerned within three days of submittal return.
2. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.

D. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.
2. Comply with "Temporary Facilities" for controlling dust and dirt, environmental protection, and noise control.

3.02 RECYCLING CONSTRUCTION WASTE, GENERAL

A. General: Recycle paper and beverage containers used by on-site workers.

B. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall accrue to Owner.

C. Preparation of Waste: Prepare and maintain recyclable waste materials according to recycling or reuse facility requirements. Maintain materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process.

D. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical according to approved construction waste management plan.

1. Provide appropriately marked containers or bins for controlling recyclable waste until they are removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.
   a. Inspect containers and bins for contamination and remove contaminated materials if found.

2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
4. Store components off the ground and protect from the weather.
5. Remove recyclable waste off Owner's property and transport to recycling receiver or processor.

3.03 RECYCLING CONSTRUCTION WASTE

A. Packaging:

1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.
4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.

B. Site-Clearing Wastes: Chip brush, branches, and trees on-site, as good practice however not required by LEED requirements.

C. Wood Materials:
1. Clean Cut-Offs of Lumber: Grind or chip into small pieces.
2. Clean Sawdust: Bag sawdust that does not contain painted or treated wood.

D. Gypsum Board: Stack large clean pieces on wood pallets or in container and store in a dry location.
   1. Clean Gypsum Board: Grind scraps of clean gypsum board using small mobile chipper or hammer mill. Screen out paper after grinding.

3.04 DISPOSAL OF WASTE

A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.
   1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
   2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Burning: Do not burn waste materials.

C. Disposal: Transport waste materials off Owner's property and legally dispose of them.

END OF SECTION 01524
PART 1 - GENERAL

A. Provide labor, equipment, and materials for fabrication of a project sign as specified by the Project Architect.

B. Project sign(s) shall be required for all major renovation and new construction projects. The location(s) shall be at a point on or adjacent to the worksite where its visibility to the passing public is most apparent.

C. The maximum size of project sign backgrounds shall be 40 sq. ft. In most cases, an 8' x 4' plywood panel is recommended. For smaller projects, sign backgrounds may be less, but in no case shall be smaller than 16 sq. ft.

PART 2 -- PRODUCT

A. Fabricate project sign of three (3) treated 4" x 4" wood posts for 4'-0" x 8'-0" backgrounds or two (2) treated 4" x 4" wood posts for smaller backgrounds. Posts shall be set in 12" diameter holes at least three (3) feet deep and filled with concrete. Backgrounds shall be at least 3/4" thick exterior A/C plywood, "Dura ply" pre-treated surface, sheet metal overlay cemented to background, or other approved surface. Seal edges of plywood with paint. Supporting posts shall receive two coats of exterior grade paint or stain.

B. Design of the sign, including graphics, lettering, and colors, shall be furnished by the Project Architect and approved by the University. At a minimum, the sign shall include the following information:
   1. An artist's conception of the completed building or other facility as envisioned by the Project Architect.
   2. Project name in prominent sized lettering.
   3. Name of principal occupant or use.
   4. Owner's name: "University of Colorado at Boulder." Use approved style lettering and "CU" logo.
   5. Under owner's name add: "Project Manager: Department of Facilities Management."
   6. Project Architect and Principal Consultants' names. Include city and state of each, and telephone number of Project Architect.
   7. Include "Project Start [date]," and "Project Completion [date]."

PART 3 - EXECUTION

A. Project sign shall be in place prior to the start of construction, and shall not be removed until the point of substantial completion.

B. Location(s), number(s), size, configuration, and other details of the installation, including height above grade, shall be furnished and approved by the Project Architect with the approval of the University.

C. An experienced professional sign painter shall be hired and approved by the Project Architect and the University to prepare the graphics and lettering for the sign.

D. If, at the end of the project, the sign is re-usable, it shall be disposed of as directed by the University.

END OF SECTION
PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Products.
   2. Transportation and Handling.
   4. Manufacturer's Instructions.
   5. Product Options.
   6. Products List.
   7. Substitutions.

B. Related Sections:
   1. Section 01400 - Quality Control.
   2. Section 01730 - Operation and Maintenance Data.

1.02 QUALITY ASSURANCE

A. Conform to applicable specifications and standards.

B. Comply with size, make, type and quality specified, or as specifically approved in writing by the Consultant.

C. Manufactured and Fabricated Products:
   1. Two or more items of the same kind shall be identical, by the same manufacturer.
   2. Equipment capacities, sizes and dimensions shown or specified shall be adhered to unless variations are specifically approved in writing.

1.03 TRANSPORTATION AND HANDLING

A. Arrange deliveries of products in accord with construction schedules, coordinate to avoid conflict with work and conditions at the site.

B. Promptly inspect shipments to assure that products comply with requirements, quantities are correct, and products are undamaged.

1.04 STORAGE AND PROTECTION

A. Store products in accordance with manufacturer's instruction, with seals and labels intact and legible.

B. Arrange storage to provide access for inspection. Periodically inspect to assure products are undamaged, and are maintained under required conditions.

1.05 MANUFACTURER'S INSTRUCTIONS

A. When Contract Documents require that installation of work shall comply with manufacturer's printed instructions, obtain and distribute copies of such instructions to parties involved in the installation, including one copy to the Consultant and one copy to the Contractor.
B. Perform work in accord with manufacturer's instructions. Do not omit any preparatory step or installation procedure unless specifically modified or exempted by Contract Documents.

1.06 PRODUCT OPTIONS

A. Products Specified by Reference Standards or by Description Only: Any product meeting those standards.

B. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not specifically named.

C. Consultant will review requests for substitutions with reasonable promptness, and notify, by Addendum, of the decision to accept or reject the requested substitution.

1.07 PRODUCT LIST

A. Within 15 days after signing of agreement, submit complete list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.

1.08 SUBSTITUTIONS

A. Will only be considered prior to bid or in the event that Equipment is not available.

1.09 SYSTEMS DEMONSTRATION

A. Prior to final inspection, demonstrate operation of each system to Consultant and Owner.

B. Instruct Owner's personnel in operation, adjustment, and maintenance of equipment and systems, using the operation and maintenance data as the basis of instruction.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION
PART 1 - GENERAL

1.01 SUBSTANTIAL COMPLETION AND FINAL INSPECTION

A. The Contractor shall comply with procedures stated in the General Conditions of the Contract for Notice of Completion, Final Inspection, Notice of Substantial Completion and Notice of Acceptance.

B. Should the Architect/Engineer or the Principle Representative determine that the work is not substantially complete, or the punch list items exceed 25, he will immediately notify the Contractor, in writing, stating reasons. After Contractor completes work, he shall resubmit certification and request for final inspection. The Contractor will be responsible for all costs beyond two Architect/Engineer walk-throughs.

C. Owner may occupy designated portions of the Project under provisions stated in the General Conditions of the Contract.

1.02 CLOSE-OUT FORMS

The Architect/Engineer will complete the Notice of Approval of Beneficial Occupancy, Closing-out Checklist and Contract Close-out forms and forward them to the Contractor. Comply with procedures stated in General Conditions of the Contract.

1.03 FINAL SETTLEMENT AND PAYMENT

A. Contractor shall comply with procedures stated in the General Conditions of the Contract before final settlement and payment are made.

B. The Contractor shall also submit the following prior to the final application for payment:
   1. Contractor’s Affidavit of Payment of Debit and Claims: AIA G706.
   2. Contractor’s Affidavit of Release of Liens (claims): AIA G706A, with:
      a. Consent of Surety to final payment: AIA G707
      b. Contractor’s release of waivers of claims.
      c. Separate release of waivers of claims for subcontractors, suppliers and others with claim rights, against property of owner, together with list of those parties.

1.04 GUARANTEE INSPECTION

A. The Contractor shall comply with procedures stated in the General Conditions of the Contract for Guarantee Inspections after completion of the work.

1.05 WARRANTIES AND SPECIAL GUARANTEES

The Contractor shall comply with procedures and criteria outlined in the General Conditions of the Contract for all warranties and special guarantees of the work.

1.06 OPERATING AND MAINTENANCE DATA

A. Refer to Section 01730 - Operating and Maintenance.

B. Mechanical - By Mechanical Contractor: See Division 15.
C. Electrical - By Electrical Contractor: See Division 16.

1.07 DEMONSTRATIONS

A. Refer to Section 01730 - Operating and Maintenance

B. Mechanical - By Mechanical Contractor: See Division 15

C. Electrical - By Electrical Contractor: See Division 16.

1.08 SPARE PARTS AND MAINTENANCE MATERIALS

A. Provide products, spare parts, and maintenance materials in quantities specified in each Section, in addition to that used for construction of work. Coordinate with Owner, deliver to Project site and obtain receipt prior to final payment.

B. At the completion of the project, all loose keys for hose bibs; adjustment keys and wrenches for door closers and panic hardware; and keys for electric switches, electrical panels, etc., shall be accounted for by the Contractor and turned over to the Owner.

END OF SECTION
PART 1 - GENERAL

1.01 CLEANING

A. Clean-up During Construction: Each contractor shall keep the building and premises free from all surplus material, waste material, dirt and rubbish caused by his employees or work, and at the completion of his work he shall remove all such surplus material, waste material, dirt and rubbish, as well as his tools, equipment and scaffolding, and shall leave his work clean and spotless, unless more exact requirements are specified. In case of dispute, the owner may remove all such items and charge the cost of such removal to the contractor.

Each sub-contractor shall perform his clean-up daily and shall transport his rubbish to an on-site location designated by the Contractor who will arrange for its removal.

B. Cleaners: With the exception of clean-up of the site and cleaning specifically assigned to Contractors under various sections of the specifications, all final clean-up of exterior and interior of the building shall be done by professional cleaners.

C. Final Clean-up:

1. Exterior: In addition to items specified below, any new surfaces on exterior, concrete, metal, etc., shall be carefully and thoroughly cleaned.

2. Glass: Both sides of all glass in work areas shall be carefully and thoroughly cleaned by professional window cleaners and left absolutely clean and free from paint, grease, dirt, etc.

3. Hardware: Clean and polish all hardware and leave clean and free from paint, grease, dirt, etc.

4. Plumbing: Clean and polish all plumbing fixtures, fittings, and exposed plated piping. Leave clean and free from paint, grease, dirt, etc. Remove all labels.

5. Electrical: Clean and polish all electric fixtures, including glassware, switch plates, etc. and leave clean and free from paint, grease, dirt, etc.

6. Equipment: Carefully and thoroughly clean all items of equipment, mechanical, electrical, cabinets, ductwork, etc.

7. Floors: Thoroughly clean all floors. Vacuum and clean carpeting. Shampooing of pre-existing carpet is required once project is complete. Contractor is responsible for this.

   a. Contractors are responsible for cleaning (stripping floors if necessary) then applying the required two coats of sealer and three coats of finish before releasing the building for occupancy. Facilities Management will provide a contact person for help concerning campus standards free of charge. Or Custodial floor care services may be sub-contracted out through Facilities Management’s work order system.

   b. Facilities Management Approved Sealers and Finishes for Vinyl Tile Flooring:

CU requires floor care products to be from the same product line. (Different brands may interact disastrously).

All of these products may be ordered through Construction Stores, but these products not stocked at Stores, please place orders at least two weeks in advance.
Strippers:  
JohnsWax: Freedom
Butchers: 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 facilitates 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

1.1 SUMMARY

A. This Section includes the following:

1. Demolition, removal, and recycling of selected portions of building or structure.
2. Salvage of existing items to be reused or recycled.

B. Related Sections:

1. “Summary of Work” for use of premises and Owner-occupancy requirements.
3. “Cutting and Patching” for cutting and patching procedures.
4. Division 1 Section “Construction Waste Management and Recycling” for nonhazardous demolition and construction waste.

C. Related Document: Environmental Consultation/Comprehensive Asbestos Building Inspection attached End of this Section.

1.2 DEFINITIONS

A. Remove: Detach items from existing construction and legally dispose of them off-site, unless indicated to be removed and salvaged or removed and reinstalled.

B. Remove and Salvage: Detach items from existing construction and deliver them to Owner.

C. Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.

D. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.3 SUBMITTALS

A. Schedule of Selective Demolition Activities: Indicate detailed sequence of selective demolition and removal work, with starting and ending dates for each activity, interruption of utility services, use of elevator and stairs, and locations of temporary partitions and means of egress.

B. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

C. Waste Management Log: Indicate amount of material by weight and it’s recycling/disposal method.
1.4 QUALITY ASSURANCE

A. Demolition Firm Qualifications: An experienced firm that has specialized in demolition work similar in material and extent to that indicated for this Project.

B. Refrigerant Recovery Technician Qualifications: Certified by an EPA-approved certification program.

C. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

D. Standards: Comply with ANSI A10.6 and NFPA 241.

1.5 PROJECT CONDITIONS

A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner’s operations will not be disrupted.

B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

D. Hazardous Materials: Hazardous materials are present in construction to be selectively demolished. A report on the presence of hazardous materials is on file for review and use. Examine report to become aware of locations where hazardous materials are present.

   1. Do not disturb hazardous materials or items suspected of containing hazardous materials except under procedures specified elsewhere in the Contract Documents.

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

F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.

   1. Maintain fire-protection facilities in service during selective demolition operations.

1.6 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials so as not to void existing warranties.
PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that utilities have been disconnected and capped.

B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.

C. Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged.

D. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.

E. Engage a professional engineer to survey condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective demolition operations.

F. Survey of Existing Conditions: Record existing conditions by use of measured drawings, preconstruction photographs, preconstruction videotapes and templates.

G. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Services/Systems: Maintain services/systems indicated to remain and protect them against damage during selective demolition operations.

B. Service/System Requirements: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.

1. Arrange to shut off indicated utilities with utility companies.
2. If services/systems are required to be removed, relocated, or abandoned, before proceeding with selective demolition provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
3. Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing.

3.3 PREPARATION

A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
1. Comply with requirements for access and protection specified in "Temporary Facilities."

B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

C. Temporary Shoring: Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.

3.4 SELECTIVE DEMOLITION

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:

1. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.

2. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.

3. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.

4. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.

5. Dispose of demolished items and materials promptly.

B. Removed and Salvaged Items:

1. Clean salvaged items.

2. Pack or crate items after cleaning. Identify contents of containers.

3. Store items in a secure area until delivery to Owner.

4. Transport items to Owner's storage area on-site.

5. Protect items from damage during transport and storage.

C. Removed and Reinstalled Items:

1. Clean and repair items to functional condition adequate for intended reuse. Paint equipment to match new equipment.

2. Pack or crate items after cleaning and repairing. Identify contents of containers.

3. Protect items from damage during transport and storage.

4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

D. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and reinstalled in their original locations after selective demolition operations are complete.
3.5 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

A. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals, using power-driven saw, then remove concrete between saw cuts.

B. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, then remove masonry between saw cuts.

C. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, then break up and remove.

D. Resilient Floor coverings: Remove floor coverings and adhesive according to recommendations in RFCI-WP and its Addendum.

3.6 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Except for items or materials indicated to be recycled, reused, salvaged, reinstalled, or otherwise indicated to remain Owner’s property, remove demolished materials from Project site, recycle all metals, wood, plastics, and paper products, and legally dispose of all unrecyclable materials in an EPA-approved landfill.

B. Burning: Do not burn demolished materials.

C. Disposal: Transport demolished materials off Owner’s property and legally dispose of them.

3.7 CLEANING

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.
PART 1 - GENERAL

1.1 SUMMARY

A. Section includes miscellaneous steel framing and supports.

B. Products furnished, but not installed, under this Section:
   1. Anchor bolts, steel pipe sleeves, slotted-channel inserts, and wedge-type inserts indicated to be cast into concrete or built into unit masonry.
   2. Steel weld plates and angles for casting into concrete.

C. Related Sections:
   1. Division 1 Section “Sustainable Design Requirements – LEED for Commercial Interiors.”
   2. Division 1 Section “Construction Waste Management and Recycling.”

1.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design ladders, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.

   1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

1.3 SUBMITTALS

A. Product Data: For the following:

   1. Paint products.
   2. Grout.

B. LEED Submittals: Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.

C. Shop Drawings: Show fabrication and installation details for metal fabrications.

   1. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.

D. Delegated-Design Submittal: For installed products indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
PART 2 - PRODUCTS

2.1 METALS, GENERAL
   A. Metal Surfaces, General: Provide materials with smooth, flat surfaces without blemishes.

2.2 FERROUS METALS
   A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 75 percent.
   B. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
   C. Stainless-Steel Bars and Shapes: ASTM A 276, Type 304.
   D. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from plate complying with ASTM A 36/A 36M or ASTM A 283/A 283M, Grade C or D.
   E. Rolled-Stainless-Steel Floor Plate: ASTM A 793.
   F. Steel Tubing: ASTM A 500, cold-formed steel tubing.
   G. Steel Pipe: ASTM A 53/A 53M, standard weight (Schedule 40) unless otherwise indicated.
   H. Slotted Channel Framing: Cold-formed metal box channels (struts) complying with MFMA-4.
      1. Size of Channels: 1-5/8 by 1-5/8 inches (41 by 41 mm).
      2. Material: Galvanized steel, ASTM A 653/A 653M, structural steel, Grade 33 (Grade 230), with G90 (Z275) coating; 0.108-inch (2.8-mm) nominal thickness.
   I. Cast Iron: Either gray iron, ASTM A 48/A 48M, or malleable iron, ASTM A 47/A 47M.

2.3 NONFERROUS METALS
   A. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), Alloy 6063-T6.
   C. Aluminum Castings: ASTM B 26/B 26M, Alloy 443.0-F.
   E. Bronze Castings: ASTM B 584, Alloy UNS No. C83600 (leaded red brass) or No. C84400 (leaded semired brass).
2.4 FASTENERS

A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 5, at exterior walls.

1. Provide stainless-steel fasteners for fastening aluminum.
2. Provide stainless-steel fasteners for fastening stainless steel.
4. Provide bronze fasteners for fastening bronze.

B. Cast-in-Place Anchors in Concrete: Either threaded type or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A 47/A 47M malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F 2329.

C. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors.

1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 5, unless otherwise indicated.

D. Slotted-Channel Inserts: Cold-formed, hot-dip galvanized-steel box channels (struts) complying with MFMA-4, 1-5/8 by 7/8 inches (41 by 22 mm) by length indicated with anchor straps or studs not less than 3 inches (75 mm) long at not more than 8 inches (200 mm) o.c. Provide with temporary filler and tee-head bolts, complete with washers and nuts, all zinc-plated to comply with ASTM B 633, Class Fe/Zn 5, as needed for fastening to inserts.

2.5 MISCELLANEOUS MATERIALS

A. Shop Primers: Provide primers that comply with Division 9 painting Sections.

B. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.

C. Epoxy Zinc-Rich Primer: Complying with MPI#20 and compatible with topcoat.

D. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

E. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

F. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

G. Concrete: Comply with requirements in Division 3 Section "Cast-in-Place Concrete" for normal-weight, air-entrained, concrete with a minimum 28-day compressive strength of 3000 psi (20 MPa).
2.6 FABRICATION, GENERAL

A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Use connections that maintain structural value of joined pieces.

B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges. Remove sharp or rough areas on exposed surfaces.

C. Weld corners and seams continuously to comply with the following:
   1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
   2. Obtain fusion without undercut or overlap.
   3. Remove welding flux immediately.
   4. At exposed connections, finish exposed welds and surfaces smooth and blended.

D. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Locate joints where least conspicuous.

E. Fabricate seams and other connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

F. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors not less than 24 inches (600 mm) o.c.

2.7 MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.

B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.

C. Fabricate steel girders for wood frame construction from continuous steel shapes of sizes indicated.
   1. Where wood nailers are attached to girders with bolts or lag screws, drill or punch holes at 24 inches (600 mm) o.c.

D. Fabricate steel pipe columns for supporting wood frame construction from steel pipe with steel baseplates and top plates as indicated. Drill or punch baseplates and top plates for anchor and connection bolts and weld to pipe with fillet welds all around. Make welds the same size as pipe wall thickness unless otherwise indicated.

2.8 MISCELLANEOUS STEEL TRIM

A. Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.
B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.

C. Galvanize exterior miscellaneous steel trim.

2.9 FINISHES, GENERAL

A. Comply with NAAMM’s “Metal Finishes Manual for Architectural and Metal Products” for recommendations for applying and designating finishes.

B. Finish metal fabrications after assembly.

2.10 STEEL AND IRON FINISHES

A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153/A 153M for steel and iron hardware and with ASTM A 123/A 123M for other steel and iron products.

B. Shop prime iron and steel items not indicated to be galvanized unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.
   1. Shop prime with primers specified in Division 9 painting Sections unless zinc-rich primer is indicated.

C. Preparation for Shop Priming: Prepare surfaces to comply with requirements indicated below:
   2. Items Indicated to Receive Primers Specified in Division 9 Section "High-Performance Coatings": SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
   3. Other Items: SSPC-SP 3, "Power Tool Cleaning."

D. Shop Priming: Apply shop primer to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

C. Field Welding: Comply with the following requirements:
1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended.

D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction.

E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

3.2 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION 05500
PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Wood blocking and nailers.
   2. Wood sleepers.
   3. Interior wood trim.

B. Related Sections:
   1. Division 1 Section “Sustainable Design Requirements – LEED for Commercial Interiors.”
   2. Division 1 Section “Construction Waste Management and Recycling.”

1.2 DEFINITIONS

A. Dimension Lumber: Lumber of 2 inches nominal (38 mm actual) or greater but less than 5 inches nominal (114 mm actual) in least dimension.

B. Lumber grading agencies, and the abbreviations used to reference them, include the following:
   3. NLGA: National Lumber Grades Authority.
   5. WCLIB: West Coast Lumber Inspection Bureau.

1.3 SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
   1. Wood Treatment:
      a. Submit chemical treatment manufacturer’s instructions for handling, storing, installation, and finishing of treated material.
      b. Preservative Treatment:
         1) For each type specified, include certification by treating plant stating preservative solutions and pressure process used, net amount of preservative retained, and conformance with applicable standards.
         2) For water-borne preservatives, certify that moisture content of materials was reduced to maximum of 19 percent after treatment and prior to shipping to Project site.
   2. Fire-Retardant Treatment:
      a. Include certification by treating plant that treatment material complies with specified standards, and governing authorities.
b. Include materials test reports from qualified testing laboratory indicating and interpreting test results relative to compliance of fire-retardant treated wood products with requirements indicated.

B. LEED Submittals:

1. Local/Regional Materials: Provide a statement from the manufacturer stating that materials provided were manufactured within a 500 mile radius of the Project. Include location of the manufacturing facility including name, address and distance between manufacturing facility and the Project site. Provide manufacturer’s documentation indicating location where the base materials were extracted, mined, harvested, etc. and distance between manufacturing facility and the Project site (applies to LEED MR 5: Regional Materials).
   a. Include material costs (excluding cost of installation).

2. Recycled Content: Provide a statement from the manufacturer including the recycled content percentage, by weight, and whether the recycled content is post-consumer or post-industrial (applies to LEED MR 4: Recycled Content).

3. Credit EQ 4.1: Manufacturers’ product data and material safety data sheets (MSDS) for construction adhesive and sealants used on the interior of the building, including printed statement of VOC content in g/L.

4. Credit EQ 4.2: Manufacturers’ product data and material safety data sheets (MSDS) for construction painting and coatings used on the interior of the building, including printed statement of VOC content in g/L.

5. Credit EQ 4.4: Composite wood manufacturer’s product data for each composite wood product used indicating that bonding agent used contains no urea formaldehyde.

6. Credit MR 7: Certificates of chain-of-custody signed by manufacturers certifying that products specified to be made from certified wood were made from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC 1.2, “Principles and Criteria.” Include evidence that mill is certified for chain-of-custody by an FSC-accredited certification body.
   a. Include cost of material and chain-of-custody certification number obtained from manufacturer.

1.4 QUALITY ASSURANCE

A. Forest Certification: For the following wood products, provide materials produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship":

1. Dimension lumber framing.
2. Miscellaneous lumber.
3. Interior wood trim.
4. Shelving and clothes rods.

B. Standards:

1. Lumber: Comply with PS 20, WWPA Grading Rules and other grading rules as specified.
2. Plywood: Comply with PS 1, “U.S. Product Standard for Construction and Industrial Plywood”.


4. Factory-mark each piece of lumber and plywood with type, grade, mill and grading agency, except omit markings from surfaces to be exposed with transparent finish or without finish.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Stack lumber flat with spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.

B. Deliver interior wood materials that are to be exposed to view only after building is enclosed and weatherproof, wet work other than painting is dry, and HVAC system is operating and maintaining temperature and humidity at occupancy levels.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

A. Certified Wood: Lumber and plywood shall be produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, “FSC Principles and Criteria for Forest Stewardship.”

2.2 WOOD-PRESERVATIVE-TREATED MATERIALS

A. General: Where lumber or plywood is indicated as preservative treated or is specified to be treated, comply with applicable requirements of AWPA C2 (lumber) and AWPA C9 (plywood). Mark each treated item with the Quality Mark Requirements of an inspection agency approved by ALSC's Board of Review.

1. Do not use chemicals containing chromium or arsenic.
2. Composite wood and agrifiber products shall not contain added urea-formaldehyde resins.
3. Wood nailers for roofing shall be weather resistant to comply with roof manufacturer’s standards for Wolmanized or equal treatment.
4. Wood for nailers shall be #2 or better.
5. Creosote and asphaltic preservatives are not acceptable

B. Pressure treat aboveground items with waterborne preservatives to a minimum retention of 0.25 lb/cu. ft. (4.0 kg/cu. m) to comply with AWPB LP-2. After treatment, kiln-dry lumber and plywood to a maximum moisture content of 19 and 15 percent, respectively. Treat indicated items and the following:

1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
2. Wood sills, sleepers, blocking, stripping, and similar concealed members in contact with masonry or concrete.
C. Complete fabrication of treated items prior to treatment, where possible. If cut after treatment, coat cut surfaces with heavy brush coat of same chemical used for treatment. Inspect each piece of lumber or plywood after drying and discard damaged of defective pieces.

D. Do not treat any wood to receive fire-retardant treatment.

E. Pressure treat wood members in contact with ground or freshwater with waterborne preservatives to a minimum retention of 0.40 lb/cu. ft. (6.4 kg/cu. m).

2.3 FIRE-RETARDANT-TREATED MATERIALS

A. General: Comply with performance requirements in AWPA C20 (lumber) and AWPA C27 (plywood).

1. Use treatment that does not promote corrosion of metal fasteners.
2. Use Exterior type for exterior locations and where indicated.
3. Use Interior Type A, High Temperature (HT) for enclosed roof framing, framing in attic spaces, and where indicated.
4. Use Interior Type A, unless otherwise indicated.

B. Identify fire-retardant-treated wood with appropriate classification marking of testing and inspecting agency acceptable to authorities having jurisdiction.

1. Fire-retardant chemicals to achieve a flame-spread rating of not more than 25 when tested in accordance with UL Test 723 or ASTM E84.
   a. Provide UL label on each piece of fire-retardant treated lumber or plywood.
   b. Rack dry or kiln-dry treated items to a maximum moisture content of 15 percent.

C. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not bleed through, contain colorants, or otherwise adversely affect finishes.

D. Application: Treat all miscellaneous carpentry, unless otherwise indicated.

2.4 MISCELLANEOUS LUMBER

A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:

1. Blocking.
2. Nailers.

B. Fabricate miscellaneous lumber from dimension lumber of sizes indicated and into shapes shown.

C. Moisture Content: 19 percent maximum for lumber items are not specified to receive wood preservative treatment.

D. Grade: For dimension lumber sizes, provide No. 3 or Standard grade lumber per ALSC’s NGRs of any species. For board-size lumber, provide No. 3 Common grade per NELMA, NLGA, or WWPA, No. 2 grade per SPIB, or Standard grade per NLGA, WCLIB or WWPA of any species.
2.5 PLYWOOD

A. Plywood: Provide either all-veneer, mat-formed, or composite panels complying with DOC PS 2, "Performance Standard for Wood-Based Structural-Use Panels," unless otherwise indicated. Provide plywood panels complying with DOC PS 1, "U.S. Product Standard for Construction and Industrial Plywood," where plywood is indicated.

1. Composite wood and agrifiber products shall not contain added urea-formaldehyde resins.

B. Trademark: Factory mark structural-use panels with APA trademark evidencing compliance with grade requirements.


D. Miscellaneous Concealed Panels: APA-rated sheathing, Exposure 1, span rating to suit framing in each location.

E. Plywood Underlayment: Underlayment B-C Exterior with fully sanded face, thickness as indicated but not less than 1/2 inch (12.7 mm).

F. Miscellaneous Exposed Plywood: A-D Interior, thickness as indicated but not less than 1/2 inch (12.7 mm).

2.6 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.

1. Where carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.

B. Nails, Brads, and Staples: ASTM F 1667.


D. Screws for Fastening to Cold-Formed Metal Framing: ASTM C 954, except with wafer heads and reamer wings, length as recommended by screw manufacturer for material being fastened.

E. Bolts: Steel bolts complying with ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with ASTM A 563 (ASTM A 563M) hex nuts and, where indicated, flat washers.

2.7 MISCELLANEOUS MATERIALS

A. Adhesives for Gluing Sleepers to Concrete or Masonry: Formulation complying with ASTM D 3498 that is approved for use indicated by adhesive manufacturer.

1. Adhesives shall have a VOC content of 75 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
B. Wood Glues and Adhesives: All adhesives shall meet or exceed the VOC limits of South Coast Air Quality Management District Rule #1168. Provide low VOC, FS MMM-A-125C, Type II, water and mold resistant adhesives.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit carpentry to other construction; scribe and cope as needed for accurate fit. Locate nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.

B. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.

C. Framing Standard: Comply with AF&PA's "Details for Conventional Wood Frame Construction," unless otherwise indicated.

D. Do not splice structural members between supports, unless otherwise indicated.

E. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.

1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches (406 mm) o.c.

F. Provide fire blocking in furred spaces, stud spaces, and other concealed cavities as indicated and as follows:

1. Fire block furred spaces of walls, at each floor level, at ceiling, and at not more than 96 inches (2438 mm) o.c. with solid wood blocking or noncombustible materials accurately fitted to close furred spaces.

2. Fire block concealed spaces of wood-framed walls and partitions at each floor level, at ceiling line of top story, and at not more than 96 inches (2438 mm) o.c. Where fire blocking is not inherent in framing system used, provide closely fitted solid wood blocks of same width as framing members and 2-inch nominal- (38-mm actual-) thickness.

3. Fire block concealed spaces between floor sleepers with same material as sleepers to limit concealed spaces to not more than 100 sq. ft. (9.3 sq. m) and to solidly fill space below partitions.

4. Fire block concealed spaces behind combustible cornices and exterior trim at not more than 20 feet (6 m) o.c.

G. Sort and select lumber so that natural characteristics will not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

H. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.
1. Use inorganic boron for items that are continuously protected from liquid water.
2. Use copper naphthenate for items not continuously protected from liquid water.

I. Securely attach carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
   1. NES NER-272 for power-driven fasteners.
   5. Table 2306.1, "Fastening Schedule," in SBCCI's Standard Building Code.
   7. Table 602.3(1), "Fastener Schedule for Structural Members," and Table 602.3(2), "Alternate Attachments," in ICC's International One- and Two-Family Dwelling Code.

J. Use common wire nails, unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood; do not countersink nail heads, unless otherwise indicated.

3.2 WOOD GROUND, SLEEPER, BLOCKING, AND NAILER INSTALLATION

A. Provide 2 inch nominal wood blocking in metal stud framing to support toilet accessories, grab bars, railings, fixtures, wall mounted casework and equipment, wall mounted door stops and other similar items.
   1. At Contractor's option to above, metal backing may be provided.

B. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.

C. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces, unless otherwise indicated.

D. Provide permanent grounds of dressed, pressure-preservative-treated, key-beveled lumber not less than 1-1/2 inches (38 mm) wide and of thickness required to bring face of ground to exact thickness of finish material. Remove temporary grounds when no longer required.

3.3 WOOD TRIM INSTALLATION

A. Install with minimum number of joints practical, using full-length pieces from maximum lengths of lumber available. Do not use pieces less than 24 inches (610 mm) long except where necessary. Stagger joints in adjacent and related standing and running trim. Cope at returns and miter at corners to produce tight-fitting joints with full-surface contact throughout length of joint. Use scarf joints for end-to-end joints.
   1. Match color and grain pattern across joints.
   2. Install trim after gypsum board joint-finishing operations are completed.
   3. Drill pilot holes in hardwood before fastening to prevent splitting. Fasten to prevent movement or warping. Countersink fastener heads and fill holes.
4. Install to tolerance of 1/8 inch in 96 inches (3 mm in 2438 mm) for level and plumb. Install adjoining finish carpentry with 1/32-inch (0.8-mm) maximum offset for flush installation and 1/16-inch (1.6-mm) maximum offset for reveal installation.

3.4 PROTECTION

A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

B. Protect rough carpentry from weather. If, despite protection, rough carpentry becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION
PART 1 - GENERAL

1.1 SUMMARY

A. This Section Includes:
   1. Plastic-laminate countertops and trim.
   2. Solid-surfacing-material countertops.

B. Related Sections:
   1. Division 1 Section “Sustainable Design Requirements – LEED for Commercial Interiors.”
   2. Division 1 Section “Construction Waste Management and Recycling.”
   3. Division 11 Section “Food Service Equipment,” for installation and preparation of all food service equipment.

1.2 DEFINITIONS

A. Interior architectural woodwork includes wood blocking, shims, and hanging strips for installing woodwork items unless concealed within other construction before woodwork installation.

B. Rough carriages for stairs are a part of interior architectural woodwork. Platform framing, headers, partition framing, and other rough framing associated with stairwork are specified in Division 6 Section "Miscellaneous Carpentry."

1.3 SUBMITTALS

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

B. LEED Submittals:

   1. Local/Regional Materials: Provide a statement from the manufacturer stating that materials provided were manufactured within a 500 mile radius of the Project. Include location of the manufacturing facility including name, address and distance between manufacturing facility and the Project site. Provide manufacturer’s documentation indicating location where the base materials were extracted, mined, harvested, etc. and distance between manufacturing facility and the Project site (applies to LEED MR 5: Regional Materials).
      a. Include material costs (excluding cost of installation).

   2. Recycled Content: Provide a statement from the manufacturer including the recycled content percentage, by weight, and whether the recycled content is post-consumer or post-industrial (applies to LEED MR 4: Recycled Content).

   3. Composite Wood and Agrifiber: Provide manufacturers’ product data indicating the type of resin binder used, and confirming that neither the product nor the laminating adhesives contain urea-formaldehyde resin binders.

   4. Credit EQ 4.1: Manufacturers’ product data and material safety data sheets (MSDS) for construction adhesive and sealants used on the interior of the building, including printed statement of VOC content in g/L.
5. Credit EQ 4.4: Composite wood manufacturer’s product data for each composite wood product used indicating that bonding agent used contains no urea formaldehyde.
6. Credit MR 7: Certificates of chain-of-custody signed by manufacturers certifying that products specified to be made from certified wood were made from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC 1.2, “Principles and Criteria.” Include evidence that mill is certified for chain-of-custody by an FSC-accredited certification body.
   a. Include cost of material and chain-of-custody certification number obtained from manufacturer.

C. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.
   1. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.

D. Samples for Initial Selection:
   1. Plastic laminates, three 2 by 3 inch samples.
   2. Solid-surfacing material.

E. Samples for Verification:
   1. Plastic laminates, 8 by 10 inches (200 by 250 mm), for each type, color, pattern, and surface finish, with 1 sample applied to core material.
   2. Solid-surfacing materials, 6 inches (150 mm) square.

F. Product Certificates: For each type of product, signed by product manufacturer.

G. Woodwork Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.

H. Qualification Data: For Installer.

1.4 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate products similar to those required for this Project and whose products have a record of successful in-service performance. Shop is a certified participant in AWI’s Quality Certification Program.

B. Installer Qualifications: Certified participant in AWI’s Quality Certification Program.

C. Quality Standard: Except as otherwise shown or specified, comply with specified provisions of the Architectural Woodwork Institute (AWI) “Quality Standards”. In event of dispute as to performance under AWI standards, Owner may call upon AWI for an inspection and report by AWI Quality Certification Program. All parties agree to abide by AWI decisions. Costs for this service will be paid by Owner unless AWI determines that specified standards have not been met, in which case costs will be paid by Contractor.
   1. Plastic Laminate Casework: AWI Section 400, Custom Grade.
   2. Installation: AWI Section 1700, Custom Grade.
D. Forest Certification: Provide interior architectural woodwork produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."

E. Fire-Test-Response Characteristics: Where fire-retardant materials or products are indicated, provide materials and products with specified fire-test-response characteristics as determined by testing identical products per test method indicated by UL, ITS, or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify with appropriate markings of applicable testing and inspecting agency in the form of separable paper label or, where required by authorities having jurisdiction, imprint on surfaces of materials that will be concealed from view after installation.

F. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

G. Preinstallation Conference: Conduct conference at Project site.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver woodwork until painting and similar operations that could damage woodwork have been completed in installation areas. If woodwork must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Project Conditions" Article.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

B. Field Measurements: Where woodwork is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Locate concealed framing, blocking, and reinforcements that support woodwork by field measurements before being enclosed, and indicate measurements on Shop Drawings.

2. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating woodwork without field measurements. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

C. Do not install architectural woodwork in any space until plaster, masonry and other wet work are sufficiently dry and all hemispheric conditions are acceptable.

D. Protect all products after installation. All items must be protected from damage from other trades and on-site conditions.
1.7 COORDINATION

A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that interior architectural woodwork can be supported and installed as indicated.

B. Hardware Coordination: Distribute copies of approved hardware schedule specified in Division 8 Section "Door Hardware (Scheduled by Describing Products)" to fabricator of architectural woodwork; coordinate Shop Drawings and fabrication with hardware requirements.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Provide materials that comply with requirements of AWI's quality standard for each type of woodwork and quality grade specified, unless otherwise indicated.

B. Certified Wood: Interior architectural woodwork shall be produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."

C. Wood Products: Comply with the following:

1. Recycled Content of Medium-Density Fiberboard and Particleboard: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 75 percent.
5. Softwood Plywood: DOC PS 1, Medium Density Overlay.

D. Thermoset Decorative Panels: Particleboard or medium-density fiberboard finished with thermally fused, melamine-impregnated decorative paper complying with LMA SAT-1.

1. Provide PVC or polyester edge banding complying with LMA EDG-1 on components with exposed or semiexposed edges.

E. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or, if not indicated, as required by woodwork quality standard.

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering high-pressure decorative laminates that may be incorporated into the Work include, but are not limited to, the following:

   a. Abet Laminati, Inc.
   b. Arborite; Division of ITW Canada, Inc.
   c. Formica Corporation.
   d. Lamin-Art, Inc.
   e. Nevamar Company, LLC; Decorative Products Div.
   f. Panolam Industries International Incorporated.
   g. Westinghouse Electric Corp.; Specialty Products Div.
   h. Wilsonart International; Div. of Premark International, Inc.
F. Solid-Surfacing Material: Homogeneous solid sheets of filled plastic resin complying with ISSFA-2.

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. Avonite, Inc.
   c. Formica Corporation.
   d. Nevamar Company, LLC; Decorative Products Div.
   e. Wilsonart International; Div. of Premark International, Inc.

2. Type: Standard type, unless Special Purpose type is indicated.
3. Colors and Patterns: As selected by Architect from manufacturer's full range.

2.2 FIRE-RETARDANT-TREATED MATERIALS

A. General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this Article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified.

1. Do not use treated materials that do not comply with requirements of referenced woodworking standard or that are warped, discolored, or otherwise defective.

2. Use fire-retardant-treatment formulations that do not bleed through or otherwise adversely affect finishes. Do not use colorants to distinguish treated materials from untreated materials.

3. Identify fire-retardant-treated materials with appropriate classification marking of UL, U.S. Testing, Timber Products Inspection, or another testing and inspecting agency acceptable to authorities having jurisdiction.

B. Fire-Retardant Fiberboard: Medium-density fiberboard panels complying with ANSI A208.2, made from softwood fibers, synthetic resins, and fire-retardant chemicals mixed together at time of panel manufacture to achieve flame-spread index of 25 or less and smoke-developed index of 200 or less per ASTM E 84.

1. Product: Subject to compliance with requirements, provide "Medite FR" by SierraPine Ltd.; Medite Div.

2.3 MISCELLANEOUS MATERIALS

A. Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln dried to less than 15 percent moisture content.

B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls and elsewhere as required for corrosion resistance. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.

C. Adhesives, General: Do not use adhesives that contain urea formaldehyde.

1. Interior Applications: AWI Section 100, Type II.
D. VOC Limits for Installation Adhesives and Glues: Use installation adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

1. Wood Glues: 30 g/L.
2. Contact Adhesive: 250 g/L.

E. Adhesive for Bonding Plastic Laminate: Unpigmented contact cement.

2.4 FABRICATION, GENERAL

A. Workmanship shall equal in all respect to the standards of Premium quality furniture work as described by AWI. Perform all work by qualified and fully competent workmen.

B. Allow sufficient additional material to permit.

1. Accurate scribing to walls and related work.
2. Provide for shrinkage that may develop after installation.
3. Scribe casework edge panels to walls.

C. Interior Woodwork Grade: Unless otherwise indicated, provide Premium-grade interior woodwork complying with referenced quality standard.

D. Wood Moisture Content: Comply with requirements of referenced quality standard for wood moisture content in relation to ambient relative humidity during fabrication and in installation areas.

E. Sand fire-retardant-treated wood lightly to remove raised grain on exposed surfaces before fabrication.

F. Fabricate woodwork to dimensions, profiles, and details indicated. Ease edges to radius indicated for the following:

1. Corners of Cabinets and Edges of Solid-Wood (Lumber) Members 3/4 Inch (19 mm) Thick or Less: 1/16 inch (1.5 mm).
2. Edges of Rails and Similar Members More Than 3/4 Inch (19 mm) Thick: 1/8 inch (3 mm).

G. Complete fabrication, including assembly, finishing, and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

1. Notify Architect seven days in advance of the dates and times woodwork fabrication will be complete.

H. Shop-cut openings to maximum extent possible to receive hardware, appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

1. Seal edges of openings in countertops with a coat of varnish.
I. Kitchen Equipment and Associated Electrical Work Applications:
   1. Uncrate, set in place and seal all kitchen equipment specified that is directly attached to or associated with all millwork.
   2. All custom millwork is to be prewired at the manufacturer’s facility. Locate outlets and junction boxes for all specified equipment and panel boxes as described in the Electrical Drawings. All work to be completed according to the National Electrical Code.

2.5 PLASTIC-LAMINATE COUNTERTOPS AND TRIM
   A. Grade: Premium.
   B. High-Pressure Decorative Laminate Grade: HGS.
   C. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:
      1. Match Architect’s sample.
   D. Edge Treatment: Three (3) mil self-formed vinyl edges to match plastic laminate.
   E. Core Material: Medium-density fiberboard.
   F. Backer Sheet: Provide plastic-laminate backer sheet, Grade BKL, on underside of countertop substrate.

2.6 SOLID-SURFACING-MATERIAL COUNTERTOPS
   A. Grade: Premium.
   B. Solid-Surfacing-Material Thickness: Not less than 3/4 inch (19 mm) unless otherwise indicated.
   C. Colors, Patterns, and Finishes: Provide materials and products that result in colors of solid-surfacing material complying with the following requirements:
      1. As selected by Architect from manufacturer’s full range.
   D. Fabricate tops in one piece, unless otherwise indicated. Comply with solid-surfacing-material manufacturer's written recommendations for adhesives, sealers, fabrication, and finishing.
      1. Fabricate tops with shop-applied edges of materials and configuration indicated.
   E. Drill holes in countertops for plumbing fittings and soap dispensers in shop.

PART 3 - EXECUTION

3.1 PREPARATION
   A. Verify all dimensions in the field and take particular care to align with all joints and recesses, where required, with the building module lines.
3.1 PREPARATION

B. Before installation, condition woodwork to average prevailing humidity conditions in installation areas.

C. Before installing architectural woodwork, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming.

D. Do not proceed until all unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Grade: Install woodwork to comply with requirements for the same grade specified in Part 2 for fabrication of type of woodwork involved.

B. Assemble woodwork and complete fabrication at Project site to comply with requirements for fabrication in Part 2, to extent that it was not completed in the shop.

C. Install woodwork level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb (including tops) to a tolerance of 1/8 inch in 96 inches (3 mm in 2400 mm).

D. Scribe and cut woodwork to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.

E. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing as required for complete installation. Use fine finishing nails for exposed fastening, countersunk and filled flush with woodwork and matching final finish if transparent finish is indicated.

F. Countertops: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.

1. Align adjacent solid-surfacing-material countertops and form seams to comply with manufacturer's written recommendations using adhesive in color to match countertop. Carefully dress joints smooth, remove surface scratches, and clean entire surface.

2. Install countertops with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.

3. Secure backsplashes to tops with concealed metal brackets at 16 inches (400 mm) o.c. and to walls with adhesive.

4. Calk space between backsplash and wall with sealant specified in Division 7 Section "Joint Sealants."

G. Touch up finishing work specified in this Section after installation of woodwork. Fill nail holes with matching filler where exposed.

3.3 ADJUSTING AND CLEANING

A. Repair damaged and defective woodwork, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.

B. Clean, lubricate, and adjust hardware.

C. Clean woodwork on exposed and semiexposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

END OF SECTION 06402
PART 1 - GENERAL

1.1 SUMMARY
A. Section includes glass-fiber reinforced plastic (FRP) wall paneling and trim accessories.

B. Related Sections:
1. Division 1 Section “Sustainable Design Requirements – LEED for Commercial Interiors.”
2. Division 1 Section “Construction Waste Management and Recycling.”

1.2 SUBMITTALS
A. Product Data: For each type of product indicated, including information on recycled content.

B. LEED Submittals:
1. Product Data for Credit IEQ 4.1: For adhesives and sealants, documentation including printed statement of VOC content.
2. Product Data for Credit IEQ 4.4: For laminating adhesive and composite wood products used in factory-laminated plastic panels, documentation indicating that product contains no urea formaldehyde.

C. Samples for Verification: For plastic paneling and trim accessories, in manufacturer’s standard sizes.

1.3 QUALITY ASSURANCE
A. Source Limitations: Obtain plastic paneling and trim accessories from single manufacturer.

B. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: 25 or less.
2. Smoke-Developed Index: 450 or less.

1.4 PROJECT CONDITIONS
A. Environmental Limitations: Do not deliver or install plastic paneling until spaces are enclosed and weathertight and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
PART 2 - PRODUCTS

2.1 PLASTIC SHEET PANELING

A. General: Gelcoat-finished, glass-fiber reinforced plastic panels complying with ASTM D 5319.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. Kemlite Company Inc.
   b. Marlite.
   c. Nudo Products, Inc.

2. Nominal Thickness: Not less than 0.09 inch (2.3 mm).

3. Surface Finish: As selected by Architect from manufacturer's full range.

4. Color: As selected by Architect from manufacturer's full range.

2.2 ACCESSORIES

A. Trim Accessories: Manufacturer's standard two-piece, snap-on vinyl extrusions designed to cover edges of panels. Provide division bars, inside corners, outside corners, and caps as needed to conceal edges.


B. Exposed Fasteners: Nylon drive rivets recommended by panel manufacturer.

C. Concealed Mounting Splines: Continuous, H-shaped aluminum extrusions designed to fit into grooves routed in edges of factory-laminated panels and to be fastened to substrate.

D. Adhesive: As recommended by plastic paneling manufacturer.

1. VOC Content: 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

E. Sealant: Single-component, mildew-resistant, neutral-curing silicone sealant recommended by plastic paneling manufacturer and complying with requirements in Division 7 Section "Joint Sealants."

1. VOC Content: 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean substrates of substances that could impair bond of adhesive, including oil, grease, dirt, and dust.

B. Condition panels by unpacking and placing in installation space before installation according to manufacturer's written recommendations.

C. Lay out paneling before installing. Locate panel joints so that trimmed panels at corners are not less than 12 inches (300 mm) wide.
   1. Mark plumb lines on substrate at trim accessory locations for accurate installation.
   2. Locate trim accessories to allow clearance at panel edges according to manufacturer's written instructions.

3.3 INSTALLATION

A. Install plastic paneling according to manufacturer's written instructions.

B. Install panels in a full spread of adhesive.

C. Install panels with fasteners. Layout fastener locations and mark on face of panels so that fasteners are accurately aligned.
   1. Drill oversized fastener holes in panels and center fasteners in holes.
   2. Apply sealant to fastener holes before installing fasteners.

D. Install trim accessories with adhesive. Do not fasten through panels.

E. Fill grooves in trim accessories with sealant before installing panels and bed inside corner trim in a bead of sealant.

F. Maintain uniform space between panels and wall fixtures. Fill space with sealant.

G. Remove excess sealant and smears as paneling is installed. Clean with solvent recommended by sealant manufacturer and then wipe with clean dry cloths until no residue remains.

END OF SECTION 06640
PART 1 - GENERAL

1.01 SUMMARY

A. This Section Includes:
   1. Through-penetration firestopping in fire-rated barriers including both empty openings and openings containing cables, pipes, ducts, conduits, and other penetrating items.
   2. Construction-gap firestopping at connections of the same or different materials in fire-rated construction using fire-resistant sealants.
   3. Construction-gap firestopping occurring within fire-rated walls using fire-resistant sealants.
   4. Construction-gap firestopping occurring at the top of fire-rated walls.

B. Related Sections:
   1. Division 1 Section "Sustainable Design Requirements – LEED for Commercial Interiors."
   2. Division 1 Section “Construction Waste Management and Recycling.”
   3. Division 7 Section "Fire-Resistive Joint Systems" for joints in or between fire-resistance-rated construction, at exterior curtain-wall/floor intersections, and in smoke barriers.

1.02 PERFORMANCE REQUIREMENTS

A. General: For penetrations through the following fire-resistance-rated constructions, including both empty openings and openings containing penetrating items, provide through-penetration firestop systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated.

   1. Fire-resistance-rated walls including fire walls, fire partitions, fire barriers and smoke barriers.
   2. Fire-resistance-rated horizontal assemblies including floors and floor/ceiling assemblies.

B. Rated Systems: Provide through-penetration firestop systems with the following ratings determined per ASTM E 814 or UL 1479:

   1. F-Rated Systems: Provide through-penetration firestop systems with F-ratings indicated, but not less than that equaling or exceeding fire-resistance rating of constructions penetrated.
   2. T-Rated Systems: For the following conditions, provide through-penetration firestop systems with T-ratings indicated, as well as F-ratings, where systems protect penetrating items exposed to potential contact with adjacent materials in occupiable floor areas:
      a. Penetrations located outside wall cavities.
      b. Penetrations located outside fire-resistance-rated shaft enclosures.
   3. L-Rated Systems: Provide through-penetration firestop systems with L-ratings indicated at both ambient temperatures and 400 deg F (204 deg C).
C. For through-penetration firestop systems exposed to view, traffic, moisture, and physical damage, provide products that, after curing, do not deteriorate when exposed to these conditions both during and after construction.
   
   1. For piping penetrations for plumbing and wet-pipe sprinkler systems, provide moisture-resistant through-penetration firestop systems.
   
   2. For floor penetrations with annular spaces exceeding 4 inches (100 mm) in width and exposed to possible loading and traffic, provide firestop systems capable of supporting floor loads involved, either by installing floor plates or by other means.
   
   3. For penetrations involving insulated piping, provide through-penetration firestop systems not requiring removal of insulation.

D. Exposed-to-View Firestopping Materials:
   
   1. For firestopping exposed to view, traffic, moisture, UV radiation, and physical damage, provide products that do not deteriorate when exposed to these conditions.
      
      a. For piping penetrations for plumbing and wet-pipe sprinkler systems, provide moisture-resistant through-penetration firestop systems.
      
      b. For floor penetrations with annular spaces exceeding 4 inches or more in width and exposed to possible loading and traffic, provide firestop systems capable of supporting the floor loads involved either by installing floor plates or by other means.
      
      c. For penetrations involving insulated piping, provide through-penetration firestop systems not requiring removal of insulation.
   
   2. For through-penetration firestop systems exposed to view, provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.

1.03 SUBMITTALS

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

B. LEED Submittals: Product Data for Credit IEQ 4.1: For penetration firestopping sealants and sealant primers, documentation including printed statement of VOC content.

C. Shop Drawings: For each through-penetration firestop system, show each type of construction condition penetrated, relationships to adjoining construction, and type of penetrating item. Include firestop design designation of qualified testing and inspecting agency that evidences compliance with requirements for each condition indicated.
   
   1. Submit documentation, including illustrations, from a qualified testing and inspecting agency that is applicable to each through-penetration firestop system configuration for construction and penetrating items.
   
   2. Where Project conditions require modification to a qualified testing and inspecting agency’s illustration for a particular through-penetration firestop condition, submit illustration, with modifications marked, approved by through-penetration firestop system manufacturer’s fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.

D. Through-Penetration Firestop System Schedule: Indicate locations of each through-penetration firestop system, along with the following information:
1. Types of penetrating items.
2. Types of constructions penetrated, including fire-resistance ratings and, where applicable, thicknesses of construction penetrated.
3. Through-penetration firestop systems for each location identified by firestop design designation of qualified testing and inspecting agency.

E. Qualification Data: For Installer.

F. Certificates:
1. Submit manufacturer’s certification that materials supplied are in accordance with the specifications and requirements of the authorities having jurisdiction.
2. Submit certification that materials supplied are VOC compliant and are nontoxic to building occupants.

G. Test Reports: Submit product test reports from, and based on tests performed by a qualified testing and inspecting agency who is acceptable to ICBO and the University of Colorado at Boulder Department of Environmental Health and Safety evidencing compliance of firestopping with requirements based on comprehensive testing of current products.

H. Penetration Schedule: Submit a schedule showing typical penetrations of each penetrating material type, firestopping type to be used, F ratings, T ratings, UL or other acceptable testing agency reference numbers, and other pertinent data.

1.04 QUALITY ASSURANCE

A. Installer Qualifications: A firm that has been approved by FMG according to FMG 4991, "Approval of Firestop Contractors."

B. Installer Qualifications: A firm experienced in installing through-penetration firestop systems similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful performance.

C. Installation Responsibility: Assign installation of through-penetration firestop systems and fire-resistant joint systems in Project to a single qualified installer.

D. Source Limitations: Obtain through-penetration firestop systems, for each kind of penetration and construction condition indicated, through one source from a single manufacturer.

E. Fire-Test-Response Characteristics: Provide through-penetration firestop systems that comply with the following requirements and those specified in Part 1 "Performance Requirements" Article:
1. Perform firestopping test by a qualified testing and inspecting agency. A qualified testing and inspecting agency is UL, Warnock Hersey, or another agency performing testing and follow-up inspection services for firestop systems that is acceptable to the University of Colorado at Boulder Department of Environmental Health and Safety.
2. Through-penetration firestop systems must be identical to those tested per ASTM E814 under conditions where positive furnace pressure differential of a least 0.01 inch of water is maintained at a distance of 0.78 inches below the fill materials surrounding the penetrating items in the test assembly. Provide rated systems complying with the following requirements:
a. Furnish products bearing classification marking of qualified testing and inspecting agency.

b. Furnish firestop systems corresponding to those indicated by reference to system designations listed by UL in their “Fire Resistance Directory” or by Warnock Hersey.

F. Standards: Conform to applicable standards, including, but not limited to:

2. ASTM E814 Test Method of Fire Tests of Through-Penetration Firestops.

G. Preconstruction Laboratory Tests:

1. Submit substrate materials representative of actual joint surfaces to be sealed to manufacturer of firestopping products for laboratory testing of firestop materials for adhesion to primed and unprimed substrate joints and for compatibility with secondary seals, if required, as indicate below:

a. Use test methods standard with manufacturer to determine if priming and other specific substrate preparation techniques are required to obtain rapid, optimum adhesion of firestopping to substrate joints under environmental conditions that will exist during actual installation.

b. Testing will not be required when firestopping manufacturer is able to submit preparation data required above which is based on previous testing of current firestopping products for adhesion to, and compatibility with, substrates matching those submitted.

H. Detectable Asbestos: Provide firestopping products containing no detectable asbestos as determined by the method specified in 40 CFR Part 763, Subpart F, Appendix A, Section 1, “Polarized Light Microscopy.”

I. Preinstallation Conference: Conduct conference at Project site.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver through-penetration firestop system products to Project site in original, unopened containers or packages with intact and legible manufacturers' labels identifying product and manufacturer, date of manufacture, lot number, shelf life if applicable, qualified testing and inspecting agency's classification marking applicable to Project, curing time, and mixing instructions for multicomponent materials.

B. Store and handle materials for through-penetration firestop systems to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

1.06 PROJECT CONDITIONS

A. Environmental Limitations: Do not install through-penetration firestop systems when ambient or substrate temperatures are outside limits permitted by through-penetration firestop system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.

B. Ventilate through-penetration firestop systems per manufacturer's written instructions by natural means or, where this is inadequate, forced-air circulation.
1.07 COORDINATION

A. Coordinate construction of openings and penetrating items to ensure that through-penetration firestop systems are installed according to specified requirements.

B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate through-penetration firestop systems.

C. Notify Owner’s inspecting agency at least seven days in advance of through-penetration firestop system installations; confirm dates and times on days preceding each series of installations.

1.08 WARRANTY

A. Submit 2 copies of written 2-year warranty agreeing to repair or replace firestopping which fails to perform as airtight and watertight joints; or fails in joint adhesion cohesion, abrasion resistance, weather resistance, extrusion resistance, migration resistance, stain resistance, or general durability; or appears 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.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Available Products: Subject to compliance with requirements, through-penetration firestop systems that may be incorporated into the Work include, but are not limited to, those systems indicated in the Through-Penetration Firestop System Schedule at the end of Part 3 that are produced by one of the following manufacturers:

1. Bio-Fireshield Inc.
2. General Electric Company.
3. Hilti, Inc.
4. 3M; Fire Protection Products Division.
5. Tremco; Sealant/Weatherproofing Division.

2.02 FIRESTOPPING, GENERAL

A. Compatibility: Provide through-penetration firestop systems that are compatible with one another; with the substrates forming openings; and with the items, if any, penetrating through-penetration firestop systems, under conditions of service and application, as demonstrated by through-penetration firestop system manufacturer based on testing and field experience.

B. VOC Content: Provide penetration firestopping that complies with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

1. Architectural Sealants: 250 g/L.
2. Sealant Primers for Nonporous Substrates: 250 g/L.
3. Sealant Primers for Porous Substrates: 775 g/L.
C. Accessories: Provide components for each through-penetration firestop system that are needed to install fill materials and to comply with Part 1 "Performance Requirements" Article. Use only components specified by through-penetration firestop system manufacturer and approved by qualified testing and inspecting agency for firestop systems indicated. Accessories include, but are not limited to, the following items:

1. Permanent forming/damming/backing materials, including the following:
   a. Slag-/rock-wool-fiber insulation.
   b. Sealants used in combination with other forming/damming/backing materials to prevent leakage of fill materials in liquid state.
   c. Fire-rated form board.
   d. Fillers for sealants.

2. Temporary forming materials.
5. Steel sleeves.

2.03 FILL MATERIALS

A. General: Provide through-penetration firestop systems containing the types of fill materials indicated in the Through-Penetration Firestop System Schedule at the end of Part 3 by referencing the types of materials described in this Article. Fill materials are those referred to in directories of referenced testing and inspecting agencies as "fill," "void," or "cavity" materials.

B. Cast-in-Place Firestop Devices: Factory-assembled devices for use in cast-in-place concrete floors and consisting of an outer metallic sleeve lined with an intumescent strip, a radial extended flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.

C. Latex Sealants: Single-component latex formulations that after cure do not re-emulsify during exposure to moisture.

D. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.

E. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced elastomeric sheet bonded to galvanized steel sheet.

F. Intumescent Putties: Nonhardening dielectric, water-resistant putties containing no solvents, inorganic fibers, or silicone compounds.

G. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.

H. Mortars: Prepackaged dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers, and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogeneous mortar.

I. Pillows/Bags: Reusable heat-expanding pillows/bags consisting of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents, and fire-retardant additives.
J. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

K. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below:
   1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces, and nonsag formulation for openings in vertical and other surfaces requiring a nonslumping, gunnable sealant, unless indicated firestop system limits use to nonsag grade for both opening conditions.
   2. Grade for Horizontal Surfaces: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces.

2.04 MIXING
A. For those products requiring mixing before application, comply with through-penetration firestop system manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

PART 3 - EXECUTION

3.01 EXAMINATION
A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of work.
   1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION
A. Surface Cleaning: Clean out openings immediately before installing through-penetration firestop systems to comply with firestop system manufacturer's written instructions and with the following requirements:
   1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of through-penetration firestop systems.
   2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with through-penetration firestop systems. Remove loose particles remaining from cleaning operation.
   3. Remove laitance and form-release agents from concrete.

B. Priming: Prime substrates where recommended in writing by through-penetration firestop system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

C. Masking Tape: Use masking tape to prevent through-penetration firestop systems from contacting adjoining surfaces that will remain exposed on completion of Work and that would
otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from firestop system materials. Remove tape as soon as possible without disturbing firestop system’s seal with substrates.

3.03 THROUGH-PENETRATION FIRESTOP SYSTEM INSTALLATION

A. General: Install through-penetration firestop systems to comply with Part 1 "Performance Requirements" Article and with firestop system manufacturer’s written installation instructions and published drawings for products and applications indicated.

B. Install forming/damming/backing materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.

1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of firestop systems.

C. Install fill materials for firestop systems by proven techniques to produce the following results:

1. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.
2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
3. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.04 IDENTIFICATION

A. Identify through-penetration firestop systems with preprinted metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches (150 mm) of edge of the firestop systems so that labels will be visible to anyone seeking to remove penetrating items or firestop systems. Use mechanical fasteners for metal labels. For plastic labels, use self-adhering type with adhesives capable of permanently bonding labels to surfaces on which labels are placed and, in combination with label material, will result in partial destruction of label if removal is attempted. Include the following information on labels:

1. The words "Warning - Through-Penetration Firestop System - Do Not Disturb. Notify Building Management of Any Damage."
2. Contractor's name, address, and phone number.
3. Through-penetration firestop system designation of applicable testing and inspecting agency.
4. Date of installation.
5. Through-penetration firestop system manufacturer's name.
6. Installer's name.

3.05 FIELD QUALITY CONTROL

A. Inspecting Agency: Owner will engage a qualified, independent inspecting agency to inspect through-penetration firestops. Independent inspecting agency shall comply with ASTM E 2174
requirements including those related to qualifications, conducting inspections, and preparing test reports.

B. Where deficiencies are found, repair or replace through-penetration firestop systems so they comply with requirements.

C. Proceed with enclosing through-penetration firestop systems with other construction only after inspection reports are issued and firestop installations comply with requirements.

3.06 CLEANING AND PROTECTING

A. Clean off excess fill materials adjacent to openings as Work progresses by methods and with cleaning materials that are approved in writing by through-penetration firestop system manufacturers and that do not damage materials in which openings occur.

B. Provide final protection and maintain conditions during and after installation that ensure that through-penetration firestop systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated through-penetration firestop systems immediately and install new materials to produce systems complying with specified requirements.

3.07 THROUGH-PENETRATION FIRESTOP SYSTEM SCHEDULE

A. Where UL-classified systems are indicated, they refer to alpha-alpha-numeric designations listed in UL's "Fire Resistance Directory" under product Category XHEZ.

B. Firestop Systems with No Penetrating Items:
   2. Type of Fill Materials: One or more of the following:
      a. Latex sealant.
      b. Silicone sealant.
      c. Intumescent putty.
      d. Mortar.

C. Firestop Systems for Metallic Pipes, Conduit, or Tubing:
   2. Type of Fill Materials: One or more of the following:
      a. Latex sealant.
      b. Silicone sealant.
      c. Intumescent putty.
      d. Mortar.

D. Firestop Systems for Nonmetallic Pipe, Conduit, or Tubing:
   2. Type of Fill Materials: One or more of the following:
a. Latex sealant.
b. Silicone sealant.
c. Intumescent putty.
d. Intumescent wrap strips.
e. Firestop device.

E. Firestop Systems for Electrical Cables:
2. Type of Fill Materials: One or more of the following:
   a. Latex sealant.
   b. Silicone sealant.
   c. Intumescent putty.
   d. Silicone foam.
   e. Pillows/bags.

F. Firestop Systems for Cable Trays:
2. Type of Fill Materials: One or more of the following:
   a. Latex sealant.
   b. Intumescent putty.
   c. Silicone foam.
   d. Pillows/bags.
   e. Mortar.

G. Firestop Systems for Insulated Pipes:
2. Type of Fill Materials: One or more of the following:
   a. Latex sealant.
   b. Intumescent putty.
   c. Silicone foam.
   d. Intumescent wrap strips.

H. Firestop Systems for Miscellaneous Electrical Penetrants:
2. Type of Fill Materials: One or more of the following:
   a. Latex sealant.
   b. Intumescent putty.
   c. Mortar.

I. Firestop Systems for Miscellaneous Mechanical Penetrants:
2. Type of Fill Materials: One or both of the following:
   a. Latex sealant.
b. Mortar.

J. Firestop Systems for Groupings of Penetrants:

2. Type of Fill Materials: One or more of the following:
   a. Latex sealant.
   b. Mortar.
   c. Intumescent wrap strips.
   d. Firestop device.
   e. Intumescent composite sheet.
PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes sealants for the following applications, including those specified by reference to this Section:

1. Interior joints in the following vertical surfaces and horizontal nontraffic surfaces:
   a. Control and expansion joints on exposed interior surfaces of exterior walls.
   b. Perimeter joints of exterior openings where indicated.
   c. Perimeter joints between interior wall surfaces and frames of interior doors, windows, and elevator entrances.
   d. Joints between plumbing fixtures and adjoining walls, floors, and counters.
   e. Other joints as indicated.

B. Related Sections:

1. Division 1 Section “Sustainable Design Requirements – LEED for Commercial Interiors.”
2. Division 1 Section “Construction Waste Management and Recycling.”
3. Division 8 Section “Glazing” for glazing sealants.
4. Division 9 Section “Gypsum Board” for sealing perimeter joints.
5. Division 9 Section “Ceramic Tile” for sealing tile joints.
6. Division 9 Section “Acoustical Panel Ceilings” for sealing edge moldings at perimeters with acoustical sealants.

1.02 PERFORMANCE REQUIREMENTS

A. Provide exterior elastomeric joint sealants that establish and maintain watertight and airtight continuous joint seats without staining or deteriorating joint substrates.

B. Provide joint sealants for interior applications that establish and maintain airtight and water-resistant continuous joint seals without staining or deteriorating joint substrates.

1.03 SUBMITTALS

A. Product Data: For each joint-sealant product indicated.

B. LEED Submittals: Product Data for Credit IEQ 4.1: For sealants and sealant primers used inside the weatherproofing system, documentation including printed statement of VOC content.

C. Samples for Selection: Manufacturer's color charts consisting of strips of cured sealants showing the standard range of colors available for each product exposed to view.

D. Samples for Verification: For each type and color of joint sealant required. Install joint sealants in 1/2-inch- (13-mm-) wide joints formed between two 6-inch- (150-mm-) long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

E. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience.
F. Product Test Reports: From a qualified testing agency indicating sealants comply with requirements, based on comprehensive testing of current product formulations.

1.04 QUALITY ASSURANCE

A. Applicator Qualifications: Application shall be done by a Joint Sealant Subcontractor with five years experience. Submit documentation to the Architect and Owner.

B. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.

C. Manufacturer Technical Assistance: Materials shall be supplied by manufacturer who will provide qualified technical assistance at the Project site.

D. Product Testing: Obtain test results for "Product Test Reports" Paragraph in "Submittals" Article from a qualified testing agency based on testing current sealant formulations within a 36-month period.

1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated, as documented according to ASTM E 548.

2. Test elastomeric joint sealants for compliance with requirements specified by reference to ASTM C 920, and where applicable, to other standard test methods.

3. Test other joint sealants for compliance with requirements indicated by referencing standard specifications and test methods.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration date, pot life, curing time, and mixing instructions for multicomponent materials.

1.06 PROJECT CONDITIONS

A. Environmental Limitations: Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer.

2. When joint substrates are wet.

B. Joint-Width Conditions: Do not proceed with installation of joint sealants where joint widths are less than those allowed by joint sealant manufacturer for applications indicated.

C. Joint-Substrate Conditions: Do not proceed with installation of joint sealants until contaminants capable of interfering with adhesion are removed from joint substrates.
1.07 WARRANTY

A. General Warranty: Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Special Installer's Warranty: Written warranty, signed by Installer agreeing to repair or replace elastomeric joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
   1. Warranty Period: Two years from date of Substantial Completion.

C. Special Manufacturer's Warranty: Written warranty, signed by elastomeric sealant manufacturer agreeing to furnish elastomeric joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.
   1. Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Tremco Manufacturing.
   2. Dow Corning.
   4. Pecora Corporation.
   5. Maneco International.
   7. Sonneborn Building Products.

2.02 MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.

B. VOC Content of Interior Sealants: Sealants and sealant primers used inside the weatherproofing system shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
   1. Architectural Sealants: 250 g/L.
   2. Sealant Primers for Nonporous Substrates: 250 g/L.
   3. Sealant Primers for Porous Substrates: 775 g/L.
2.03 ELASTOMERIC JOINT SEALANTS

A. Elastomeric Sealant Standard: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.

B. Stain-Test-Response Characteristics: Where elastomeric sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.

C. Multicomponent Nonsag Urethane Sealant ES-4:
   1. Available Products:
      a. Bostik Findley; Chem-Calk 500.
      b. Pacific Polymers, Inc.; Elasto-Thane 227 R Type II (Gun Grade).
      c. Polymeric Systems Inc.; PSI-270.
      d. Tremco; Dymeric.
   2. Type and Grade: M (multicomponent) and NS (nonsag).
   4. Additional Movement Capability: 40 percent movement in extension and 25 percent in compression for a total of 65 percent movement.
   5. Use Related to Exposure: NT (nontraffic).
   6. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated, O.

D. Multicomponent Pourable Urethane Sealant ES-6:
   1. Available Products:
      b. Meadows, W. R., Inc.; POURTHANE.
      c. Pacific Polymers, Inc.; Elasto-Thane 227 High Shore Type I (Self Leveling).
      d. Pacific Polymers, Inc.; Elasto-Thane 227 Type I (Self Leveling).
      e. Pecora Corporation; Urexpan NR-200.
      f. Polymeric Systems Inc.; PSI-270SL
      g. Schnee-Morehead, Inc.; Permathane SM 7201.
      h. Tremco; THC-901.
      i. Tremco; THC-900.
      j. Tremco; Vulkem 245
      k. Pecora Corporation; Urexpan NR 300, Type H.
      l. Pecora Corporation; Urexpan NR 300, Type M.
   2. Type and Grade: M (multicomponent) and P (pourable).
   4. Use Related to Exposure: T (traffic).
   5. Uses Related to Joint substrates: M, A, and, as applicable to joint substrates indicated, O.

E. Single-Component Neutral- and Basic-Curing Silicone Sealant ES1:
   1. Available Products:
a. Dow Corning Corporation; 790.
b. GE Silicones; SilPruf LM SCS2700.
c. Tremco; Spectrem 1 (Basic).
d. GE Silicones; SilPruf SCS2000.
e. Pecora Corporation; 864.
f. Pecora Corporation; 890.
g. Polymeric Systems Inc.; PSI-641.
h. Sonneborn, Division of ChemRex Inc.; Omniseal.
i. Tremco; Spectrem 3.
j. Dow Corning Corporation; 791.
k. Dow Corning Corporation; 795.
l. GE Silicones; SilPruf NB SCS9000.
m. GE Silicones; UltraPruf II SCS2900.
n. Pecora Corporation; 865.
o. Pecora Corporation; 895.
p. Pecora Corporation; 898.

2. Type and Grade: S (single component) and NS (nonsag).
3. Class: 100/50.
4. Use Related to Exposure: NT (nontraffic).
5. Uses Related to Joint Substrates: M, G, A, and as applicable to joint substrates indicated, O.

F. Single-Component Mildew-Resistant Neutral-Curing Silicone Sealant ES3:
1. Available Products:
   a. Pecora Corporation; 898.
   b. Tremco; Tremsil 600 White.

2. Type and Grade: S (single component) and NS (nonsag).
4. Use Related to Exposure: NT (nontraffic).
5. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated, O.

G. Single-Component Mildew-Resistant Acid-Curing Silicone Sealant ES2:
1. Available Products:
   a. Dow Corning Corporation; 786 Mildew Resistant.
   b. GE Silicones; Sanitary SCS1700.
   c. Tremco; Tremsil 200 Clear.

2. Type and Grade: S (single component) and NS (nonsag).
4. Use Related to Exposure: NT (nontraffic).
5. Uses Related to Joint Substrates: G, A, and, as applicable to joint substrates indicated, O.
6. Use for steam room vertical and horizontal joints.

H. Single-Component Nonsag Urethane Sealant ES5:
1. Available Products:
   b. Sika Corporation, Inc.; Sikaflex – 15LM.
   c. Sonneborn, Division of ChemRex Inc.; Ultra.
   d. Sonneborn, Division of ChemRex Inc.; NP 1.
   e. Tremco; Vulkem 116.

2. Type and Grade:  S (single component) and NS (nonsag).

3. Class:  100/50.

4. Use Related to Exposure:  T (traffic) and NT (nontraffic).

5. Uses Related to Joint Substrates:  M, G, A, and, as applicable to joint substrates indicated, O.

2.04 SOLVENT-RELEASE JOINT SEALANTS

A. Acrylic-Based Solvent-Release Joint Sealant:  Comply with ASTM C 1311 or FS TT-S-00230.

   1. Available Products:
      b. Tremco; Mono 555.


   1. Available Products:
      a. Bostik Findley; Bostik 300.
      b. Fuller, H. B. Company; SC-0296.
      c. Fuller, H. B. Company; SC-0288.
      d. Pecora Corporation; BC-158.
      e. Polymeric Systems Inc.; PSI-301
      f. Sonneborn, Division of ChemRex Inc.; Sonneborn Multi-Purpose Sealant.
      g. Tremco; Tremco Butyl Sealant.

2.05 LATEX JOINT SEALANTS

A. Latex Sealant Standard:  Comply with ASTM C 834, Type P, Grade NF.

B. Available Products:

   1. Bostik Findley; Chem-Calk 600.
   2. Pecora Corporation; AC-20+
   4. Sonneborn, Division of ChemRex Inc.; Sonolac.
   5. Tremco; Tremflex 834.

2.06 ACOUSTICAL JOINT SEALANTS

A. Acoustical Sealant for Exposed and Concealed Joints:  Provide manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834 and the following:
1. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

B. Acoustical Sealant for Concealed Joints: Manufacturer's standard nondrying, nonhardening, nonskinning, nonstaining, gunnable, synthetic-rubber sealant recommended for sealing interior concealed joints to reduce transmission of airborne sound.

C. Available Products: Subject to compliance with requirements, acoustical sealants that may be incorporated in the Work include, but are not limited to, the following:

1. Acoustical Sealant for Exposed and Concealed Joints:
   a) PL Acoustical Sealant; ChemRex, Inc.; Contech Brands.
   b) AC-20 FTR Acoustical and Insulation Sealant; Pecora Corp.
   c) SHEETROCK Acoustical Sealant; United States Gypsum Co.

2. Acoustical Sealant for Concealed Joints:
   a) BA-98; Pecora Corp.
   b) Tremco Acoustical Sealant; Tremco, Inc.

2.07 JOINT-SEALANT BACKING

A. General: Provide sealant backings of material and type that are nonstaining; 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.

B. Cylindrical Sealant Backings: ASTM C 1330, of type indicated below and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance:

   1. Type C: Closed-cell material with a surface skin.
   2. Type B: Bicellular material with a surface skin.
   3. Type: Any material indicated above.

C. Elastomeric Tubing Sealant Backings: Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D 1056, nonabsorbent to water and gas, and capable of remaining resilient at temperatures down to minus 26 deg F (minus 32 deg C). Provide products with low compression set and of size and shape to provide a secondary seal, to control sealant depth, and otherwise contribute to optimum sealant performance.

D. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

2.08 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint sealant manufacturer where required for adhesion of sealant to joint substrates.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or
harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants with joint substrates.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint sealant manufacturer's written instructions and the following requirements:

1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.

2. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air. Porous joint surfaces include the following:

   a. Concrete.
   b. Masonry.
   c. Unglazed surfaces of ceramic tile.

3. Remove laitance and form-release agents from concrete.

4. Clean nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.

   a. Metal.
   b. Glass.
   c. Porcelain enamel.
   d. Glazed surfaces of ceramic tile.

B. Joint Priming: Prime joint substrates where recommended in writing by joint sealant manufacturer. Apply primer to comply with joint sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.
3.03 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint sealant manufacturer’s written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations of ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Acoustical Sealant Application Standard: Comply with recommendations of ASTM C 919 for use of joint sealants in acoustical applications as applicable to materials, applications, and conditions indicated.

D. Install sealant backings of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
   1. Do not leave gaps between ends of sealant backings.
   2. Do not stretch, twist, puncture, or tear sealant backings.
   3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

E. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and back of joints.

F. Install sealants by proven techniques to comply with the following and at the same time backings are installed:
   1. Place sealants so they directly contact and fully wet joint substrates.
   2. Completely fill recesses provided for each joint configuration.
   3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

G. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
   1. Remove excess sealants from surfaces adjacent to joint.
   2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
   3. Use masking tape to protect adjacent surfaces of recessed tooled joints.

3.04 CLEANING

A. Clean off excess sealants or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.05 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from the original work.
END OF SECTION 07920
PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes Steel Doors and Frames.

B. Related Sections include the following:

   1. Division 8 Section “Glazing.”
   2. Division 9 Section “Painting.”

1.2 SUBMITTALS

A. Product Data for each type of door and frame specified, including details of construction, materials, dimensions, hardware preparation, core, label compliance, sound ratings, profiles, and finishes.

B. Shop Drawings showing fabrication and installation of steel doors and frames. Include details of each frame type, elevations of door design types, conditions at openings, details of construction, location and installation requirements of door and frame hardware and reinforcements, and details of joints and connections. Show anchorage and accessory items.

C. Door Schedule: Submit schedule of doors and frames using same reference numbers for details and openings as those within the Construction Documents.

   1. Indicate coordination of glazing frames and stops with glass and glazing requirements.

D. Samples for verification of each type of exposed finish required. Samples to be not less than 3 by 5 inches and of same thickness and material indicated for final unit of work. Where finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.

1.3 QUALITY ASSURANCE

A. Provide doors and frames complying with the Steel Door Institute Standard ANSI A250.8-1998 (SDI 100) "Recommended Specifications for Standard Steel Doors and Frames" and as specified.

B. Fire-Rated Door Assemblies: Units that comply with NFPA 80, are identical to door and frame assemblies tested for fire-test-response characteristics per ASTM E 152, and are labeled and listed by UL, ITS (formerly Warnock Hersey), or another testing and inspecting agency acceptable to authorities having jurisdiction.

   1. Temperature-Rise Rating: Where indicated, provide doors that have a temperature-rise rating of 250 deg F temperature rise.
C. Fire-Rated, Borrowed-Light Frame Assemblies: Assemblies complying with NFPA 80 that are listed and labeled, by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 257 or UL 9. Label each individual glazed lite.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver doors and frames cardboard-wrapped or crated to provide protection during transit and job storage. Provide additional protection to prevent damage to finish of factory-finished doors and frames.

B. Inspect doors and frames on delivery for damage. Minor damages may be repaired provided refinished items match new work and are acceptable to Architect; otherwise, remove and replace damaged items as directed.

C. Store doors and frames at building site under cover. Place units on minimum 4-inch-high wood blocking. Avoid using nonvented plastic or canvas shelters that could create a humidity chamber. If cardboard wrappers on doors become wet, remove cartons immediately. Provide minimum 1/4-inch spaces between stacked doors to promote air circulation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:

1. Steel Doors and Frames:
   a. Republic Builders Products (Basis of Design)
   b. Curries Co.
   c. Deansteel Manufacturing, Inc.
   d. Steelcraft

2.2 MATERIALS

A. Cold-Rolled Steel Sheets: Carbon steel complying with ASTM A 366, commercial quality, or ASTM A 620, drawing quality, special killed.

B. Supports and Anchors: Fabricated from not less than 0.0478-inch-thick steel sheet; 0.0516-inch-thick galvanized steel where used with galvanized steel frames.

C. Inserts, Bolts, and Fasteners: Manufacturer's standard units. Where items are to be built into exterior walls, hot-dip galvanize complying with ASTM A 153, Class C or D as applicable.
2.3 DOORS

A. Steel Doors: Provide 1-3/4-inch- (44-mm-) thick doors of materials and ANSI A250.8-1998 (SDI 100) grades and models specified below, or as indicated on drawings or schedules:

1. Interior Doors: Grade II, Heavy-Duty, Model 2, seamless design, minimum 18 gauge thick cold-rolled steel sheet faces.

2.4 FRAMES

A. Provide metal frames for doors according to the Steel Door Institute Standard ANSI A250.8-1998 (SDI 100) "Recommended Specifications for Standard Steel Doors and Frames", and of types and styles as shown on drawings and schedules. Conceal fastenings, unless otherwise indicated.

1. Fabricate frames with mitered and continuously welded corners.

B. Plaster Guards: Provide minimum 0.0179-inch-thick steel plaster guards or mortar boxes at back of hardware cutouts where mortar or other materials might obstruct hardware operation and to close off interior of openings.

2.5 FABRICATION

A. Fabricate steel door and frame units to be rigid, neat in appearance, and free from defects, warp, or buckle. Where practical, fit and assemble units in manufacturer's plant. Clearly identify work that cannot be permanently factory assembled before shipment, to assure proper assembly at Project site. Comply with the Steel Door Institute Standard ANSI A250.8-1998 (SDI 100) "Recommended Specifications for Standard Steel Doors and Frames" requirements.

1. Internal Construction: One of the following manufacturer's standard core materials according to SDI standards:

   a. Rigid mineral fiber with internal sound deadener on inside of face sheets.

2. Clearances: Not more than 1/8 inch at jambs and heads, except not more than 1/4 inch between non-fire-rated pairs of doors. Not more than 3/4 inch at bottom.

3. Fire Doors: Provide clearances according to NFPA 80.

B. Fabricate exposed faces of doors and panels from only cold-rolled steel sheet.

C. Tolerances: Comply with SDI 117 "Manufacturing Tolerances Standard Steel Doors and Frames."

D. Fabricate concealed stiffeners, reinforcement, edge channels and moldings from either cold- or hot-rolled steel sheet.
E. Exposed Fasteners: Unless otherwise indicated, provide countersunk flat or oval heads for exposed screws and bolts.

F. Hardware Preparation: Prepare doors and frames to receive mortised and concealed hardware according to final door hardware schedule and templates provided by hardware supplier. Comply with applicable requirements of SDI 107 and ANSI A115 Series specifications for door and frame preparation for hardware.
   1. For concealed overhead door closers, provide space, cutouts, reinforcing, and provisions for fastening in top rail of doors or head of frames, as applicable.

G. Reinforce doors and frames to receive surface-applied hardware. Drilling and tapping for surface-applied hardware may be done at Project site.

H. Locate hardware as indicated on Shop Drawings or, if not indicated, according to the Door and Hardware Institute's (DHI) "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."

I. Glazing Stops: Minimum 0.0359-inch-thick steel or 0.040-inch-thick aluminum.
   1. Provide non-removable stops on secure side of interior doors for glass panels in doors.
   2. Provide screw-applied, removable, glazing beads on inside of glass panels in doors.

2.6 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual" for recommendations relative to applying and designating finishes.


C. Factory Priming for Field-Painted Finish: Where field painting after installation is indicated, apply air-dried primer specified below immediately after cleaning and pretreatment.
   1. Shop Primer: Zinc-dust, zinc-oxide primer paint complying with performance requirements of FS TT-P-641, Type II.

2.7 STEEL SHEET FINISHES

A. Surface Preparation: Solvent-clean surfaces to comply with SSPC-SP 1 to remove dirt, oil, grease, and other contaminants that could impair paint bond. Remove mill scale and rust, if present, from uncoated steel to comply with SSPC-SP 5 (White Metal Blast Cleaning) or SSPC-SP 8 (Pickling).

B. Factory Priming for Field-Painted Finish: Apply shop primer that complies with ANSI A224.1 acceptance criteria, is compatible with finish paint systems indicated, and has capability to provide a sound foundation for field-applied topcoats. Apply primer immediately after surface preparation and pretreatment.
PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Install steel doors, frames, and accessories according to Shop Drawings, manufacturer's data, and as specified.

B. Placing Frames: Comply with provisions of SDI 105, unless otherwise indicated. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is completed, remove temporary braces and spreaders, leaving surfaces smooth and undamaged.

1. Except for frames located in existing concrete, masonry, or gypsum board assembly construction, place frames before constructing enclosing walls and ceilings.

2. Install fire-rated frames according to NFPA 80.

C. Door Installation: Fit hollow-metal doors accurately in frames, within clearances specified in the Steel Door Institute Standard ANSI A250.8-1998 (SDI 100).

1. Fire-Rated Doors: Install with clearances specified in NFPA 80.

2. Smoke Control Doors: Comply with NFPA 105.

3.2 ADJUSTING AND CLEANING

A. Prime Coat Touchup: Immediately after erection, sand smooth any rusted or damaged areas of prime coat and apply touchup of compatible air-drying primer.

B. Protection Removal: Immediately before final inspection, remove protective wrappings from doors and frames.

END OF SECTION 08110
1.1 SUMMARY

A. Section includes manually operated open-curtain overhead coiling grilles.

B. Related Sections:
   1. Division 1 Section "Sustainable Design Requirements – LEED for Commercial Interiors" for additional sustainable design requirements.
   2. Division 1 Section "Construction Waste Management and Recycling" for construction waste management and disposal requirements.
   3. Division 5 Section "Metal Fabrications" for miscellaneous steel supports.
   4. Division 9 Section "Interior Painting" for finish painting of factory-primed grilles.

1.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design overhead coiling grilles, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. Operation Cycles: Provide overhead coiling grille components and operators capable of operating for not less than number of cycles indicated for each grille. One operation cycle is complete when a grille is opened from the closed position to the fully open position and returned to the closed position.

1.3 SUBMITTALS

A. Product Data: For each type and size of overhead coiling grille and accessory. Include the following:

   1. Construction details, material descriptions, dimensions of individual components, profiles for curtain components, and finishes.

B. LEED Submittals:

   1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.

C. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data. Include plans, elevations, sections, details, and attachments to other work.

   1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

D. Samples for Initial Selection: Manufacturer's finish charts showing full range of colors and textures available for units with factory-applied finishes.
1. Include similar Samples of accessories involving color selection.

E. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below.

1. Open-Curtain Grille: 18-inch- (457-mm-) square assembly with full-size components consisting of rods, spacers, and links as required to illustrate each assembly.
2. Bottom Bar: 6 inches (150 mm) long.
3. Guides: 6 inches (150 mm) long.
4. Mounting Frame: 6 inches (150 mm) long.
5. Brackets: 6 inches (150 mm) square.
6. Hood: 6 inches (150 mm) square.

F. Qualification Data: For qualified Installer.

G. Maintenance Data: For overhead coiling grilles to include in maintenance manuals.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for both installation and maintenance of units required for this Project.

B. Source Limitations: Obtain overhead coiling grilles from single source from single manufacturer.

1. Obtain operators and controls from overhead coiling grille manufacturer.


PART 2 - PRODUCTS

2.1 GRILLE CURTAIN MATERIALS AND CONSTRUCTION

A. Recycled Content (MR 4): Building materials in this section must have 75% post-industrial recycled content by weight of total product.

B. Open-Curtain Grilles: Fabricate metal grille curtain as an open network of horizontal rods, spaced at regular intervals, that are interconnected with vertical links, which are formed and spaced as indicated and are free to rotate on the rods.

1. Aluminum Grille Curtain: ASTM B 221 (ASTM B 221M), alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.

C. Endlocks: Continuous end links, chains, or other devices at ends of rods; locking and retaining grille curtain in guides against excessive pressures, maintaining grille curtain alignment, and preventing lateral movement.

D. Bottom Bar: Manufacturer's standard continuous channel or tubular shape, finished to match grille.
1. Astragal: Equip each grille bottom bar with a replaceable, adjustable, continuous, compressible gasket of flexible vinyl, rubber, or neoprene as a cushion bumper.
2. Provide motor-operated grilles with combination bottom astragal and sensor edge.

E. Grille Curtain Jamb Guides: Manufacturer's standard shape having curtain groove with return lips or bars to retain curtain. Provide continuous integral wear strips to prevent metal-to-metal contact and to minimize operational noise; with removable stops on guides to prevent overtravel of curtain.

1. Removable Posts and Jamb Guides: Manufacturer's standard.

2.2 HOODS AND ACCESSORIES

A. General: Form sheet metal hood to entirely enclose coiled curtain and operating mechanism at opening head. Contour to fit end brackets to which hood is attached. Roll and reinforce top and bottom edges for stiffness. Form closed ends for surface-mounted hoods and fascia for any portion of between-jamb mounting that projects beyond wall face. Equip hood with intermediate support brackets as required to prevent sagging.

1. Galvanized Steel: Nominal 0.028-inch- (0.71-mm-) thick, hot-dip galvanized steel sheet with G90 (Z275) zinc coating, complying with ASTM A 653/A 653M.

B. Removable Metal Soffit: Formed or extruded from same metal and with same finish as curtain if hood is mounted above ceiling, unless otherwise indicated.

C. Mounting Frame: Manufacturer's standard mounting frame designed to support grille; factory fabricated from ASTM A 36/A 36M structural-steel tubes or shapes, hot-dip galvanized per ASTM A 123/A 123M; fastened to floor and structure above grille; to be built into wall construction; and complete with anchors, connections, and fasteners.

D. Push/Pull Handles: Equip each push-up-operated or emergency-operated grille with lifting handles on each side of grille, finished to match grille.

1. Provide pull-down straps or pole hooks for grilles more than 84 inches (2130 mm) high.

2.3 LOCKING DEVICES

A. Slide Bolt: Fabricate with side-locking bolts to engage through slots in tracks for locking by padlock, located on both left and right jamb sides, operable from coil side.

B. Locking Device Assembly: Fabricate with cylinder lock, spring-loaded dead bolt, operating handle, cam plate, and adjustable locking bars to engage through slots in tracks.

1. Lock Cylinders: Provide cylinders specified in Division 8 Section "Door Hardware."
2. Keys: Two for each cylinder.

2.4 COUNTERBALANCING MECHANISM

A. General: Counterbalance grilles by means of manufacturer's standard mechanism with an adjustable-tension, steel helical torsion spring mounted around a steel shaft and contained in a
spring barrel connected to top of curtain with barrel rings. Use grease-sealed bearings or self-lubricating graphite bearings for rotating members.

B. Counterbalance Barrel: Fabricate spring barrel of manufacturer's standard hot-formed, structural-quality, welded or seamless carbon-steel pipe, of sufficient diameter and wall thickness to support rolled-up curtain without distortion of parts and to limit barrel deflection to not more than 0.03 in./ft. (2.5 mm/m) of span under full load.

C. Spring Balance: One or more oil-tempered, heat-treated steel helical torsion springs. Size springs to counterbalance weight of curtain, with uniform adjustment accessible from outside barrel. Secure ends of springs to barrel and shaft with cast-steel barrel plugs.

D. Torsion Rod for Counterbalance Shaft: Fabricate of manufacturer's standard cold-rolled steel, sized to hold fixed spring ends and carry torsional load.

E. Brackets: Manufacturer's standard mounting brackets of either cast iron or cold-rolled steel plate.

2.5 OPEN-CURTAIN GRILLE ASSEMBLY

A. Open-Curtain Grille: Overhead coiling grille with a curtain having a network of horizontal rods that interconnect with vertical links.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. ACME Rolling Doors.
   b. Alpine Overhead Doors, Inc.
   c. Cookson Company.
   d. Cornell Iron Works, Inc.
   e. Mahon Door Corporation.
   f. McKeon Rolling Steel Door Company, Inc.
   g. Overhead Door Corporation.
   h. Raynor.

B. Operation Cycles: Not less than 20,000.

1. Include tamperproof cycle counter.

C. Grille Curtain Material: Aluminum.

1. Space rods at approximately 2 inches (51 mm) o.c.
2. Space links approximately 3 inches (76 mm) apart in a straight in-line pattern.
4. Spacers: Metal tubes matching curtain material.

D. Curtain Jamb Guides: Aluminum with exposed finish matching curtain slats. Provide continuous integral wear strips to prevent metal-to-metal contact and to minimize operational noise.

E. Hood: Match curtain material and finish.
1. Shape: As shown on Drawings.
2. Mounting: As shown on Drawings.

F. Locking Devices: Equip grille with locking device assembly.
   1. Locking Device Assembly: Cremone type, both jamb sides locking bars, operable from inside with thumb turn.


H. Grille Finish:
   1. Aluminum Finish: As selected by Architect from full range of industry colors and color densities.

2.6 MANUAL GRILLE OPERATORS

A. Equip grille with manufacturer's recommended manual grille operator unless another type of grille operator is indicated.

B. Push-up Grille Operation: Design counterbalance mechanism so required lift or pull for grille operation does not exceed 25 lbf (111 N).

C. Chain-Hoist Operator: Consisting of endless steel hand chain, chain-pocket wheel and guard, and gear-reduction unit with a maximum 25 lbf (111 N) force for grille operation. Provide alloy-steel hand chain with chain holder secured to operator guide.

2.7 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.8 ALUMINUM FINISHES

A. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates areas and conditions, with Installer present, for compliance with requirements for substrate construction and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.
3.2 INSTALLATION

A. Install overhead coiling grilles and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.

B. Install overhead coiling grilles, hoods, and operators at the mounting locations indicated for each grille.

C. Accessibility: Install overhead coiling grilles along accessible routes in compliance with regulatory requirements for accessibility.

3.3 ADJUSTING

A. Adjust hardware and moving parts to function smoothly so that grilles operate easily, free of warp, twist, or distortion.

B. Lubricate bearings and sliding parts as recommended by manufacturer.

3.4 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain overhead coiling grilles.

END OF SECTION 08334
PART 1 - GENERAL

1.1 SUMMARY

A. Section includes laminated decorative glass for interior applications.

1.2 DEFINITION

A. Glass Thickness: Indicated by thickness designations in millimeters according to ASTM C 1036.

1.3 PERFORMANCE REQUIREMENTS

A. General Performance: Installed glazing systems shall withstand normal thermal movement and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; deterioration of glazing materials; or other defects in construction.

1.4 SUBMITTALS

A. Product Data: For each decorative-glass and glazing product indicated.

B. LEED Submittals:
   1. Product Data: For glazing sealants, including printed statement of VOC content.

C. Shop Drawings: For decorative glass. Show fabrication and installation details. Include the following:
   1. Glazing method.
   3. Attachments to other work.

D. Glass Samples: For the following products, 12 inches (300 mm) square:
   1. Each type of decorative glass.
   2. Each edge treatment on type of decorative glass.

E. Product Schedule: For decorative glass.

F. Qualification Data: For qualified Installer.

G. Product Certificates: For each type of decorative glass, from manufacturer.

H. Preconstruction Adhesion and Compatibility Test Reports: Based on evaluation and comprehensive tests performed by a qualified testing agency, for laminated glass.

I. Maintenance Data: For each type of decorative glass to include in maintenance manuals.
J. Warranty: Sample of special warranty.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under NGA's Certified Glass Installer Program.

B. Source Limitations for Glass: Obtain each type of decorative glass from single source from single manufacturer.

C. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer, for each product and installation method.

D. Glazing Publications: Comply with published recommendations in GANA's "Laminated Glazing Reference Manual" and GANA's "Glazing Manual" unless more stringent requirements are indicated. See these publications for glazing terms not otherwise defined in this Section or in referenced standards.

E. Safety Glazing: Where safety glazing is indicated, comply with testing requirements in 16 CFR 1201 for Category II materials.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect decorative glass and glazing materials according to manufacturer's written instructions and as needed to prevent damage to surfaces and edges.

B. Retain packaging and sequencing numbers for decorative-glass units.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install decorative glass until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

B. Field Measurements: Verify actual dimensions of openings and construction contiguous with decorative glass by field measurements before fabrication.

1.8 WARRANTY

A. Special Warranty on Laminated Glass: Manufacturer's standard form in which laminated-glass manufacturer agrees to replace laminated-glass units that deteriorate within specified warranty period. Deterioration of laminated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.

1. Warranty Period: Five years from date of Substantial Completion.
PART 2 - PRODUCTS

2.1 GLASS PRODUCTS, GENERAL

A. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass lites in thicknesses as needed to comply with requirements indicated.

B. Strength: Where float glass is indicated, provide annealed float glass, Kind HS heat-treated float glass, or Kind FT heat-treated float glass as needed to comply with requirements indicated. Where heat-strengthened glass is indicated, provide Kind HS heat-treated float glass or Kind FT heat-treated float glass as needed to comply with requirements indicated. Where fully tempered glass is indicated, provide Kind FT heat-treated float glass.

2.2 MONOLITHIC-GLASS PRODUCTS

A. Float Glass: ASTM C 1036, Type I, Quality-Q3, Class I (clear) unless otherwise indicated.

B. Tempered Glass: ASTM C 1048, Kind FT (fully tempered), Type I (transparent flat glass), Class 1 (clear), Quality-Q3.

1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.

2.3 DECORATIVE GLASS TYPES

A. Decorative Glass: Laminated glass, ASTM C 1172. Use materials that have a proven record of not bubbling, discoloring, or losing physical and mechanical properties after fabrication and installation.

1. Products: Subject to compliance with requirements, provide the following:

2. Construction: Two plies of clear, fully tempered float glass.


4. Construction: Laminate glass with Frosted PVB interlayer to comply with interlayer manufacturer's written recommendations. Interlayer Thickness: 0.030 inch (0.76 mm) or 0.060 inch (1.52 mm).

5. Comply with requirements for safety glazing.

6. Interlayer Material Color and Pattern: As selected by Architect from manufacturer's full range.

7. Sound Transmission Requirements: Sound transmission loss performance is tested according to ASTM E 90, determined by ASTM E 413, and rated for Sound Transmission Class (STC) plus or minus 1 of 40.

2.4 HARDWARE FOR GLASS INSTALLATION

A. Hardware: Edge grips.

1. Available Manufacturers: Subject to compliance with requirements, available manufacturers that may be incorporated into the Work include, but are not limited to, the following:
a. CHMI Custom Hardware Manufacturing, Inc.
b. Laurence, C. R. Co., Inc.

2. Dimensions: As indicated on Drawings, or if not indicated, as selected by Architect from manufacturer's full range of available options.

3. Material and Finish: As selected by Architect from manufacturer's full range of available options.

B. Fasteners: Fabricated of same basic metal and alloy as fastened metal and matching it in finished color and texture where fasteners are exposed.

C. Anchors and Inserts: Provide devices as required for hardware installation. Provide toothed or lead-shield expansion-bolt devices for drilled-in-place anchors. Provide anchors and inserts for applications on inside face of exterior walls and where indicated.

2.5 DECORATIVE-GLASS FABRICATION

A. Fabricate decorative glass and provide other glazing products in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written recommendations of product manufacturer and with referenced glazing standard.

B. Edge Finishing: Fabricate finished edges to produce smooth, polished edges without chips, scratches, or warps.

1. Finished Edge: Clean cut.

2. Edge-Finished Glass Adhesive: Clear, nonyellowing, as recommended by manufacturer.

C. Decorative Film Interlay: Apply squarely aligned to glass edges, uniformly smooth, and free from tears, air bubbles, wrinkles, and rough edges, in single sheet completely interlaying the back face of clean glass, according to manufacturer's written instructions, including surface preparation and application temperature limitations.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine decorative-glass framing members, with Installer present, for compliance with the following:

1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.

2. Minimum required face or edge clearances.

B. Proceed with installation only after unsatisfactory conditions have been corrected.
3.2 PREPARATION
   A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.
   B. Examine glazing units to locate orientation of outer surfaces. Label or mark units as needed so that surface orientation is readily identifiable. Do not use materials that leave visible marks in the completed Work.

3.3 INSTALLATION
   A. Set decorative-glass units in each series true in line with uniform orientation, pattern, draw, bow, and similar characteristics.
   B. Set glass lites with proper orientation so that each outer surface faces the direction indicated on Drawings.
   C. Set decorative glass in bussing and recycling area locations indicated on Drawings. Install glass with hardware and accessories according to hardware manufacturer's written instructions. Attach hardware securely to mounting surfaces.
   D. Set decorative glass in bussing and recycling area locations indicated on Drawings.

3.4 GLAZING, GENERAL
   A. Decorative Glass: Install glazing as specified in Division 8 Section "Glazing."
   B. Comply with combined written instructions of manufacturers of gaskets, glass, sealants, tapes, and other glazing materials unless more stringent requirements are indicated, including those in referenced glazing publications.
   C. Adjust glazing channel dimensions during installation as required by Project conditions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.
   D. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.
   E. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
   F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
   G. Provide spacers for glass lites where length plus width is more than 50 inches (1270 mm).
      1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances, and to comply with system performance requirements.
H. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.

3.5 CLEANING AND PROTECTION

A. Protect decorative glass from damage immediately after installation by attaching crossed streamers to framing and held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels, and clean surfaces.

B. Protect glass from contact with contaminating substances resulting from construction operations. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer.

C. Remove and replace glass that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, and vandalism, during construction period.

D. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

END OF SECTION 08816
PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes non-load-bearing steel framing members for the following applications:
   1. Interior framing systems (e.g., supports for partition walls, framed soffits, furring, etc.).
   2. Interior suspension systems (e.g., supports for ceilings, suspended soffits, etc.).

B. Related Sections:
   1. Division 1 Section “Sustainable Design Requirements – LEED for Commercial Interiors.”
   2. Division 1 Section “Construction Waste Management and Recycling.”

1.02 SUBMITTALS

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

B. LEED Submittals: Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating costs for each product having recycled content.

1.03 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: Provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by a testing and inspection agency.

B. Sound Transmission Characteristics: Provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by a testing and inspection agency.

PART 2 - PRODUCTS

2.01 NON-LOAD-BEARING STEEL FRAMING, GENERAL

A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 75 percent.

B. Framing Members, General: Comply with ASTM C 754 for conditions indicated.
   1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal, unless otherwise indicated.
2.02 SUSPENSION SYSTEM COMPONENTS

A. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.0625-inch- (1.59-mm-) diameter wire, or double strand of 0.0475-inch- (1.21-mm-) diameter wire.

B. Hanger Attachments to Concrete:

1. Anchors: Fabricated from corrosion-resistant materials with holes or loops for attaching wire hangers and capable of sustaining, without failure, a load equal to 5 times that imposed by construction as determined by testing according to ASTM E 488 by an independent testing agency.

2. Powder-Actuated Fasteners: Suitable for application indicated, fabricated from corrosion-resistant materials with clips or other devices for attaching hangers of type indicated, and capable of sustaining, without failure, a load equal to 10 times that imposed by construction as determined by testing according to ASTM E 1190 by an independent testing agency.

C. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.162-inch (4.12-mm) diameter.

D. Flat Hangers: Steel sheet, 1 by 3/16 inch (25.4 by 4.76 mm) by length indicated.

E. Carrying Channels: Cold-rolled, commercial-steel sheet with a base-metal thickness of 0.0538 inch (1.37 mm) and minimum 1/2-inch- (12.7-mm-) wide flanges.

1. Depth: As indicated on Drawings.

F. Furring Channels (Furring Members):

1. Cold-Rolled Channels: 0.0538-inch (1.37-mm) bare-steel thickness, with minimum 1/2-inch- (12.7-mm-) wide flanges, 3/4 inch (19.1 mm) deep.
2. Steel Studs: ASTM C 645.
   a. Minimum Base-Metal Thickness: 0.0312 inch (0.79 mm).
   b. Depth: As indicated on Drawings.

3. Hat-Shaped, Rigid Furring Channels: ASTM C 645, 7/8 inch (22.2 mm) deep.
   a. Minimum Base Metal Thickness: 0.0312 inch (0.79 mm).

4. Resilient Furring Channels: 1/2-inch- (12.7-mm-) deep members designed to reduce sound transmission.
   a. Configuration: Asymmetrical or hat shaped.

G. Grid Suspension System for Ceilings: ASTM C 645, direct-hung system composed of main beams and cross-furring members that interlock.

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
   b. Chicago Metallic Corporation; Drywall Furring System.
c. USG Corporation; Drywall Suspension System.

2.03 STEEL FRAMING FOR FRAMED ASSEMBLIES

A. Steel Studs and Runners: ASTM C 645.
   1. Minimum Base-Metal Thickness: 0.0312 inch (0.79 mm).
   2. Depth: As indicated on Drawings.

B. Slip-Type Head Joints: Where indicated, provide one of the following:
   1. Single Long-Leg Runner System: ASTM C 645 top runner with 2-inch- (50.8-mm-) deep flanges in thickness not less than indicated for studs, installed with studs friction fit into top runner and with continuous bridging located within 12 inches (305 mm) of the top of studs to provide lateral bracing.
   2. Double-Runner System: ASTM C 645 top runners, inside runner with 2-inch- (50.8-mm-) deep flanges in thickness not less than indicated for studs and fastened to studs, and outer runner sized to friction fit inside runner.
   3. Deflection Track: Steel sheet top runner manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.
      a. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
         1) Steel Network Inc. (The); Verti Series.
         2) Superior Metal Trim; Superior Flex Track System (SFT).

C. Firestop Tracks: Top runner manufactured to allow partition heads to expand and contract with movement of the structure while maintaining continuity of fire-resistance-rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs.
   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. Fire Trak Corp.; Fire Trak.
      b. Metal-Lite, Inc.; The System.

D. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.
   1. Minimum Base-Metal Thickness: 0.0312 inch (0.79 mm).

E. Cold-Rolled Channel Bridging: 0.0538-inch (1.37-mm) bare-steel thickness, with minimum 1/2-inch- (12.7-mm-) wide flanges.
   1. Depth: As indicated on Drawings.
   2. Clip Angle: Not less than 1-1/2 by 1-1/2 inches (38.1 by 38.1 mm), 0.068-inch- (1.73-mm-) thick, galvanized steel.

F. Hat-Shaped, Rigid Furring Channels: ASTM C 645.
   1. Minimum Base Metal Thickness: 0.0312 inch (0.79 mm).
2. Depth: As indicated on Drawings.

G. Resilient Furring Channels: 1/2-inch- (12.7-mm-) deep, steel sheet members designed to reduce sound transmission.

1. Configuration: Asymmetrical or hat shaped.

H. Cold-Rolled Furring Channels: 0.0538-inch (1.37-mm) bare-steel thickness, with minimum 1/2-inch- (12.7-mm-) wide flanges.

1. Depth: As indicated on Drawings.
2. Furring Brackets: Adjustable, corrugated-edge type of steel sheet with minimum bare-steel thickness of 0.0312 inch (0.79 mm).
3. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.0625-inch- (1.59-mm-) diameter wire, or double strand of 0.0475-inch- (1.21-mm-) diameter wire.

I. Z-Shaped Furring: With slotted or nonslotted web, face flange of 1-1/4 inches (31.8 mm), wall attachment flange of 7/8 inch (22.2 mm), minimum bare-metal thickness of 0.0179 inch (0.45 mm), and depth required to fit insulation thickness indicated.

2.04 AUXILIARY MATERIALS

A. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

PART 3 - EXECUTION

3.01 INSTALLATION, GENERAL

A. Installation Standard: ASTM C 754, except comply with framing sizes and spacing indicated.

1. Gypsum Plaster Assemblies: Also comply with requirements in ASTM C 841 that apply to framing installation.
2. Portland Cement Plaster Assemblies: Also comply with requirements in ASTM C 1063 that apply to framing installation.
3. Gypsum Veneer Plaster Assemblies: Also comply with requirements in ASTM C 844 that apply to framing installation.
4. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing installation.

3.02 INSTALLING SUSPENSION SYSTEMS

A. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.

B. Suspend hangers from building structure as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.
a. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.

2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.
   a. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced installation standards.

3. Do not attach hangers to steel roof deck.
4. Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
5. Do not attach hangers to rolled-in hanger tabs of composite steel floor deck.
6. Do not connect or suspend steel framing from ducts, pipes, or conduit.

C. Fire-Resistance-Rated Assemblies: Wire tie furring channels to supports.

D. Grid Suspension Systems: Attach perimeter wall track or angle where grid suspension systems meet vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.

E. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet (3 mm in 3.6 m) measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

3.03 INSTALLING FRAMED ASSEMBLIES

A. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.

B. Install studs so flanges within framing system point in same direction.

C. Install tracks (runners) at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings, except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts penetrating partitions above ceiling.
   1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
   2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.
      a. Install two studs at each jamb, unless otherwise indicated.
      b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch (12.7-mm) clearance from jamb stud to allow for installation of control joint in finished assembly.
      c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.
3. Other Framed Openings: Frame openings other than door openings the same as required for door openings, unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.

4. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.
   a. Firestop Track: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.

5. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.

6. Curved Partitions:
   a. Bend track to uniform curve and locate straight lengths so they are tangent to arcs.
   b. Begin and end each arc with a stud, and space intermediate studs equally along arcs. On straight lengths of not less than 2 studs at ends of arcs, place studs 6 inches (150 mm) o.c.

D. Direct Furring:
   1. Screw to wood framing.
   2. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches (610 mm) o.c.

E. Z-Furring Members:
   1. Erect insulation vertically and hold in place with Z-furring members spaced 24 inches (610 mm) o.c.
   2. Except at exterior corners, securely attach narrow flanges of furring members to wall with concrete stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches (600 mm) o.c.
   3. At exterior corners, attach wide flange of furring members to wall with short flange extending beyond corner; on adjacent wall surface, screw-attach short flange of furring channel to web of attached channel. At interior corners, space second member no more than 12 inches (300 mm) from corner and cut insulation to fit.

F. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch (3 mm) from the plane formed by faces of adjacent framing.

END OF SECTION 09111
PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes the following:
   1. Interior gypsum board.
   2. Tile backing panels.

B. Related Sections include the following:
   1. Division 1 Section “Sustainable Design Requirements – LEED for Commercial Interiors.”
   2. Division 1 Section “Construction Waste Management and Recycling.”
   3. Division 9 Section “Non-Load Bearing Steel Framing” for non-structural framing and suspension systems that support gypsum board.
   4. Division 9 Section “Ceramic Tile” for cementitious backer units installed as substrates for ceramic tile.
   5. Division 9 Section “Interior Painting” for primers applied to gypsum board surfaces.

1.02 SUBMITTALS

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

B. LEED Submittals:
   1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
   2. Product Certificates for Credit MR 5: For products and materials required to comply with requirements for regionally manufactured and regionally extracted and manufactured materials. Include statement indicating cost for each regionally manufactured material.
      a. Include statement indicating location of manufacturer and distance to Project for each regionally manufactured material.
   3. Product Data for Credit IEQ 4.1: For adhesives used to laminate gypsum board panels to substrates, documentation including printed statement of VOC content.

C. Manufacturer’s Data:
   1. Certification Requirements:
      a. Certify that products furnished for this Project are asbestos free.
      b. Certify that products meet or exceed specification requirements.
   2. Indicate compliance with specified fire or sound ratings.
   3. Indicate stud height limitations.

D. Samples: For the following products:
   1. Trim Accessories: Full-size Sample in 12-inch- (300-mm-) long length for each trim accessory indicated.
2. Textured Finishes: Manufacturer's standard size for each textured finish indicated and on same backing indicated for Work.

1.03 QUALITY ASSURANCE

A. Industry Standard: Comply with applicable requirements of ASTM C840, “Application and Finishing of Gypsum Board” by the Gypsum Association, except where more detailed or more stringent requirements are indicated, including the recommendations of the manufacturer.

B. Allowable Tolerances: 1/16 inch offset between planes of board faces and 1/4 inch in 8’-0” for plumb, level, warp, and bow.

C. Obtain each type of gypsum board and related joint treatment materials from a single manufacturer.

D. Comply with applicable requirements of Mountain States Bureau of Lath, Plaster and Drywall, Inc.

E. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.

F. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

G. Mockups: Before beginning gypsum board installation, install mockups of at least 100 sq. ft. (9 sq. m) in surface area to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Install mockups for the following:
   a. Each level of gypsum board finish indicated for use in exposed locations.
   b. Each texture finish indicated and as follows:
      1) Skipped trowel finish.
      2) Diamond finish.

2. Apply or install final decoration indicated, including painting and wallcoverings, on exposed surfaces for review of mockups.

3. Simulate finished lighting conditions for review of mockups.

4. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.04 STORAGE AND HANDLING

A. Store materials inside under cover and keep them dry and protected against damage from weather, condensation, direct sunlight, construction traffic, and other causes. Stack panels flat to prevent sagging.
1.05 PROJECT CONDITIONS

A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.

B. Do not install interior products until installation areas are enclosed and conditioned.

C. Do not install panels that are wet, those that are moisture damaged, and those that are mold damaged.
   1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
   2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.01 GYPSUM BOARD, GENERAL

A. Recycled Content of Gypsum Panel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 75 percent.

B. Regional Materials: Gypsum panel products shall be manufactured within 500 miles (800 km) of Project site from materials that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles (800 km) of Project site.

C. Size: Provide in maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.02 INTERIOR GYPSUM BOARD

A. General: Complying with ASTM C 36/C 36M or ASTM C 1396/C 1396M, as applicable to type of gypsum board indicated and whichever is more stringent.
   1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. American Gypsum Co.
      b. Domtar Gypsum.
      c. G-P Gypsum.
      e. USG Corporation.

B. Type X:
   1. Thickness: 5/8 inch (15.9 mm).
   2. Long Edges: Tapered and featured (rounded or beveled) for prefilling.
C. Type C:
   1. Thickness: As required by fire-resistance-rated assembly indicated on Drawings.
   2. Long Edges: Tapered.

D. Flexible Type: Manufactured to bend to fit radii and to be more flexible than standard regular-type gypsum board of same thickness.
   1. Thickness: 1/4 inch (6.4 mm).
   2. Long Edges: Tapered.

E. Ceiling Type: Manufactured to have more sag resistance than regular-type gypsum board.
   1. Thickness: 5/8 inch (12.7 mm).
   2. Long Edges: Tapered.

F. Foil-Backed Type:
   1. Core: As indicated on Drawings.
   2. Long Edges: Tapered and featured (rounded or beveled) for prefilling.

G. Abuse-Resistant Type: Manufactured to produce greater resistance to surface indentation, through-penetration (impact resistance), and abrasion than standard, regular-type and Type X gypsum board.
   1. Core: As indicated on Drawings.
   2. Long Edges: Tapered.

H. High-Impact Type: Manufactured with Type X core, plastic film laminated to back side for greater resistance to through-penetration (impact resistance).
   1. Core: As indicated on Drawings.
   2. Plastic-Film Thickness: 0.030 inch (0.762 mm).

I. Moisture- and Mold-Resistant Type: With moisture- and mold-resistant core and surfaces.
   1. Core: 5/8 inch (15.9 mm), Type X.
   2. Long Edges: Tapered.

2.03 TILE BACKING PANELS

A. Glass-Mat, Water-Resistant Backing Board:
   1. Complying with ASTM C 1178/C 1178M.
      a. Product: Subject to compliance with requirements, provide "DensShield Tile Guard" by G-P Gypsum.
   2. Complying with ASTM C 1177/C 1177M.
      a. Product: Subject to compliance with requirements, provide "DensArmor Plus Interior Guard" by G-P Gypsum.
3. Core: As indicated on Drawings.

B. Cementitious Backer Units: ANSI A118.9.

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. Custom Building Products; Wonderboard.
   b. FinPan, Inc.; Util-A-Crete Concrete Backer Board.

2. Thickness: As indicated on Drawings.

2.04 TRIM ACCESSORIES

A. Interior Trim: ASTM C 1047.

1. Material: Galvanized or aluminum-coated steel sheet or rolled zinc.
2. Shapes:
   a. Cornerbead.
   b. LC-Bead: J-shaped; exposed long flange receives joint compound.
   c. L-Bead: L-shaped; exposed long flange receives joint compound.
   d. U-Bead: J-shaped; exposed short flange does not receive joint compound.
   e. Expansion (control) joint.

B. Aluminum Trim: Extruded accessories of profiles and dimensions indicated.

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. Fry Reglet Corp.
   b. Gordon, Inc.
   c. Pittcon Industries.

2. Aluminum: Alloy and temper with not less than the strength and durability properties of ASTM B 221 (ASTM B 221M), Alloy 6063-T5.
3. Finish: Corrosion-resistant primer compatible with joint compound and finish materials specified.

2.05 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C 475/C 475M.

B. Joint Tape:

1. Interior Gypsum Wallboard: Paper.
4. Tile Backing Panels: As recommended by panel manufacturer.
C. Joint Compound for Interior Gypsum Wallboard: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.

1. Prefilling: At open joints, rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.
2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping compound.
   a. Use setting-type compound for installing paper-faced metal trim accessories.
3. Fill Coat: For second coat, use setting-type, sandable topping or drying-type, all-purpose compound.
4. Finish Coat: For third coat, use setting-type, sandable topping or drying-type, all-purpose compound.
5. Skim Coat: For final coat of Level 5 finish, use high-build interior coating product designed for application by airless sprayer and to be used instead of skim coat to produce Level 5 finish.

D. Joint Compound for Tile Backing Panels:

1. Glass-Mat, Water-Resistant Backing Panel: As recommended by backing panel manufacturer.
2. Cementitious Backer Units: As recommended by backer unit manufacturer.

2.06 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.

B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.

1. Use adhesives that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

C. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.

1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch (0.84 to 2.84 mm) thick.
2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.

D. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.

1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.
2. Recycled Content of Blankets: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 75 percent.

E. Acoustical Sealant: Manufacturer's standard nonag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through
perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

1. Acoustical joint sealant shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.07 TEXTURE FINISHES

A. Primer: As recommended by textured finish manufacturer.

B. Polystyrene Aggregate Finish: Water-based, job-mixed, polystyrene aggregate finish with flame-spread and smoke-developed indexes of not more than 25 when tested according to ASTM E 84.

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. G-P Gypsum; Georgia-Pacific Regency Ceiling Textures/Polystyrene.
   b. National Gypsum Company; Perfect Spray.
   c. USG Corporation; SHEETROCK Ceiling Spray Texture, QT.

2. Texture: As selected by Architect.

C. Aggregate Finish: Water-based, job-mixed, aggregated, drying-type texture finish for spray application.

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. G-P Gypsum; Georgia-Pacific Ceiling Textures/Vermiculite.
   b. USG Corporation; SHEETROCK Wall and Ceiling Spray Texture (Aggregated).

2. Texture: As selected by Architect.

D. Acoustical Finish: Water-based, chemical-setting or drying-type, job-mixed texture finish for spray application.

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. International Cellulose Corp.; SonaSpray "fc."
   b. USG Corporation; USG Acoustical Plaster Finish.

2. Application Thickness: 1/2 inch (12.7 mm).
3. Fire-Test-Response Characteristics: Indices when tested according to ASTM E 84 as follows:
   b. Smoke Developed: Less than 450.
4. NRC: 0.55 according to ASTM C 423.
PART 3 - EXECUTION

3.01 APPLYING AND FINISHING PANELS, GENERAL

A. Comply with ASTM C 840.

B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.

C. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch- (6.4- to 12.7-mm-) wide spaces at these locations, and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

D. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written recommendations for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.

3.02 APPLYING INTERIOR GYPSUM BOARD

A. Install interior gypsum board in the following locations:

1. Regular Type: Vertical surfaces, unless otherwise indicated.
2. Type X: Where required for fire-resistance-rated assembly.
3. Type C: Where required for specific fire-resistance-rated assembly indicated.
4. Flexible Type: Apply in double layer at curved assemblies.
5. Ceiling Type: As indicated on Drawings.
6. Foil-Backed Type: As indicated on Drawings.
7. Abuse-Resistant Type: As indicated on Drawings.
8. High-Impact Type: As indicated on Drawings.
9. Moisture- and Mold-Resistant Type: As indicated on Drawings.

3.03 APPLYING TILE BACKING PANELS

A. Glass-Mat, Water-Resistant Backing Panel: Comply with manufacturer's written installation instructions and install at locations indicated to receive tile. Install with 1/4-inch (6.4-mm) gap where panels abut other construction or penetrations.

B. Cementitious Backer Units: ANSI A108.11, at locations indicated to receive tile.

C. Areas Not Subject to Wetting: Install regular-type gypsum wallboard panels to produce a flat surface except at showers, tubs, and other locations indicated to receive water-resistant panels.

D. Where tile backing panels abut other types of panels in same plane, shim surfaces to produce a uniform plane across panel surfaces.
3.04 INSTALLING TRIM ACCESSORIES

A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.

B. Control Joints: Install control joints according to ASTM C 840 and in specific locations approved by Architect for visual effect.

C. Interior Trim: Install in the following locations:
   1. Cornerbead: Use at outside corners, unless otherwise indicated.
   2. Bullnose Bead: Use where indicated.
   3. LC-Bead: Use at exposed panel edges.
   4. L-Bead: Use where indicated.
   5. U-Bead: Use at exposed panel edges.
   6. Curved-Edge Cornerbead: Use at curved openings.

D. Aluminum Trim: Install in locations indicated on Drawings.

3.05 FINISHING GYPSUM BOARD

A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.

B. Prefill open joints, rounded or beveled edges, and damaged surface areas.

C. Apply joint tape over gypsum board joints, except those with trim having flanges not intended for tape.

D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:
   1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
   2. Level 2: Panels that are substrate for tile.
   3. Level 3: Where indicated on Drawings.
   4. Level 4: At panel surfaces that will be exposed to view, unless otherwise indicated.
      a. Primer and its application to surfaces are specified in other Division 9 Section “Interior Painting.”
   5. Level 5: Where indicated on Drawings.
      a. Primer and its application to surfaces are specified in other Division 9 Section “Interior Painting.”

E. Glass-Mat, Water-Resistant Backing Panels: Finish according to manufacturer's written instructions.

F. Cementitious Backer Units: Finish according to manufacturer's written instructions.
3.06 APPLYING TEXTURE FINISHES

A. Surface Preparation and Primer: Prepare and apply primer to gypsum panels and other surfaces receiving texture finishes. Apply primer to surfaces that are clean, dry, and smooth.

B. Texture Finish Application: Mix and apply finish using powered spray equipment, to produce a uniform texture matching approved mockup and free of starved spots or other evidence of thin application or of application patterns.

C. Prevent texture finishes from coming into contact with surfaces not indicated to receive texture finish by covering them with masking agents, polyethylene film, or other means. If, despite these precautions, texture finishes contact these surfaces, immediately remove droppings and overspray to prevent damage according to texture-finish manufacturer’s written recommendations.

3.07 PROTECTION

A. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

B. Remove and replace panels that are wet, moisture damaged, and mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.

2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 09250
PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes acoustical panels and exposed suspension systems for ceilings.

B. Related Sections:
   1. Division 1 Section “Sustainable Design Requirements – LEED for Commercial Interiors.
   2. Division 1 Section “Construction Waste Management and Recycling.”

1.2 SUBMITTALS

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

B. LEED Submittals:
   1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating costs for each product having recycled content.
   2. Product Data for Credit EQ 4.1: For sealants, documentation including printed statement of VOC content.

C. Manufacturer’s Data:
   1. Certification Requirements:
      a. Certify that products furnished for this Project are asbestos free.
      b. Certify that products meet or exceed specification requirements.

D. Coordination Drawings: Drawn to scale and coordinating acoustical panel ceiling installation with hanger attachment to building structure and ceiling mounted items:

E. Samples: Submit three 12 inch square samples of each type of acoustical material to illustrate color and range of appearance to be expected in completed work.

F. Product test reports.

G. Research/evaluation reports.

H. Maintenance data:
   1. Submit instructions for proper maintenance and cleaning.
   2. Provide instructions for refinishing.
   3. Provide recommendations on precautions against materials and methods which may be detrimental to finishes and acoustical performance.

1.3 QUALITY ASSURANCE

A. Manufacturers Qualifications: Company specializing in the manufacture of acoustical ceiling tile and panels with 3 years minimum experience.
B. Installer’s Qualifications: Company with 3 years minimum experience and approved by manufacturer of acoustical units.

C. Terminology and Performance: Applicable publications by the Ceilings and Interior Systems Contractors’ Association (CISCA), including former Acoustical Materials Association Standards issued by CISCA.

D. Acoustical Testing Agency Qualifications: An independent testing laboratory or an NVLAP-accredited laboratory.

E. Source Limitations: Obtain each type of acoustical ceiling panel and supporting suspension system through one source from a single manufacturer.

F. Fire-Test-Response Characteristics:
   1. Fire-Resistance Characteristics: Where indicated, provide acoustical panel ceilings identical to those of assemblies tested for fire resistance per ASTM E 119 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
      a. Smoke-Developed Index: 450 or less.

1.4 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. Acoustical Ceiling Panels: Full-size panels equal to 2.0 percent of quantity installed.
   2. Suspension System Components: Quantity of each exposed component equal to 2.0 percent of quantity installed.

PART 2 - PRODUCTS

2.1 ACOUSTICAL PANEL CEILINGS, GENERAL

A. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 75 percent.

B. Acoustical Panel Standard: Comply with ASTM E 1264.

C. Metal Suspension System Standard: Comply with ASTM C 635.

D. Attachment Devices: Size for five times the design load indicated in ASTM C 635, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.

E. Wire Hangers, Braces, and Ties: Zinc-coated carbon-steel wire; ASTM A 641/A 641M, Class 1 zinc coating, soft temper.

   1. Size: Select wire diameter so its stress at 3 times hanger design load (ASTM C 635, Table 1, "Direct Hung") will be less than yield stress of wire, but provide not less than 0.106-inch- (2.69-mm-) diameter wire.
F. Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that comply with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension system runners.

2.2 ACOUSTICAL PANELS FOR ACOUSTICAL PANEL CEILING - TYPE 1

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. Armstrong World Industries, Inc.
2. Celotex World Industries, Inc.
3. USG Interiors, Inc.

B. Classification: Provide panels complying with ASTM E 1264 for type, form, and pattern as follows:

1. Type and Form: Type III, mineral base with painted finish; Form 2, water felted.
2. Pattern: Match existing.

C. Color: White.

D. LR: Not less than 0.84.

E. NRC: Not less than 0.55.

F. CAC: Not less than 30.

G. Edge/Joint Detail: Match existing.

H. Thickness: Match existing.

I. Modular Size: 24 by 24 inches (610 by 610 mm).

J. Antimicrobial Treatment: Broad spectrum fungicide and bactericide based.

2.3 ACOUSTICAL PANELS FOR ACOUSTICAL PANEL CEILING - TYPE 2

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

1. Armstrong World Industries, Inc.
2. Celotex World Industries, Inc.
3. USG Interiors, Inc.

B. Classification: Provide fire-resistance-rated panels complying with ASTM E 1264 for type, form, and pattern as follows:

1. Type and Form: Type XX, other types; described as high-density, ceramic- and mineral-base panels with scrubbable finish, resistant to heat, moisture, and corrosive fumes.

C. Color: White.
D. LR: Not less than 0.70.

E. CAC: Not less than 35.

F. Edge/Joint Detail: Square.

G. Thickness: 1/2 inch (12 mm).

H. Modular Size: 24 by 24 inches (610 by 610 mm).

2.4 METAL SUSPENSION SYSTEM FOR ACOUSTICAL PANEL CEILING

A. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 75 percent.

B. 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. Armstrong World Industries, Inc.
2. BPB USA.
3. Chicago Metallic Corporation.
4. Ecophon CertainTeed, Inc.
5. USG Interiors, Inc.

C. Double-Web, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet, prepainted, electrotyically zinc coated, or hot-dip galvanized according to ASTM A 653/A 653M, not less than G30 (Z90) coating designation, with prefinished metal caps on flanges.

2. Cap Material: Steel or aluminum cold-rolled sheet.
3. Cap Finish: Painted to match color of acoustical unit.

2.5 ACOUSTICAL SEALANT

A. Acoustical Sealant: Manufacturer's standard sealant complying with ASTM C 834 and effective in reducing airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

3. Acoustical sealant shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with UBC Standard 25-2 and seismic design requirements indicated, per manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."
B. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders.

C. Suspend ceiling hangers from building's structural members, plumb and free from contact with insulation or other objects within ceiling plenum. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers, use trapezes or equivalent devices. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
   1. Do not support ceilings directly from permanent metal forms or floor deck; anchor into concrete slabs.
   2. Do not attach hangers to steel deck tabs.

D. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels. Screw attach moldings to substrate at intervals not more than 16 inches (400 mm) o.c. and not more than 3 inches (75 mm) from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet (3.2 mm in 3.6 m). Miter corners accurately and connect securely.

E. Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.

F. Install acoustical panels with undamaged edges and fit accurately into suspension system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide a neat, precise fit.

END OF SECTION 09511
PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes vinyl luxury floor tiles.

B. Related Sections:
   1. Division 1 Section “Sustainable Design Requirements – LEED for Commercial Interiors.”
   2. Division 1 Section “Construction Waste Management and Recycling.”
   3. Division 9 Section "Resilient Wall Base and Accessories" for resilient base, reducer strips, and other accessories installed with resilient floor coverings.

1.2 SUBMITTALS

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

B. LEED Submittals:
   1. Product Data for Credit IEQ 4.1: For adhesives and sealants documentation including printed statement of VOC content.
   2. Product Data for Credit IEQ 4.3: For adhesives documentation including printed statement of VOC content.
   3. Product Data for Credit IEQ 4.3: For resilient tile flooring, documentation from an independent testing agency indicating compliance with the FloorScore Standard.

C. Shop Drawings: For each type of floor tile. Include floor tile layouts, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.
   1. Show details of special patterns.

D. Samples for Verification: Full-size units of each color and pattern of floor tiles required.
   1. For heat-welding bead, manufacturer's standard-size Samples, but not less than 9 inches (230 mm) long, of each color required.

E. Seam Samples: For seamless-installation technique indicated and for each flooring product, color, and pattern required; with seam running lengthwise and in center of 6-by-9-inch (150-by-230-mm) Sample applied to a rigid backing and prepared by Installer for this Project.

F. Product Schedule: For floor tiles.

G. Qualification Data: For qualified Installer.

H. Maintenance Data: For each type of floor tile to include in maintenance manuals.
1.3 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs workers for this Project who are competent in techniques required by manufacturer for floor tile installation and seaming method indicated.

1. Engage an installer who employs workers for this Project who are trained or certified by manufacturer for installation techniques required.

B. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.

1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Store floor tiles and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F (10 deg C) or more than 90 deg F (32 deg C). Store floor tiles on flat surfaces.

1.5 PROJECT CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F (21 deg C) or more than 95 deg F (35 deg C), in spaces to receive floor tiles during the following time periods:

1. 48 hours before installation.
2. During installation.
3. 48 hours after installation.

B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F (13 deg C) or more than 95 deg F (35 deg C).

C. Close spaces to traffic during floor tile installation.

D. Close spaces to traffic for 48 hours after floor tile installation.

E. Install floor tiles after other finishing operations, including painting, have been completed.

1.6 EXTRA MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Floor Tiles: Furnish 1 box for every 50 boxes or fraction thereof, of each type, color, and pattern of floor tiles installed.
PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. FloorScore Compliance: Resilient tile flooring shall comply with requirements of FloorScore Standard.

2.2 LUXURY VINYL FLOOR TILE

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. FloorFolio Industries (Basis-of-Design).

B. Tile Classification: ASTM F1700, Class III, Type B

C. Wearing Surface: Smooth.

D. Gauge: 3.0 mm.

E. Colors and Patterns: As selected by Architect from full range of industry colors.

2.3 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by manufacturer to suit floor tiles and substrate conditions indicated.

1. Adhesives shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
   a. VCT and Asphalt Tile Adhesives: Not more than 50 g/L.

C. Floor Polish: Provide protective liquid floor polish products as recommended by manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of floor tiles.
C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.

B. Concrete Substrates: Prepare according to ASTM F 710.
   1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
   2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
   3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
   4. Moisture Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
      a. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m) in 24 hours.
      b. Perform relative humidity test using in situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 75% relative humidity level measurement.

C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.

D. Do not install floor tiles until they are same temperature as space where they are to be installed.
   1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.

E. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

3.3 FLOOR INSTALLATION

A. Comply with manufacturer's written instructions for installing floor tiles.

B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.

C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.

D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.
E. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.

F. Adhere floor tiles to flooring substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

3.4 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protection of floor tiles.

B. Perform the following operations immediately after completing floor tiles installation:

1. Remove adhesive and other blemishes from exposed surfaces.
2. Sweep and vacuum surfaces thoroughly.
3. Damp-mop surfaces to remove marks and soil.

C. Protect floor tiles products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

D. Cover floor tiles until Substantial Completion.

END OF SECTION 09651
PART 1 - GENERAL

1.1 SUMMARY
A. Section Includes:
   1. Resilient base.
   2. Resilient molding accessories/floor transition materials.
B. Related Sections:
   1. Division 1 Section “Sustainable Design Requirements – LEED for Commercial Interiors.”
   2. Division 1 Section “Construction Waste Management and Recycling.”
   3. Division 9 Section “Resilient Floor Tile for resilient floor tile.”

1.2 SUBMITTALS
A. Product Data: For each type of product indicated.
B. LEED Submittals: Product Data for Credit IEQ 4.1: For adhesives, documentation including printed statement of VOC content.
C. Samples for Initial Selection: For each type of product indicated.
D. Samples for Verification: For each type of product indicated, in manufacturer's standard-size Samples but not less than 12 inches (300 mm) long, of each resilient product color, texture, and pattern required.
E. Product Schedule: For resilient products.

1.3 QUALITY ASSURANCE
A. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.
   1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

1.4 DELIVERY, STORAGE, AND HANDLING
A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F (10 deg C) or more than 90 deg F (32 deg C).

1.5 PROJECT CONDITIONS
A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F (21 deg C) or more than 95 deg F (35 deg C), in spaces to receive resilient products during the following time periods:
1. 48 hours before installation.
2. During installation.
3. 48 hours after installation.

B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F (13 deg C) or more than 95 deg F (35 deg C).

C. Install resilient products after other finishing operations, including painting, have been completed.

1.6 EXTRA MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Furnish not less than 10 linear feet (3 linear m) for every 500 linear feet (150 linear m) or fraction thereof, of each type, color, pattern, and size of resilient product installed.

PART 2 - PRODUCTS

2.1 RESILIENT BASE

A. Resilient Base:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

   a. Allstate Rubber Corp.; Stoler Industries.
   b. Armstrong World Industries, Inc.
   c. Burke Mercer Flooring Products; Division of Burke Industries, Inc.
   d. Flexco, Inc.
   e. Johnsonite.
   f. Mondo Rubber International, Inc.
   g. Musson, R. C. Rubber Co.
   h. Nora Rubber Flooring; Freudenberg Building Systems, Inc.
   i. Roppe Corporation, USA.


1. Material Requirement: Type TS (rubber, vulcanized thermoset).
3. Style: Cove (base with toe for all hard floor surface locations) and Straight (flat or toeless for all carpet flooring locations).

C. Minimum Thickness: 0.125 inch (3.2 mm).

D. Height: 4 inches (102 mm).

E. Lengths: Roll goods in manufacturer's standard length.
F. Outside Corners: Job formed.

G. Inside Corners: Job formed.

H. Finish: As selected by Architect from manufacturer's full range

I. Colors and Patterns: As selected by Architect from full range of industry colors.

2.2 RESILIENT MOLDING ACCESSORY

A. Resilient Molding Accessory:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. Burke Mercer Flooring Products; Division of Burke Industries, Inc.
   b. Flexco, Inc.
   c. Johnsonite.
   d. R.C.A. Rubber Company (The).
   e. Roppe Corporation, USA.
   f. VPI, LLC; Floor Products Division.

B. Description:

   1. Carpet bar for tackless installations.
   2. Carpet edge for glue-down applications
   5. Reducer strip for resilient floor covering.
   7. Transition strips.

C. Material: Rubber.

D. Profile and Dimensions: As indicated, and designed for application intended on Drawings.

E. Colors and Patterns: As selected by Architect from full range of industry colors.

2.3 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.
1. Use adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
   a. Cove Base Adhesives: Not more than 50 g/L.
   b. Rubber Floor Adhesives: Not more than 60 g/L.

C. Floor Polish: Provide protective liquid floor polish products as recommended by resilient stair tread manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.

B. Concrete Substrates for Accessories: Prepare according to ASTM F 710.
   1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
   2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
   3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer.
   4. Moisture Testing: Perform tests recommended by manufacturer and as follows. Proceed with installation only after substrates pass testing.
      a. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m) in 24 hours.
      b. Perform relative humidity test using in situ probes, ASTM F 2170. Proceed with installation only after substrates have maximum 75 percent relative humidity level measurement.

C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.

D. Do not install resilient products until they are same temperature as the space where they are to be installed.
1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.

E. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

3.3 RESILIENT BASE INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient base.

B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.

C. Install resilient base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.

D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.

E. Do not stretch resilient base during installation.

F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.

G. Preformed Corners: Install preformed corners before installing straight pieces.

H. Job-Formed Corners:
   1. Outside Corners: Use straight pieces of maximum lengths possible. Form without producing discoloration (whitening) at bends.
   2. Inside Corners: Use straight pieces of maximum lengths possible.

3.4 RESILIENT ACCESSORY INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient accessories.

B. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of carpet and resilient floor covering that would otherwise be exposed.

3.5 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protection of resilient products.

B. Perform the following operations immediately after completing resilient product installation:
   1. Remove adhesive and other blemishes from exposed surfaces.
   2. Sweep and vacuum surfaces thoroughly.
   3. Damp-mop surfaces to remove marks and soil.

C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
D. Floor Polish: Remove soil, visible adhesive, and surface blemishes from resilient stair treads before applying liquid floor polish.
   1. Apply two coat(s), or as recommended by flooring manufacturer.
   2. Do not apply protective coatings unless specifically recommended by flooring manufacturer.

E. Cover resilient products until Substantial Completion.

END OF SECTION 09653
PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes modular, tufted carpet tile.

B. Related Sections:
   1. Division 1 Section “Sustainable Design Requirements – LEED for Commercial Interiors.”
   2. Division 1 Section “Construction Waste Management and Recycling.”
   3. Division 9 Section "Resilient Base and Accessories" for resilient wall base and accessories installed with carpet tile.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated. Include manufacturer's written data on physical characteristics, durability, and fade resistance. Include installation recommendations for each type of substrate.

B. LEED Submittals: Product Data for Credit EQ 4.3:
   1. For carpet tile, documentation indicating compliance with testing and product requirements of CRI's "Green Label Plus" program.
   2. For installation adhesive, documentation including printed statement of VOC content.

C. Shop Drawings: Show the following:
   1. Columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required in carpet tiles.
   2. Carpet tile type, color, and dye lot.
   3. Type of subfloor.
   4. Type of installation.
   5. Pattern of installation.
   6. Pattern type, location, and direction.
   7. Pile direction.
   8. Type, color, and location of insets and borders.
   9. Type, color, and location of edge, transition, and other accessory strips.
   10. Transition details to other flooring materials.

D. Samples: For each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.
   2. Exposed Edge, Transition, and other Accessory Stripping: 12-inch- (300-mm-) long Samples.

E. Product Schedule: For carpet tile. Use same designations indicated on Drawings.

F. Qualification Data: For Installer.
G. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency.

H. Maintenance Data: For carpet tiles to include in maintenance manuals. Include the following:

1. Methods for maintaining carpet tile, including cleaning and stain-removal products and procedures and manufacturer’s recommended maintenance schedule.
2. Precautions for cleaning materials and methods that could be detrimental to carpet tile.

I. Warranty: Special warranty specified in this Section.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who is certified by the Floor Covering Installation Board or who can demonstrate compliance with its certification program requirements.

B. Fire-Test-Response Characteristics: Provide products with the critical radiant flux classification indicated in Part 2, as determined by testing identical products per ASTM E 648 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.

C. Preinstallation Conference: Conduct conference at Project site to comply with requirements in "Project Meetings."

1. Review delivery, storage, and handling procedures.
2. Review ambient conditions and ventilation procedures.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Comply with CRI 104, Section 5, "Storage and Handling."

1.5 PROJECT CONDITIONS

A. Comply with CRI 104, Section 7.2, "Site Conditions; Temperature and Humidity" and Section 7.12, "Ventilation."

B. Environmental Limitations: Do not install carpet tiles until wet work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

C. Do not install carpet tiles over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive and concrete slabs have pH range recommended by carpet tile manufacturer.

D. Where demountable partitions or other items are indicated for installation on top of carpet tiles, install carpet tiles before installing these items.
1.6 WARRANTY

A. Special Warranty for Carpet Tiles: Manufacturer's standard form in which manufacturer agrees to repair or replace components of carpet tile installation that fail in materials or workmanship within specified warranty period.

1. Warranty does not include deterioration or failure of carpet tile due to unusual traffic, failure of substrate, vandalism, or abuse.
2. Failures include, but are not limited to, more than 10 percent loss of face fiber, edge raveling, snags, runs, loss of tuft bind strength, dimensional stability, excess static discharge, and delamination.
3. Warranty Period: 10 years from date of Substantial Completion.

1.7 EXTRA MATERIALS

A. Furnish extra materials described below, before installation begins, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Carpet Tile: Full-size units equal to 5 percent of amount installed for each type indicated, but not less than 10 sq. yd. (8.3 sq. m).

PART 2 - PRODUCTS

2.1 CARPET TILE

A. Available Manufacturers: Subject to compliance with requirements, manufacturers providing products that may be incorporated into the Work include, but are not limited to, the following:

1. As indicated on Drawings.

B. Environmental Requirements: Provide carpet tile that complies with testing and product requirements of Carpet and Rug Institute's "Green Label Plus" program.

2.2 INSTALLATION ACCESSORIES

A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer.

B. Adhesives: Water-resistant, mildew-resistant, nonstaining, pressure-sensitive type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet tile and is recommended by carpet tile manufacturer for releasable installation.

1. Adhesives shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet tile performance. Examine carpet tile for type, color, pattern, and potential defects.

B. Concrete Subfloors: Verify that concrete slabs comply with ASTM F 710 and the following:
   1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by carpet tile manufacturer.
   2. Subfloor finishes comply with requirements specified in Division 03 Section "Cast-in-Place Concrete" for slabs receiving carpet tile.
   3. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits.

3.2 PREPARATION

A. General: Comply with CRI 104, Section 6.2, "Site Conditions; Floor Preparation," and with carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile installation.

B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions 1/8 inch (3 mm) wide or wider and protrusions more than 1/32 inch (0.8 mm), unless more stringent requirements are required by manufacturer's written instructions.

C. Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by carpet tile manufacturer.

D. Broom and vacuum clean substrates to be covered immediately before installing carpet tile.

3.3 INSTALLATION

A. General: Comply with CRI 104, Section 14, "Carpet Modules," and with carpet tile manufacturer's written installation instructions.

B. Installation Method: As recommended in writing by carpet tile manufacturer.

C. Maintain dye lot integrity. Do not mix dye lots in same area.

D. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet tile manufacturer.

E. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use nonpermanent, nonstaining marking device.

G. Install pattern parallel to walls and borders.

3.4 CLEANING AND PROTECTION

A. Perform the following operations immediately after installing carpet tile:

1. Remove excess adhesive, seam sealer, and other surface blemishes using cleaner recommended by carpet tile manufacturer.
2. Remove yarns that protrude from carpet tile surface.

B. Protect installed carpet tile to comply with CRI 104, Section 16, "Protection of Indoor Installations."

C. Protect carpet tile against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet tile manufacturer.

END OF SECTION 09681
PART 1 - GENERAL

1.1 SUMMARY

A. Section includes vinyl wall covering.

B. Related Sections:
   1. Division 1 Section “Sustainable Design Requirements – LEED for Commercial Interiors.”
   2. Division 1 Section “Construction Waste Management and Recycling.”
   3. Division 9 Section "Interior Painting" for priming wall surfaces.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated. Include data on physical characteristics, durability, fade resistance, and flame-resistance characteristics.

B. LEED Submittals:
   1. Certificates for Credit MR 7: Chain-of-custody certificates certifying that wood-veneer wall coverings comply with forest certification requirements. Include evidence that manufacturer is certified for chain of custody by an FSC-accredited certification body.
   2. Product Data for Credit EQ 4.2: For paints and coatings, including printed statement of VOC content and chemical components.

C. Samples for Initial Selection: For each type of wall covering indicated.

D. Samples for Verification:
   1. Full width by 36-inch- (914-mm-) long section of wall covering.
   2. Acceptance of vinyl wall covering material shall be contingent upon Architect's approval of samples.
   3. Sample from same print run or dye lot to be used for the Work, with specified treatments and paint applied. Mark top and face of fabric.
   4. Sample from same flitch to be used for the Work, with specified finish applied.

E. Qualification Data: For qualified testing agency.

F. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for wall covering.

G. Maintenance Data: For wall coverings to include in maintenance manuals.

1.3 QUALITY ASSURANCE

A. Applicator Qualification:
   1. Installation shall be by an experienced applicator approved by the manufacturer of the material supplied.
   2. Applicator shall have minimum one of year experience.
B. Regulatory Requirements: Fire hazard classifications for all materials specified in this Section shall be as determined by Tables 42-A and 42-B of the Uniform Building Code.

C. Fire-Test-Response Characteristics: As determined by testing identical wall coverings applied with identical adhesives to substrates according to test method indicated below by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Surface-Burning Characteristics: As follows, per ASTM E 84:
   a. Flame-Spread Index: 25 or less.
   b. Smoke-Developed Index: 50 or less.

D. Physical Properties: Adhesion of Vinyl Film: Minimum of 3 lbs. per sq. in. when tested in accordance with ASTM D751.

E. Vinyl wall covering shall be delivered to the job in sealed packages with testing laboratory certification on each package.

F. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.

   1. Build mockups for each type of wall covering on each substrate required. Comply with requirements in ASTM F 1141.
   2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.4 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install wall coverings until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above ceilings 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.

B. Lighting: Do not install wall covering until a permanent level of lighting is provided on the surfaces to receive wall covering.

C. Ventilation: Provide continuous ventilation during installation and for not less than the time recommended by wall-covering manufacturer for full drying or curing.

1.5 EXTRA MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

   1. Wall-Covering Materials: Provide 5 lineal yards of full width material of each pattern and color.
PART 2 - PRODUCTS

2.1 WALL COVERINGS

A. General: Provide rolls of each type of wall covering from same print run or dye lot.

2.2 VINYL WALL COVERING

A. Vinyl Wall-Covering Standards: Provide mildew-resistant products complying with the following:

1. ASTM F 793 for peelable or strippable wall coverings that qualify as Category V, Type II, Commercial Serviceability products.

2. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
   a. As indicated on the Drawings.

2.3 ACCESSORIES

A. Adhesive:
   1. Mildew-resistant, nonstaining, strippable adhesive, for use with specific wall covering and substrate application; as recommended in writing by wall-covering manufacturer and with a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
   2. All Adhesives shall meet or exceed the VOC and chemical component limits of South Coast Air Quality Management District Rule #1168.

B. Primer/Sealer:
   1. All sealants shall meet or exceed the VOC and chemical component limits of South Coast Air Quality Management District Rule #1168 and sealants used as fillers must meet the Bay Area Air Quality Management District Regulation 8, Rule 51 requirements.
   2. Mildew resistant, complying with requirements in Division 9 Section "Interior Painting" and recommended in writing by wall-covering manufacturer for intended substrate.

C. Seam Tape: As recommended in writing by wall-covering manufacturer.

D. Metal Primer: Interior ferrous metal primer complying with Division 9 Section "Interior Painting."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for levelness, wall plumbness, maximum moisture content, and other conditions affecting performance of the Work.
B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Comply with manufacturer's written instructions for surface preparation.

B. Clean substrates of substances that could impair bond of wall covering, including dirt, oil, grease, mold, mildew, and incompatible primers.

C. Prepare substrates to achieve a smooth, dry, clean, structurally sound surface free of flaking, unsound coatings, cracks, and defects.
   1. Moisture Content: Maximum of 5 percent on new plaster, concrete, and concrete masonry units when tested with an electronic moisture meter.
   2. Plaster: Allow new plaster to cure. Neutralize areas of high alkalinity. Prime with primer as recommended in writing by primer/sealer manufacturer and wall-covering manufacturer.
   3. Metals: If not factory primed, clean and apply metal as recommended in writing by primer/sealer manufacturer and wall-covering manufacturer.
   4. Gypsum Board: Prime with primer as recommended in writing by primer/sealer manufacturer and wall-covering manufacturer.
   5. Painted Surfaces: Treat areas susceptible to pigment bleeding.

D. Check painted surfaces for pigment bleeding. Sand gloss, semigloss, and eggshell finish with fine sandpaper.

E. Remove hardware and hardware accessories, electrical plates and covers, light fixture trims, and similar items.

F. Acclimatize wall-covering materials by removing them from packaging in the installation areas not less than 24 hours before installation.

3.3 INSTALLATION

A. General: Comply with wall-covering manufacturers' written installation instructions applicable to products and applications indicated except where more stringent requirements apply.

B. Cut wall-covering strips in roll number sequence. Change roll numbers at partition breaks and corners.

C. Install strips in same order as cut from roll.

D. Install reversing every other strip.

E. Install wall covering with no gaps or overlaps, no lifted or curling edges, and no visible shrinkage.

F. Match pattern 72 inches (1830 mm) above the finish floor.

G. Install seams vertical and plumb at least 6 inches (150 mm) from outside corners and 6 inches (150 mm) from inside corners unless a change of pattern or color exists at corner. No horizontal seams are permitted.
H. Fully bond wall covering to substrate. Remove air bubbles, wrinkles, blisters, and other defects.

I. Trim edges and seams for color uniformity, pattern match, and tight closure. Butt seams without any overlay or spacing between strips.

3.4 CLEANING

A. Remove excess adhesive at finished seams, perimeter edges, and adjacent surfaces.

B. Use cleaning methods recommended in writing by wall-covering manufacturer.

C. Replace strips that cannot be cleaned.

D. Reinstall hardware and hardware accessories, electrical plates and covers, light fixture trims, and similar items.

END OF SECTION 09720
PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes surface preparation and the application of paint systems on the following interior substrates:

1. Concrete.
2. Steel.

B. Related Sections:

1. Division 1 Section “Sustainable Design Requirements – LEED for Commercial Interiors."
2. Division 1 Section “Construction Waste Management and Recycling."

1.2 SUBMITTALS

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

B. LEED Submittals: Product Data for Credit EQ 4.2: For paints and coatings, including printed statement of VOC content.

C. Samples: For each finish and for each color and texture required.

D. Product List: Printout of current "MPI Approved Products List" for each product category specified in Part 2, with the proposed product highlighted.

E. Painting Material and Color Matrix: Contractor to submit to the Owner and Architect a “Painting Material and Color Matrix” during project closeout listing all interior painting products used on the project, with a listing of the room and/or area location the interior painting is applied. The Painting Material and Color Matrix shall be an accurate record document of the actual interior painting manufactured products and colors utilized on the project.

1. The Contractor shall submit the “Painting Material and Color Matrix” in a similar format to that of the project “Finish Legend” indicated on the Drawings and the "Sample Finish Legend" serving as an attachment to this Section at the conclusion of PART 3 – "EXECUTION."

1.3 QUALITY ASSURANCE

A. MPI Standards:

1. Products: Complying with MPI standards indicated and listed in "MPI Approved Products List."
1.4 EXTRA MATERIALS

A. Furnish extra materials (one gallon minimum) described below that are from same production run (batch mix) as materials applied and that are packaged for storage and identified with labels describing contents.

PART 2 - PRODUCTS

2.1 PAINT, GENERAL

A. Material Compatibility:
   1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
   2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

B. Chemical Components of Field-Applied Interior Paints and Coatings: Provide products that comply with the following limits for VOC content, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24) and the following chemical restrictions; these requirements do not apply to primers or finishes that are applied in a fabrication or finishing shop:
   1. Flat Paints and Coatings: VOC content of not more than 50 g/L.
   2. Nonflat Paints and Coatings: VOC content of not more than 150 g/L.
   3. Aromatic Compounds: Paints and coatings shall not contain more than 1.0 percent by weight of total aromatic compounds (hydrocarbon compounds containing one or more benzene rings).
   4. Restricted Components: Paints and coatings shall not contain any of the following:
      a. Acrolein.
      b. Acrylonitrile.
      c. Antimony.
      d. Benzene.
      e. Butyl benzyl phthalate.
      f. Cadmium.
      g. Di (2-ethylhexyl) phthalate.
      h. Di-n-butyl phthalate.
      i. Di-n-octyl phthalate.
      j. 1,2-dichlorobenzene.
      k. Diethyl phthalate.
      l. Dimethyl phthalate.
      m. Ethylbenzene.
      n. Formaldehyde.
      o. Hexavalent chromium.
      p. Isophorone.
      q. Lead.
      r. Mercury.
      s. Methyl ethyl ketone.
      t. Methyl isobutyl ketone.
      u. Methylene chloride.
C. VOC Content: Products shall comply with VOC limits of authorities having jurisdiction and, for interior paints and coatings applied at Project site, the following VOC limits, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

1. Flat Paints and Coatings: 50 g/L.
2. Nonflat Paints and Coatings: 150 g/L.
3. Dry-Fog Coatings: 400 g/L.
4. Primers, Sealers, and Undercoaters: 200 g/L.
5. Anticorrosive and Antirust Paints Applied to Ferrous Metals: 250 g/L.
7. Pretreatment Wash Primers: 420 g/L.
8. Floor Coatings: 100 g/L.
9. Shellacs, Clear: 730 g/L.
10. Shellacs, Pigmented: 550 g/L.

2.2 PRIMERS/SEALERS

A. Interior Latex Primer/Sealer: MPI #50.

2.3 METAL PRIMERS

A. Rust-Inhibitive Primer (Water Based): MPI #107.

2.4 LATEX PAINTS

A. Interior Latex (Satin): MPI #43 (Gloss Level 4).

B. 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. Kwal Paint, part of the Comex Group; 2810 Accu-Tone Satin Latex Enamel (Basis-of-Design).
   a. Paint to be used or matched based on Owner’s approval.
   b. Formula per gallon: C-6, L-12.
   c. VOC: Maximum of 150 g/l.
   d. Solids by Volume: 40.18%.
2. Benjamin Moore & Co.
3. ICI Paints.
PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

1. Concrete: 12 percent.
2. Gypsum Board: 12 percent.

C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

D. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.

1. Beginning coating application constitutes Subcontractor's acceptance of substrates and conditions.

3.2 PREPARATION AND APPLICATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.

B. Clean substrates of substances that could impair bond of paints, including dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers as required to produce paint systems indicated.

C. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

D. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

E. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.3 INTERIOR PAINTING SCHEDULE

A. Concrete Substrates, Nontraffic Surfaces:

1. Latex Over Sealer System: MPI INT 3.1A.

c. Topcoat: Interior latex (eggshell).

B. Steel Substrates:

1. Quick-Drying Enamel System: MPI INT 5.1A.
   c. Topcoat: Quick-drying enamel (semigloss).

C. Gypsum Board Substrates:

1. Latex System: MPI INT 9.2A.
   c. Topcoat: Interior latex (eggshell, unless otherwise noted).

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PART 1 - GENERAL

1.01 SUMMARY
A. This Section includes corner guards and impact resistant wall coverings.
B. Related Sections:
   1. Division 1 Section “Sustainable Design Requirements – LEED for Commercial Interiors.”
   2. Division 1 Section “Construction Waste Management and Recycling.”

1.02 SUBMITTALS
A. Product Data: Include construction details, material descriptions, impact strength, dimensions of individual components and profiles, and finishes for each impact-resistant wall protection unit.
B. LEED Submittals: Product Data for Credit IEQ 4.1: For adhesives, documentation including printed statement of VOC content.
C. Shop Drawings: For each impact-resistant wall protection unit showing locations and extent. Include sections, details, and attachments to other work.
   1. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
D. Samples for Initial Selection: For each type of impact-resistant wall protection unit indicated.
E. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below.
   1. Corner Guards: 12 inches (300 mm) long.
   2. Impact-Resistant Wall Covering: 6 by 6 inches (150 by 150 mm) square.
F. Qualification Data: For qualified Installer.
G. Material Certificates: For each impact-resistant plastic material, from manufacturer.
H. Maintenance Data: For each impact-resistant wall protection unit to include in maintenance manuals.
   1. Include recommended methods and frequency of maintenance for maintaining optimum condition of plastic covers under anticipated traffic and use conditions. Include precautions against using cleaning materials and methods that may be detrimental to plastic finishes and performance.
I. Warranty: Sample of special warranty.

1.03 QUALITY ASSURANCE
A. Installer Qualifications: An employer of workers trained and approved by manufacturer.
B. Source Limitations: Obtain impact-resistant wall protection units from single source from single manufacturer.

C. Product Options: Drawings indicate size, profiles, and dimensional requirements of impact-resistant wall protection units and are based on the specific system indicated. Refer to Division 1 Section "Quality Requirements."

1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

D. Surface-Burning Characteristics: Provide impact-resistant, plastic wall protection units with surface-burning characteristics as determined by testing identical products per ASTM E 84, NFPA 255, or UL 723 by UL or another qualified testing agency.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Store plastic wall-protection components for a minimum of 72 hours, or until plastic material attains a minimum room temperature of 70 deg F (21 deg C).

1. Maintain room temperature within storage area at not less than 70 deg F (21 deg C) during the period plastic materials are stored.
2. Keep plastic sheet material out of direct sunlight.
3. Store plastic wall protection components for a minimum of 72 hours, or until plastic material attains a minimum room temperature of 70 deg F (21 deg C).

a. Store corner-guard covers in a vertical position.

1.05 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install impact-resistant wall protection units until building is enclosed and weatherproof, wet work is complete and dry, and HVAC system is operating and maintaining temperature at 70 deg F (21 deg C) for not less than 72 hours before beginning installation and for the remainder of the construction period.

1.06 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of impact-resistant wall-protection units that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

1.07 EXTRA MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Corner-Guard Covers: Full-size plastic covers of maximum length equal to 2 percent of each type, color, and texture of units installed, but no fewer than two, 4-foot- (1.2-m-) long units.

B. Include mounting and accessory components. Replacement materials shall be from same production run as installed units.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.

2.02 MATERIALS

A. Extruded Rigid Plastic: ASTM D 1784, Class 1, textured, chemical- and stain-resistant, high-impact-resistant PVC or acrylic-modified vinyl plastic with integral color throughout; thickness as indicated.

1. Impact Resistance: Minimum 25.4 ft-lbf/in. (1356 J/m) of notch when tested according to ASTM D 256, Test Method A.
2. Chemical and Stain Resistance: Tested according to ASTM D 543.
3. Self-extinguishing when tested according to ASTM D 635.
4. Flame-Spread Index: 25 or less.
5. Smoke-Developed Index: 450 or less.

B. Stainless-Steel Sheet: ASTM A 240/A 240M.

C. Fasteners: Aluminum, nonmagnetic stainless steel, or other noncorrosive metal; security-type where exposed to view.

D. Adhesive: As recommended by impact-resistant plastic wall protection manufacturer and with a VOC content of 70 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.03 CORNER GUARDS

A. Surface-Mounted, Metal Corner Guards:: Fabricated from one-piece, formed or extruded metal with formed edges; with 90- or 135-degree turn to match wall condition.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

   a. American Floor Products Co., Inc.
   b. Arden Architectural Specialties, Inc.
2.04 IMPACT-RESISTANT WALL COVERINGS (FRP)

A. Impact-Resistant Sheet Wall Covering: Fabricated from plastic sheet wall-covering material.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

   a. Marlite (Basis-of-Design).
   b. Arden Architectural Specialties, Inc.
   c. Balco, Inc.
   d. Construction Specialties, Inc.
   e. IPC Door and Wall Protection Systems; Division of InPro Corporation.
   f. Korogard Wall Protection Systems; a division of RJF International Corporation.
   g. Kwalu, LLC.
   h. Pawling Corporation.

2. Size: 48 by 96 inches (1219 by 2438 mm) for sheet.

3. Sheet Thickness: 0.022 inch (0.56 mm).


5. Height: Full wall.

6. Trim and Joint Moldings: Extruded rigid plastic that matches sheet wall covering color.


2.05 FABRICATION

A. Fabricate impact-resistant wall protection units to comply with requirements indicated for design, dimensions, and member sizes, including thicknesses of components.

B. Assemble components in factory to greatest extent possible to minimize field assembly. Disassemble only as necessary for shipping and handling.
C. Fabricate components with tight seams and joints with exposed edges rolled. Provide surfaces free of wrinkles, chips, dents, uneven coloration, and other imperfections. Fabricate members and fittings to produce flush, smooth, and rigid hairline joints.

2.06 METAL FINISHES

A. Comply with NAAMM’s "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

1. Remove tool and die marks and stretch lines, or blend into finish.
2. Grind and polish surfaces to produce uniform finish, free of cross scratches.
3. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

B. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates and wall areas, with Installer present, for compliance with requirements for installation tolerances, fire rating, and other conditions affecting performance of work.

B. Examine walls to which impact-resistant wall protection will be attached for blocking, grounds, and other solid backing that have been installed in the locations required for secure attachment of support fasteners.

1. For impact-resistant wall protection units attached with adhesive or foam tape, verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Complete finishing operations, including painting, before installing impact-resistant wall protection system components.

B. Before installation, clean substrate to remove dust, debris, and loose particles.

3.03 INSTALLATION

A. Complete finishing operations, including painting, before installing impact-resistant wall-protection system components.

B. Install impact-resistant wall-protection units level, plumb, and true to line without distortions. Do not use materials with chips, cracks, voids, stains, or other defects that might be visible in the finished Work.
1. Provide splices, mounting hardware, anchors, and other accessories required for a complete installation.

C. Immediately after completion of installation, clean plastic covers and accessories using a standard, ammonia-based, household cleaning agent.

D. Remove excess adhesive using methods and materials recommended in writing by manufacturer.

3.04 CLEANING

A. Immediately after completion of installation, clean plastic covers and accessories using a standard, ammonia-based, household cleaning agent.

B. Remove excess adhesive using methods and materials recommended in writing by manufacturer.

END OF SECTION 10265
PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes interior identifying devices as indicated on Drawings.

1.02 SYSTEM DESCRIPTION

A. Interior signs: Provide interior room signs to accomplish the following functions:
   1. Directional signs.
   2. Accessibility signage.
   3. Code required signage.
   4. Maximum occupancy signage for assembly areas.
   5. Emergency and life safety signage.
   6. Building directory, where applicable.

1.03 SUBMITTALS

A. Product data for each type of sign specified, including details of construction relative to
   materials, dimensions of individual components, profiles, and finishes.

B. Shop drawings showing fabrication and erection of signs. Include plans, elevations showing
   mounting heights from floor level, and large-scale sections of typical members and other
   components. Show anchors, grounds, layout, reinforcement, accessories, and installation
   details.

   1. Provide a signage schedule for each floor level.
   2. Provide message list for each sign required, including large-scale details of wording and
      lettering layout.
   3. Furnish location template drawings for items supported or anchored to permanent
      construction.

      a. Furnish full-size spacing templates for individual building–mounted letters and
         numbers.

C. Samples: Submit samples of each sign form and material showing finishes, colors, surface
   textures and qualities of manufacturer and design of each sign component including graphics.

   1. Submit full-size template sample unit. Acceptable units may be installed as part of the
      Work if approved by the Architect.

      a. Manufacturer's color charts consisting of actual sample sections of material
         including the full range of colors available for each material required.


1.04 QUALITY ASSURANCE
A. ADA Requirements: Provide interior signage in compliance with “Title III of the Americans with Disabilities Act (ADA)” for handicapped accessibility requirements. Building signage identifying permanent rooms and spaces, provide with “Grade 2 Braille” and letters raised minimum of 1/32-inch.

1. Fabricate signs to meet ADA Accessibility Guidelines (ADAAG) and the Uniform Federal Accessibility Standards (UFAS) as required.
2. Fabricate signs to comply with the University of Colorado Boulder Campus Facilities Identification System guidelines.

B. Certificate of Occupancy Requirements: Provide interior signage for all permanent rooms and spaces on each floor level as required by the local building officials for Certificate of Occupancy.

C. Manufacturer: For each sign form and graphic image process indicated furnish products of a single manufacturer with a minimum of three (3) years experience in the types of signs required.

D. Single-Source Responsibility: For each separate sign type required, obtain signs from one source of a single manufacturer.

1.05 COORDINATION

A. Using the “Interior Signage Schedule” at the end of this Section, coordinate final accepted amount of interior signage required for each floor level with the Owner’s Representative.

1.06 PROJECT CONDITIONS

A. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication to ensure proper fitting. Show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delay.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Panel sign Materials: Provide the following materials as manufactured by New Hermes or approved substitute:

1. General Signage: Gravoply.
2. Raised Lettering and Braille Signage: Gravo-Tac 2-ply system.

B. Vinyl Film: Provide opaque nonreflective vinyl film, 0.0035-inch minimum thickness, with pressure-sensitive adhesive backing, suitable for exterior as well as interior applications.

C. Other Materials: Other approved materials for specific designated uses shall be approved by the Campus Architect.

D. Fasteners: Use concealed fasteners fabricated from metals that are not corrosive to the sign material and mounting surface.
E. Anchors and Inserts: Use nonferrous metal or hot-dipped galvanized anchors and inserts for exterior installations and elsewhere as required for corrosion resistance. Use toothed steel or lead expansion bolt devices for drilled-in-place anchors. Furnish inserts, as required, to be set into concrete or masonry work.

F. Colored Coatings for Acrylic Plastic Sheet: Use colored coatings, including inks and paints for copy and background colors, that are recommended by acrylic manufacturers for optimum adherence to acrylic surface and are nonfading for the application intended.

G. Accessories:
   1. Mounting Tape: Heavy Duty 1 inch by 1 inch mounting squares by 3M or approved substitute.

2.02 PANEL SIGNS

A. Panel Signs: Comply with requirements indicated for materials, thicknesses, finishes, colors, designs, shapes, sizes, and details of construction.
   1. Produce smooth, even, level sign panel surfaces, constructed to remain flat under installed conditions within a tolerance of plus or minus 1/16 inch measured diagonally.

B. Interior Room Signs:
   1. Fabricate white plastic room signs with edges mechanically and smoothly finished with square cut edges and 3/8 inch radiused corners. Sign face shall be edged with a recessed 1/8 inch border.
      a. Size: 6 inch by 6 inch for room number signs and directional signs.
      b. Letters shall be black in color and in the Helvetica Medium letter style raised from the background not less than 0.03125 inches thick as required by ADAAG.
      c. Provide 1.125 inch letter height for room numbers, centered 2 inches from top of the letter ot the top of the sign. Canter a ½ inch wide black braille lettering panel 3/8 inch from the bottom of the sign.
      d. Provide raised copy and recessed Braille lettering in copy thickness not less than 0.03125 inches thick as required by ADAAG.
   2. Fabricate black anodized aluminum inserts for occupant use.
      a. Size: 1 inch by 6 inch open-ended horizontal sleeve.
      b. Provide a blank white 90 lb. card stock insert covered with a clear acrylic matte strip 0.625 inches (1/16”) thick.
      c. Where required for informational signage, provide 6 inch by 6 inch black anodized insert sleeve open at the top.
      d. Provide a blank white 90 lb. card stock insert covered with a clear acrylic matte strip 0.625 inches (1/16”) thick for a 6 inch by 6 inch insert sleeve.
   3. Fabricate white plastic directional signs with edges mechanically and smoothly finished with square cut edges and 3/8 inch radiused corners. Sign face shall be edged with a recessed 1/8 inch border.
a. Size: 6 inch by 6 inch surface-mounted signs that may be arranged one over the other, or side by side, as necessary to carry the message.
b. Provide upper and lower case black vinyl die-cut letters in the Helvetica Medium letter style.
c. Provide black vinyl die-cut left, right, up, or down arrows as required.

C. Handicapped Accessibility Signage:

1. Provide symbol for handicapped access on signage designating those areas accessible for the handicapped in conformance with the Society for Environmental Graphic Designers (SEGD) recommendations for accessible signage, most recent edition.

2.03 METAL LETTERS AND NUMBERS

A. Metal letters and numbers mounted on vertical surfaces are not recommended and shall not be used without special permission from the Campus Architect.

2.04 FACTORY FINISHES

A. Colors and Surface Textures: Provide colors as selected by Architect and user which are acceptable to Campus Architect.

B. Metal Finishes: Comply with NAAMM “Metal Finished Manual” for finish designations and application recommendations.

C. Aluminum Finishes: Class II, Clear Anodized Satin Finish. AA-M31C21A31 (fine satin mechanical finish; chemical etch, fine matte; 0.4 mil minimum thick anodic coating).

2.05 LIFE SAFETY SIGNAGE

A. Provide surface-mounted signs as specified above and as required by applicable Building Code and Fire Department regulations for life safety which may include stair and exitway doors, areas of refuge, elevator lobbies, elevators, fire command center and standpipe valve cabinets.

1. Provide signs, 12 inch by 12 inch on stairwell side of each stairwell door, at each floor for buildings four stories or more in accordance with the provisions of the 1997 Uniform Building Code.

PART 3 – EXECUTION

3.01 INSTALLATION

A. General: Locate sign units and accessories where indicated, using mounting methods of the type described and in compliance with the manufacturer's instructions.

1. Install signs level, plumb, and at the height indicated, with sign surfaces free from distortion or other defects in appearance.

B. Interior Signs:
1. Surface-Mounted Units: Attach signs to wall surfaces using mounting tape squares in each corner of the sign except at each top corner and one centered at bottom of sign for 6 inch by 6 inch units.

2. Bracket-Mounted Units: Not permitted except with special permission from the Campus Architect.

3. Locate surface-mounted signs on the wall adjacent to the latch side of the door (or the nearest adjacent wall) at 60 inches above the finished floor from the centerline of the sign (any size) and out of the swing of the door. Mount signs with right edge 4 inches from the inside face of the door jamb or best possible alternate location, not on the door.

4. Locate surface-mounted insert sleeves centered below the room sign in multiples as necessary, each spaced 1 inch apart.

C. Vinyl Film:

1. Apply vinyl film letters without wrinkles or distortions. Provide template to establish letter spacing.

3.02 CLEANING AND PROTECTION

A. After installation, clean soiled sign surfaces according to the manufacturer's instructions. Protect units from damage until acceptance by the Owner.

END OF SECTION 10431
PART 1 - GENERAL

1.1 SUMMARY

A. Section includes fire protection cabinets for the portable fire extinguishers.

B. Related Section: Division 10 Section "Signage" for directional signage to out-of-sight fire extinguishers and cabinets.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for fire protection cabinets.

B. Shop Drawings: For fire protection cabinets. Include plans, elevations, sections, details, and attachments to other work.

C. Samples for Initial Selection: For each type of fire protection cabinet indicated.

D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below:
   1. Size: 6 by 6 inches (150 by 150 mm) square.

E. Product Schedule: For fire protection cabinets. Coordinate final fire protection cabinet schedule with fire extinguisher schedule to ensure proper fit and function.

F. Maintenance Data: For fire protection cabinets to include in maintenance manuals.

1.3 COORDINATION

A. Coordinate size of fire protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.

B. Coordinate sizes and locations of fire protection cabinets with wall depths.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B.

B. Aluminum: Alloy and temper recommended by aluminum producer and manufacturer for type of use and finish indicated, and as follows:
2. Extruded Shapes: ASTM B 221 (ASTM B 221M).

C. Clear Float Glass: ASTM C 1036, Type I, Class 1, Quality q3, 3 mm thick.

D. Tempered Float Glass: ASTM C 1048, Kind FT, Condition A, Type I, Quality q3, 3 mm thick, Class 1 (clear).

E. Break Glass: Clear annealed float glass, ASTM C 1036, Type I, Class 1, Quality q3, 1.5 mm thick, single strength.

F. Tempered Break Glass: ASTM C 1048, Kind FT, Condition A, Type I, Quality q3, 1.5 mm thick.

2.2 FIRE PROTECTION CABINET

A. Cabinet Type: Suitable for extinguisher.

1. Manufacturers: Subject to compliance with requirements, available manufacturers that may be incorporated into the Work include, but are not limited to, the following:
   b. Larsen's Manufacturing Company.
   c. Modern Metal Products, Division of Technico Inc.
   d. Potter Roemer LLC.

B. Cabinet Construction: Nonrated.

C. Cabinet Material: Steel sheet.

D. Semirecessed Cabinet: Cabinet box partially recessed in walls of sufficient depth to suit style of trim indicated; with one-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend). Provide where walls are of insufficient depth for recessed cabinets but are of sufficient depth to accommodate semirecessed cabinet installation.

   1. Square-Edge Trim: 1-1/4- to 1-1/2-inch (32- to 38-mm) backbend depth.

E. Accessories:

   1. Mounting Bracket: Manufacturer's standard steel, designed to secure fire extinguisher to fire protection cabinet, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.

   2. Break-Glass Strike: Manufacturer's standard metal strike, complete with chain and mounting clip, secured to cabinet.

F. Finishes:

   1. Manufacturer's standard baked-enamel paint for the following:
      a. Exterior of cabinet door and trim except for those surfaces indicated to receive another finish.
      b. Interior of cabinet.

   2. Steel: Baked enamel or powder coat.
2.3 FABRICATION

A. Fire Protection Cabinets: Provide manufacturer's standard box (tub) with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated.

1. Weld joints and grind smooth.
2. Provide factory-drilled mounting holes.
3. Prepare doors and frames to receive locks.

B. Cabinet Doors: Fabricate doors according to manufacturer's standards, from materials indicated and coordinated with cabinet types and trim styles selected.

1. Fabricate door frames with tubular stiles and rails and hollow-metal design, minimum 1/2 inch (13 mm) thick.
2. Fabricate door frames of one-piece construction with edges flanged.
3. Miter and weld perimeter door frames.

C. Cabinet Trim: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.

2.4 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces of fire protection cabinets from damage by applying a strippable, temporary protective covering before shipping.

C. Finish fire protection cabinets after assembly.

D. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.5 STEEL FINISHES

A. Surface Preparation: Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning" or SSPC-SP 8, "Pickling"

B. Baked-Enamel or Powder-Coat Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat. Comply with coating manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of 2 mils (0.05 mm).

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in for cabinets to verify actual locations of piping connections before cabinet installation.
B. Examine walls and partitions for suitable framing depth and blocking where semirecessed cabinets will be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare recesses for semirecessed fire protection cabinets as required by type and size of cabinet and trim style.

3.3 INSTALLATION

A. General: Install fire protection cabinets in locations and at mounting heights indicated.

3.4 ADJUSTING AND CLEANING

A. Remove temporary protective coverings and strippable films, if any, as fire protection cabinets are installed unless otherwise indicated in manufacturer's written installation instructions.

B. Adjust fire protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.

C. On completion of fire protection cabinet installation, clean interior and exterior surfaces as recommended by manufacturer.

D. Touch up marred finishes, or replace fire protection cabinets that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by fire protection cabinet and mounting bracket manufacturers.

E. Replace fire protection cabinets that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 10522
PART 1 - GENERAL

1.1 SUMMARY

A. Section includes portable, hand-carried fire extinguishers and mounting brackets for fire extinguishers.

B. Related Section: Division 10 Section "Fire Extinguisher Cabinets."

1.2 SUBMITTALS

A. Product Data: For each type of product indicated. Include rating and classification, material descriptions, dimensions of individual components and profiles, and finishes for fire extinguisher and mounting brackets.

B. Product Schedule: For fire extinguishers. Coordinate final fire extinguisher schedule with fire protection cabinet schedule to ensure proper fit and function.

C. Operation and Maintenance Data: For fire extinguishers to include in maintenance manuals.

D. Warranty: Sample of special warranty.

1.3 QUALITY ASSURANCE

A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."

B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.

PART 2 - PRODUCTS

2.1 PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS

A. Fire Extinguishers: Type, size, and capacity for each fire protection cabinet and mounting bracket indicated.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   b. Larsen's Manufacturing Company.
   c. Modern Metal Products by Muckle.
   d. Potter Roemer LLC.

2. Valves: Manufacturer's standard.
3. Handles and Levers: Manufacturer's standard.
4. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B.

B. Multipurpose Dry-Chemical Type: UL-rated 10 lb. nominal capacity, with monoammonium phosphate-based dry chemical in manufacturer's standard enameled container.

2.2 MOUNTING BRACKETS

A. Mounting Brackets: Manufacturer's standard steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated or red baked-enamel finish.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Amerex Corporation.
   b. Ansul Incorporated; Tyco International Ltd.
   c. Badger Fire Protection; a Kidde company.
   d. Buckeye Fire Equipment Company.
   e. Fire End & Croker Corporation.
   g. Larsen's Manufacturing Company.
   h. Potter Roemer LLC.

B. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.

1. Identify bracket-mounted fire extinguishers with the words "FIRE EXTINGUISHER" in red letter decals applied to mounting surface.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine fire extinguishers for proper charging and tagging.

1. Remove and replace damaged, defective, or undercharged fire extinguishers.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Install fire extinguishers and mounting brackets in locations indicated and in compliance with requirements of authorities having jurisdiction.

1. Mounting Brackets: 54 inches (1372 mm) above finished floor to top of fire extinguisher.

B. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated.
SECTION 11400

FOODSERVICE EQUIPMENT

PART I  GENERAL

1.01 QUALIFICATIONS
A. The Food Service Equipment Contractor (K.E.C.) must meet the following conditions to be deemed eligible and acceptable on this project.
B. Must be a current contractor license holder in the State where the project resides. The use of any other companies’ license is not acceptable.
C. Must be bondable in the amount of the Food Service Contract.
D. Must be financially capable of purchasing the equipment specified from the manufacturers specified.

1.02 WORK COVERED
A. Items of work included in this section are labor, material, tools, equipment, and transportation, and include:
   1. Furnishing, uncrating, assembly, setting-in-place and installation of all equipment as listed in equipment schedule and written specifications.
   2. Coordinating with work of other sections and providing support and accommodation of related work.
   3. Work involved in the making and installation of stands and supports for equipment.
   4. Cutting of all holes in equipment, including holes for pipes, drains, electrical outlets, required for this section. Work shall include welded sleeves, collars, ferrules, grommets, or escutcheons.
   5. Repair and restore of all damages including paint replacement to building resulting from work of this section.
   6. Furnishing of all faucets, sink wastes, drain fittings, tail pieces and strainers for food service equipment sinks.
   7. Coordinate but do not install (unless specifically directed to do so in the technical specifications) Owner and Vendor-supplied items noted on the drawings or in the specifications as NIKEC. Provide rough-in information of said items as if the equipment is contractor furnished.
   8. Furnish mechanical and electrical devices that are an integral part of the equipment for installation by others.

1.03 RELATED WORK IN OTHER SECTIONS AND PERFORMED BY OTHER TRADES
A. All electrical, gas, steam, water and waste service to rough-in points at fixture locations and final connections to fixtures shall include all material and labor necessary to pipe or wire the fixture complete ready for operation, the extensions of all indirect waste lines to floor sinks or standpipes, the interconnections of pipe or wiring from utility distribution systems; the interconnections of piping to water troughs with the appropriate controls,
and interconnections of piping through solenoid valves and vacuum breakers, the interconnections of wiring from junction box to lights, door heaters, vents and refrigeration equipment, the interconnections of wiring to light fixtures in appliances. The term fixture includes all items listed including existing, re-used and vendor-furnished items.

B. All ventilation work and ducts above finished ceiling including the welded transition between duct and ventilator. All exhaust fans and make-up air units.

C. All concrete work, including curbs, gutters, raised bases, floor depressions, cement finishings and tile overlay, including cold storage room floors and coved bases.

D. Finish floor sealing or covering.

E. Color and pattern selection of paints, stains, and plastic laminate materials.

1.04 BASE BID AND SUBSTITUTIONS

A. Base bid shall be for furnishing all equipment and material as specified. Prior approval of substitutions covered in Section 11400.

B. Acceptance of proposed substitution is entirely at discretion of owner or his Representative, and subject to the following qualifications:

1. Equal in quality of materials used, in structural strength, and in details of construction.

2. Equal in performance and capacity.

3. Mechanical and electrical requirements must be comparable.

4. Equal in finish or in characteristics permitting specified finish to be applied.

5. Availability of replacement parts and maintenance service.

1.05 MODIFICATION/RESET OF EXISTING EQUIPMENT

A. All equipment noted in the specifications as “Existing/Relocate” shall be removed and relocated as specified and shown on the drawings. All utility connections must be disconnected by the KEC prior to removal of equipment.

B. Bidders shall carefully examine the specifications and the project site including location and condition of existing equipment to determine cost of each “Existing/Relocate” and “Existing/Modify” item to cover removal, cleaning, inspection for damage, repair, resetting and relocating.

C. Each “Existing/Relocate” item shall be clean, in good repair, and operable condition when relocated and reset.

1.06 DRAWINGS

A. Drawings furnished represent the design intent and must be used in conjunction with these specifications. They show locations of equipment and the general arrangement of mechanical and electrical services. Necessary deviation from the illustrated arrangement to meet structural conditions shall be considered a part of the work of this section.

B. The drawings are for the assistance and guidance of the Contractor. Exact locations shall be governed by the building configuration.
1.07 REGULATORY AGENCIES

A. All work shall be in accordance with the governing health, building, safety and fire protection codes and regulations.

B. Standards of the National Sanitation Foundation (NSF) shall serve as guidelines or the work of this section. All fabrication and equipment furnished shall be currently listed by NSF.

C. All electric equipment and accessories shall conform to the standards of the National Electric Manufacturers Association (NEMA), Underwriters Laboratories, Inc. (UL) or the local Electrical Testing Laboratories. For fire extinguishing systems comply with UL300.

D. All gas-fired equipment and accessories shall conform to the standards of the American Gas Association (AGA), equipped to operate on the type of gas available at the job site and shall contain automatic safety shut-off device.

E. All steam-generating equipment and accessories shall conform to the standards of the American Society of Mechanical Engineers (ASME).

F. Rulings and interpretations of state and local enforcing agencies shall be considered a part of the regulations.

1.08 SUBMITTALS

A. Upon award of Contract, furnish the Architect with one reproducible sepia and two prints of the following drawings in accordance with the approved project schedule. Reproduced copies of bid documents will not be accepted for this purpose in any fashion.

1. Equipment specified for fabrication shall be detailed and fully dimensioned to a minimum scale of 3/4" = 1'-0" (1:20) for plan and elevation views and 1-1/2" = 1'-0" (1:10) for sections. Show all materials, gauges, and methods of construction.

2. Prepare separate electrical and mechanical dimensioned rough-in drawings at 1/4" = 1'-0" (1:50) showing exact point of penetration of floors, walls and ceilings for all services required to operate the equipment that the Contractor shall furnish, including the requirements for Contractor supplied and installed refrigerant and beverage piping line runs. These drawings shall also show exact locations of final connections to equipment. Indicate floor drains, floor sinks, receptacles, lights and other special conditions related to the equipment known to the Contractor but provided under other Sections.

3. Dimensioned drawings shall be submitted showing the location and size of all bases, depressions, grease interceptors, special height walls, openings in walls for equipment or operations, and critical dimensions, etc. Drawings shall be drawn to a scale of not less than 1/4" = 1'-0" (1:50).

B. MANUFACTURERS’ LITERATURE - Upon award of contract, submit four bound sets of manufacturers’ specifications and data sheets, describing articles and equipment, as specified, for approval. Cut sheets shall be printed originals.

1. Each submittal must contain a page for every item indicating units to be furnished, manufacturer’s number and list optional finish and accessories to be supplied. In addition, show electrical characteristics and BTU rating and indicate if electrical cord and plug will be furnished.

2. Bound submittals shall be complete, accounting for each specified “buy out” (standard equipment) item. Loose sheets or “piecemeal” submittals shall not be acceptable. If a manufacturer’s catalog sheet is not obtainable, for a specific
item, inset a typewritten sheet describing the item giving all of the required information.

C. MAINTENANCE DATA AND OPERATING INSTRUCTIONS - Submit for approval, for Owner’s use, three bound sets, of operating and maintenance instructions containing complete description, wiring diagrams, operating data and other information pertaining to the proper operation and upkeep of the various items of mechanical equipment having motors or other moving parts. Include names, addresses and telephone numbers of authorized service agencies for all items with mechanical/electrical components.

1.09 GUARANTIES AND WARRANTIES

A. New equipment furnished for this food service facility shall be guaranteed for a period of one year, covering parts and labor, beginning on the date of final acceptance of the work of this section. Warranty shall protect against defective material, design and workmanship.

B. In addition to the above, all self-contained and remote refrigeration systems shall include in their warranty, installation, start-up and an additional, minimum four-year extended warranty on sealed compressor/motor assemblies. The extended warranty shall include parts only.

C. Upon receipt of notice of failure of any part, during the guarantee period, the affected part or parts shall be replaced promptly at no cost to the Owner.

D. In the event the replacement of an entire item is required, the Owner shall have the option of full use of the defective equipment until a replacement has been delivered and completely installed.

E. All repairs and replacement shall be made at a time and during hours satisfactory to the Owner.

PART II PRODUCTS

2.01 MATERIALS

A. Metal

1. Stainless Steel: All new, first grade, material; U.S. Standard Gauges as specified or shown; 18-8, Type 304, No. 4 finish, ASTM A 167.

2. Galvanized Steel: All new, commercial quality, zinc-coated carbon steel; U.S. Standard Gauges as specified or shown, ASTM A 526.

3. Steel Pipe: All new, commercial quality, galvanized; rust resistant coating on threads.

B. Wood

1. Plywood: All new material; thickness as specified; waterproof glued, Marine grade. (Particle board is not acceptable.)

2. Hardwood: Birch, kiln dried, clear stock sizes.

3. Construction Lumber: Douglas fir, commercial construction grade, select “Wolmanize” where in contact with concrete or masonry.
C. Plastic Laminate
1. Shall be as manufactured by one of the following:
   a) Formica, Nevamar, Textolite, Micarta, Consoweld
   b) Can be different if specified otherwise
2. Horizontal surfaces, standard grade, 1/16" thick.
4. Curved surfaces, where 1/16" or 1/32" is impractical, use post forming grade, 0.050" thick.
5. Backing sheet, 0.025" thick, or reject 1/16" or 1/32" thick.

D. Hardware
1. Locks
   a) All metal cabinet doors and drawers shall be furnished with Standard-Keil cylinder locks No. 1230-1216-3000, or equal, all keyed alike unless specified otherwise.
   b) All wood cabinet doors and drawers shall be furnished with Standard-Keil cylinder locks No. 1210-421–3000, or equal, all keyed alike unless specified otherwise.
   c) All refrigerated and heated cabinets of the reach-in type shall be furnished with heavy-duty cylinder locks, on all doors, all keyed alike unless specified otherwise.
2. Catches
   a) All cabinet doors shall be Magna Tite No. 592, self-aligning Magnetic, or equal, unless specified otherwise.
3. Door and Drawer Pulls
   a) For metal sliding doors, shall be stainless steel recessed type Standard-Keil No. 1262-1014-1283, or equal, unless shown or specified otherwise.
   b) For metal sliding doors, shall be stainless steel recessed typed Standard-Keil No. 1262-1014-1283, or equal, unless shown or specified otherwise.
   c) For wood cabinet doors and drawers provide an allowance for pulls to be selected by Interior Design, unless specified otherwise.
4. Hinges
   a) For metal cabinet doors, shall be heavy-duty concealed pivot hinge of stainless steel or cadmium plated, unless shown or specified otherwise.
   b) For wood cabinet doors, shall be heavy-duty concealed pivot hinge finished to harmonize with cabinet finish unless shown or specified otherwise.
5. Casters
   a) Shall be heavy-duty, bright zinc or chrome plated, ball-bearing type with
greaseproof rubber, neoprene or polyurethane tires. Wheels shall be 5”
diameter with minimum width treads of 1-1/8” and minimum capacity of
250 lbs. per caster. Furnish with rubber donut bumpers and wheel
brakes.

E. Plumbing Fixtures
1. Faucets
   a) Deck mounted mixing faucet assemblies shall be T&S B222 with 6”
swing nozzle and non-splash aerator, or equal, unless specified
otherwise.
   b) Splash mounted mixing faucet assemblies for pot sinks shall be T&S 290
with 12” nozzle and non-splash aerator, or equal, unless specified
otherwise.
   c) Splash mounted mixing faucets for preparation and utility sinks shall be
T&S 230 with 12” nozzle and non-splash aerator, or equal, unless
specified otherwise.
   d) All faucet assemblies shall be polished chromium plated.

2. Rotary Wastes
   a) Shall be Component Hardware No. D50-7200 (for pot sinks) and D50-
7215 (for utility sinks) with stainless steel basket strainer, or equal,
unless specified otherwise.

3. Pre-Rise Assemblies
   a) Splash mounted pre-rinse assemblies shall be T&S B-133 with B-109
wall bracket, or equal, unless specified otherwise.
   b) Deck mounted pre-rinse assemblies shall be T&S B-123 with B-109 wall
bracket and remote control mixing valve, or equal, unless specified
otherwise.
   c) All pre-rinse assemblies shall be polished chromium plated.

4. Scraping Troughs
   a) Furnish water inlet fitting and control valve as part of all scraping
troughs ready for final connection. Furnish Component Hardware NO. K
36-6000 (or equal) Water Inlet Fitting with chrome plated control valve
indexed “cold.”

5. All plumbing fixtures shall be identifiable for manufacturer.

6. Furnish all built-in mechanically cooled and ice cooled water chillers with
interconnecting insulated pipe between units and faucets installed and ready for
final connection.

F. Heating Equipment
1. Furnish all built-in gas and electric heating equipment as complete systems, in
size and rating specified, ready for final connection.
   a) All controls shall be readily accessible.
b) All equipment shall be readily cleanable or easily removable for cleaning.

2. Furnish thermostatic controls and low water protection on all gas and electric heated warewasher and utensil washer tanks.

3. Furnish thermostatic controls on all gas heated appliances other than open burner units, hot plates, hot tops, and broilers, unless specified otherwise.

4. Furnish all built-in steam heating equipment as complete systems, including valves, strainers, steam traps, gauges and pressure regulators in size or rating specified ready for final connection.
   a) All control valves, gauges, and safety valves shall be readily accessible.
   b) All steam traps and check valves shall be accessible.

5. Furnish all buy-out steam operated equipment with necessary pressure regulators, traps and valves, etc., for final connection.

G. Electrical

1. Furnish a control switch and starter with overload protection for each motor driven appliance and electrical heating unit, unless specified otherwise.

2. Furnish and install all electrical devices, including hood lights unless specified otherwise, and do all internal wiring of electrical apparatus built into or forming an integral part of fabricated equipment, complete to a J-box or breaker panel, as shown on plans, ready for final connection.

3. Furnish cord and plug for all mobile and portable equipment operating on 120 volts or 208 volts single phase power supply, unless specified, or indicated otherwise.
   a) Cord to be rubber covered, three-wire or proper current capacity; furnish appropriate length.
   b) Plug to be three prong, ground type of proper NEMA configuration. (Verify for matching receptacle.)

4. Furnish and install all fluorescent and incandescent fixtures, with lamps, when specified or shown on the drawings. Light switches (unless a part of a fixture) shall be furnished and installed by the Electrical Contractor.

H. Mechanical

1. All ventilators shall be constructed with a totally all welded shell in strict accordance with NFPA 96, 1994 edition, and must meet this criteria even though the ventilators may carry a "U.L. Listed" or "U.L. Classified" designation.

2. All penetrations for lights or fire suppression must be minimal and sealed with a heat resistant sealant or gasket material.

3. Recessed light fixtures are not approved if they require cutting the all welded shell.

4. Special ventilator designs necessary to meet exceptional field conditions must be submitted to the local agency in charge for approval prior to installation.

5. Furnish and install all welded stainless steel ducts, stacks and vents to finished ceiling connections from hoods, ventilators, ovens and other appliances furnished by this section. H.V.A.C. to make final connections. Refer to Section 3.03 - B.
6. The flue risers of broilers, griddles, fryers and their equipment furnished by this section shall be verified for proper venting.

7. All equipment heights shall be verified for clearance under ceilings, beams, pipes, and all exhaust devices including hoods and ventilators.

8. Any variation or modification of ventilators shall be the sole responsibility of the Kitchen Equipment Contractor.

2.02 METAL FABRICATION

A. General

1. Custom fabricated items shall be fabricated by one manufacturer in an approved manner acceptable to Owner.

2. Weld all top, splash, sink and panel construction, of 18 gauge or heavier, into uninterrupted integral units.
   a) All seams and joints shall be shop welded where possible.
   b) All exposed stainless steel to have No. 4 finish.

3. Grind and polish all welds on stainless steel, with finish abrasion marks running longitudinally to a No. 4 finish.

4. Grind smooth welds on galvanized steel and restore coating with Allstate No. 321 Galvanizing Powder or equal.

5. Conceal fasteners where possible; cap exposed bolts, nuts, and pipe ends.
   a) Use non-corrosive materials.

6. Use 1-5/8", 16 gauge stainless steel tubing for all legs, tubular supports and cross rails unless shown or specified otherwise.
   a) Furnish stainless steel foot insert and leg socket for mounting each leg.
      i) Standard-Keil No. 1010-0802-1144 foot insert, or equal.
      ii) Standard-Keil No. 1020-0206-1283 leg socket, or equal.
   b) Furnish 6" high cabinet base legs, including foot.
      i) Standard-Keil No. 1064-0642-1680 cabinet base leg, or equal.

7. For metal top tables, weld gussets to 14 gauge stainless steel hat sections, or open channels.

8. Fully weld all cross rails to legs 10 inches above floor, grind smooth and polish.

9. Legs without shelves or cross rails shall have ½" O.D. stainless steel pin for anchoring to floor.

10. Undercoat sink tops (drainboards), dishtable and work tables with Component Hardware latex sound deadening material, light tan color.

B. Tops

1. Table tops, drainboards, counter tops, splashes and extensions shall be constructed of 14 gauge stainless steel, unless shown otherwise.

2. All tops with turned up rolled edge shall be reinforced with 14 gauge stainless steel closed hat sections, or open channels, spaced 30 inches O.C. or less, fastened to threaded studs, welded to underside of top, with acorn nuts.
3. All tops with turned down rolled edge shall be reinforced with 14 gauge stainless steel closed hat sections or open channels, spaced 30 inches O.C. or less, fastened to threaded studs, welded to underside of top, with acorn nuts.

4. All hat sections shall be sealed to underside of tops with pad of 3M-1000 sealant.

5. Raised rolled edges shall have a roll diameter of 1-1/2 inches. Corners shall be bull nosed.

6. Inside radius bends, wherever horizontal and vertical surfaces intersect, shall be 9/16 inches.

7. All drainboard surfaces shall pitch toward drainers, scraping through, dishwashers, and sinks.

8. Tops shall be turned down no less than 1 inch into openings for ice bins; and 1/4 inch minimum raised embossment shall be provided on horizontal surface of top around entire perimeter of opening.

9. All openings for exposed foods shall be provided with 1/4 inch minimum raised embossment on horizontal surface of top around entire perimeter of opening.

C. Sinks

1. Sinks that are integral with drainboards shall be fabricated and constructed of same gauge and material as drainboard and splash.

2. Sinks that are integral with table or counter tops may be fabricated or die formed.

   a) Fabricated sinks shall be of same gauge and materials as top.

   b) Die formed sinks shall be not less than 18 gauge stainless steel.

3. All interior vertical and horizontal corners shall be coved.

4. Partitions between adjacent sink compartments shall be 1" apart joined with continuously welded radius top closure.

5. Exterior front of multiple compartment sinks shall be continuous.

6. Bottom of all sink compartments shall be pitched to insure complete drainage to waste opening.

D. Cabinets

1. Fabricate all visible parts of counter cabinet of 18 gauge stainless steel, unless shown otherwise, reinforced with formed steel sections, welded throughout to form a one-piece box-like structure, including front rails and mullions.

E. Drawers

1. Furnish all-welded double pan drawer front with 16 gauge stainless steel exterior pan, 18 gauge stainless steel interior pan and interlocking channel supports, with Standard-Keil drawer track Series 1452; shall be easily removable; recessed stainless steel drawer pulls; 128 gauge stainless steel die-formed, easily removable, drawer bowl.

   a) Drawers mounted on underside of open tables; furnish 18 gauge stainless steel enclosure on sides and rear. Furnish with keyed cylinder lock.
b) Drawers in refrigerated units; furnish large ball bearing wheels and large flat track bearing surfaces; wheels and bearings of corrosion resistant, long wearing material, grease packed before assembly. Drawers shall be self-closing with easily removable drawer pans, perforated on all sides.

F. Doors

1. Furnish double cased steel doors, unless specified otherwise; 16 gauge stainless steel outer pan with corners welded, ground smooth and polished; 18 gauge stainless steel inner pan fitted tightly into outer pan with sound deadening material, such as Celtex, used as a core; tack weld pans together and fill seams with solder; finished door shall be approximately 3/4" thick and furnished with recessed pull.
   a) Reinforce and stiffen with closed hat sections, single pan type doors, when specified.

2. Flush mount sliding doors; suspend with large ball-bearing quiet rollers in 14 gauge stainless steel overhead tracks; made easily removable.

3. Flush mount hinged doors.

G. Shelves

1. All wall mounted shelves, elevated shelves and undershelves with open leg bases shall be constructed of 16 gauge stainless steel, unless shown otherwise.

2. Unless shown otherwise, wall mounted shelves shall be die-rolled down 2 inches at fronts and ends, and turned up 2 inches at back and flared. Shelf shall be mounted on 14 gauge stainless steel brackets and anchored securely to wall.

3. Elevated and undershelves shall be as detailed. Where rolled edges are indicated, they shall be die-rolled down 2 inches. Elevated shelf supports shall extend below table or counter tops and be securely attached to structural frame.

4. Shelf and flange of undershelf with open leg base shall be notched a full 90 degrees, with radius to match leg. Flange shall be welded to leg from back side, 10 inches above floor.

5. Shelves in cabinet bases shall be constructed of 16 gauge stainless steel, unless shown otherwise.

6. Unless shown otherwise, shelves in cabinet bases shall be formed with minimum 2 inches turn-up at back and sides and feathered to insure a tight fit to enclosure panels and shall be turned down at front.
   a) Bottom shelves shall be removable unless shown otherwise.

H. Ducts

1. Verify size and position of all exhaust duct connections required for hoods, ventilators, washers and appliances; furnish and install 16 gauge stainless steel all welded ducts to ceiling connection locations. Welds on seams shall be continuous. Grind and polish welds to a No. 4 finish. Include stainless steel duct collar at exposed connection.
I. Undercounter Refrigerators

1. Outer casing shall be constructed of 18 gauge stainless steel, inner liner shall be of 20 gauge stainless steel with #2B finish unless shown otherwise.

2. Refrigerator shall be fully insulated with 2" minimum thickness of urethane between outer casing and inner liner at top, bottom and sides including doors.

3. Entire perimeter of door opening shall be faced with a 1/8" black Bakelite thermal breaker strip approximately the width of mullion. Breaker strip at door sill shall be faced with 16 gauge stainless steel.

4. Door shall be constructed with 18 gauge stainless steel outer casing and 20 gauge stainless steel, #2B finish, inner lining, unless shown otherwise, molded gray vinyl latex door gasket shall be attached to perimeter of doors with concealed fasteners.

5. Drawer fronts shall be of same materials as specified for doors. Insulation shall be of same material as used in refrigerator walls and shall be a minimum of 1 inch in thickness. Unless shown otherwise, drawers shall be provided with Standard-Keil No. 1260-1410-1283, or equal, flush style pulls.

6. All refrigerators shall be furnished with one 40 watt incandescent appliance light bulb and socket for each mullion connected in parallel with automatic door switch mounted in each door opening; full set of Kason No. 65 with No. 66 shelf clip bracket, or equal, stainless steel, removable adjustable pilaster standards for shelves for each refrigerator opening; two heavy-duty epoxy coated wire shelves per compartment; one exterior reading, flush mounted dial type thermometer with -40 to +60 degree F. range.

7. All electrical wiring, including service for built-in evaporator coil fan shall be run in flexible conduit within refrigerator walls and shall terminate in external J-box mounted on end or rear of refrigerator cabinet in an accessible location for final connection.

8. Hardware for doors shall be Kason No. 218 self-closing edge mount hinge and Kason No. 171C, cylinder-locking, edge mount, magnetic latch, or equal, (all locks keyed alike).

9. All undercounter refrigerators shall be furnished with 20 gauge stainless steel box to house expansion valve located in base of fixture housing refrigerator or other concealed but accessible location.

10. Where cut-outs in refrigerator tops are specified or shown on detail drawings, raw edges of cut metal and insulation shall be covered with stainless steel sleeve. Counter top shall be turned down into opening to overlap sleeve with thermal barrier installed between. A stainless steel expanded metal guard shall be furnished for the full length and width of opening with sides attached to underside of refrigerator interior with closed bottom of guard located 6-1/2" below counter top.

J. Ice Bins and Cold Pans

1. Inner lining shall be constructed of 18 gauge stainless steel and outer casing shall be of 18 gauge galvanized iron, unless shown otherwise.

2. All ice bins and cold pans shall be fully insulated with 2" minimum thickness of urethane or Styrofoam between outer casing and inner liner.
3. Ice bins and cold pans shall be isolated from tops of support fixtures by means of thermal barrier.

4. Furnish 16 gauge stainless steel perforated false bottom raise 1" above bin or pan bottom.

5. Furnish 1" drain and extend to floor skin.

K. Wall Flashing

1. Wall flashing shall be of 18 gauge stainless steel affixed to wall with heavy-duty, heat-resistant adhesive.

2. Flashing shall be fabricated from maximum width sheets for minimum amount of vertical joints and shall be sealed with silicone and capped with 1" wide “T” molding, without exposed screws or fasteners.

3. When wall flashing includes capping of wall ends, capping shall be fabricated from 16 gauge stainless steel.

2.03 WOOD AND LAMINATED CONSTRUCTION

A. General

1. Wood fixtures included under this section shall comply with the requirements of the drawings, and the following listed standard specifications.


2. Wherever laminated plastic materials are specified for cabinet work, counter or top facing, they shall be veneered with Urea Based cement, and shall be waterproof and heat proof. Rubber based adhesives are not acceptable. Top sheets shall be placed on and over finished edges.

3. Selection of all colors, pattern, laminates, paint, stain and varnish shall be made by the Architect.

B. Interior Finishes

1. Finish all interior surfaces of cabinets, including shelves and drawers as follows (except when specified otherwise):

   a) Cabinets: Non-exposed interiors shall be stained to match exterior finish of cabinets; finish with one coat of clear plastic varnish painted with a light colored enamel.

   b) Shelves: Wrap in shelf-grade laminate, light in color.

   c) Drawers: Wrap in shelf-grade laminate, light in color.

   d) Doors and Panels: When exterior and edges are of plastic laminate, apply plastic laminate backing sheet to match color.
PART III EXECUTION

3.01 UTILITIES, STORAGE AND SPECIAL HANDLING
A. It shall be the Equipment Contractor’s responsibility to determine whether the General Contractor will furnish and provide temporary power and light, openings and storage space to permit scheduled delivery of equipment.
B. The Equipment Contractor shall verify door openings, passages and conditions at the buildings. All special handling equipment charges shall be paid by the Equipment Contractor.

3.02 CONDITIONS AND PREPARATION
A. Verify all pertinent dimensions of the building and examine conditions affecting proper execution of this section. Evaluate access to various areas for moving in or equipment, and coordinate with General Contractor.
B. Verify water pressures and furnish necessary reducing valves.
**C.** Inspect flooring and raised concrete bases, wall finishes; verify existence of required mechanical and electrical rough-ins; check painting, ceiling installation and all related work for readiness to receive installation of kitchen equipment.

**D.** Coordinate with the project superintendent as to the proper sequence for installation of equipment and wall finish.

**E.** Sweep clean all floor areas and tops of raised concrete bases before setting equipment in place; remove any spillage of foreign matter.

### 3.03 EQUIPMENT CONNECTIONS

**A.** Equipment shall be complete with connection terminals as standardized by equipment manufacturers, except where specified otherwise, for others to make plumbing, electrical, ventilation, and refrigeration connections.

**B.** The Kitchen Equipment Contractor shall install the hoods or exhaust ventilators in the locations indicated. The HVAC shall be responsible for bringing all ducts to the hoods or ventilators and welding the transitions in accordance with all codes.

**C.** Indirect waste lines for buy-out and fabricated items, except sinks, shall be furnished and extended to drain location by the Kitchen Contractor.

**D.** Indirect waste lines shall be hard copper tubing, wrapped with insulating tape when extended from ice storage bins, ice bins or other equipment where “sweating” may occur.

**E.** All exposed utility lines, valves, gauges, tubing, and conduit including mounting brackets, shall be chrome plated, stainless steel or sheathed in stainless steel.

### 3.04 TRIMMING AND SEALING EQUIPMENT

**A.** All gaps, joints, and seams between fixtures and walls, ceilings, and floor shall be completely closed and sealed with stainless steel trim strips, welding, silicone (Dow Corning No. #784 or equal), or epoxy sealant.

1. Sealant is not permissible in joints or seams which exceed 3/16 inch width.

2. Wood fixtures shall be scribed to exactly fit floor and wall surfaces and shall not be shimmed. Tops are to be installed level and securely fastened to bases.

**B.** All hollow sections shall be sealed.

**C.** All exposed ends of back splashes shall be capped with stainless steel, welded, ground smooth, and polished.

**D.** Fixtures resting on concrete bases shall be set into a mastic bed to eliminate crevices between fixture and base, and caulked after installation has been completed.

**E.** Where applicable, ends of all fixtures, splash backs, and shelves, shall be finished flush to walls or adjoining fixtures.

### 3.05 CLEANING

**A.** All debris, crates, and packages resulting from this work shall be removed from the premises or to area designated by the project superintendent.

**B.** All food service equipment shall be cleaned and ready for use when the structure is turned over to the Owner.

1. Protection of completed and cleaned work shall be the responsibility of the Equipment Contractor.

2. Include all existing-reset equipment, if any, as listed in the specifications.
3.06 ADJUSTMENT OF EQUIPMENT AND DEMONSTRATION

A. Turn on all mechanical equipment, test for leaks, poor connections, inadequate or faulty performance and correct if necessary; adjust for proper operation.
   1. All thermostatically controlled equipment and equipment with automatic features shall be operated for a sufficient length of time to prove controls are functioning as intended.

B. At a time and date, selected by the Owner, the Equipment Contractor shall arrange for a demonstration of all mechanical equipment for the Owner and his appointed representatives, to be conducted by representatives of the various equipment manufacturers, with the Equipment Contractor in attendance.

3.07 STATEMENT OF CLARIFICATION OF WORK RESPONSIBILITY PERTAINING TO THE INSTALLATION OF FOOD SERVICE EQUIPMENT

A. Clarifications regarding areas of work performance and responsibility by the various trades.

B. General Contractor
   1. The General Contractor is responsible for creating depressions, adding insulation under the floor, adding redwood screens within the floor for the purpose of installing Walk-In Coolers and Freezers.
   2. The General Contractor is responsible for adding concrete or masonry bases where required.
   3. The General Contractor is responsible for any or all wall penetrations for refrigeration lines, soda lines, beer lines, etc., that may be required.
   4. The General Contractors responsible for the roof penetrations or wall penetrations for exhaust ducts or make-up air ducts for the exhaust ventilators.
   5. The General Contractor is responsible for creating fire retention chambers around exhaust ducts, hoods or ventilators that require closures by code.
   6. The General Contractor shall install all internal wall supports for shelves, cantilever brackets, cabinets, utensil racks, etc., as shown on plans.

C. Kitchen Equipment Contractor
   1. The K.E.C. shall deliver, uncrate and set-in-place all equipment.
   2. The K.E.C. shall install all custom stainless steel items including tables, dishtable, sinks, hoods and ventilators, utility distribution systems, shelving, and all walk-in coolers and freezers.
   3. The K.E.C. shall deliver to the General contractor items such as hand sinks, floor troughs, janitor sinks, faucets, drains, lever wastes, hose reels, hose reel piping assemblies, ventilator piping assemblies, filters or any other miscellaneous items that are part of the Kitchen equipment Specifications but are to be installed by other trades.
4. The K.E.C. shall install the exhaust ventilators including hanger rods, and channel supports and leave ready for the final duct connections by other trades. (When a ventilator has internal piping such as a water wash system, the internal piping connections between units, the piping between the control panel and ventilator and the drain extension to the floor sink is the responsibility of the Plumbing Contractor).

5. The K.E.C. shall set the dishmachine in place and provide stainless steel exhaust ducts that extend from the vent cowls of the dishmachine to approximately 2" to 4" above the finished ceiling line. The HVAC shall then bring the exhaust duct system to this point and make the final connections. In cases where the exhaust duct system is in place before the hood is installed, the K.E.C. shall field measure and build the exhaust risers to meet existing conditions. The HVAC will be responsible for making the all welded transition.

6. The K.E.C. shall erect the Walk-in Coolers and Freezers, install the cooling coils and the complete refrigeration system. The K.E.C.’s Refrigeration contractor shall be responsible for running hard copper drain lines from the cooler and freezer coil drainer pan to a floor sink or floor drain. Drain lines in the freezer shall be wrapped with heating tape and wired to prevent freezing.

7. The K.E.C. supplies all lighting fixtures for walk-ins including a light bulb for each fixture. The Electrical Contractor shall complete the conduit and wiring.

8. The K.E.C. or his subcontractor shall install the fire suppression systems for all exhaust hoods requiring same. This includes piping, fittings, remote pulls and tanks.

D. Plumbing Contractor

1. The Plumbing Contractor shall install all drains, traps and fittings from hand sinks, prep sinks, pot sinks, ice machines, steamers, ventilators, dishtable, dishmachines, booster heaters, drainers in tables and in all appliances requiring drains except those specifically called out in the specifications to be pre-plumbed.

2. The Plumbing Contractor shall provide incoming water lines as required on all appliances in hard copper without reduction in size to the faucets. All water lines are to be provided with stops upstream from the appliance.

3. The Plumbing Contractor shall install water filters or special valves, strainers, dampers, vacuum breakers, etc., that may be supplied as part of the appliance or by the K.E.C. separately.

4. The Plumbing Contractor shall install all faucets supplied with the appliance or furnished separately by the K.E.C.

5. The Plumbing Contractor shall extend the water supply line through the disposer solenoid to trough inlets or cone hopper inlets complete with a control valve.

6. The Plumbing Contractor shall pipe between the booster heater and the dishmachine including the temperature gauge, pressure gauge, line strainer or check valves that may be supplied by others.
E. Electrical Contractor

1. The Electrical Contractor shall make all the final connections to all kitchen appliances in the project unless specified to the contrary.

2. The Electrical Contractor shall supply all disconnects, shunt trips, and control switches required for individual appliances including conduit, flex and fittings as necessary.

3. The Electrical Contractor shall complete the wiring from source through the control panel and solenoid valve to disposers.

4. The Electrical Contractor shall install all loose light fixtures supplied for the Walk-ins and connect the cooling coils to the remote condensers complete with disconnects. University Memorial Center

5. The Electrical Contractor shall furnish all special receptacles that may be required that are not furnished with the appliances.

6. The Electrical Contractor shall furnish all Ground Fault receptacles that may be required by code.

7. The Electrical Contractor shall supply all switch and receptacle plates in stainless steel and moisture resistant covers where necessary or as specified.

8. The Electrical Contractor shall, if necessary, rework or shorten and install all loose electrical cords supplied with the appliances.

9. The Electrical Contractor shall, when pulling wire, leave an additional four to six feet beyond the junction box in order to make a continuous connection to an appliance, particularly those requiring heavy loads.

ITEMIZED PRODUCT SPECIFICATIONS

ITEM 1.001 COUNTER ROTISSERIE
NIKEC/FUTURE
ALTO-SHAAM AR-7E-DBLPANE

This Item is not in the Kitchen Equipment Contract

EcoSmart™, electric, temperature dropping hold mode, stainless steel exterior & solid stainless steel back, double pane curved glass front door, cook & hold modes, solid state electronic controls, recessed interior lighting, 4” adjustable stainless steel legs, seven (7) angled spits with drip pan & drain.

Upgrade to deluxe model (includes programmable menu memory control).
AR-7VH ventless hood.
Left-hand door swing.

ITEM 1.002 HOT FOOD HOLDING DISPLAY
EXISTING TO REMAIN (NOT SHOWN)

ITEM 1.003 AL FRESCO COUNTER
BSI, LLC CUSTOM/NSF

Constructed and equipped in accordance with plans, elevations, sections and details as shown on Architectural drawings & FS.09-FS.12.
Configuration to be Contoura construction consisting of 3/16” powder coated or stainless steel end panels connected by galvanized horizontal supports using mechanical fasteners. Counter front décor panels to be supported by 14 ga. galvanized spars creating a utility chase. Interior to be made up of 16 ga. stainless steel, removable bottom shelf and 18 ga. stainless steel, removable back for access to utility chase. Stainless Steel top to be adhered to galvanized horizontal supports and be installed to meet manufacturer’s guidelines for application.

Provide intermediate shelf for storage.
Meganite tray rest (KEC to verify color with Architect).
Counter to be constructed for future addition of Meganite top without impact to current overall counter height (ADA 34”).
Provide internal chaseway in counter front for concealed wiring and plumbing.
Removable stainless steel kick plates on public side.
Coordinate cutout, installation and wiring of all drop-in & counter top equipment and food guards.
Pull box for single point connection.
Reference millwork counters, tops and interior finish sections 06400 & 11400 for construction details.
KEC to verify all finishes with Architect.

ITEM 1.004 FOOD GUARD
BSI, LLC ZG9930
Counter mounted, for full serve application with top shelf, fully adjustable, approximately 5’-6” long as shown on plan. To include two (2) end supports, one (1) 3/8” tempered glass front panel, one (1) 3/8” tempered glass top shelf, two (2) full height ¼” tempered glass end panels & 1130605-120-54 warmer/fluorescent light combo with remote infinite control for warmer and remote switch for light. Finish to be brushed aluminum (KEC to verify with Architect). MWU5 heavy duty flange/inverted under counter mount for millwork counter. 1” diameter aluminum tubing single supports, NSF, UL listed.

Under counter mount includes heavy duty flanges, stainless steel wood screws & nylon grommets (requires under counter access).

Electrical Contractor to mount Brass Smith provided remote controls at an accessible location on server side counter face and interwire as necessary through Food Guard post.

KEC to verify dimensions, post locations, spacing & mounting style in field prior to fabrication.

ITEM 1.005 WASTE RECEPTACLE
NIKEC/BY OWNER
This Item is not in the Kitchen Equipment Contract.

ITEM 1.006 CONVEYOR TOASTER
EXISTING TO REMAIN (NOT SHOWN)

ITEM 1.007 SLUMGULLION PASS COUNTER
EXISTING/MODIFY
Existing counter to be modified by BSI, LLC as follows:

New Meganite tray rest (BSIMTS-1988), KEC to verify color with Architect.
New front panel (BSINFP-1988).
Provide and install stainless steel toe kick plate.
Cutout, installation and wiring of all drop-in & counter top equipment and food guards.

ITEM 1.008 AL’S LODGE COUNTER
EXISTING/MODIFY

Existing counter to be modified by BSI, LLC as follows:

New stainless steel top (BSI SST-1988)
New Meganite tray rest (BSIMTS-1988), KEC to verify color with Architect.
New front panel (BSINFP-1988).
Provide and install stainless steel toe kick plate.
Cutout, installation and wiring of all drop-in & counter top equipment and food guards.

ITEM 1.009 DROP-IN HOT FOOD WELL
EXISTING/RELOCATE

KEC shall coordinate with the GC to disconnect any utilities from existing equipment as required.

KEC is responsible for the removal, cleaning, storage, and relocation of item as required and specified on the bid document and to coordinate final placement of Item as shown on plan with counter manufacturer.

Appropriate trades to make final required utility connections.

ITEM 1.010 REFRIGERATED DISPLAY COUNTER
EXISTING/MODIFY

Existing counter to be modified by BSI, LLC as follows:

New stainless steel top (BSI SST-1988)
New Meganite tray rest (BSIMTS-1988), KEC to verify color with Architect.
New front panel (BSINFP-1988).
Provide and install stainless steel toe kick plate.
Cutout, installation and wiring of all drop-in equipment.
ITEM 1.011  OPEN NUMBER

ITEM 1.012  OPEN NUMBER

ITEM 1.013  COUNTER GRIDDLE EXISTING TO REMAIN (NOT SHOWN)

ITEM 1.014  MOBILE REFRIGERATED EQUIPMENT STAND EXISTING TO REMAIN (NOT SHOWN)

ITEM 1.015  FOUR BURNER COUNTER RANGE EXISTING TO REMAIN (NOT SHOWN)

ITEM 1.016  FOOD GUARD BSI, LLC ZG9930/ZG9500-4
Counter mounted, for full serve application with top shelf on left & right sections, fully adjustable, approximately 11'-0" long in three (3) sections of 2’-3", 3’-3" & 5’-6" (left to right) as shown on plan. Left & right sections to be ZG9930 sections and middle section to be ZG9500-4 section. To include two (2) end supports, two (2) center posts, three (3) 3/8" tempered glass front panels, two (2) 3/8" tempered glass top shelves & two (2) full height ¼" tempered glass end panels. Left section to have 1130605-120-18 & right section to have 1130605-120-54 warmer/fluorescent light combos with separate remote infinite control for warmer and remote switch for light for each. Finish to be brushed aluminum (KEC to verify with Architect). MWU5 heavy duty flange/inverted under counter mount for millwork counter. 1" diameter aluminum tubing single supports, NSF, UL listed.

Under counter mount includes heavy duty flanges, stainless steel wood screws & nylon grommets (requires under counter access).

Electrical Contractor to mount Brass Smith provided remote controls at an accessible location on server side counter face and interwire as necessary through Food Guard post.

KEC to verify dimensions, post locations, spacing & mounting style in field prior to fabrication.

ITEM 1.017  MOBILE FRYER BATTERY EXISTING TO REMAIN (NOT SHOWN)

ITEM 1.018  CONVEYOR BROILER EXISTING TO REMAIN (NOT SHOWN)

ITEM 1.019  REFRIGERATED WORK TABLE EXISTING/RELOCATE

KEC shall coordinate with the GC to disconnect any utilities from existing equipment as required.

KEC is responsible for the removal, cleaning, storage, relocation & refrigeration start-up/adjustment of item as required and specified on the bid document and to coordinate final placement of Item as shown on plan.
Appropriate trades to make final required utility connections.

ITEM 1.020  EXHAUST VENTILATOR  
EXISTING TO REMAIN (NOT SHOWN)

ITEM 1.021  OPEN NUMBER

ITEM 1.022  OPEN NUMBER

ITEM 1.023  OPEN NUMBER

ITEM 1.024  OPEN NUMBER

ITEM 1.025  HAND SINK WITH SOAP & TOWEL DISPENSER  
EXISTING/RELOCATE

KEC shall coordinate with the GC to disconnect any utilities from existing equipment as required.

KEC is responsible for the removal, cleaning, storage, and relocation of item as required and specified on the bid document and to coordinate final placement of Item as shown on plan.

Appropriate trades to make final required utility connections.

ITEM 1.026  OPEN NUMBER

ITEM 1.027  EL CANIBAL COUNTER  
BSI, LLC CUSTOM/NSF

Constructed and equipped in accordance with plans, elevations, sections and details as shown on Architectural drawings & FS.09-FS.12.

Configuration to be Contoura construction consisting of 3/16” powder coated or stainless steel end panels connected by galvanized horizontal supports using mechanical fasteners. Counter front décor panels to be supported by 14 ga. galvanized spars creating a utility chase. Interior to be made up of 16 ga. stainless steel, removable bottom shelf and 18 ga. stainless steel, removable back for access to utility chase. Stainless Steel top to be adhered to galvanized horizontal supports and be installed to meet manufacturer’s guidelines for application.

Provide intermediate shelf for storage.
Meganite tray rest (KEC to verify color with Architect).
Counter to be constructed for future addition of Meganite top without impact to current overall counter height (ADA 34”).
Provide internal chaseway in counter front for concealed wiring and plumbing.
Removable stainless steel kick plates on public side.
Coordinate cutout, installation and wiring of all drop-in & counter top equipment and food guards.
Pull box for single point connection.
Reference millwork counters, tops and interior finish sections 06400 & 11400 for construction details.
KEC to verify all finishes with Architect.
ITEM 1.028  FOOD GUARD  
BSI, LLC ZG9930/ZG9500-4

Counter mounted, for full serve application with top shelf on center & right sections, fully adjustable, approximately 8'-6" long in three (3) sections of 2'-2", 3'-2" & 3'-2" (left to right) as shown on plan. Center & right sections to be ZG9930 sections and left section to be ZG9500-4 section. To include two (2) end supports, two (2) center posts, three (3) 3/8" tempered glass front panels, two (2) 3/8" tempered glass top shelves & two (2) full height ¼" tempered glass end panels. Center & right sections to have 1130605-120-30 warmer/fluorescent light combos with separate remote infinite control for warmer and remote switch for light for each. Finish to be brushed aluminum (KEC to verify with Architect). MWU5 heavy duty flange/inverted under counter mount for millwork counter. 1" diameter aluminum tubing single supports, NSF, UL listed.

Under counter mount includes heavy duty flanges, stainless steel wood screws & nylon grommets (requires under counter access).

Electrical Contractor to mount Brass Smith provided remote controls at an accessible location on server side counter face and interwire as necessary through Food Guard post.

KEC to verify dimensions, post locations, spacing & mounting style in field prior to fabrication.

ITEM 1.029  OPEN NUMBER

ITEM 1.030  OPEN NUMBER

ITEM 1.031  OPEN NUMBER

ITEM 1.032  FIRE EXTINGUISHING SYSTEM  
EXISTING TO REMAIN (NOT SHOWN)

ITEM 1.033  DROP-IN SINK  
EXISTING/RELOCATE

KEC shall coordinate with the GC to disconnect any utilities from existing equipment as required.

KEC is responsible for the removal, cleaning, storage, and relocation of item as required and specified on the bid document and to coordinate final placement of Item as shown on plan with counter manufacturer.

Appropriate trades to make final required utility connections.

ITEM 1.034  OPEN NUMBER

ITEM 1.035  HEATED SANDWICH PRESS  
(4) EXISTING/RELOCATE & (2) EXISTING TO REMAIN (NOT SHOWN)

KEC shall coordinate with the GC to disconnect any utilities from existing equipment as required (4 units).

KEC is responsible for the removal, cleaning, storage, and relocation of item as required and specified on the bid document and to coordinate final placement of Item as shown on plan (4 units) & with counter manufacturer (2 of 4 relocated units).
Appropriate trades to make final required utility connections (4 units).

ITEM 1.036 ROLL-THRU FREEZER
EXISTING (TO REMAIN)

ITEM 1.037 MOBILE RACK
EXISTING/RELOCATE

KEC is responsible for the removal, cleaning, storage, and relocation of item as required and specified on the bid document and to coordinate final placement of Item as shown on plan.

ITEM 1.038 OPEN NUMBER

ITEM 1.039 DROP-IN HAND SINK
EXISTING/RELOCATE

KEC shall coordinate with the GC to disconnect any utilities from existing equipment as required.

KEC is responsible for the removal, cleaning, storage, and relocation of item as required and specified on the bid document and to coordinate final placement of Item as shown on plan with counter manufacturer.

Appropriate trades to make final required utility connections.

ITEM 1.040 OPEN NUMBER

ITEM 1.041 OPEN NUMBER

ITEM 1.042 OPEN NUMBER

ITEM 1.043 FOOD GUARD
BSI, LLC ZG9500-4

Specified as part of Item 1.045.

ITEM 1.044 MOBILE UNDERCOUNTER HEATED HOLDING CABINET
ALTO-SHAAM 750-S/STD

Halo Heat® EcoSmart™ free standing, on/off adjustable thermostat, indicator light, two (2) chrome plated side racks & three (3) wire shelves, aluminum exterior, capacity of ten (10) 12” x 20” full size pans, UL, CE, EnergyStar® rated, cord & plug.

2½” low profile casters, two (2) with locking brakes.
Full perimeter rubber bumper.
Door hinged as shown on plan.
LK-22567 cylinder door handle locks, master keyed to all other Alto-Shaam cabinets.
Overall unit height not to exceed 32” for placement under ADA 34” high counter.
ITEM 1.045  FOOD GUARD  
BSI, LLC ZG9930/ZG9500-4  
Counter mounted, for full serve application with top shelf on left & right sections, fully adjustable, approximately 11'-8" long in three (3) sections of 4'-3", 3'-2" & 4'-3" (left to right) as shown on plan. Left & right sections to be ZG9930 sections and middle section to be ZG9500-4 section. To include two (2) end supports, two (2) center posts, three (3) 3/8" tempered glass front panels, two (2) 3/8" tempered glass top shelves & two (2) full height ¼" tempered glass end panels. Left & right sections to have 1130605-120-42 warmer/fluorescent light combos with separate remote infinite control for warmer and remote switch for light for each. Finish to be brushed aluminum (KEC to verify with Architect). MWU5 heavy duty flange/inverted under counter mount for millwork counter. 1" diameter aluminum tubing single supports, NSF, UL listed.

Under counter mount includes heavy duty flanges, stainless steel wood screws & nylon grommets (requires under counter access).

Electrical Contractor to mount Brass Smith provided remote controls at an accessible location on server side counter face and interwire as necessary through Food Guard post.

KEC to verify dimensions, post locations, spacing & mounting style in field prior to fabrication.

ITEM 1.046  FOOD GUARD  
BSI, LLC ZG9500-4  
Counter mounted, for full service/vertical application with no top shelf, fully adjustable, approximately 5'-6" long with an 18" high glass panel. To include two (2) end supports & one (1) 3/8" tempered glass front panel. Finish to be brushed aluminum (KEC to verify with Architect). MWU5 heavy duty flange/inverted under counter mount for millwork counter. 1" diameter aluminum tubing single supports, NSF listed.

Under counter mount includes heavy duty flanges, stainless steel wood screws & nylon grommets (requires under counter access).

ITEM 1.047  DOUBLE INDUCTION WARMER  
EXISTING/RELOCATE  
KEC shall coordinate with the GC to disconnect any utilities from existing equipment as required.

KEC is responsible for the removal, cleaning, storage, and relocation of item as required and specified on the bid document and to coordinate final placement of Item as shown on plan with counter manufacturer.

Appropriate trades to make final required utility connections.
ITEM 1.048 OPEN NUMBER

ITEM 1.049 OPEN NUMBER

ITEM 1.050 OPEN NUMBER

ITEM 1.051 OPEN NUMBER

ITEM 1.052 ROLL-THRU REFRIGERATOR EXISTING (TO REMAIN)

ITEM 1.053 OPEN NUMBER

ITEM 1.054 REACH-IN HEATED CABINET EXISTING/RELOCATE

KEC shall coordinate with the GC to disconnect any utilities from existing equipment as required.

KEC is responsible for the removal, cleaning, storage, and relocation of item as required and specified on the bid document and to coordinate final placement of Item as shown on plan.

Appropriate trades to make final required utility connections.

ITEM 1.055 TABOR COUNTER
BSI, LLC CUSTOM/NSF

Constructed and equipped in accordance with plans, elevations, sections and details as shown on Architectural drawings & FS.09-FS.12.

Configuration to be Contoura construction consisting of 3/16" powder coated or stainless steel end panels connected by galvanized horizontal supports using mechanical fasteners. Counter front décor panels to be supported by 14 ga. galvanized spars creating a utility chase. Interior to be made up of 16 ga. stainless steel, removable bottom shelf and 18 ga. stainless steel, removable back for access to utility chase. Stainless Steel top to be adhered to galvanized horizontal supports and be installed to meet manufacturer’s guidelines for application.

Provide removable bottom shelf.
Meganite tray rest (KEC to verify color with Architect).
Counter to be constructed for future addition of Meganite top without impact to current overall counter height (ADA 34").
Provide internal chaseway in counter front for concealed wiring and plumbing.
Removable stainless steel kick plates on public side.
Coordinate cutout, installation and wiring of all drop-in, counter top & undercounter equipment and food guards.
Pull box for single point connection.
Reference millwork counters, tops and interior finish sections 06400 & 11400 for construction details.
KEC to verify all finishes with Architect.
ITEM 1.056 FOOD GUARD
BSI, LLC ZG9930

Counter mounted, for full serve application with top shelf, fully adjustable, approximately 7'-0" long in two (2) equal sections as shown on plan. To include two (2) end supports, one (1) center post, two (2) 3/8" tempered glass front panels, two (2) 3/8" tempered glass top shelves, two (2) full height ¼" tempered glass end panels & two (2) 1130605-120-36 warmer/fluorescent light combos with separate remote infinite control for warmer and remote switch for light for each. Finish to be brushed aluminum (KEC to verify with Architect). MWU5 heavy duty flange/inverted under counter mount for millwork counter. 1" diameter aluminum tubing single supports, NSF, UL listed.

Under counter mount includes heavy duty flanges, stainless steel wood screws & nylon grommets (requires under counter access).

Electrical Contractor to mount Brass Smith provided remote controls at an accessible location on server side counter face and interwire as necessary through Food Guard post.

KEC to verify dimensions, post locations, spacing & mounting style in field prior to fabrication.

ITEM 1.057 DROP-IN HOT FOOD WELL
EXISTING/RELOCATE

KEC shall coordinate with the GC to disconnect any utilities from existing equipment as required.

KEC is responsible for the removal, cleaning, storage, and relocation of item as required and specified on the bid document and to coordinate final placement of Item as shown on plan with counter manufacturer.

Appropriate trades to make final required utility connections.

ITEM 1.058 DROP-IN HOT FOOD WELL
EXISTING/RELOCATE

KEC shall coordinate with the GC to disconnect any utilities from existing equipment as required.

KEC is responsible for the removal, cleaning, storage, and relocation of item as required and specified on the bid document and to coordinate final placement of Item as shown on plan with counter manufacturer.

Appropriate trades to make final required utility connections.

ITEM 1.059 OPEN NUMBER

ITEM 1.060 OPEN NUMBER

ITEM 1.061 BACK COUNTER
NIKEC/FUTURE

This Item is not in the Kitchen Equipment Contract.
ITEM 1.062  REACH-IN REFRIGERATOR
EXISTING/RELOCATE

KEC shall coordinate with the GC to disconnect any utilities from existing equipment as required.

KEC is responsible for the removal, cleaning, storage, relocation & refrigeration start-up/adjustment of item as required and specified on the bid document and to coordinate final placement of Item as shown on plan.

Appropriate trades to make final required utility connections.

ITEM 1.063  OPEN NUMBER

ITEM 1.064  OPEN NUMBER

ITEM 1.065  OPEN NUMBER

ITEM 1.066  MOBILE CARVING STATION
ALTO-SHAAM 750-S/BCS-2

EcoSmart™ Halo Heat® series, with two (2) light carving shelf, stainless steel construction, one (1) adjustable thermostat, capacity of ten (10) 12” x 20” pans, one (1) cutting board, two (2) chrome plated side racks & three (3) wire shelves, 3½” casters, two (2) with locking brakes, cord & plug for each electric connection.

One (1) year extended warranty to begin at the end of standard warranty & to continue for twelve (12) additional months.
Prime rib carving holder.
Basket-type Steamship round carving holder with attached pan, stainless steel, pan dimensions: 12¾” long X 20¾” wide X 1¾” deep, holder dimensions: 5/16” diameter wire, 8-3/8” long X 11-3/8” wide X 3¾” high.
Cutting board, extra large, 18” X 24” X ½” with gravy lane.
Cylinder door handle lock with two (2) keys master keyed to all other Alto-Shaam cabinets.
Drip pan.
Full perimeter bumper.
Standard right-hand door swing.

ITEM 1.067  CHILI WELL
WELLS SS-10ULTD (2 EXISTING/RELOCATE)

New unit:

Top mount, built-in, electric, for eleven (11) quart round inserts, drain, wet/dry operation, thermostatic controls, stainless steel interior, Wellslok, UL listed.

20385 drain valve extension kit, extension from drain to counter front with remote handle (for use with "D" models only).
Two (2) 21057 eleven (11) quart round inset, with hinged lid, no handles.
21709 drain screen.
Wellslok extension adapter kit for millwork counter tops (if required).
Remote control to be mounted onto server side of counter and at an accessible location and height.

Existing units:

KEC shall coordinate with the GC to disconnect any utilities from existing equipment as required.

KEC is responsible for the removal, cleaning, storage, and relocation of item as required and specified on the bid document and to coordinate final placement of Item as shown on plan with counter manufacturer.

Appropriate trades to make final required utility connections.

**ITEM 1.068 FOOD GUARD**

BSI, LLC ZG9930

Counter mounted, for full serve application with top shelf, fully adjustable, approximately 4'-6" long as shown on plan. To include two (2) end supports, one (1) 3/8" tempered glass front panel, one (1) 3/8" tempered glass top shelf, two (2) full height ¼" tempered glass end panels & 1130605-120-48 warmer/fluorescent light combo with remote infinite control for warmer and remote switch for light. Finish to be brushed aluminum (KEC to verify with Architect). MWU5 heavy duty flange/inverted under counter mount for millwork counter. 1" diameter aluminum tubing single supports, NSF, UL listed.

Under counter mount includes heavy duty flanges, stainless steel wood screws & nylon grommets (requires under counter access).

Electrical Contractor to mount Brass Smith provided remote controls at an accessible location on server side counter face and interwire as necessary through Food Guard post.

KEC to verify dimensions, post locations, spacing & mounting style in field prior to fabrication.

**ITEM 1.069 OPEN NUMBER**

**ITEM 1.070 COUNTER TOP FOOD WARMER EXISTING TO REMAIN (NOT SHOWN)**

**ITEM 1.071 DROP-IN SINK**

ADVANCE TABCO DI-1-2012 (1 NIKEC/FUTURE)

Single compartment, 20" wide X 16" front to back X 12" deep bowl, 18 gauge stainless steel, with deck mounted 12" swing spout faucet, basket drain.

K-28 thick counter mounting clips for drop-in sinks into counters over 7/8" and up to 2" thick (if required). K-320-LU wrist handles, for deck mounted faucets. 7-PS-10 P-trap, heavy duty, 1½", 17 gauge.

**ITEM 1.072 OPEN NUMBER**

**ITEM 1.073 DROP-IN HOT FOOD WELL EXISTING/RELOCATE**

KEC shall coordinate with the GC to disconnect any utilities from existing equipment as required.
KEC is responsible for the removal, cleaning, storage, and relocation of item as required and specified on the bid document and to coordinate final placement of Item as shown on plan with counter manufacturer.

Appropriate trades to make final required utility connections.

**ITEM 1.074** OPEN NUMBER

**ITEM 1.075** OPEN NUMBER

**ITEM 1.076** OPEN NUMBER

**ITEM 1.077** OPEN NUMBER

**ITEM 1.078** FOOD GUARD

BSI, LLC ZG9930

Counter mounted, for self serve application with top shelf, fully adjustable, approximately 8'-0" long in two (2) sections of 3'-0" & 5'-0" (left to right) as shown on plan. To include two (2) end supports, one (1) center post, two (2) 3/8" tempered glass front panels, two (2) 3/8" tempered glass top shelves, two (2) full height ¼" tempered glass end panels & a single row of Slimline fluorescent lighting with 4100K lamps throughout. Finish to be brushed aluminum (KEC to verify with Architect). MWU5 heavy duty flange/inverted under counter mount for millwork counter. 1" diameter aluminum tubing single supports, NSF, UL listed.

Under counter mount includes heavy duty flanges, stainless steel wood screws & nylon grommets (requires under counter access).

Electrical Contractor to provide counter mounted on/off switch at an accessible location on server side counter face and interwire as necessary through Food Guard post.

KEC to verify dimensions, post locations, spacing & mounting style in field prior to fabrication.

**ITEM 1.079** DROP-IN REFRIGERATED COLD PAN

EXISTING/RELOCATE

KEC shall coordinate with the GC to disconnect any utilities from existing equipment as required.

KEC is responsible for the removal, cleaning, storage, and relocation of item as required and specified on the bid document and to coordinate final placement of Item as shown on plan with counter manufacturer.

Appropriate trades to make final required utility connections.

**ITEM 1.080** DROP-IN HOT FOOD WELL

EXISTING/RELOCATE

KEC shall coordinate with the GC to disconnect any utilities from existing equipment as required.

KEC is responsible for the removal, cleaning, storage, and relocation of item as required and specified on the bid document and to coordinate final placement of Item as shown on plan with counter manufacturer.
Appropriate trades to make final required utility connections.

**ITEM 1.081** OPEN NUMBER

**ITEM 1.082** MOBILE CONVECTION OVEN/PROOFER EXISTING/RELOCATE

KEC shall coordinate with the GC to disconnect any utilities from existing equipment as required.

KEC is responsible for the removal, cleaning, storage, and relocation of item as required and specified on the bid document and to coordinate final placement of Item as shown on plan.

Appropriate trades to make final required utility connections.

**ITEM 1.083** EXHAUST VENTILATOR

CAPTIVE-AIRE 6024VHB

Constructed and equipped as shown on plan and per CaptiveAire/Aquamatic drawing 1069493.

4'-0" long X 5'-0" deep, exhaust (heat removal) only Type II ventilator.

304 stainless steel construction. Contractor to verify exterior finish with Architect prior to construction.

Full length 304 stainless steel back splash from top of floor cove base to underside of ventilator.

Front, left & right 18" high field wrapper.

The ventilator shall be UL and NSF listed. The ventilator shall comply with all requirements of NFPA-96, IMC, UMC, BOCA and SBCCI model codes.

Provide 18 gauge stainless steel enclosure panel from top of ventilator to underside of building ceiling and/or enclosure.

Manufacturer shall supervise unit installation.

Contractor to verify that ventilator meets all applicable code requirements prior to construction.

**ITEM 1.084** FOOD GUARD

BSI, LLC ZG9930

Counter mounted, for self serve application with top shelf, fully adjustable, approximately 7'-0" long in two (2) equal sections as shown on plan. To include two (2) end supports, one (1) center post, two (2) 3/8" tempered glass front panels, two (2) 3/8" tempered glass top shelves, two (2) full height ¼" tempered glass end panels & a single row of Slimline fluorescent lighting with 4100K lamps throughout. Finish to be brushed aluminum (KEC to verify with Architect). MWU5 heavy duty flange/inverted under counter mount for millwork counter. 1" diameter aluminum tubing single supports, NSF, UL listed.

Under counter mount includes heavy duty flanges, stainless steel wood screws & nylon grommets (requires under counter access).
Electrical Contractor to provide counter mounted on/off switch at an accessible location on server side counter face and interwire as necessary through Food Guard post.

KEC to verify dimensions, post locations, spacing & mounting style in field prior to fabrication.

**ITEM 1.085 BAKED GOODS COUNTER**

BSI, LLC CUSTOM/NSF

Constructed and equipped in accordance with plans, elevations, sections and details as shown on Architectural drawings & FS.09-FS.12.

Configuration to be Contoura construction consisting of 3/16” powder coated or stainless steel end panels connected by galvanized horizontal supports using mechanical fasteners. Counter front décor panels to be supported by 14 ga. galvanized spars creating a utility chase. Interior to be made up of 16 ga. stainless steel, removable bottom shelf and 18 ga. stainless steel, removable back for access to utility chase. Stainless Steel top to be adhered to galvanized horizontal supports and be installed to meet manufacturer’s guidelines for application.

Provide removable bottom shelf.
Meganite tray rest (KEC to verify color with Architect).
Counter to be constructed for future addition of Meganite top without impact to current overall counter height (ADA 34”).
Provide internal chaseway in counter front for concealed wiring and plumbing.
Removable stainless steel kick plates on public side.
Coordinate installation and wiring of all food guards.
Pull box for single point connection.
Reference millwork counters, tops and interior finish sections 06400 & 11400 for construction details.
KEC to verify all finishes with Architect.

**ITEM 1.086 DESSERT COUNTER**

BSI, LLC CUSTOM/NSF

Constructed and equipped in accordance with plans, elevations, sections and details as shown on Architectural drawings & FS.09-FS.12.

Configuration to be Contoura construction consisting of 3/16” powder coated or stainless steel end panels connected by galvanized horizontal supports using mechanical fasteners. Counter front décor panels to be supported by 14 ga. galvanized spars creating a utility chase. Interior to be made up of 16 ga. stainless steel, removable bottom shelf and 18 ga. stainless steel, removable back for access to utility chase. Stainless Steel top to be adhered to galvanized horizontal supports and be installed to meet manufacturer’s guidelines for application.

Provide intermediate shelf for storage.
Meganite tray rest (KEC to verify color with Architect).
Counter to be constructed for future addition of Meganite top without impact to current overall counter height (ADA 34”).
Provide internal chaseway in counter front for concealed wiring and plumbing.
Removable stainless steel kick plates on public side.
Coordinate cutout, installation and wiring of all drop-in & counter top equipment and food guards.
Pull box for single point connection.
Reference millwork counters, tops and interior finish sections 06400 & 11400 for construction details.
KEC to verify all finishes with Architect.
ITEM 1.087      OPEN NUMBER

ITEM 1.088      GLASS DOOR DISPLAY FREEZER
                EXISTING/RELOCATE

KEC shall coordinate with the GC to disconnect any utilities from existing equipment as required.

KEC is responsible for the removal, cleaning, storage, relocation & refrigeration start-up/adjustment of
item as required and specified on the bid document and to coordinate final placement of Item as shown
on plan.

Appropriate trades to make final required utility connections.

ITEM 1.089      GLASS DOOR DISPLAY REFRIGERATOR
                EXISTING/RELOCATE

KEC shall coordinate with the GC to disconnect any utilities from existing equipment as required.

KEC is responsible for the removal, cleaning, storage, relocation & refrigeration start-up/adjustment of
item as required and specified on the bid document and to coordinate final placement of Item as shown
on plan.

Appropriate trades to make final required utility connections.

ITEM 1.090      SLIDING DOOR BEVERAGE REFRIGERATOR
                EXISTING/RELOCATE

KEC shall coordinate with the GC to disconnect any utilities from existing equipment as required.

KEC is responsible for the removal, cleaning, storage, relocation & refrigeration start-up/adjustment of
item as required and specified on the bid document and to coordinate final placement of Item as shown
on plan.

Appropriate trades to make final required utility connections.

ITEM 1.091      SLIDING GLASS DOOR DISPLAY REFRIGERATOR
                EXISTING/RELOCATE

KEC shall coordinate with the GC to disconnect any utilities from existing equipment as required.

KEC is responsible for the removal, cleaning, storage, relocation & refrigeration start-up/adjustment of
item as required and specified on the bid document and to coordinate final placement of Item as shown
on plan.

Appropriate trades to make final required utility connections.
ITEM 1.092 OPEN NUMBER

ITEM 1.093 OPEN NUMBER

ITEM 1.094 OPEN NUMBER

ITEM 1.095 OPEN NUMBER

ITEM 1.096 OPEN NUMBER

ITEM 1.097 OPEN NUMBER

ITEM 1.098 COUNTER TOP PASTRY CASE EXISTING/RELOCATE

KEC is responsible for the removal, cleaning, storage & relocation of item as required and specified on the bid document and to coordinate final placement of Item as shown on plan with counter manufacturer.

ITEM 1.099 ELECTRONIC SCALE EXISTING/RELOCATE

KEC shall coordinate with the GC to disconnect any utilities from existing equipment as required.

KEC is responsible for the removal, cleaning, storage & relocation of item as required and specified on the bid document and to coordinate final placement of Item as shown on plan with counter manufacturer.

Appropriate trades to make final required utility connections.

ITEM 1.100 POS REGISTER/DRAWER EXISTING/RELOCATE

KEC shall coordinate with the GC to disconnect any utilities from existing equipment as required.

KEC is responsible for the removal, cleaning, storage & relocation of item as required and specified on the bid document and to coordinate final placement of Item as shown on plan with counter manufacturer.

Appropriate trades to make final required utility connections.

ITEM 1.101 UNDERCOUNTER CUP DISPENSER SAN JAMAR C2410C

Gourmet® EZ-Fit® series, counter mount, four (4) gaskets with 5-11/16" counter hole, fits 8 to 46 oz. paper/plastic/foam cups with rim diameter of 2-7/8" to 4¾", vertical or horizontal mount, 24" long tube, high-impact plastic, NSF.

ITEM 1.102 ESPRESSO/CAPPUCCINO MACHINE EXISTING/RELOCATE

KEC shall coordinate with the GC to disconnect any utilities from existing equipment as required.
KEC is responsible for the removal, cleaning, storage & relocation of item as required and specified on the bid document and to coordinate final placement of Item as shown on plan with counter manufacturer.

Appropriate trades to make final required utility connections.

ITEM 1.103 OPEN NUMBER

ITEM 1.104 BABY DOE’S COUNTER
BSI, LLC CUSTOM/NSF

Constructed and equipped in accordance with plans, elevations, sections and details as shown on Architectural drawings & FS.09-FS.12.

Configuration to be Contoura construction consisting of 3/16” powder coated or stainless steel end panels connected by galvanized horizontal supports using mechanical fasteners. Counter front décor panels to be supported by 14 ga. galvanized spars creating a utility chase. Interior to be made up of 16 ga. stainless steel, removable bottom shelf and 18 ga. stainless steel, removable back for access to utility chase. Meganite (color to be verified with Architect) top to be adhered to galvanized horizontal supports and be installed to meet manufacturer’s guidelines for application.

Provide removable bottom shelf.
Provide intermediate shelf for storage.
Provide internal chaseway in counter front for concealed wiring and plumbing.
Removable stainless steel kick plates on public side.
Coordinate cutout, installation and wiring of all counter top, undercounter & adjacent free standing equipment.
Pull box for single point connection.
Reference millwork counters, tops and interior finish sections 06400 & 11400 for construction details.
KEC to verify all finishes with Architect.

ITEM 1.105 MOBILE UNDERCOUNTER REFRIGERATOR
TRUE FOOD SERVICE EQUIPMENT, INC. TUC-48-LP

33-38° F, twelve (12) cubic feet capacity, 300 series stainless steel top & sides, white aluminum interior with 300 series stainless steel floor, two (2) stainless steel doors hinged as shown on plan, 1½” diameter dual wheel casters, front breathing, cord & plug.

Five (5) year compressor warranty.
One (1) year parts and labor warranty.
16 ga. stainless steel top.
Four (4) interior wire shelves, clips included.
Exterior digital thermometer.
Factory installed barrel door locks master keyed to all True cabinets.

ITEM 1.106 OPEN NUMBER

ITEM 1.107 THERMAL POT COFFEE BREWER
EXISTING/RELOCATE

KEC shall coordinate with the GC to disconnect any utilities from existing equipment as required.
KEC is responsible for the removal, cleaning, storage & relocation of item as required and specified on the bid document and to coordinate final placement of Item as shown on plan with counter manufacturer.

Appropriate trades to make final required utility connections.

**ITEM 1.108  CUP/LID DISPENSER**  
**EXISTING/RELOCATE**

KEC is responsible for the removal, cleaning, storage & relocation of item as required and specified on the bid document and to coordinate final placement of Item as shown on plan with counter manufacturer.

**ITEM 1.109  PASTRY DISPLAY CASE**  
**EXISTING/RELOCATE**

KEC shall coordinate with the GC to disconnect any utilities from existing equipment as required.

KEC is responsible for the removal, cleaning, storage & relocation of item as required and specified on the bid document and to coordinate final placement of Item as shown on plan with counter manufacturer.

Appropriate trades to make final required utility connections.

**ITEM 1.110  BACK COUNTER**  
**BSI, LLC CUSTOM/NSF**

Construct and equipped in accordance with plans, elevations, sections and details as shown on Architectural drawings & FS.09-FS.12.

Configuration to be Contoura construction consisting of 3/16” powder coated or stainless steel end panels (verify end panel finishes with Architect) connected by galvanized horizontal supports using mechanical fasteners. Interior to be made up of 16 ga. stainless steel, removable bottom shelf and 18 ga. stainless steel back. Meganite (color to be verified with Architect) top to be adhered to galvanized horizontal supports and be installed to meet manufacturer’s guidelines for application.

Provide removable bottom shelf,
Provide partial intermediate shelf for storage in non-sink section.
Coordinate cutout, installation and wiring of all drop-in, counter top & adjacent free standing equipment.
Reference millwork counters, tops and interior finish sections 06400 & 11400 for construction details.
KEC to verify all finishes with Architect.

**ITEM 1.111  CUP DISPENSER**  
**EXISTING/RELOCATE**

KEC is responsible for the removal, cleaning, storage & relocation of item as required and specified on the bid document and to coordinate final placement of Item as shown on plan with counter manufacturer.
ITEM 1.112 OPEN NUMBER

ITEM 1.113 BAGEL BIN
CAL-MIL PLASTIC 1204
7" wide X 12" deep X 20" high, three (3) bins, frosted top, bottom & back, clear sides & door.

ITEM 1.114 THERMAL COFFEE DISPENSER
EXISTING/RELOCATE
KEC is responsible for the removal, cleaning, storage & relocation of item as required and specified on the bid document and to coordinate final placement of Item as shown on plan with counter manufacturer.

ITEM 1.115 MOBILE UNDERCOUNTER REFRIGERATOR
BEVERAGE AIR UCR34
Two (2) section, 34" long, 20½" deep, two (2) doors, stainless steel exterior & top, anodized aluminum interior, rear-mounted self-contained, front breathing, cord & plug.

Standard one (1) year parts and labor limited warranty.
Standard additional four (4) year compressor warranty.

00C30-099A door locks, factory installed, master keyed to all other Beverage Air cabinets..
00C31-041A 3" casters, front casters with locking brakes.
Four (4) interior epoxy coated wire shelves with shelf clips.
Exterior digital thermometer.

ITEM 1.116 COFFEE COUNTER
BSI, LLC CUSTOM/NSF
Constructed and equipped in accordance with plans, elevations, sections and details as shown on Architectural drawings & FS.09-FS.12.

Configuration to be Contoura construction consisting of 3/16" powder coated or stainless steel end panels connected by galvanized horizontal supports using mechanical fasteners. Counter front décor panels to be supported by 14 ga. galvanized spars creating a utility chase. Interior to be made up of 16 ga. stainless steel, removable bottom shelf and 18 ga. stainless steel, removable back for access to utility chase. Meganite (color to be verified with Architect) top to be adhered to galvanized horizontal supports and be installed to meet manufacturer’s guidelines for application.

Provide removable bottom shelf.
Provide intermediate shelf for storage.
Provide internal chaseway in counter front for concealed wiring and plumbing.
Removable stainless steel kick plates on public side.
Coordinate cutout, installation and wiring of all counter top & undercounter equipment.
Pull box for single point connection.
Reference millwork counters, tops and interior finish sections 06400 & 11400 for construction details.
KEC to verify all finishes with Architect.
ITEM 1.117 COFFEE GRINDER
EXISTING/RELOCATE

KEC shall coordinate with the GC to disconnect any utilities from existing equipment as required.

KEC is responsible for the removal, cleaning, storage & relocation of item as required and specified on the bid document and to coordinate final placement of Item as shown on plan with counter manufacturer.

Appropriate trades to make final required utility connections.

ITEM 1.118 BEVERAGE COUNTER
BSI, LLC CUSTOM/NSF

Constructed and equipped in accordance with plans, elevations, sections and details as shown on Architectural drawings & FS.09-FS.12.

Configuration to be Contoura construction consisting of 3/16” powder coated or stainless steel end panels (verify end panel finishes with Architect) connected by galvanized horizontal supports using mechanical fasteners. Counter front décor panels. Interior to be made up of 16 ga. stainless steel, removable bottom shelf and 18 ga. stainless steel back. Meganite (color to be verified with Architect) top to be adhered to galvanized horizontal supports and be installed to meet manufacturer’s guidelines for application.

Provide removable bottom shelf.
Meganite tray rest (KEC to verify color with Architect).
Removable stainless steel kick plates on front side.
Coordinate cutout, installation and wiring of all counter top equipment.
Reference millwork counters, tops and interior finish sections 06400 & 11400 for construction details.
KEC to verify all finishes with Architect.

ITEM 1.119 OPEN NUMBER

ITEM 1.120 OPEN NUMBER

ITEM 1.121 OPEN NUMBER

ITEM 1.122 OPEN NUMBER

ITEM 1.123 MOBILE NOVELTY ICE CREAM FREEZER
EXISTING/RELOCATE

KEC shall coordinate with the GC to disconnect any utilities from existing equipment as required.

KEC is responsible for the removal, cleaning, storage, relocation & refrigeration start-up/adjustment of item as required and specified on the bid document and to coordinate final placement of Item as shown on plan.

Appropriate trades to make final required utility connections.
ITEM 1.124  REFRIGERATED AIR SCREEN MERCHANDISER
STRUCTURAL CONCEPTS CEC4860R

Oasis® series self service, 51¼" long, 61" high, T-8 top light, adjustable/removable non-lighted shelves, full end panel, mirror interior, double row 1” bumpers, Breeze™ self contained refrigeration system, black lower front panel, cord & plug.

Standard one (1) year parts & labor & five (5) year compressor warranty. Standard Breeze self-contained refrigeration with evaporator pan, air intake one side & air discharge out other side. Heavy duty casters with locking brakes. Clean Sweep automatic condenser coil cleaner. Wilsonart or Formica premium laminate exterior, KEC to verify color with Architect. Add lights (T-8) to standard non-lighted shelves. Stainless steel interior.

ITEM 1.125  SUNDRY DISPLAY SHELVING
EXISTING/RELOCATE

KEC is responsible for the removal, cleaning, storage & relocation of item as required and specified on the bid document and to coordinate final placement of Item as shown on plan.

ITEM 1.126  MOBILE DISPLAY RACK
EXISTING/RELOCATE

KEC is responsible for the removal, cleaning, storage & relocation of item as required and specified on the bid document and to coordinate final placement of Item as shown on plan.

ITEM 1.127  OPEN NUMBER

ITEM 1.128  OPEN NUMBER

ITEM 1.129  OPEN NUMBER

ITEM 1.130  CASH COUNTER
BSI, LLC CUSTOM/NSF

Constructed and equipped in accordance with plans, elevations, sections and details as shown on Architectural drawings & FS.09-FS.12.

Configuration to be Contoura construction consisting of millwork end panels connected by galvanized horizontal supports using mechanical fasteners. Counter front décor panels to be supported by 14 ga. galvanized spars creating a utility chase. Interior to be made up of 16 ga. stainless steel, removable bottom shelf and 18 ga. stainless steel, removable back for access to utility chase. Meganite (color to be verified with Architect) top to be adhered to galvanized horizontal supports and be installed to meet manufacturer’s guidelines for application.

Provide removable bottom shelf.
Provide intermediate shelf for storage.
Provide internal chaseway in counter front for concealed wiring and plumbing.
Removable stainless steel kick plates on public side.
Coordinate cutout, installation and wiring of all counter top & undercounter equipment.
Pull box for single point connection.
Reference millwork counters, tops and interior finish sections 06400 & 11400 for construction details.
KEC to verify all finishes with Architect.

ITEM 1.131  CASH COUNTER
BSI, LLC CUSTOM/NSF

Constructed and equipped in accordance with plans, elevations, sections and details as shown on Architectural drawings & FS.09-FS.12.

Configuration to be Contoura construction consisting of millwork end panels connected by galvanized horizontal supports using mechanical fasteners. Counter front décor panels to be supported by 14 ga. galvanized spars creating a utility chase. Interior to be made up of 16 ga. stainless steel, removable bottom shelf and 18 ga. stainless steel, removable back for access to utility chase. Meganite (color to be verified with Architect) top to be adhered to galvanized horizontal supports and be installed to meet manufacturer’s guidelines for application.

Provide removable bottom shelf.
Provide intermediate shelf for storage.
Provide internal chaseway in counter front for concealed wiring and plumbing.
Removable stainless steel kick plates on public side.
Coordinate cutout, installation and wiring of all counter top & undercounter equipment.
Pull box for single point connection.
Reference millwork counters, tops and interior finish sections 06400 & 11400 for construction details.
KEC to verify all finishes with Architect.

ITEM 1.132  CASH COUNTER
BSI, LLC CUSTOM/NSF

Constructed and equipped in accordance with plans, elevations, sections and details as shown on Architectural drawings & FS.09-FS.12.

Configuration to be Contoura construction consisting of millwork end panels connected by galvanized horizontal supports using mechanical fasteners. Counter front décor panels to be supported by 14 ga. galvanized spars creating a utility chase. Interior to be made up of 16 ga. stainless steel, removable bottom shelf and 18 ga. stainless steel, removable back for access to utility chase. Meganite (color to be verified with Architect) top to be adhered to galvanized horizontal supports and be installed to meet manufacturer’s guidelines for application.

Provide removable bottom shelf.
Provide intermediate shelf for storage.
Provide internal chaseway in counter front for concealed wiring and plumbing.
Removable stainless steel kick plates on public side.
Coordinate cutout, installation and wiring of all counter top & undercounter equipment.
Pull box for single point connection.
Reference millwork counters, tops and interior finish sections 06400 & 11400 for construction details.
KEC to verify all finishes with Architect.
ITEM 1.133  CANDY BIN  
EXISTING/RELOCATE

KEC is responsible for the removal, cleaning, storage & relocation of item as required and specified on the bid document and to coordinate final placement of item as shown on plan.

ITEM 1.134  CASH COUNTER  
BSI, LLC CUSTOM/NSF

Constructed and equipped in accordance with plans, elevations, sections and details as shown on Architectural drawings & FS.09-FS.12.

Configuration to be Contoura construction consisting of millwork end panels connected by galvanized horizontal supports using mechanical fasteners. Counter front décor panels to be supported by 14 ga. galvanized spars creating a utility chase. Interior to be made up of 16 ga. stainless steel, removable bottom shelf and 18 ga. stainless steel, removable back for access to utility chase. Meganite (color to be verified with Architect) top to be adhered to galvanized horizontal supports and be installed to meet manufacturer’s guidelines for application.

Provide removable bottom shelf.
Provide intermediate shelf for storage.
Meganite tray rest (KEC to verify color with Architect).
Provide internal chaseway in counter front for concealed wiring and plumbing.
Removable stainless steel kick plates on public side.
Coordinate cutout, installation and wiring of all counter top & undercounter equipment.
Pull box for single point connection.
Reference millwork counters, tops and interior finish sections 06400 & 11400 for construction details.
KEC to verify all finishes with Architect.

ITEM 1.141  CUP DISPENSER  
NIKEC/BY VENDOR

This Item is not in the Kitchen Equipment Contract.

ITEM 1.142  ICE MAKER  
EXISTING/RELOCATE

KEC shall coordinate with the GC to disconnect any utilities from existing equipment as required.
KEC is responsible for the removal, cleaning, storage, relocation & refrigeration start-up/adjustment of item as required and specified on the bid document and to coordinate final placement of Item as shown on plan with counter manufacturer.

Appropriate trades to make final required utility connections.

ITEM 1.143 ICE/SODA DISPENSER
NIKEC/BY VENDOR

This Item is not in the Kitchen Equipment Contract.

ITEM 1.144 JUICE DISPENSER
NIKEC/BY VENDOR

This Item is not in the Kitchen Equipment Contract.

ITEM 1.145 ICED TEA BREWER/DISPENSER
EXISTING/RELOCATE

KEC shall coordinate with the GC to disconnect any utilities from existing equipment as required.

KEC is responsible for the removal, cleaning, storage & relocation of item as required and specified on the bid document and to coordinate final placement of Item as shown on plan with counter manufacturer.

Appropriate trades to make final required utility connections.

ITEM 1.146 CUP/LID/CONDIMENT DISPENSER
NIKEC/BY VENDOR

This Item is not in the Kitchen Equipment Contract.

ITEM 1.147 FROZEN BEVERAGE DISPENSER
NIKEC/BY VENDOR

This Item is not in the Kitchen Equipment Contract.

ITEM 1.148 ICE MAKER
(1) EXISTING/RELOCATE & (2) NIKEC/BY VENDOR

Existing unit:

KEC shall coordinate with the GC to disconnect any utilities from existing equipment as required.

KEC is responsible for the removal, cleaning, storage, relocation & refrigeration start-up/adjustment of item as required and specified on the bid document and to coordinate final placement of Item as shown on plan with counter manufacturer.

Appropriate trades to make final required utility connections.

NIKEC/By Vendor units:
This Item is not in the Kitchen Equipment Contract.

ITEM 1.149 OPEN NUMBER

ITEM 1.150 BEVERAGE COUNTER
BSI, LLC MILLWORK CUSTOM/NSF

Constructed and equipped in accordance with plans, elevations, sections and details as shown on Architectural drawings & FS.09-FS.12.

Configuration to be Contoura construction consisting of 3/16” powder coated or stainless steel end panels (verify end panel finishes with Architect) connected by galvanized horizontal supports using mechanical fasteners. Counter front décor panels. Interior to be made up of 16 ga. stainless steel, removable bottom shelf and 18 ga. stainless steel back. Meganite (color to be verified with Architect) top to be adhered to galvanized horizontal supports and be installed to meet manufacturer’s guidelines for application.

Provide removable bottom shelf.
Meganite tray rest (KEC to verify color with Architect).
Removable stainless steel kick plates on front side.
Coordinate cutout, installation and wiring of all counter top equipment.
Reference millwork counters, tops and interior finish sections 06400 & 11400 for construction details.
KEC to verify all finishes with Architect.

ITEM 1.151 BEVERAGE COUNTER
BSI, LLC CUSTOM/NSF

Constructed and equipped in accordance with plans, elevations, sections and details as shown on Architectural drawings & FS.09-FS.12.

Configuration to be Contoura construction consisting of 3/16” powder coated or stainless steel end panels (verify end panel finishes with Architect) connected by galvanized horizontal supports using mechanical fasteners. Counter front décor panels. Interior to be made up of 16 ga. stainless steel, removable bottom shelf and 18 ga. stainless steel back. Meganite (color to be verified with Architect) top to be adhered to galvanized horizontal supports and be installed to meet manufacturer’s guidelines for application.

Provide removable bottom shelf.
Meganite tray rest (KEC to verify color with Architect).
Removable stainless steel kick plates on front side.
Coordinate cutout, installation and wiring of all counter top equipment.
Reference millwork counters, tops and interior finish sections 06400 & 11400 for construction details.
KEC to verify all finishes with Architect.
ITEM 1.152 OPEN NUMBER

ITEM 1.153 OPEN NUMBER

ITEM 1.154 OPEN NUMBER

ITEM 1.155 FOOD GUARD
BSI, LLC ZG9930

Counter mounted, for self serve application with top shelf, fully adjustable, approximately 14’-3” long in three (3) sections of 5’-3”, 5’-3” & 3’-9” (left to right) as shown on plan. To include two (2) end supports, two (2) center posts, three (3) 3/8” tempered glass front panels, three (3) 3/8” tempered glass top shelves, two (2) full height ¼” tempered glass end panels & 1130605-120-54 (for left & center sections), 1130605-120-36 (for right section) warmer/fluorescent light combos with separate remote infinite control for warmer and remote switch for light for each. Finish to be brushed aluminum (KEC to verify with Architect). MWU5 heavy duty flange/inverted under counter mount for millwork counter. 1” diameter aluminum tubing single supports, NSF, UL listed.

Under counter mount includes heavy duty flanges, stainless steel wood screws & nylon grommets (requires under counter access).

Electrical Contractor to mount Brass Smith provided remote controls at an accessible location on server side counter face and interwire as necessary through Food Guard post.

KEC to verify dimensions, post locations, spacing & mounting style in field prior to fabrication.

ITEM 1.156 DROP-IN REFRIGERATED COLD PAN/REFRIGERATED BASE
BSI, LLC CUSTOM/NSF

Specified as part of Item 1.158.

ITEM 1.157 DROP-IN HOT/COLD PAN
ATLAS METAL WCM-HP-4

Single tank with thermostat switch for hot or cold operation, with self contained refrigeration system and immersion type heating element, four (4) pan size, stainless steel top and inner liner, galvanized outer liner, cord & plug.

Five (5) year compressor warranty.

ITEM 1.158 SALAD/SOUP/TOPPINGS COUNTER
BSI, LLC CUSTOM/NSF

Constructed and equipped in accordance with plans, elevations, sections and details as shown on Architectural drawings & FS.09-FS.12.

Configuration to be Contoura construction consisting of 3/16” powder coated or stainless steel end panels connected by galvanized horizontal supports using mechanical fasteners. Counter front décor panels to be supported by 14 ga. galvanized spars creating a utility chase. Interior to be made up of 16 ga. stainless steel, removable bottom shelf and 18 ga. stainless steel, removable back for access to utility
chase. Meganite (color to be verified with Architect) top to be adhered to galvanized horizontal supports and be installed to meet manufacturer’s guidelines for application.

Provide removable bottom shelf.
Meganite tray rest (KEC to verify color with Architect).
Provide internal chaseway in counter front for concealed wiring and plumbing.
Removable stainless steel kick plates on public side.
Coordinate cutout, installation and wiring of all counter top & undercounter equipment and food guards.
Load center for single point connection.
Custom fabricated drop-in refrigerated cold pans with refrigerated door bases (BSI CCP, Items 1.156, 1.165 & 1.176) as shown on plan with undercounter mounted air-cooled condensing unit & electric condensate evaporator. Cold pans to be provided with stainless steel top adapters for tilting the pan towards the customer side.
Reference millwork counters, tops and interior finish sections 06400 & 11400 for construction details.
KEC to verify all finishes with Architect.

ITEM 1.159 FOOD GUARD
BSI, LLC ZG9930
Counter mounted, for full serve application with top shelf, fully adjustable, approximately 8’-6” long in two sections 4’-0” & 4’-6” (left to right) as shown on plan. To include two (2) end supports, one (1) center post, two (2) 3/8” tempered glass front panels, two (2) 3/8” tempered glass top shelves, two (2) full height ¼” tempered glass end panels & a single row of Slimline fluorescent lighting with 4100K lamps throughout. Finish to be brushed aluminum (KEC to verify with Architect). MWU5 heavy duty flange/inverted under counter mount for millwork counter. 1” diameter aluminum tubing single supports, NSF, UL listed.

Under counter mount includes heavy duty flanges, stainless steel wood screws & nylon grommets (requires under counter access).

Electrical Contractor to provide counter mounted on/off switch at an accessible location on server side counter face and interwire as necessary through Food Guard post.

KEC to verify dimensions, post locations, spacing & mounting style in field prior to fabrication.

ITEM 1.160 DROP-IN REFRIGERATED COLD PAN
ATLAS METAL WCM-3
Three (3) pan size, self-contained refrigeration system, insulated pan, stainless steel inner liner & top, galvanized steel outer liner, with on/off thermostat switch and pilot light, cord & plug.

Five (5) year compressor warranty.
Electric condensate evaporator.

ITEM 1.161 MOBILE UNDERCOUNTER HEATED HOLDING CABINET
ALTO-SHAAM 750-S/STD
Halo Heat® EcoSmart™ free standing, on/off adjustable thermostat, indicator light, two (2) chrome plated side racks & three (3) wire shelves, aluminum exterior, capacity of ten (10) 12” x 20” full size pans, UL, CE, EnergyStar® rated, cord & plug.

2½” low profile casters, two (2) with locking brakes.
Full perimeter rubber bumper.
Door hinged as shown on plan.
LK-22567 cylinder door handle locks, master keyed to all other Alto-Shaam cabinets.
Overall unit height not to exceed 32" for placement under ADA 34" high counter.

**ITEM 1.162**  
**CUTTING BOARD**  
**JOHN BOOS R02-3**

18" X 24" X 1½", hard rock maple with Boos Block cream finish with beeswax, reversible.

**ITEM 1.163**  
**DROP-IN REFRIGERATED COLD PAN**  
**ATLAS METAL WCM-1**

One (1) pan size, self-contained refrigeration system, insulated pan, stainless steel inner liner & top, galvanized steel outer liner, with on/off thermostat switch and pilot light, cord & plug.

Five (5) year compressor warranty.
Electric condensate evaporator.

**ITEM 1.164**  
**FOOD GUARD**  
**BSI, LLC ZG9930**

Counter mounted, for self serve application with top shelf, fully adjustable, approximately 14'-3" long in three (3) sections of 3'-9", 5'-3" & 5'-3" (left to right) as shown on plan. To include two (2) end supports, two (2) center posts, three (3) 3/8" tempered glass front panels, three (3) 3/8" tempered glass top shelves, two (2) full height ¼" tempered glass end panels & 1130605-120-54 (for right & center sections), 1130605-120-36 (for left section) warmer/fluorescent light combos with separate remote infinite control for warmer and remote switch for light for each. Finish to be brushed aluminum (KEC to verify with Architect). MWU5 heavy duty flange/inverted under counter mount for millwork counter. 1” diameter aluminum tubing single supports, NSF, UL listed.

Under counter mount includes heavy duty flanges, stainless steel wood screws & nylon grommets (requires under counter access).

Electrical Contractor to mount Brass Smith provided remote controls at an accessible location on server side counter face and interwire as necessary through Food Guard post.

KEC to verify dimensions, post locations, spacing & mounting style in field prior to fabrication.

**ITEM 1.165**  
**DROP-IN REFRIGERATED COLD PAN/REFRIGERATED BASE**  
**BSI, LLC CUSTOM/NSF**

Specified as part of Item 1.158.
ITEM 1.166 OPEN NUMBER

ITEM 1.167 OPEN NUMBER

ITEM 1.168 OPEN NUMBER

ITEM 1.169 SOUP WARMER EXISTING/RELOCATE

KEC shall coordinate with the GC to disconnect any utilities from existing equipment as required.

KEC is responsible for the removal, cleaning, storage & relocation of item as required and specified on the bid document and to coordinate final placement of Item as shown on plan with counter manufacturer.

Appropriate trades to make final required utility connections.

ITEM 1.170 ISLAND COUNTER BSI, LLC CUSTOM/NSF

Constructed and equipped in accordance with plans, elevations, sections and details as shown on Architectural drawings & FS.09-FS.12.

Configuration to be Contoura construction consisting of 3/16” powder coated or stainless steel end panels (verify end panel finishes with Architect) connected by galvanized horizontal supports using mechanical fasteners. Interior to be made up of 16 ga. stainless steel & removable bottom shelf. Meganite (color to be verified with Architect) top to be adhered to galvanized horizontal supports and be installed to meet manufacturer’s guidelines for application.

Provide removable bottom shelf.
Removable stainless steel kick plates on all front sides.
Coordinate cutout, installation and wiring of all drop-in & undercounter equipment.
Reference millwork counters, tops and interior finish sections 06400 & 11400 for construction details.
KEC to verify all finishes with Architect.

ITEM 1.171 MOBILE UNDERCOUNTER REFRIGERATOR TRUE FOOD SERVICE EQUIPMENT, INC. TUC-48-LP

33-38° F, twelve (12) cubic feet capacity. 300 series stainless steel top & sides, white aluminum interior with 300 series stainless steel floor, two (2) stainless steel doors hinged as shown on plan, 1½” diameter dual wheel casters, front breathing, cord & plug.

Five (5) year compressor warranty.
One (1) year parts and labor warranty.
16 ga. stainless steel top.
Four (4) interior wire shelves, clips included.
Exterior digital thermometer.
Factory installed barrel door locks master keyed to all True cabinets.
ITEM 1.172  OPEN NUMBER

ITEM 1.173  DROP-IN HAND SINK
ADVANCE TABCO DI-1-5

Single compartment, 10" wide X 14" front-to-back X 5" deep bowl, 20 gauge stainless steel, with deck mounted gooseneck faucet, basket drain.

K-28 thick counter mounting clips for drop-in sinks into counters over 7/8" and up to 2" thick (set of 4). K-320-LU wrist handles, for deck mounted faucets.
7-PS-10 P-trap, heavy duty, 1½", 17 gauge.
7-PS-35 wall mounted paper towel dispenser.
K-13 wall mounted soap dispenser, stainless steel, for liquid or lotion soap, push-in type pump.

ITEM 1.174  DROP-IN CONDIMENT PUMP
EXISTING (NOT SHOWN)

ITEM 1.175  FOOD GUARD
BSI, LLC ZG9945 EZ SPAN

Counter mounted, for self service application with top shelf, fully adjustable, approximately 7'-0" long. To include two (2) end supports, one (1) 3/8" tempered glass front panel, one (1) 3/8" tempered glass top shelf, two (2) full height ¼" tempered glass end panels, and a single row of Slimline fluorescent lighting with 4100K lamps throughout. Finish to be brushed aluminum (KEC to verify with Architect). MWU5 heavy duty flange/inverted under counter mount for millwork counter. 1” diameter aluminum tubing single supports, NSF, UL listed.

Under counter mount includes heavy duty flanges, stainless steel wood screws & nylon grommets (requires under counter access).

Electrical Contractor to provide counter mounted on/off switch at an accessible location on server side counter face and interwire as necessary through Food Guard post.

KEC to verify dimensions, post locations, spacing & mounting style in field prior to fabrication.

ITEM 1.176  DROP-IN REFRIGERATED COLD PAN/REFRIGERATED BASE
BSI, LLC CUSTOM/NSF

Specified as part of Item 1.158.

ALTERNATE 1

ITEM 1.002  HOT FOOD HOLDING DISPLAY
EXISTING/RELOCATE

KEC shall coordinate with the GC to disconnect any utilities from existing equipment as required.

KEC is responsible for the removal, cleaning, storage & relocation of item as required and specified on the bid document and to coordinate final placement of Item as shown on plan with counter manufacturer.
Appropriate trades to make final required utility connections.

**ITEM 1.005**  
**WASTE RECEPTACLE**  
**NIKEC/BY OWNER**

This Item is not in the Kitchen Equipment Contract.

**ITEM 1.006**  
**CONVEYOR TOASTER**  
**EXISTING/RELOCATE**

KEC shall coordinate with the GC to disconnect any utilities from existing equipment as required.

KEC is responsible for the removal, cleaning, storage & relocation of item as required and specified on the bid document and to coordinate final placement of Item as shown on plan with counter manufacturer.

Appropriate trades to make final required utility connections.

**ITEM 1.009**  
**DROP-IN HOT FOOD WELL**  
**EXISTING/RELOCATE**

KEC shall coordinate with the GC to disconnect any utilities from existing equipment as required.

KEC is responsible for the removal, cleaning, storage, and relocation of item as required and specified on the bid document and to coordinate final placement of Item as shown on plan with counter manufacturer.

Appropriate trades to make final required utility connections.

**ITEM 1.011**  
**FOOD GUARD**  
**BSI, LLC ZG9930**

Counter mounted, for self serve & full serve applications with top shelf, fully adjustable, approximately 6'-0" long in two (2) sections consisting of a 4'-0" self serve section & a 2'-0" full serve section (left to right) as shown on plan. To include two (2) end supports, one (1) center post, two (2) 3/8" tempered glass front panels, two (2) 3/8" tempered glass top shelves, two (2) full height ¼" tempered glass end panels, one (1) 1130605-120-42 warmer/fluorescent light combo (in 4'-0" section) & one (1) single row of Slimline fluorescent lighting with 4100K lamps throughout (in 2'-0" section) with separate remote infinite control for warmer and remote switch for light for each. Finish to be brushed aluminum (KEC to verify with Architect).

MWU5 heavy duty flange/inverted under counter mount for millwork counter. 1" diameter aluminum tubing single supports, NSF, UL listed.

Under counter mount includes heavy duty flanges, stainless steel wood screws & nylon grommets (requires under counter access).

Electrical Contractor to mount Brass Smith provided remote controls at an accessible location on server side counter face for warmer/fluorescent light combo and to provide counter mounted on/off switch at an accessible location on server side counter face for fluorescent lighting and interwire as necessary through Food Guard post.

KEC to verify dimensions, post locations, spacing & mounting style in field prior to fabrication.
ITEM 1.012 BACK COUNTER
BSI, LLC CUSTOM/NSF

Constructed and equipped in accordance with plans, elevations, sections and details as shown on Architectural drawings & FS.14.

Configuration to be Contoura construction consisting of 3/16" powder coated or stainless steel end panels (verify end panel finishes with Architect) connected by galvanized horizontal supports using mechanical fasteners. Interior to be made up of 16 ga. stainless steel, removable bottom shelf and 18 ga. stainless steel back. Meganite (color to be verified with Architect) top to be adhered to galvanized horizontal supports and be installed to meet manufacturer’s guidelines for application.

Provide removable bottom shelf.
Provide intermediate shelf for storage.
Coordinate installation and wiring of all counter top & adjacent free standing equipment.
Reference millwork counters, tops and interior finish sections 06400 & 11400 for construction details.
KEC to verify all finishes with Architect.

ITEM 1.013 COUNTER GRIDDLE
EXISTING/RELOCATE

KEC shall coordinate with the GC to disconnect any utilities from existing equipment as required.

KEC is responsible for the removal, cleaning, storage, and relocation of item as required and specified on the bid document and to coordinate final placement of Item as shown on plan with counter manufacturer.

Appropriate trades to make final required utility connections.

ITEM 1.014 MOBILE REFRIGERATED EQUIPMENT STAND
EXISTING/RELOCATE

KEC shall coordinate with the GC to disconnect any utilities from existing equipment as required.

KEC is responsible for the removal, cleaning, storage, relocation & refrigeration start-up/adjustment of item as required and specified on the bid document and to coordinate final placement of Item as shown on plan.

Appropriate trades to make final required utility connections.

ITEM 1.015 FOUR BURNER COUNTER RANGE
EXISTING/RELOCATE

KEC shall coordinate with the GC to disconnect any utilities from existing equipment as required.

KEC is responsible for the removal, cleaning, storage, and relocation of item as required and specified on the bid document and to coordinate final placement of Item as shown on plan with counter manufacturer.

Appropriate trades to make final required utility connections.
ITEM 1.017 MOBILE FRYER BATTERY
EXISTING/RELOCATE
KEC shall coordinate with the GC to disconnect any utilities from existing equipment as required.

KEC is responsible for the removal, cleaning, storage, and relocation of item as required and specified on the bid document and to coordinate final placement of Item as shown on plan with counter manufacturer.

Appropriate trades to make final required utility connections.

ITEM 1.018 CONVEYOR BROILER
EXISTING/RELOCATE
KEC shall coordinate with the GC to disconnect any utilities from existing equipment as required.

KEC is responsible for the removal, cleaning, storage, and relocation of item as required and specified on the bid document and to coordinate final placement of Item as shown on plan with counter manufacturer.

Appropriate trades to make final required utility connections.

ITEM 1.019 REFRIGERATED WORK TABLE
EXISTING/RELOCATE
KEC shall coordinate with the GC to disconnect any utilities from existing equipment as required.

KEC is responsible for the removal, cleaning, storage, relocation & refrigeration start-up/adjustment of item as required and specified on the bid document and to coordinate final placement of Item as shown on plan.

Appropriate trades to make final required utility connections.

ITEM 1.020 EXHAUST VENTILATOR
EXISTING/RELOCATE
KEC shall coordinate with the GC to disconnect any utilities from existing equipment as required.

KEC is responsible for the removal, cleaning, storage, relocation start-up/adjustment & air balancing of item as required and specified on the bid document and to coordinate final placement of Item as shown on plan.

KEC to verify ventilator is able to meet exhaust requirements of relocated equipment as shown on plan.

Appropriate trades to make final required utility connections.

ITEM 1.021 FIRE EXTINGUISHING SYSTEM
ANSUL R-102
Part of Item 1.022
System shall provide surface and duct protection for items of cooking equipment located beneath the Ventilator, Item 1.022, in accordance with all applicable codes, regulations and provisions of NFPA 17A and 96.
All system piping and fitting shall be concealed where possible

System shall be inter-wired with shunt-trip breaker and electric/gas shut-off valve serving items of cooking equipment beneath the ventilator to provide power and fuel shut-off in the event of system actuation

Remote octagonal fire pull station located at 4'-0" above finished floor and minimum of 10'-0" from cooking surface

Installation, field inspection and specification shall be performed by a factory authorized Ansul agency

KEC to verify all state and local codes for compliance.

ITEM 1.022  EXHAUST VENTILATOR
CAPTIVE-AIRE/AQUAMATIC 6024NDI

Constructed and equipped as shown on plan and per CaptiveAire/Aquamatic drawing 1069493

11'-0" long (10'-0" active) X 5'-0" deep (including utility cabinet housing) island ventilator with integral fire extinguishing system.

304 stainless steel construction. Contractor to verify exterior finish with Architect prior to construction.

Twelve (12) 16" X 20" Kleen-Gard high efficiency UL baffle filters with handles, stainless steel.

The ventilator shall be equipped with ten (10) vapor proof compact fluorescent bulb light fixtures. Light fixtures shall be factory pre-wired to a single connection point. Ventilators built in multiple sections shall be furnished with coiled flex conduit for interconnecting sections.

The ventilator shall be factory pre-wired to a single connection point. Ventilators built in multiple sections shall be furnished with coiled flex conduit for interconnecting sections by applicable trade.

The ventilator shall be UL and NSF listed. The ventilator shall comply with all requirements of NFPA-96, IMC, UMC, BOCA and SBCCI model codes.

½ pint grease cup new style, flanged slotted

1" wide insulated left end standoff

18" high field wrapper on front, left, right & back

Piping for Fire Extinguishing System, Item 2.021, shall be provided internally by ventilator manufacturer.

Provide 18 gauge stainless steel enclosure panels from top of ventilator to underside of building ceiling.

Manufacture shall supervise unit installation

Contractor to verify that ventilator meets all applicable code requirements prior to construction.

ITEM 1.023  REACH-IN FREEZER
EXISTING/RELOCATE

KEC shall coordinate with the GC to disconnect any utilities from existing equipment as required.
KEC is responsible for the removal, cleaning, storage, relocation & refrigeration start-up/adjustment of item as required and specified on the bid document and to coordinate final placement of Item as shown on plan.

Appropriate trades to make final required utility connections

**ITEM 1.024 REACH-IN REFRIGERATOR**
**EXISTING/RELOCATE**

KEC shall coordinate with the GC to disconnect any utilities from existing equipment as required.

KEC is responsible for the removal, cleaning, storage, relocation & refrigeration start-up/adjustment of item as required and specified on the bid document and to coordinate final placement of Item as shown on plan.

Appropriate trades to make final required utility connections

**ITEM 1.025 HAND SINK WITH SOAP & TOWEL DISPENSER**
**EXISTING/RELOCATE**

KEC shall coordinate with the GC to disconnect any utilities from existing equipment as required.

KEC is responsible for the removal, cleaning, storage, and relocation of item as required and specified on the bid document and to coordinate final placement of Item as shown on plan.

Appropriate trades to make final required utility connections

**ITEM 1.026 MOBILE UNDERCOUNTER DRAWER WARMER**
**NIKEC/FUTURE ALTO-SHAAM 500-3D**

This Item is not in the Kitchen Equipment Contract.

EcoSmart™ free standing, three (3) drawer, large stainless steel pan, capacity of fifty (50) rolls or thirty-four (34) baked potatoes per drawer, stainless steel exterior, cord & plug

Electronic control LED display with on/off power switch & electronic temperature adjustment in lieu of standard manual controls

Drawer assembly, with vents, for 500-3D drawer unit warmer

Anti-tip kit

3" caster stand assembly, two (2) casters with locking brakes (overall height of unit not to exceed 31").

**ITEM 1.029 FOOD GUARD**
**BSI, LLC ZG9500-4**

Counter mounted, for full service/vertical application with no top shelf, fully adjustable, approximately 9'-0" long in two (2) equal sections with 18" high glass panels. To include two (2) end supports & two (2) 3/8" tempered glass front panels. Finish to be brushed aluminum (KEC to verify with Architect). MWU5 heavy duty flange/inverted under counter mount for millwork counter. 1" diameter aluminum tubing single supports, NSF listed.
Under counter mount includes heavy duty flanges, stainless steel wood screws & nylon grommets (requires under counter access).

**ITEM 1.030 THERMAL STONE SHELF**  
NIKEC/FUTURE  
HATCO GRSS-6018

This Item is not in the Kitchen Equipment Contract.

Glo-Ray® counter top heated stone shelf, portable, 60" X 18" X 2½", 100-200°F temperature range, cord and plug

KEC to verify decorative stone color with Architect.

**ITEM 1.031 FOOD GUARD**  
BSI, LLC ZG9930

Counter mounted, for self serve application with top shelf, fully adjustable, approximately 6'-0" long in two (2) equal sections as shown on plan. To include two (2) end supports, one (1) center post, two (2) 3/8" tempered glass front panels, two (2) 3/8" tempered glass top shelves, two (2) full height ¼" tempered glass end panels & two (2) 1130605-120-30 warmer/fluorescent light combos with separate remote infinite control for warmer and remote switch for light for each. Finish to be brushed aluminum (KEC to verify with Architect). MWU5 heavy duty flange/inverted under counter mount for millwork counter. 1" diameter aluminum tubing single supports, NSF, UL listed.

Under counter mount includes heavy duty flanges, stainless steel wood screws & nylon grommets (requires under counter access).

Electrical Contractor to mount Brass Smith provided remote controls at an accessible location on server side counter face and interwire as necessary through Food Guard post.

KEC to verify dimensions, post locations, spacing & mounting style in field prior to fabrication.

**ITEM 1.032 FIRE EXTINGUISHING SYSTEM**  
EXISTING/RELOCATE

KEC shall coordinate with the GC to disconnect any utilities from existing equipment as required.

KEC is responsible for the removal, cleaning, storage, and relocation of item as required and specified on the bid document and to coordinate final placement of Item as shown on plan.

KEC to verify system is able to meet all code requirements providing adequate fire extinguishing for Item 1.020.

Appropriate trades to make final required utility connections.
ITEM 1.033  DROP-IN SINK
EXISTING/RELOCATE

KEC shall coordinate with the GC to disconnect any utilities from existing equipment as required.

KEC is responsible for the removal, cleaning, storage, and relocation of item as required and specified on
the bid document and to coordinate final placement of Item as shown on plan.

Appropriate trades to make final required utility connections.

ITEM 1.034  BACK COUNTER
BSI, LLC CUSTOM/NSF

Constructed and equipped in accordance with plans, elevations, sections and details as shown on
Architectural drawings & FS.14.

Configuration to be Contoura construction consisting of 3/16” powder coated or stainless steel end panels
(verify end panel finishes with Architect) connected by galvanized horizontal supports using mechanical
fasteners. Interior to be made up of 16 ga. stainless steel, removable bottom shelf and 18 ga. stainless
steel back. Meganite (color to be verified with Architect) top to be adhered to galvanized horizontal
supports and be installed to meet manufacturer’s guidelines for application.

Provide removable bottom shelf.
Provide partial intermediate shelf for storage in non-sink section.
Coordinate cutout, installation and wiring of all drop-in & adjacent free standing equipment.
Reference millwork counters, tops and interior finish sections 06400 & 11400 for construction details.
KEC to verify all finishes with Architect.

ITEM 1.035  HEATED SANDWICH PRESS
EXISTING

ITEM 1.036  ROLL-THRU FREEZER
EXISTING/RELOCATE

KEC shall coordinate with the GC to disconnect any utilities from existing equipment as required.

KEC is responsible for the removal, cleaning, storage, relocation & refrigeration start-up/adjustment of
item as required and specified on the bid document and to coordinate final placement of Item as shown
on plan.

Appropriate trades to make final required utility connections.

ITEM 1.037  MOBILE RACK
EXISTING/RELOCATE

KEC is responsible for the removal, cleaning, storage, and relocation of item as required and specified on
the bid document and to coordinate final placement of Item as shown on plan.
ITEM 1.038 BACK COUNTER
BSI, LLC CUSTOM/NSF

Constructed and equipped in accordance with plans, elevations, sections and details as shown on Architectural drawings & FS.14.

Configuration to be Contoura construction consisting of 3/16” powder coated or stainless steel end panels (verify end panel finishes with Architect) connected by galvanized horizontal supports using mechanical fasteners. Interior to be made up of 16 ga. stainless steel, removable bottom shelf and 18 ga. stainless steel back. Meganite (color to be verified with Architect) top to be adhered to galvanized horizontal supports and be installed to meet manufacturer’s guidelines for application.

Provide removable bottom shelf.
Provide partial intermediate shelf for storage in non-sink section.
Coordinate cutout, installation and wiring of all drop-in & adjacent free standing equipment.
Reference millwork counters, tops and interior finish sections 06400 & 11400 for construction details.
KEC to verify all finishes with Architect.

ITEM 1.039 DROP-IN HAND SINK
EXISTING/RELOCATE

KEC shall coordinate with the GC to disconnect any utilities from existing equipment as required.

KEC is responsible for the removal, cleaning, storage, and relocation of item as required and specified on the bid document and to coordinate final placement of Item as shown on plan.

Appropriate trades to make final required utility connections.

ITEM 1.041 WORK TABLE
EXISTING (ITEM 85 FROM MAIN KITCHEN)/RELOCATE

KEC is responsible for the removal, cleaning, storage, and relocation of item as required and specified on the bid document and to coordinate final placement of Item as shown on plan.

ITEM 1.050 GRILL COUNTER
BSI, LLC CUSTOM/NSF

Constructed and equipped in accordance with plans, elevations, sections and details as shown on Architectural drawings & FS.14.

Configuration to be Contoura construction consisting of 3/16” powder coated or stainless steel end panels connected by galvanized horizontal supports using mechanical fasteners. Counter front décor panels to be supported by 14 ga. galvanized spars creating a utility chase. Interior to be made up of 16 ga. stainless steel, removable bottom shelf and 18 ga. stainless steel, removable back for access to utility chase. Meganite (color to be verified with Architect) top to be adhered to galvanized horizontal supports and be installed to meet manufacturer’s guidelines for application.

Provide removable bottom shelf.
Meganite tray rest (KEC to verify color with Architect).
Provide internal chaseway in counter front for concealed wiring and plumbing.
Removable stainless steel kick plates on public side.
Coordinate cutout, installation and wiring of all counter top & undercounter equipment and food guards.
Load center for single point connection. Reference millwork counters, tops and interior finish sections 06400 & 11400 for construction details. KEC to verify all finishes with Architect.

**ALTERNATE 2**

**ITEM 1.005 WASTE RECEPTACLE**
NIKEC/BY OWNER

This Item is not in the Kitchen Equipment Contract.

**ITEM 1.009 DROP-IN HOT FOOD WELL**
EXISTING/RELOCATE

KEC shall coordinate with the GC to disconnect any utilities from existing equipment as required.

KEC is responsible for the removal, cleaning, storage, and relocation of item as required and specified on the bid document and to coordinate final placement of Item as shown on plan with counter manufacturer.

Appropriate trades to make final required utility connections.

**ITEM 1.035 HEATED SANDWICH PRESS**
EXISTING/RELOCATE

KEC shall coordinate with the GC to disconnect any utilities from existing equipment as required.

KEC is responsible for the removal, cleaning, storage, and relocation of item as required and specified on the bid document and to coordinate final placement of Item as shown on plan.

Appropriate trades to make final required utility connections.

**ITEM 1.040 WORK TABLE**
EXISTING/RELOCATE

KEC is responsible for the removal, cleaning, storage, and relocation of item as required and specified on the bid document and to coordinate final placement of Item as shown on plan.

**ITEM 1.042 FOOD GUARD**
BSI, LLC ZG9930

Counter mounted, for full serve application with top shelf, fully adjustable, approximately 4'-6" long as shown on plan. To include two (2) end supports, one (1) 3/8" tempered glass front panel, one (1) 3/8" tempered glass top shelf, two (2) full height 1/4" tempered glass end panels & 1130605-120-48 warmer/fluorescent light combo with remote infinite control for warmer and remote switch for light. Finish to be brushed aluminum (KEC to verify with Architect). MWU5 heavy duty flange/inverted under counter mount for millwork counter. 1" diameter aluminum tubing single supports, NSF, UL listed.

Under counter mount includes heavy duty flanges, stainless steel wood screws & nylon grommets (requires under counter access).
Electrical Contractor to mount Brass Smith provided remote controls at an accessible location on server side counter face and interwire as necessary through Food Guard post.

KEC to verify dimensions, post locations, spacing & mounting style in field prior to fabrication.

ITEM 1.044 MOBILE UNDERCOUNTER HEATED HOLDING CABINET
NIKEC/FUTURE
ALTO-SHAAM 750-S/STD

This Item is not in the Kitchen Equipment Contract.

Halo Heat® EcoSmart™ free standing, on/off adjustable thermostat, indicator light, two (2) chrome plated side racks & three (3) wire shelves, aluminum exterior, capacity of ten (10) 12” x 20” full size pans, UL, CE, EnergyStar® rated, cord & plug.

2½” low profile casters, two (2) with locking brakes.
Full perimeter rubber bumper.
Door hinged as shown on plan.
LK-22567 cylinder door handle locks, master keyed to all other Alto-Shaam cabinets.
Overall unit height not to exceed 32” for placement under ADA 34” high counter.

ITEM 1.047 DOUBLE INDUCTION WARMER
EXISTING/RELOCATE

KEC shall coordinate with the GC to disconnect any utilities from existing equipment as required.

KEC is responsible for the removal, cleaning, storage, and relocation of item as required and specified on the bid document and to coordinate final placement of Item as shown on plan with counter manufacturer.

Appropriate trades to make final required utility connections.

ITEM 1.048 FOOD GUARD
BSI, LLC ZG9930

Counter mounted, for full serve application with top shelf, fully adjustable, approximately 6'-2" long in two (2) sections consisting of a 4'-2" & 2'-0" section (left to right) as shown on plan. To include two (2) end supports, one (1) center post, two (2) 3/8” tempered glass front panels, two (2) 3/8” tempered glass top shelves, two (2) full height ¼” tempered glass end panels, one (1) 1130605-120-42 (in 4'-2” section) & one (1) 1130605-120-18 (in 2'-0” section) warmer/fluorescent light combos with separate remote infinite control for warmer and remote switch for light for each. Finish to be brushed aluminum (KEC to verify with Architect). MWU5 heavy duty flange/inverted under counter mount for millwork counter. 1” diameter aluminum tubing single supports, NSF, UL listed.

Under counter mount includes heavy duty flanges, stainless steel wood screws & nylon grommets (requires under counter access).

Electrical Contractor to mount Brass Smith provided remote controls at an accessible location on server side counter face and interwire as necessary through Food Guard post.

KEC to verify dimensions, post locations, spacing & mounting style in field prior to fabrication.
ITEM 1.049 FOOD GUARD
BSI, LLC ZG9500-4

Counter mounted, for full service/vertical application with no top shelf, fully adjustable, approximately 3'-2" long with an 18" high glass panel. To include two (2) end supports & one (1) 3/8" tempered glass front panel. Finish to be brushed aluminum (KEC to verify with Architect). MWU5 heavy duty flange/inverted under counter mount for millwork counter. 1" diameter aluminum tubing single supports, NSF listed.

Under counter mount includes heavy duty flanges, stainless steel wood screws & nylon grommets (requires under counter access).

ITEM 1.051 OPEN NUMBER

ITEM 1.053 PANINI COUNTER
BSI, LLC CUSTOM/NSF

Constructed and equipped in accordance with plans, elevations, sections and details as shown on Architectural drawings & FS.17.

Configuration to be Contoura construction consisting of 3/16" powder coated or stainless steel end panels connected by galvanized horizontal supports using mechanical fasteners. Counter front décor panels to be supported by 14 ga. galvanized spars creating a utility chase. Interior to be made up of 16 ga. stainless steel, removable bottom shelf and 18 ga. stainless steel, removable back for access to utility chase. Meganite (color to be verified with Architect) top to be adhered to galvanized horizontal supports and be installed to meet manufacturer’s guidelines for application.

Provide removable bottom shelf.
Meganite tray rest (KEC to verify color with Architect).
Provide internal chaseway in counter front for concealed wiring and plumbing.
Removable stainless steel kick plates on public side.
Coordinate cutout, installation and wiring of all counter top & undercounter equipment and food guards.
Load center for single point connection.
Reference millwork counters, tops and interior finish sections 06400 & 11400 for construction details.
KEC to verify all finishes with Architect.

ALTERNATE 3

ITEM 1.001 COUNTER ROTISSERIE
ALTO-SHAAM AR-7E-DBLPANE

EcoSmart™, electric, temperature dropping hold mode, stainless steel exterior & solid stainless steel back, double pane curved glass front door, cook & hold modes, solid state electronic controls, recessed interior lighting, 4" adjustable stainless steel legs, seven (7) angled spits with drip pan & drain.

Upgrade to deluxe model (includes programmable menu memory control).
AR-7VH ventless hood.
Left-hand door swing.
ITEM 1.005  WASTE RECEPTACLE
NIKEC/BY OWNER

This Item is not in the Kitchen Equipment Contract.

ITEM 1.019  REFRIGERATED WORK TABLE
EXISTING/RELOCATE

KEC shall coordinate with the GC to disconnect any utilities from existing equipment as required.

KEC is responsible for the removal, cleaning, storage, relocation & refrigeration start-up/adjustment of item as required and specified on the bid document and to coordinate final placement of Item as shown on plan.

Appropriate trades to make final required utility connections.

ITEM 1.025  HAND SINK WITH SOAP & TOWEL DISPENSER
EXISTING/RELOCATE

KEC shall coordinate with the GC to disconnect any utilities from existing equipment as required.

KEC is responsible for the removal, cleaning, storage, and relocation of item as required and specified on the bid document and to coordinate final placement of Item as shown on plan.

Appropriate trades to make final required utility connections.

ITEM 1.035  HEATED SANDWICH PRESS
EXISTING/RELOCATE

KEC shall coordinate with the GC to disconnect any utilities from existing equipment as required.

KEC is responsible for the removal, cleaning, storage, and relocation of item as required and specified on the bid document and to coordinate final placement of Item as shown on plan.

Appropriate trades to make final required utility connections.

ITEM 1.037  MOBILE RACK
EXISTING/RELOCATE

KEC is responsible for the removal, cleaning, storage, and relocation of item as required and specified on the bid document and to coordinate final placement of Item as shown on plan.

ITEM 1.051  EL CANIBAL COUNTER
BSI, LLC CUSTOM/NSF

Constructed and equipped in accordance with plans, elevations, sections and details as shown on Architectural drawings & FS.20.

Configuration to be Contoura construction consisting of 3/16” powder coated or stainless steel end panels connected by galvanized horizontal supports using mechanical fasteners. Counter front décor panels to be supported by 14 ga. galvanized spars creating a utility chase. Interior to be made up of 16 ga. stainless steel, removable bottom shelf and 18 ga. stainless steel, removable back for access to utility
chase. Stainless Steel top to be adhered to galvanized horizontal supports and be installed to meet manufacturer’s guidelines for application.

Counter to be fabricated to mate with right end of Tabor Counter (Item 1.055 in base plan) and welded with a smooth ground and polished field joint.
Provide removable bottom shelf.
Meganite tray rest (KEC to verify color with Architect).
Counter to be constructed for future addition of Meganite top without impact to current overall counter height (ADA 34").
Provide internal chaseway in counter front for concealed wiring and plumbing.
Removable stainless steel kick plates on public side.
Coordinate cutout, installation and wiring of all drop-in, counter top & undercounter equipment and food guards.
Pull box for single point connection.
Reference millwork counters, tops and interior finish sections 06400 & 11400 for construction details.
KEC to verify all finishes with Architect.

ITEM 1.052 ROLL-THRU REFRIGERATOR
EXISTING/RELOCATE

KEC shall coordinate with the GC to disconnect any utilities from existing equipment as required.

KEC is responsible for the removal, cleaning, storage, relocation & refrigeration start-up/adjustment of item as required and specified on the bid document and to coordinate final placement of Item as shown on plan.

Appropriate trades to make final required utility connections.

ITEM 1.054 REACH-IN HEATED CABINET
EXISTING/RELOCATE

KEC shall coordinate with the GC to disconnect any utilities from existing equipment as required.

KEC is responsible for the removal, cleaning, storage, and relocation of item as required and specified on the bid document and to coordinate final placement of Item as shown on plan.

Appropriate trades to make final required utility connections.

ITEM 1.059 DROP-IN HOT FOOD WELL
DUKE MANUFACTURING ADI-2E

Electric with two (2) 12" X 20" hot food wells, remote control panel, 32¼" long, 12¾" high, stainless steel top and interior liner, steel exterior housing, exposed elements, includes 576 spillage pans.

ITEM 1.060 FOOD GUARD
BSI, LLC ZG9930

Counter mounted, for full serve application with top shelf, fully adjustable, approximately 15'-6" long in three (3) sections consisting of 4'-6", 5'-6" & 5'-6" sections (left to right) as shown on plan. To include two (2) end supports, two (2) center posts, three (3) 3/8" tempered glass front panels, three (3) 3/8" tempered glass top shelves, two (2) full height ¼" tempered glass end panels, one (1) 1130605-120-48
warmer/fluorescent light combo (in 4'-6" section), one (1) 1130605-120-60 warmer/fluorescent light combo (in center 5'-6" section) & one (1) single row of Slimline fluorescent lighting with 4100K lamps throughout (in right 5'-6" section) with separate remote infinite control for warmer and remote switch for light for each. Finish to be brushed aluminum (KEC to verify with Architect). MWU5 heavy duty flange/inverted under counter mount for millwork counter. 1" diameter aluminum tubing single supports, NSF, UL listed.

Under counter mount includes heavy duty flanges, stainless steel wood screws & nylon grommets (requires under counter access).

Electrical Contractor to mount Brass Smith provided remote controls at an accessible location on server side counter face for warmer/fluorescent light combo and to provide counter mounted on/off switch at an accessible location on server side counter face for fluorescent lighting and interwire as necessary through Food Guard post.

KEC to verify dimensions, post locations, spacing & mounting style in field prior to fabrication.

**ITEM 1.061 BACK COUNTER**
BSI, LLC CUSTOM/NSF

Constructed and equipped in accordance with plans, elevations, sections and details as shown on Architectural drawings & FS.20.

Configuration to be Contoura construction consisting of 3/16" powder coated or stainless steel end panels (verify end panel finishes with Architect) connected by galvanized horizontal supports using mechanical fasteners. Interior to be made up of 16 ga. stainless steel, removable bottom shelf and 18 ga. stainless steel back. Meganite (color to be verified with Architect) top to be adhered to galvanized horizontal supports and be installed to meet manufacturer's guidelines for application.

Provide removable bottom shelf.
Provide partial intermediate shelf for storage in non-sink section.
Coordinate cutout, installation and wiring of all drop-in, counter top & adjacent free standing equipment.
Reference millwork counters, tops and interior finish sections 06400 & 11400 for construction details.
KEC to verify all finishes with Architect.

**ITEM 1.062 REACH-IN REFRIGERATOR**
EXISTING/RELOCATE

KEC shall coordinate with the GC to disconnect any utilities from existing equipment as required.

KEC is responsible for the removal, cleaning, storage, relocation & refrigeration start-up/adjustment of item as required and specified on the bid document and to coordinate final placement of Item as shown on plan.

Appropriate trades to make final required utility connections.

**ITEM 1.063 OPEN NUMBER**

**ITEM 1.064 OPEN NUMBER**
ITEM 1.065 FOOD GUARD
BSI, LLC ZG9500-4

Counter mounted, for full service/vertical application with no top shelf, fully adjustable, approximately 4'-0" long with an 18" high glass panel. To include two (2) end supports & one (1) 3/8" tempered glass front panel. Finish to be brushed aluminum (KEC to verify with Architect). MWU5 heavy duty flange/inverted under counter mount for millwork counter. 1" diameter aluminum tubing single supports, NSF listed.

Under counter mount includes heavy duty flanges, stainless steel wood screws & nylon grommets (requires under counter access).

ITEM 1.069 BACK COUNTER
BSI, LLC CUSTOM/NSF

Constructed and equipped in accordance with plans, elevations, sections and details as shown on Architectural drawings & FS.20.

Configuration to be Contoura construction consisting of 3/16" powder coated or stainless steel end panels (verify end panel finishes with Architect) connected by galvanized horizontal supports using mechanical fasteners. Interior to be made up of 16 ga. stainless steel, removable bottom shelf and 18 ga. stainless steel back. Meganite (color to be verified with Architect) top to be adhered to galvanized horizontal supports and be installed to meet manufacturer’s guidelines for application.

Provide removable bottom shelf.
Provide partial intermediate shelf for storage in non-sink section.
Coordinate cutout, installation and wiring of all drop-in, counter top & adjacent free standing equipment.
Reference millwork counters, tops and interior finish sections 06400 & 11400 for construction details.
KEC to verify all finishes with Architect.

ITEM 1.070 COUNTER TOP FOOD WARMER
EXISTING/RELOCATE

KEC shall coordinate with the GC to disconnect any utilities from existing equipment as required.

KEC is responsible for the removal, cleaning, storage, and relocation of item as required and specified on the bid document and to coordinate final placement of Item as shown on plan.

Appropriate trades to make final required utility connections.

ITEM 1.071 DROP-IN SINK
ADVANCE TABCO DI-1-2012

Single compartment, 20" wide X 16" front to back X 12" deep bowl, 18 gauge stainless steel, with deck mounted 12" swing spout faucet, basket drain.

K-28 thick counter mounting clips for drop-in sinks into counters over 7/8" and up to 2" thick (if required).
K-320-LU wrist handles, for deck mounted faucets.
7-PS-10 P-trap, heavy duty, 1½", 17 gauge.

ITEM 1.072 OPEN NUMBER
ITEM 1.074 DROP-IN REFRIGERATED COLD PAN EXISTING/RELOCATE

KEC shall coordinate with the GC to disconnect any utilities from existing equipment as required.

KEC is responsible for the removal, cleaning, storage, and relocation of Item as required and specified on the bid document and to coordinate final placement of Item as shown on plan with counter manufacturer.

Appropriate trades to make final required utility connections.

END OF SECTION 11400
PART 1 - GENERAL

1.1 SUMMARY

A. Section includes furniture, refer to product data sheets end of Section.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for furniture.

B. Shop Drawings: For furniture. Include plans, elevations, sections, details, and attachments to other work.
   1. Indicate locations, dimensions, and profiles of wall and floor reinforcements.
   2. Indicate locations and installation details of built-in anchors.
   3. Show elevations of furniture and indicate dimensions of furniture, preparations for receiving anchors, and locations of anchorage.

C. Samples for Initial Selection: For furniture with factory-applied color finishes.

D. Product Certificates: For each type of furniture, from manufacturer.

E. Maintenance Data: For each type of furniture, from manufacturer.

1.3 QUALITY ASSURANCE

A. Installer and Fabricator Qualifications: Engage an authorized installer, approved by the manufacturer and who has successfully completed installations of the size and type required for this project and who has been continuously engaged in this type of installation for not less than five years.

B. Preinstallation Conference: Conduct conference at Project site.

1.4 DELIVERY, STORAGE AND HANDLING

A. Deliver Furniture components cartoned or crated to provide protection during transit and job site storage in accordance with manufacturer’s instructions. Do not deliver to job until job storage environment is, and will be, maintained at suitable temperature and humidity. Store components on raised platforms to allow for air circulation. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged. Cover and protect as required.

1.5 PROJECT SITE CONDITIONS

A. Field Measurements: Prior to placing order, awarded vendor shall field measure all areas to fit furniture as show on furniture plans. Notify Contractor and Architect immediately of any discrepancies relative to furniture specification and field measurements prior to final furniture order being placed and production starting.
1.6 WARRANTY

A. All Furniture products – Limited Lifetime Warranty:
   1. Exceptions: 10 year: Electrical components, electrical accessories and fixed task lighting. 5 year: all other mechanisms including user adjusted work surfaces and other covering materials. 3 year: textiles, vinyl and acrylic.
   2. Exclusions: Normal wear and tear; failure to maintain products according to published manufacturer instruction and guidelines; abuse misuse, or accident; alteration or modification of the product.
   3. Not Covered: Consumables; COM or non-standard textiles and materials; variations occurring in surface materials; products or other manufacturers- these will be warranted by the other manufacturer.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
B. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, CS (Commercial Steel), Type B; suitable for exposed applications.
C. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, CS (Commercial Steel), Type B; free of scale, pitting, or surface defects; pickled and oiled.
D. Stainless-Steel Sheet, Strip, Plate, and Flat Bars: ASTM A 666 or ASTM A 240/A 240M, austenitic stainless steel, Type 304.
E. Steel Tubing: ASTM A 513, Type B unless otherwise indicated; thickness indicated or required by structural loads.
F. Steel Pipe: ASTM A 53/A 53M, Standard Weight (Schedule 40) unless another weight is indicated or required by structural loads.
G. Concealed Bolts: ASTM A 307, Grade A unless otherwise indicated.
H. Welding Rods and Bare Electrodes: Select according to AWS specifications.

2.2 FURNITURE

A. Products: Subject to compliance with requirements, provide products from manufacturers as indicated in product data sheets following end of this Section.

2.3 FABRICATION

A. Shop Assembly: Preassemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
B. Coordinate dimensions and attachment methods of furniture with those of adjoining construction to produce integrated assemblies with closely fitting joints and with edges and surfaces aligned unless otherwise indicated.

C. Shear and punch metals cleanly and accurately. Remove burrs.

D. Form and grind edges and corners to be free of sharp edges or rough areas.
   1. Fabricate furniture with no more than 1/32-inch (0.8-mm) gap between component materials. Weld edges that cannot be crimped to meet tolerance so as to provide a seamless joint with no place for concealment of contraband.

E. Form metal in maximum lengths to minimize joints. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing the Work.

F. Cut, reinforce, drill, and tap furniture as indicated to receive hardware, security fasteners, and similar items.

G. Form exposed work true to line and level with accurate angles, surfaces, and straight sharp edges.

H. Form exposed connections with hairline joints, flush and smooth using concealed fasteners where possible. Use exposed security fasteners of type indicated or, if not indicated, flat-head (countersunk) security fasteners. Locate joints where least conspicuous.

2.4 STEEL FINISHES

A. Surface Preparation: Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning" or SSPC-SP 8, "Pickling." After cleaning, apply a conversion coating suited to the organic coating to be applied over it.

B. Factory Prime Finish: Apply manufacturer's standard, fast-curing, lead- and chromate-free, universal primer immediately after surface preparation and pretreatment.

C. Baked-Enamel or Powder-Coat Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat. Comply with coating manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of 2 mils (0.05 mm).
   1. Color and Gloss: As selected by Architect from manufacturer's full range.

2.5 STAINLESS-STEEL FINISHES

A. General: Remove tool and die marks and stretch lines or blend into finish. Grind and polish surfaces to produce uniform, directionally textured, polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.

B. Intermediate Polish Finish: No. 3 unless otherwise indicated.

C. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of furniture.

B. Examine roughing-in for embedded and built-in anchors to verify actual locations of furniture before furniture installation.

C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of furniture.

D. Verify locations of furniture with those indicated on Shop Drawings.

E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations.

B. Assemble furniture requiring field assembly with security fasteners with no exposed fasteners on exposed faces and frames.

3.3 CLEANING AND PROTECTION

A. Touchup Painting: Immediately after erection, clean bolted connections and abraded areas of shop paint, and paint exposed areas with same material used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

B. Touchup Painting: Cleaning and touchup painting of bolted connections and abraded areas of shop paint are specified in Division 9 Section "Interior Painting."

END OF SECTION 12500
PROJECT NAME: UMC Food Service Remodel

PROJECT NUMBER: 109119.00

CATEGORY: COM

ITEM #: Banquette Fabric F-1

MODEL #: see below

MANUFACTURER: Architex

SOURCE: Colorado Correctional Industries

4999 Oakland Street
Denver, Colorado 80216-6517
David Daiker
(303) 489-1485
David.daiker@doc.state.co.us

DESCRIPTION:
Name: Beanstalk
Color: Bark
Content: 72% Polyester, 28% Rayon

SIZE:
Width: 54"
Repeat: 7" V, 6.75" H

FINISH/COLOR:
Crypton Stain Resistant Finish

FRAME: N/A

UPHOLSTERY: See above

GENERAL LOCATION:
Sidemark: UMC/ Falcon Bezant Banquette seat backs

TOTAL QUANTITY: TBD by the furniture manufacturer
## INTERIOR FURNITURE SPECIFICATIONS

**PROJECT NAME:** UMC Food Service Remodel  
**PROJECT NUMBER:** 109119.00  
**CATEGORY:** COM  
**ITEM #:** Banquette Fabric/F-2  
**MODEL #:** see below  
**MANUFACTURER:** Paul Brayton Designs  
**SOURCE:** Colorado Correctional Industries  
4999 Oakland Street  
Denver, Colorado 80216-6517  
David Daiker  
(303) 489-1485  
david.daiker@doc.state.co.us  

**DESCRIPTION:**  
Name: Almost  
Color: AM-45 Ocean (S-1A), AM-85 Chestnut (S1-B), AM-41 Honey (S1-C)  
Content: 1005 Nylon  
**SIZE:**  
Width: 54”  
Repeat: N/A  

**FINISH/COLOR:** Crypton Stain Resistant Finish  

**FRAME:** N/A  
**UPHOLSTERY:** See above, placement as shown on drawing A5-01  
**GENERAL LOCATION:** Sidemark: UMC Falcon Bezant Banquette seats  
**TOTAL QUANTITY:** TBD
**PROJECT NAME:** UMC Food Service Remodel  
**PROJECT NUMBER:** 109119.00  
**CATEGORY:** COM  
**ITEM #:** Sofa Fabric F-3  
**MODEL #:** see below  
**MANUFACTURER:** Arc-Com  
**SOURCE:** Colorado Correctional Industries  
4999 Oakland Street  
Denver, Colorado 80216-6517  
Att: David Daiker  
(303) 489-1485  
David.daiker@doc.state.co.us  

**DESCRIPTION:**  
Name: Leonardo (18 yds plain fabric each sofa)  
Number: AC-68920  
Color: Sand #1  
Content: 60% Cotton, 40% Polyester  

**SIZE:**  
Width: 54"  
Repeat: 24 1/2" H, 7" V  

**FINISH/COLOR:** Crypton Stain Resistant Finish  

**FRAME:** N/A  
**UPHOLSTERY:** See above  
**GENERAL LOCATION:** Sidemark: UMC/Thonet Sofas/TU 530-2  
**TOTAL QUANTITY:** 22 YDS.
<table>
<thead>
<tr>
<th><strong>PROJECT NAME:</strong></th>
<th>UMC Food Service Remodel</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PROJECT NUMBER:</strong></td>
<td>109119.00</td>
</tr>
<tr>
<td><strong>CATEGORY:</strong></td>
<td>COM</td>
</tr>
<tr>
<td><strong>ITEM #:</strong></td>
<td>Lounge Chair Fabric F-4</td>
</tr>
<tr>
<td><strong>MODEL #:</strong></td>
<td>see below</td>
</tr>
<tr>
<td><strong>MANUFACTURER:</strong></td>
<td>Arc-Com</td>
</tr>
<tr>
<td><strong>SOURCE:</strong></td>
<td>Colorado Correctional Industries</td>
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<tr>
<td></td>
<td>4999 Oakland Street</td>
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<td></td>
<td>Denver, Colorado 80216-6517</td>
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<td></td>
<td>Att: David Daiker</td>
</tr>
<tr>
<td></td>
<td>(303) 489-1485</td>
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<tr>
<td></td>
<td><a href="mailto:david.daiker@doc.state.co.us">david.daiker@doc.state.co.us</a></td>
</tr>
</tbody>
</table>

**DESCRIPTION:**

Name: Posh  
**Number:** AC-67787  
Color: Topaz #18, Baltic #1, Persimmon # 13  
Content: 100% Polyester

**SIZE:**

Width: 54"  
Repeat: N/A

**FINISH/COLOR:**

Crypton Stain Resistant Finish

**FRAME:**

N/A

**UPHOLSTERY:**

See above

**GENERAL LOCATION:**

Sidemark: UMC Thonet Lounge Chairs/ TU 530/ 2 chairs in each color

**TOTAL QUANTITY:**

60 yds
**PROJECT NAME:**  UMC Food Service Remodel  
**PROJECT NUMBER:**  109119.00  
**CATEGORY:**  COM  
**ITEM #:**  Ottoman Fabric/ F-6  
**MODEL #:**  see below  
**MANUFACTURER:**  Paul Brayton Designs  
**SOURCE:**  Colorado Correctional Industries  
4999 Oakland Street  
Denver, Colorado  80216-6517  
Att: David Daiker  
(303) 489-1485  
david.daiker@doc.co.us  

**DESCRIPTION:**  
Name: Almost  
Color: AM-45 Ocean, AM-85 Chestnut, AM-41 Honey  
Content: 1005 Nylon  

**SIZE:**  
Width: 54”  
Repeat: N/A  

**FINISH/COLOR:**  Crypton Stain Resistant Finish  

**FRAME:**  N/A  

**UPHOLSTERY:**  See above  

**GENERAL LOCATION:**  Sidemark: UMC- Thonet Chill Square Ottomans  

**TOTAL QUANTITY:**  9 yds
PROJECT NAME: UMC Food Service Remodel
PROJECT NUMBER: 109119.00
CATEGORY: Seating
ITEM #: Banquette S-1
MODEL #: Falcon
MANUFACTURER: Falcon
SOURCE: Colorado Correctional Industries
4999 Oakland Street
Denver, Colorado 80216-6517
Att: David Daiker
(303) 489-1485
David.daiker@doc.state.co.us
DESCRIPTION: Bezant Banquette
SIZE: Seat Depth: 18 "
Custom Height @ 42"
Seat Height: 18 "
FINISH/COLOR: Base: Black
FRAME: Formica 7152-58 Northern Oak or equal
UPHOLSTERY: COM:
Back:
Architex
Name: Beanstalk
Color: Bark
Content: 72% Polyester, 28% Rayon (railroaded)
Finish: Crypton super Fabric
Width: 54"
Repeat: 7" V, 6.75 H
Seat:
Paul Brayton Designs
Name: Almost
Color: AM-45 Ocean (S-1A), AM-85 Chestnut (S-1B), AM-41 Honey (S-IC) color s to be
distributed as shown on the drawing Sheet A5.01
Content: 100% Nylon
Width: 54”

GENERAL LOCATION: North and East Dining Rooms
TOTAL QUANTITY: Single Units: approximately 20 LFT
Double Units: approximately 91 LFT
<table>
<thead>
<tr>
<th>PROJECT NAME:</th>
<th>UMC Food Service Remodel</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROJECT NUMBER:</td>
<td>109119.00</td>
</tr>
<tr>
<td>CATEGORY:</td>
<td>Seating</td>
</tr>
<tr>
<td>ITEM #:</td>
<td>Dining 4 Post Stool -S-2</td>
</tr>
<tr>
<td>MODEL #:</td>
<td>SLSNAP</td>
</tr>
<tr>
<td>MANUFACTURER:</td>
<td>KI</td>
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<tr>
<td>SOURCE:</td>
<td>Colorado Correctional Industries</td>
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<tr>
<td></td>
<td>4999 Oakland Street</td>
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<td></td>
<td>Denver, Colorado 80216-6517</td>
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<tr>
<td></td>
<td>Att: David Daiker</td>
</tr>
<tr>
<td></td>
<td>(303) 489-1485</td>
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<tr>
<td></td>
<td><a href="mailto:david.daiker@doc.state.co.us">david.daiker@doc.state.co.us</a></td>
</tr>
<tr>
<td>DESCRIPTION:</td>
<td>Eddy polypropylene four-legged, bar height stool.</td>
</tr>
<tr>
<td>SIZE:</td>
<td>Seat dimension: 19 1/2&quot; W x 22 1/4&quot; D x 32 1/2&quot; H</td>
</tr>
<tr>
<td></td>
<td>Back dimension: 17 3/4&quot; W x 20 1/2&quot; H</td>
</tr>
<tr>
<td></td>
<td>Seat height: 29&quot;</td>
</tr>
<tr>
<td>FINISH/COLOR:</td>
<td>Frame: Antique Vein</td>
</tr>
<tr>
<td></td>
<td>Seat and Back: Black</td>
</tr>
<tr>
<td>FRAME:</td>
<td></td>
</tr>
<tr>
<td>UPHOLSTERY:</td>
<td>N/A</td>
</tr>
<tr>
<td>GENERAL LOCATION:</td>
<td>North Dining Room at window counters and Computer stations</td>
</tr>
<tr>
<td>TOTAL QUANTITY:</td>
<td>28</td>
</tr>
</tbody>
</table>
**PROJECT NAME:** UMC Food Service Remodel  
**PROJECT NUMBER:** 109119.00  
**CATEGORY:** Seating  
**ITEM #:** Lounge Chair S-3  
**MODEL #:** TU530 Lounge Chair  
**MANUFACTURER:** Thonet  
**SOURCE:** Colorado Correctional Industries  
4999 Oakland Street  
Denver, Colorado 80216-6517  
Att: David Daiker  
(303) 489-1485  
david.daiker@doc.state.co.us  
**DESCRIPTION:** Escape/fully upholstered lounge chair, tight back and seat cushions  
**SIZE:**  
Overall: 36" W x 36" D x 33" H  
Seat: 22" W x 23" D x 19 1/2" H  
Arm: 24 1/2" H  
**FINISH/COLOR:** N/A  
**FRAME:** Wood legs/Chestnut  
**UPHOLSTERY:** COM: Arc-Com  
Name: Posh  
Number: AC-67787  
Color: Topaz #18, Baltic #1, Persimmon #13 (2 in each color)  
Content: 100% Polyester  
Finish: Crypton Stain Resistant Finish  
Width: 54"  
Repeat: N/A  
**GENERAL LOCATION:** Soft Seating Areas in North and South dining Rooms  
**TOTAL QUANTITY:** 6
(Lounge Chair)

(COM: Topaz)

(COM: Baltic)

(COM: Persimmon)
PROJECT NAME: UMC Food Service Remodel
PROJECT NUMBER: 109119.00
CATEGORY: Seating
ITEM #: Dining Chair S-4
MODEL #: SWNA-AV-BL
MANUFACTURER: KI
SOURCE: Colorado Correctional Industries
4999 Oakland Street
Denver, Colorado 80216-6517
Att: David Daiker
(303) 320-1210
david.daiker@doc.state.co.us
DESCRIPTION: Strive High Density Stack Chair
SIZE: Seat dimension: 19 1/2" W x 22 1/4" D x 32 1/2" H
Back dimension: 17 3/4" W x 20 1/2" H
FINISH(COLOR): Frame: Antique Vein
Seat and Back: Black
UPHOLSTERY: N/A
GENERAL LOCATION: Dining areas at the Banquette tables and low counters
TOTAL QUANTITY: 42
INTERIOR FURNITURE SPECIFICATIONS

PROJECT NAME: UMC Food Service Remodel
PROJECT NUMBER: 109119.00
CATEGORY: Seating
ITEM #: Ottomans S-5
MODEL #: T-3302-18
MANUFACTURER: Thonet
SOURCE: Colorado Correctional Industries
4999 Oakland Street
Denver, Colorado 80216-6517
Att: David Daiker
(303) 489-1485
david.daiker@doc.state.co.us

DESCRIPTION: Chill square ottoman/ tight seat with 1 1/2" poly on top, 1/2" on sides
Bottom standard in vinyl

SIZE: Seat dimension: 16" x 16" x 18" H

FINISH(COLOR): N/A
FRAME: Hardwood
UPHOLSTERY: COM:

Paul Brayton Designs
Name: Almost
Color: AM-45 Ocean, AM-85 Chestnut, AM-41 Honey (2 in each color)
Content: 100% Nylon
Width: 54"

GENERAL LOCATION: Sidemark: UMC Soft Seating areas
TOTAL QUANTITY: 6
PROJECT NAME: UMC Food Service Remodel
PROJECT NUMBER: 109119.00
CATEGORY: Seating
ITEM #: Sofa S-6
MODEL #: TU530-2 Sofa
MANUFACTURER: Thonet
SOURCE: Colorado Correctional Industries
4999 Oakland Street
Denver, Colorado 80216-6517
Att: David Daiker
(303) 320-1210
david.daiker@doc.state.co.us
DESCRIPTION: Escape/fully upholstered sofa, hardwood frames, glued and screwed, with corner block reinforcements and hardwood legs. Tight backs and reversible seat cushions.
SIZE:
- Overall: 72" W x 36" D x 33" H
- Seat: 59" W x 22" D x 19 1/2" H
- Arm: 24 1/2" H
FINISH/COLOR: N/A
FRAME: Wood legs/ Chestnut
UPHOLSTERY: COM: Arc-Com (requires 18 yds. plain fabric)
  - Name: Leonardo
  - Number: AC- 68920
  - Color: Sand #1
  - Content: 60% Cotton, 40% Polyester
  - Finish: Crypton Stain Resistant Finish
  - Width: 54"
  - Repeat: Approx. 24 1/2" H x 7" V
GENERAL LOCATION: Soft Seating Areas in North and South Dining Rooms
TOTAL QUANTITY: 2
PROJECT NAME: UMC Food Service Remodel
PROJECT NUMBER: 109119.00
CATEGORY: Tables
ITEM #: Banquette Tables-T1
MODEL #: see below
MANUFACTURER: Falcon Products
Representative:
SOURCE: Colorado Correctional Industries
4999 Oakland Street
Denver, Colorado 80216-6517
Att: David Daiker
(303) 489-1485
David.daiker@doc.state.co.us
DESCRIPTION: Rectangular small dining table
SIZE: 24" x 30"
Height: 29"
FINISH/COLOR: Base: Metal: Matte Black CP001MS
Top: Wilsonart Laminate
  4876-38
  Sheer Mesh
Edge: Flat Black vinyl t-mold
FRAME: N/Al
UPHOLSTERY: N/A
GENERAL LOCATION: North and South Dining Rooms
TOTAL QUANTITY: 36
Table Base

Table Top
PROJECT NAME: UMC Food Service Remodel
PROJECT NUMBER: 109119.00
CATEGORY: Table
ITEM #: End Table T-2
MODEL #: B-CU2421
MANUFACTURER: Nucraft
SOURCE: Colorado Correctional Industries
4999 Oakland Street
Denver, Colorado 80216-6517
Att: David Daiker
(303) 320-1210
David.daiker@doc.state.co.us

DESCRIPTION: Paragon wood cube table with Bevel Edge
SIZE: Overall: 24"W x 24"D x 21"H
FINISH/COLOR: M54 Sorrel Flat Cut Oak
FRAME: N/A
UPHOLSTERY: N/A
GENERAL LOCATION: North Dining Room- Soft Seating Area
TOTAL QUANTITY: 3

(Note: Photo for reference only, re: above specification for finish.)
PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

A. All drawings associated with the entire project, including general provisions of the Contract, including The General Conditions of the Contract for Construction, General and Supplementary Conditions and Division-1 Conditions specification sections shall apply to the Division 15 specifications and drawings. The Contractor shall be responsible for reviewing and becoming familiar with the aforementioned and all other Contract Documents associated with the project.

B. Related Sections: Refer to all sections in Division 15. Refer to Division 16 specification sections and Division 16 drawings.

C. Where contradictions occur between this section and Division 1, the more stringent requirement shall apply.

D. Contractor shall be defined as any and all entities involved with the construction of the project.

1.2 SUMMARY:

A. This Section specifies the basic requirements for mechanical installations and includes requirements common to more than one section of Division 15. It expands and supplements the requirements specified in Division 1.

1.3 MECHANICAL INSTALLATIONS:

A. The Contract Documents are diagrammatic, showing certain physical relationships which must be established within the mechanical work and its interface with all other work. Such establishment is the exclusive responsibility of the Contractor. Drawings shall not be scaled for the purpose of establishing material quantities.

B. Drawings and specifications are complementary. Whatever is called for in either is binding as though called for in both. Report any discrepancies to the Engineer and obtain written instructions before proceeding. Where any contradictions occur between the specifications and the drawings the more stringent requirement shall apply. **The contractor shall include pricing for the more stringent and expensive requirements.**

C. Drawings shall not be scaled for rough-in measurements or used as shop drawings. Where drawings are required for these purposes or have to be made from field measurement, Contractor shall take the necessary measurements and prepare the drawings.

D. The exact location for some items in this specification may not be shown on the drawings. The location of such items may be established by the Engineer during the progress of the work.

E. The contract documents indicate required size and points of terminations of pipes, and suggest proper routes to conform to structure, avoid obstructions and preserve clearances. It is not intended that drawings indicate necessary offsets. The contractor shall make the installation in such a manner as to conform to the structure, avoid obstructions, preserve headroom and keep openings and passageways clear, without further instructions or costs to the Owner. All equipment shall be installed so access is maintained for serviceability.
F. Before any work is installed, determine that equipment will properly fit the space; that required piping grades can be maintained and that ductwork can be run as intended without interferences between systems, structural elements or work of other trades.

G. Verify all dimensions by field measurements.

H. Coordinate installation in chases, slots and openings with all other building components to allow for proper mechanical installations.

I. Where mounting heights are not detailed or dimensioned, install mechanical services and overhead equipment to provide the maximum headroom possible.

J. Install mechanical equipment to facilitate maintenance and repair or replacement of equipment components. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations.

K. The ceiling space shall not be “layered”. It is the contractor’s responsibility to offset and system as required to allow installation within the identified ceiling cavity. **The contractor shall include labor and material in the base bid to accommodate such offsets.**

L. In general, all “static” piping systems shall be routed as high as possible, i.e. fire protection systems. Keep all equipment in accessible areas such as corridors and coordinate with systems and equipment from other sections.

M. The Contractor shall provide all labor and material necessary but not limited to the starting/stopping of all mechanical equipment, opening/closing of all valves, draining/refilling all mechanical systems and operating/verifying the operation of all mechanical systems controls as required to accomplish all work necessary to meet construction document requirements. Contractor shall submit records of such activities to engineer and include in the O & M manuals.

1.4 COORDINATION WITH OTHER DIVISIONS:

A. General:

1. Coordinate all work to conform with the progress of the work of other trades.

2. Complete the entire installation as soon as the condition of the building will permit. No extras will be allowed for corrections of ill timed work, when such corrections are required for proper installation of other work.

B. Coordinate ceiling cavity space carefully with all trades. In the event of conflict, install mechanical and electrical systems within the cavity space allocation in the following order of priority:

1. Equipment and required clearances
2. Plumbing waste, cooling coil drain piping and roof drain mains and leaders.
3. Ductwork mains
4. Plumbing vent piping
5. Low pressure ductwork and air devices.
6. Electrical and communication conduits, raceways and cabletray.
7. Domestic hot and cold water
8. Hydronic piping
9. Fire sprinkler mains, branch piping and drops (locate as tight to structure as possible).
10. DDC control wiring and other low voltage systems.
11. Fire alarm systems.

C. Chases, Inserts and Openings:
   1. Provide measurements, drawings and layouts so that openings, inserts and chases in new construction can be built in as construction progresses.
   2. Check sizes and locations of openings provided. Including the access panels for equipment in hard lid ceilings and wall cavities.
   3. Any cutting and patching made necessary by failure to provide measurements, drawings and layouts at the proper time shall be done at no additional cost in contract sum.

D. Support Dimensions: Provide dimensions and drawings so that concrete basis and other equipment supports to be provided under other sections of the specifications can be built at the proper time.

E. Coordinate the installation of required supporting devices and sleeves to be set in poured in place concrete and other structural components, as they are constructed.

F. Coordinate the cutting and patching of building components to accommodate the installation of mechanical equipment and materials. Refer to Division 1.

G. Modifications required as result of failure to resolve interferences or call attention to changes required in other work as result of modifications shall be paid for by responsible Contractor/Subcontractor.

H. Coordination with Electrical Work: Refer to Division 1 and 16.

1.5 DESIGN WORK REQUIRED BY CONTRACTOR:

A. The construction of this project requires the Contractor to include the detailing and design of several systems and/or subsystems. All such design work associated with the development of the coordination drawings shall be the complete responsibility of the Contractor.

B. The Contractor shall take the full responsibility to develop and complete routing strategies which will allow fully coordinated system to be installed in a fully functional manner. The Engineers contract drawings shall be for system design intent and general configurations.

C. Systems or subsystems which require design responsibility by the contractor include but are not limited to:
   1. Final coordinated distribution of duct, hydronic, plumbing and other systems within the ceiling cavity.
   2. Any system not fully detailed
   3. Fire protection systems
   4. Equipment supports, hangers and anchors systems not fully detailed nor specified in these documents, or catalogued by the manufacturer.
   5. Temperature controls systems
D. Design Limitations:

1. The Contractor shall not modify the Engineers design intent in any way.
2. The Contractor shall not change any pipe size or equipment size without prior written approval from the Engineer.
3. The Contractor shall conform to the SMACNA Duct Construction Standards when modifying the ductwork layout to avoid collisions.
4. Back to back 90° fittings on duct system shall not be installed under any circumstance.
5. Bull nosed tees on piping systems shall not be installed under any circumstance.

1.6 PROJECT CONDITIONS:

A. The Contractor shall be required to attend a mandatory pre-bid walk-thru and shall make themselves familiar with the existing conditions. No additional costs to the Owner shall be accepted for additional work for existing conditions.

B. Field verify all conditions prior to submitting bids.

C. Report any damaged equipment or systems to the Owner prior to any work.

D. Protect all mechanical and electrical work against theft, injury or damage from all causes until it has been tested and accepted.

E. Be responsible for all damage to the property of the Owner or to the work of other contractors during the construction and guarantee period. Repair or replace any part of the work which may show defect during one year from the final acceptance of all work, provided such defect is, in the opinion of the Architect, due to imperfect material or workmanship and not due to the Owner's carelessness or improper use.

F. The Contractor shall coordinate and co-operate with Owner at all times for all new to existing connections, system shutdowns and start-ups, flushing and filling both new and existing systems.

G. Provide temporary ductwork and piping services, where required, to maintain existing areas operable.

H. Coordinate all services shut-down with the Owner; provide temporary services. Coordinate any required disruptions with Owner, one week in advance.

I. Minimize disruptions to operation of mechanical systems in occupied areas.

J. When equipment, wiring, piping, etc. is disconnected or “abandoned”, it must be physically removed and disposed of as part of the project.

1.7 SAFETY:

A. Refer to Division 1.

1.8 EQUAL EMPLOYMENT OPPORTUNITY REQUIREMENTS:

A. Refer to Division 1 and conform with the Owners requirements.
1.9 REQUIREMENTS OF REGULATORY AGENCIES:
   A. Refer to Division 1.
   B. Execute and inspect all work in accordance with all Underwriters, local and state codes, rules and regulations applicable to the trade affected as a minimum, but if the plans and/or specifications call for requirements that exceed these rules and regulations, the greater requirement shall be followed. Follow recommendations of NFPA, SMACNA, EPA, OSHA and ASHRAE.
   C. Comply with standards in effect at the date of these Contract Documents, except where a standard or specific date or edition is indicated.
   D. The handling, removal and disposal of lead based paint and other lead containing materials shall comply with EPA, OSHA, and any other Federal, State, or local regulations.
   E. After entering into contract, Contractor will be held to complete all work necessary to meet these requirements without additional expense to the Owner.

1.10 PERMITS AND FEES:
   A. Refer to Division 1.
   B. Contractor shall arrange for and pay for all inspections, licenses and certificates required in connection with the work.

1.11 PROJECT SEISMIC REQUIREMENTS:
   A. All systems shall be installed to meet NFPA and IBC Seismic requirements.
      1. Where any conflicts arise the more stringent requirements shall be applicable.
      2. The design of the seismic requirements shall be the full responsibility of the Contractor.

1.12 PRODUCT OPTIONS AND SUBSTITUTIONS:
   A. Refer to the Instructions to Bidders and Division 1.
   B. Materials and equipment of equivalent quality may be submitted for substituted prior to bidding. This may be done by submitting to the Architect/Engineer at least ten (10) working days prior to the bid date a letter in triplicate requesting prior review. This submittal shall include all data necessary for complete evaluation of the product.
      1. Substitutions shall be allowed only upon the written approval of the Architect/Engineer NO EXCEPTIONS.
      2. The Contractor shall be responsible for removal, replacement and remedy of any system or equipment which has been installed which does not meet the specifications or which does not have prior approval.

1.13 MECHANICAL SUBMITTALS:
   A. General
1. Refer to the Conditions of the Contract (General and Supplementary), Division 1.

2. The submittals shall be submitted as one package identified by the specification section. Submittals that are not complete with the required information will be sent back to be corrected.

3. The Contractor shall identify any "long lead time" items which may impact the overall project schedule. If these submittal requirements affect the schedule, the Contractor shall identify the impacts and confer with the Engineer within two weeks of entering into the contract.

4. At least one copy of the first submittal package shall be provided in expandable, 3 post, hard back binders, sized to fit all future submittals for this job. The cover shall be identified with the job name, Owner's project number, date, Prime Contractor's name, etc.

5. Submittals may be provided electronically. All electronic submittals need to be complete with all design information and stamped for conformity by the contractor. Any submittal not stamped or complete will be sent back. Submittals that are submitted electronically will be reviewed, marked appropriately and returned by the same means received.

6. An index shall be provided which includes:
   a. Product
   b. Plan Code (if applicable)
   c. Specification Section
   d. Manufacturer and Model Number

7. Fire protection drawings do not apply to the above. These drawings may be submitted in a separate submittal.

B. The manufacturer's material or equipment listed in the schedule or identified by name on the drawings are the types to be provided for the establishment of size, capacity, grade and quality. If alternates are used in lieu of the scheduled names, the cost of any changes in construction required by their use shall be borne by Contractor.

C. All equipment shall conform to the State and/or local Energy Conservation Standards.

D. Submittal of shop drawings, product data and samples will be accepted only when submitted by and stamped by the General Contractor. Data submitted from Subcontractors and material suppliers directly to the Engineer will not be processed unless prior written approval is obtained by the General Contractor.

E. Before starting work, prepare and submit to the Architect/Engineer six (6) sets of all shop drawings and descriptive equipment data required for the project. Unless each item is identified with specification section and sufficient data to identify its compliance with the specifications and drawings, the item will be returned "Revise and Resubmit". Where an entire submittal package is returned for action by the Contractor, the Engineer will summarize comments in letter format and return the entire set. Continue to submit six (6) sets of any individual shop drawings, product data or samples which were returned without a "make corrections noted" or "no exceptions taken" action, until they are so marked. When a "Make Corrections Noted" is received, make the required corrections for inclusion in the operation and.
maintenance manual. Submittals marked "Make Corrections Noted" shall not be resubmitted during the submittal process.

F. The Design Professional’s review and appropriate action on all submittals and shop drawings is only for the limited purpose of checking for conformance with the design concept and the information expressed in the contract documents. This review shall not include:

1. Accuracy or completeness of details, such as quantities, dimensions, weights or gauges, fabrication processes
2. Construction means or methods
3. Coordination of the work with other trades
4. Construction safety precautions

G. The Design Professional’s review shall be conducted with reasonable promptness while allowing sufficient time in the Design Professional’s judgment to permit adequate review. Review of a specific item shall not indicate that the Design Professional has reviewed the entire assembly of which the item is a component.

H. The Design Professional shall not be responsible for any deviations from the contract documents not brought specifically to the attention of the Design Professional in writing by the Contractor. This shall clearly identify the design and the specific element which vary from the Design. The Contractor shall be responsible for all remedy for lack of strict conformance associated with this criteria.

I. The Design Professional shall not be required to review partial submissions or those for which submissions of correlated items have not been received.

1.14 SPECIFIC CATEGORY SUBMITTAL REQUIREMENTS:

A. Product Data:

1. Where pre-printed data covers more than one distinct product, size, type, material, trim, accessory group or other variation, mark submitted copy with black pen to indicate which of the variations is to be provided.

2. Delete or mark-out portions of pre-printed data which are not applicable.

3. Where operating ranges are shown, mark data to show portion of range required for project application.

4. For each product, include the following:
   a. Sizes.
   b. Weights.
   c. Speeds.
   d. Capacities.
   e. Piping and electrical connection sizes and locations.
   f. Statements of compliance with the required standards and regulations.
   g. Performance data.
   h. Manufacturer's specifications.

B. Shop Drawings:
1. Shop Drawings are defined as mechanical system layout drawings prepared specifically for this project, or fabrication and assembly type drawings of system components to show more detail than typical pre-printed materials.

2. Prepare Mechanical Shop Drawings, except diagrams, to accurate scale, min 1/8”-1'-0”, unless otherwise noted.
   a. Show clearance dimensions at critical locations.
   b. Show dimensions of spaces required for operation and maintenance.
   c. Show interfaces with other work, including structural support.

C. Test Reports:

1. Submit test reports which have been signed and dated by the accredited firm or testing agency performing the test.

2. Prepare test reports in the manner specified in the standard or regulation governing the test procedure (if any) as indicated.

3. Submit test reports as required for O & M manuals.

D. Product Listing:

1. Prepare listing of major mechanical equipment and materials for the project, within (2) two weeks of signing the Contract Documents and transmit to the Architect. A sample schedule is included at the end of this section to complete this requirement.
   a. Provide all information requested.
   b. Submit this listing as a part of the submittal requirement specified in Division 1, "PRODUCTS AND SUBSTITUTION."

2. Unless otherwise specified, all materials and equipment shall be of domestic (USA) manufacture and shall be of the best quality used for the purpose in commercial practice.

3. When two or more items of same material or equipment are required they shall be of the same manufacturer. Product manufacturer uniformity does not apply to raw materials, bulk materials, pipe, tube, fittings (except flanged and grooved types), sheet metal, wire, steel bar stock, welding rods, solder, fasteners, motors for dissimilar equipment units and similar items used in work, except as otherwise indicated.
   a. Provide products which are compatible within systems and other connected items.

E. Schedule of Values

1. Provide preliminary schedule of values with product data submittal, within three (3) weeks from award of contract to successful bidder. Provide according to the following descriptions:
   a. Plumbing
   b. Fire Protection
   c. HVAC
      1) Equipment
2) Sheet Metal  
3) Piping  
4) Insulation  
5) Test and Balancing  
6) Temperature Controls  
d) Demolition  
e) Miscellaneous

2. Provide a final Schedule of Values at close-out of project including updated values based on actual installation.

F. Required Submittals: Provide submittals for each item of equipment specified or scheduled in the contract documents. See table at the end of this section.

G. If more than two submittals (either for product data, shop drawings, record drawings, or test and balance reports) are made by the Contractor, the Owner reserves the right to charge the Contractor for subsequent reviews by their consultants. Such extra fees shall be deducted from payments by the Owner to the Contractor.

1.15 DELIVERY, STORAGE, AND HANDLING:

A. Refer to Division 1.

B. Deliver products to project properly identified with names, model numbers, types, grades, compliance labels and similar information needed for distinct identifications; adequately packaged and protected to prevent damage or contamination during shipment, storage, and handling.

C. Check delivered equipment against contract documents and submittals.

D. Store equipment and materials at the site, unless off-site storage is authorized in writing. Protect stored equipment and materials from damage, dirt, dust, freezing, heat and moisture.

E. Coordinate deliveries of mechanical materials and equipment to minimize construction site congestion. Limit each shipment of materials and equipment to the items and quantities needed for the smooth and efficient flow of installations.

F. Provide factory-applied plastic end-caps on each length of pipe and tube. Maintain end-caps through shipping, storage and handling to prevent pipe-end damage and prevent entrance of dirt, debris and moisture.

G. Protect stored ductwork, pipes and tubes. Elevate above grade and enclose with durable, waterproof wrapping.

H. Protect flanges, fittings and specialties from moisture and dirt by inside storage and enclosure, or by packaging with durable, waterproof wrapping.

I. Protect sheet metal ductwork and fittings. Elevate and store above grade and cover ends with waterproof wrapping.

1.16 DEMOLITION:
A. Refer to Division 1. The following paragraphs supplement the requirements of Division 1.

B. During the demolition phase of this contract it is the responsibility of this Contractor to carefully remove existing equipment, piping or ductwork and related items either as shown on the demolition drawings as being removed, or as required for the work. These items shall be tagged, protected from damage and stored as directed by the Architect. A list of all items stored shall be turned over to the Architect. At the completion of the remodeling work or when directed by the Architect, all stored items not reused or wanted by the Owner shall be removed from the premises. Disposition of items not reused is by the direction of the Architect/Engineer.

C. The location of existing equipment, pipes, ductwork, etc., shown on the drawings has been taken from existing drawings and is, therefore, only as accurate as that information. All existing conditions shall be verified from field measurements with necessary adjustment being made to the drawing information.

D. If asbestos material, in any form, is discovered by this Contractor in the process of his work, he shall report such occurrence to the Architect/Owner immediately. The Architect/Owner will determine the action to be taken for the asbestos removal, which is not a part of the work to be done under this Division.

1.17 CUTTING AND PATCHING:

A. This Article specifies the cutting and patching of mechanical equipment, components and materials to include removal and legal disposal of selected materials, components and equipment.

B. Refer to Division 1.

C. Do not endanger or damage installed work through procedures and processes of cutting and patching.

D. Arrange for repairs required to restore other work, because of damage caused as a result of mechanical installations.

E. No additional compensation will be authorized for cutting and patching work that is necessitated by ill-timed, defective or non-conforming installations.

F. Perform cutting, fitting and patching of mechanical equipment and materials required to:

1. Uncover work to provide for installation of ill-timed work;
2. Remove and replace defective work;
3. Remove and replace work not conforming to requirements of the Contract Documents;
4. Install equipment and materials in existing structures;
5. Upon written instructions from the Architect/Engineer, uncover and restore work to provide for Architect/Engineer observation of concealed work.

G. Cut, remove and legally dispose of selected mechanical equipment, components, and materials as indicated, including, but not limited to removal of mechanical piping, heating units, plumbing fixtures and trim and other mechanical items made obsolete by the new work.
H. Protect the structure, furnishings, finishes and adjacent materials not indicated or scheduled to be removed.

I. Locate, identify, and protect mechanical and electrical services passing through remodeling or demolition area and serving other areas required to be maintained operational. When services must be interrupted, provide temporary services for the affected areas and notify the Owner prior to changeover. Cover openings in ductwork to remain. Protect equipment and systems to remain.

J. Construction and pre-occupancy indoor air quality (IAQ) management:
   1. During construction, meet or exceed the recommended design approaches of the SMACNA IAQ guideline for occupied buildings under construction, 1995, Chapter 3.

1.18 ROUGH-IN:
   A. Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be connected.
   B. Refer to equipment shop drawings and manufacturer’s requirements for actual provided equipment for rough-in requirements.
   C. Work through all coordination before rough-in begins.

1.19 ACCESSIBILITY:
   A. Install equipment and materials to provide required access for servicing and maintenance. Coordinate the final location of concealed equipment and devices requiring access with final location of required access panels and doors. Allow ample space for removal of all parts that require replacement or servicing.
   B. Extend all grease fittings to an accessible location.
   C. Furnish hinged steel access doors with concealed latch, whether shown on drawings or not, in all walls and ceilings for access to all concealed valves, shock absorbers, air vents, motors, dampers, equipment controls, fans, balancing cocks, and other operating devices requiring adjustment or servicing. Refer to Division 1 for access door specification and Division 15 for duct access door requirements.
   D. The minimum size of any access door shall not be less than the size of the equipment to be removed or 20 inches x 20 inches if used for service only.
   E. Furnish doors to trades performing work in which they are to be built, in ample time for building-in as the work progresses. Whenever possible, group valves, cocks, etc., to permit use of minimum number of access doors within a given room or space.
   F. Factory manufactured doors shall be of a type compatible with the finish in which they are to be installed. In lieu of these doors, approved shop fabricated access doors with DuroDyne hinges may be used.
   G. Access doors in fire-rated walls and ceilings shall have equivalent U.L. label and fire rating.
1.20 NAMEPLATE DATA:

A. Provide permanent operational data nameplate, refer to Section 15190-Mechanical Identification, on each item of mechanical equipment, indicating manufacturer, product name, model number, serial number, capacity, operating and power characteristics, labels of tested compliances, and similar essential data. Locate nameplates in an accessible location. Coordinate with Owner for specific requirements.

1.21 LUBRICATION OF EQUIPMENT:

A. Refer to Division 1. The following paragraphs supplement the requirements of Division 1.

B. Contractor shall properly lubricate all mechanical pieces of equipment which he provided before turning the building over to the Owner. He shall attach a linen tag or heavy duty shipping tag on the piece of equipment showing the date of lubrication and the type and brand of lubricant used.

C. Furnish the Engineer with a typewritten list included in the O and M manuals of each item lubricated and type of lubricant used, no later than two (2) weeks before completion of the project, or at time of acceptance by the Owner of a portion of the building and the mechanical systems involved.

1.22 CLEANING:

A. Refer to Division 1.

B. Refer to Division 15, "TESTING, ADJUSTING AND BALANCING" for requirements for mechanical systems prior to final acceptance.

1.23 RECORD DOCUMENTS:

A. Refer to Division 1. The following paragraphs supplement the requirements of Division 1.

B. Keep a complete set of record document prints in custody during entire period of construction at the construction site. Documents shall be updated on a weekly basis.

C. Mark Drawing Prints to indicate revisions to piping and ductwork, size and location both exterior and interior; including locations of coils, dampers and other control devices, filters, boxes, and similar units requiring periodic maintenance or repair; actual equipment locations, dimensioned from column lines; concealed equipment, dimensioned to column lines; mains and branches of piping systems, with valves and control devices located and numbered, concealed unions located, and with items requiring maintenance located (i.e., traps, strainers, expansion compensators, tanks, etc.); Change Orders; concealed control system devices. Changes to be noted on the drawings shall include final location of any piping or ductwork relocated more than 1 foot-0 inches from where shown on the drawings.

D. At the completion of the project, obtain from the Architect a complete set of the Mechanical Construction Documents in the electronic format used by the design team. This set will include all revisions officially issued through the Architect. The Contractor shall transfer all revisions noted on the record document prints to the electronic drawings. The Contractor shall transmit the final record documents in the electronic format used on the project to the Architect. This
contract will not be considered completed until these record drawings have been received and reviewed by the Architect/Engineer.

1.24 OPERATION AND MAINTENANCE DATA:

A. Refer to Division 1.

B. The testing and balancing report shall be submitted and received by the Engineer at least fifteen calendar days prior to the contractor's request for final observation timeframe requirements. Include in the O & M Manual after review with "No Exceptions Taken" has been accomplished.

C. In addition to the information required by Division 1 for Maintenance Data, include the following information:

1. Description of mechanical equipment, function, installation instructions, drawing specification, complete wiring and temperature controls diagrams, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of all replaceable parts.

2. Manufacturer's printed operating procedures to include start-up, break-in, routine and normal operating instructions; regulation, control, stopping, shut-down, and emergency instructions; and summer and winter operating instructions. Provide any test reports and start-up documents.

3. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions.

4. Servicing instructions, lubrication charts and schedules, including Contractor lubrication reports.

5. Manufacturer's service manuals for all mechanical equipment provide under this contract.

6. Alphabetical list of all system components including the name, address and 24 hour phone number of the company responsible for servicing each item during the 1st year's operation.

7. Starting, stopping, lubrication, equipment identification numbers and adjustment clearly indicated for each piece of equipment.

8. Complete parts list. Provide to Owner, recommended spare parts list.

9. Mechanical warranties.

10. Final schedule of values with all mechanical change order costs included and identified.


12. Appropriate start-up information by factory representative.
D. This contract will not be considered completed nor will final payment be made until all specified
material, including testing and balancing report and final schedule of values with all mechanical
change order costs included and identified, is received in this operating and maintenance
report and the manual is reviewed by the Architect/Engineer.

1.25 PROJECT CLOSEOUT:

A. In addition to the requirements specified in Division 1, complete the requirements listed below.

B. The Contractor shall be responsible for the following Mechanical Checklist either by performing
and/or coordinating such items prior to applying for certification of substantial completion.
Refer to individual specification sections for additional requirements.

C. Contractor shall be responsible for scheduling instructional meetings for maintenance
personnel on the proper operation and maintenance of all mechanical systems, using the
“Operation and Maintenance Manual” as a guide.

1.26 WARRANTIES:

A. Refer to the Division 1 for procedures and submittal requirements for warranties. Refer to
individual equipment specifications for warranty requirements. In any case the entire
mechanical system shall be warranted no less than one year from the time of acceptance by
the Owner.

B. Provide complete warranty information for each item to include product or equipment to include
date or beginning of warranty or bond; duration of warranty or bond; and names, addresses,
and telephone numbers and procedures for filing a claim and obtaining warranty services.

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### BASIC MECHANICAL REQUIREMENTS

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#### SECTION 15010

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1. For Soft Starters and Variable Frequency Drives
2. Requires Review & Approval from T & B Contractor
3. Warranty Report/Warranty
4. Kitchen Exhaust Hood
5. See Specific Specification Section for Test & Certification Requirements

END OF SECTION 15010
MECH/ELEC REQUIREMENTS FOR MECHANICAL EQUIPMENT

SECTION 15040

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK:

A. This section specifies the basic requirements for electrical components which are either separate components or are an integral part of all mechanical equipment. These components include, but are not limited to factory installed motors, starters and disconnect switches furnished as an integral part of packaged mechanical equipment.

B. Wiring of field-mounted switches and similar mechanical-electrical devices provided for mechanical systems, to equipment control panels.

C. Specific electrical requirements (i.e. horsepower and electrical characteristics) for mechanical equipment are scheduled on the Electrical Drawings. In case of conflict, Electrical Drawings shall take precedence. Do not purchase motors or electrical equipment until power characteristics available at building site location have been confirmed by Contractor.

D. Refer to Table in Division 1 / 16 for Mechanical/Electrical coordination.

1.2 QUALITY ASSURANCE:

A. Manufacturers: Firms regularly engaged in manufacture of motors and motor starters of types, ratings and characteristics required, whose products have been in satisfactory use in similar service for not less than 5 years.

B. Single Manufacturer: Provide all motors and starters for the project by a single manufacturer except when part of factory packaged equipment.

C. Installer's Qualifications: Firm with at least 3 years of successful installation experience on projects utilizing motors, motor starters and capacitors similar to that required for this project.

D. NEC Compliance: Comply with NEC as applicable to wiring methods, construction and installation of motors, motor starters and capacitors.

E. NFPA Compliance: Comply with applicable requirements of NFPA 70E, "Standard for Electrical Safety Requirements for Employee Workplaces".

F. UL Compliance: Comply with applicable requirements of UL 486A, "Wire Connectors and Soldering Lugs for Use with Copper Conductors", and UL 508, "Electrical Industrial Control Equipment" pertaining to installation of motor starters.

G. UL Compliance: Provide equipment and components which are UL-listed and labeled.

H. ETL Compliance: Provide equipment and components which are ETL-listed and labeled.


K. Standards:

1. NEMA Standards MG 1: Motors and Generators.
2. NEMA Standard ICS 2: Industrial Control Devices, Controllers, and Assemblies.
5. Comply with National Electrical Code (NFPA 70).

L. Coordination with Electrical Work: Wherever possible, match elements of electrical provisions of mechanical work with similar elements of electrical work specified in Division 16 sections. Comply with applicable requirements of Division 16 sections for electrical work of this section which are not otherwise specified.

1.3 SUBMITTALS:

A. Product Data: Submit in accordance with Section 15010.

B. Listing, Motors of Mechanical Work: Concurrently, with submittal of mechanical products listing, submit separate listing showing rating, power characteristics, efficiencies, power factors, application and general location of every motor to be provided with mechanical work. Submit updated information promptly when and if initial data is revised.

1. Include in listing of motors, notations of whether motor starter is furnished or installed integrally with motor or equipment containing motor.

C. Electrical coordination listing. Provide the following information for each field wired electrical power connection. Information shall use nameplate data and nomenclature of actual installed nameplates. Information should list as a minimum:

1. Field connection details such as maximum/minimum wire size lugs can accommodate. Include number of lugs per phase.
2. Number and location of field connections.
3. Field interconnection wiring.
4. Operating voltage and phase.
5. Maximum fuse size or maximum overcurrent protection size (as applies).
7. Full load amperes.
8. Locked rotor current and duration for high inertia equipment.
9. Manufacturers recommended overload setting (if applicable).

The contractor shall fully coordinate these items with all subcontractors prior to submittal.

1.4 PRODUCT STORAGE:

A. All motors not designed for exposure to water or moisture shall be protected at all times.

2. PART 2 - PRODUCTS

2.1 MANUFACTURERS:
MECH/ELEC REQUIREMENTS FOR MECHANICAL EQUIPMENT

SECTION 15040

A. Subject to compliance with requirements, provide products by one of the following manufacturers for each type of product:

1. Motors
   a. AO Smith
   b. Baldor
   c. Reliance
   d. Westinghouse
   e. Toshiba
   f. Gould
   g. General Electric
   h. Louis Allis
   i. Lincoln
   j. ABB

2. Starters
   a. Cutler Hammer
   b. Allen-Bradley
   c. Sprecher & Schuh
   d. Square D
   e. General Electric
   f. Westinghouse
   g. Siemens

2.2 MOTORS:

A. The following are basic requirements for simple or common motors.

1. Torque characteristics shall be sufficient to satisfactorily accelerate the driven loads with a time limit acceptable to the motor manufacturer. Motors shall be capable of starting the driven equipment while operating at 90 percent rated terminal voltage.

2. Motor sizes shall be large enough so that the driven load will not require the motor to operate in the service factor range.

3. Temperature Rating: Rated for 40 degrees C environment with maximum 80 degrees C temperature rise for continuous duty at full load (Class B Insulation).

4. Starting capability: Frequency of starts as indicated by automatic control system, and not less than 5 evenly time spaced starts per hour for manually controlled motors.

5. Service Factor: 1.15 for poly-phase motors, 1.35 for single phase motors, and 1.0 for inverter duty motors.

6. Altitude Deration: Motors must be selected to operate within nameplate horsepower at 5400 ft. elevation.

7. All motors rated greater than 1000W shall have a power factor of not less than 85% under rated load condition.
8. Motor construction: NEMA Standard MG 1, general purpose, continuous duty, Design "B", except "C" where required for high starting torque. Design "E" shall not be used.
   a. Frames: NEMA Standard No. 48 or 54; Use driven equipment manufacturer’s standards to suit specific application.
   b. Bearings:
      1) Ball bearings with inner and outer shaft seals.
      2) Re-greasable, except permanently sealed where motor is normally inaccessible for regular maintenance.
      3) Bearings shall be rated for minimum L-10 life of 40,000 hours.
      4) Designed to resist thrust loading where belt drives or other drives produce lateral or axial thrust in motor.
      5) For fractional horsepower, light duty motors, sleeve type bearings are permitted.
   c. Enclosure Type:
      1) Open drip-proof motors for indoor use where satisfactorily housed or remotely located during operation.
      2) Guarded drip-proof motors where exposed to contact by employees or building occupants.
   d. Overload protection: Built-in thermal overload protection for all single phase motors and, where indicated, internal sensing device suitable for signaling and stopping motor at starter.
   e. Noise rating: "Quiet". Motors shall not exceed 80DB rating when running at their full speed and power range.
   f. Motors 1hp and higher are to be premium efficient, complying with Xcel Energy requirements.
   g. Nameplate: indicate the full identification of manufacturer, ratings, characteristics, construction, special features and similar information.

9. Phases and Current Characteristics: Unless indicated otherwise, provide squirrel-cage induction polyphase motors for 3/4 hp and larger, and provide capacitor-start single-phase motors for 1/2 hp and smaller, except 1/6 hp and smaller may, at equipment manufacturer’s option, be split-phase type. Tri-voltage motors are not acceptable. Coordinate current characteristics with power specified in Division 16 sections. Do not purchase motors until power characteristics available at building site have been confirmed by contractor.

10. The Contractor shall be responsible for all additional electrical and other costs involved to accommodate any motors which differ from the scheduled horsepower sizes or correct any motor which does not meet the listed efficiency as called for in mechanical or electrical plans and specifications.
11. Motors shall be of the same manufacturer, except those that are an integral part of a factory assembled packaged unit. These motors shall likewise meet the conditions of the specification in this section except motors which are part of a motor/compressor assembly are exempted from this requirement.

2.3 STARTERS, ELECTRICAL DEVICES AND WIRING:

A. Motor Starter Characteristics:
   1. Coordinate with the Electrical Contractor for motor control center starters provided by Division 16.
   2. Enclosures: NEMA 1, general purpose enclosures with padlock ears, except in wet locations shall be NEMA 3R with conduit hubs, or units in hazardous locations which shall have NEC proper class and division.
   3. Type and size of starter shall be as recommended by motor manufacturer and the driven equipment manufacturer for applicable protection and start-up condition.

B. Manual switches shall have:
   1. Maintained contacted push buttons with pilot lights for single-speed or multi-speed operation.
   2. Overload protection: melting alloy type thermal overload relays.

C. Magnetic Starters:
   1. Unless otherwise indicated, provide NEMA style, sized and rated magnetic starters including contacts and coils for motors 1/2 hp and larger and for smaller motors where interlock or automatic operation is indicated or required:
      a. Maintained contact H-O-A push buttons and pilot lights, properly arranged for single speed or multi-speed operation as indicated.
      b. Solid state adjustable motor overload. Select range so that upper limit is no more than 150 percent of the connected motor full load amps.
      c. Interlocks, pneumatic switches and similar devices as required for coordination with control requirements of Division-15 Controls sections. In addition to the interlock & switches specified above each starter shall be provided with (4) four additional spare sets of auxiliary contacts, (2) two normally open & (2) two normally closed.
      d. Built-in 120 volts control circuit transformer, fused from line side, where service exceeds 240 volts.
      e. Under-voltage release or protection. Re-start of equipment shall be automatic.
      f. All 3-phase motors 2 hp and larger shall be protected against loss of phase (single phasing protection) wired into the starter. Externally operated manual reset.

D. Motor connections:
   1. Flexible conduit, except where plug-in electrical cords are specifically indicated.

2.4 DISCONNECT SWITCHES:

A. See Division 16 for requirements.
2.5  DRIVES:
   A.  V-Belt Drives:
      1.  Capacity of V-Belt Drives at rated RPM shall be not less than 150 percent of motor
          nameplate horsepower rating.
      2.  V-Belt Drive combinations shall be limited to A, B, C and fractional horsepower belts.
          3V, 5V and 8V belts and sheaves shall not be used.
      3.  Motors and Fan Wheel Pulleys:  Adjustable pitch for use with motors through 15 HP;
          fixed pitch for use with motors larger than 15 HP.  Select pulley so that pitch adjustment
          is at the middle of the adjustment range at fan design conditions.
      4.  All fixed pitch sheaves, including single groove fan sheaves, shall be of the bushed
          type.  Fixed bore sheaves will not be acceptable for adjustable pitch sheaves.
      5.  Belts:  Oil-resistant, nonsparking, and nonstatic.
      6.  Unit manufacturer shall provide OSHA approved belt guard with tachometer holes.

2.6  EQUIPMENT FABRICATION:
   A.  General:  Fabricate mechanical equipment for secure mounting of motors and other electrical
          items included in work.  Provide either permanent alignment of motors with equipment, or
          adjustable mountings as applicable for belt drives, special couplings and similar indirect
          coupling of equipment.  Provide safe, secure, durable, and removable guards for motor drives,
          arranged for lubrication and similar running-maintenance without removal of guards.

PART 3 - EXECUTION

3.1  TEST AND TEST DATA:
   A.  A factory load test shall be performed on each motor of 1000 watt input or greater to assure
       compliance with the energy-efficiency section of this specification.
   B.  Typical test data on every motor to be used on this project shall be made available upon
       request.

3.2  INSTALLATION:
   A.  Install motors on motor mounting systems in accordance with motor manufacturer’s
       instructions, securely anchored to resist torque, drive thrusts, and other external forces
       inherent in mechanical work.  Secure sheaves and other drive units to motor shafts with keys
       and Allen set screws, except motors of 1/3 hp and less may be secured with Allen set screws
       on flat surface of shaft.  Unless otherwise indicated, set motor shafts parallel with machine
       shafts.
   B.  Deliver starters and wiring devices which have not been factory-installed on equipment unit to
       electrical installer for installation.
   C.  Install power and control connections for motors to comply with NEC and applicable provisions
       of Division 16 sections.  Install grounding except where non-grounded isolation of motor is
       indicated.
3.3 INSTALLATION COORDINATION:

A. Furnish equipment requiring electrical connections to operate properly and to deliver full capacity at electrical service available.

B. All control wiring to be in accordance with manufacturer’s recommendations; all wiring shall be color coded to facilitate checking.

C. It is the intent of this specification that one "General" Contractor enters an agreement with the Owner. The use and coordination of subcontractors is at the option of the General Contractor. All mechanical equipment, motors and controls shall be furnished, set in place, and wired. The schedule contained in Division 1 / 16 is provided as a guide only. The exact furnishing and installation of the equipment is left to the Contractors involved. Contractor should note that the intent of the schedule is to have the Division 15 and 16 Contractors responsible for coordinating all control wiring as outlined, whether or not specifically called for by the mechanical or electrical drawings and specifications. Comply with the applicable requirements of Division 16 for all electrical work which is not otherwise specified. No extras will be allowed for Contractor's failure to provide for these required items. The Contractor shall refer to the Division 16 and Division 15 specifications and plans for all power and control wiring and shall advise the Architect/Engineer of any discrepancies prior to bidding.
PART 1 - GENERAL

1.1 SUBMITTALS:

A. Refer to Division 1 and Basic Mechanical Requirements for administrative and procedural requirements for submittals.

B. Product Data: Submit industry standards and manufacturer's technical product data, installation instructions, and dimensioned drawings for each type of pipe and pipe fitting. Submit piping schedule showing pipe or tube weight, fitting type, and joint type for each piping system.

1.2 QUALITY ASSURANCE:

A. Manufacturer's Qualifications: Firms regularly engaged in manufacturer of pipes and pipe fittings of types and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.

B. Soldering and Brazing procedures shall conform to ANSI Standard Safety Code for Mechanical Refrigeration.

C. The University requires all plumbing work be performed under the direct supervision of licensed plumbers (4-year), with a ratio of not more than two apprentices per journeyman. The requirement also applies to licensed pipe fitters. Steam fitters need a City and County of Denver Journeyman Steam Fitters certification.

D. ICC gas fitter certification required for work on natural gas piping.

PART 2 PRODUCTS

2.1 GENERAL:

A. Piping Materials: Provide pipe and tube of type, pressure and temperature ratings, capacities, joint type, grade, size and weight (wall thickness or Class) indicated for each service. Where type, grade or class is not indicated, provide proper selection as determined by Installer for installation requirements, and comply with governing regulations and industry standards.

B. Pipe/Tube Fittings: Provide factory-fabricated fittings of type, materials, grade, class and pressure rating indicated for each service and pipe size. Provide sizes and types matching pipe, tube, valve or equipment connection in each case. Where not otherwise indicated, comply with governing regulations and industry standards for selections, and with pipe manufacturer's recommendations where applicable.

2.2 STEEL PIPES AND PIPE FITTINGS:

A. Black Steel Pipe: ASTM A 53, Grade B, type E, electric resistance welded.

B. 

D. Malleable-Iron Threaded Fittings: ANSI/ASME B16.3; plain or galvanized as indicated (Class 125 and 300).

E. Malleable-Iron Threaded Unions: ANSI B16.39, Class 150, 250 or 300; selected by Installer for proper piping fabrication and service requirements, including style, end connections, and metal-to-metal seats (iron, bronze or brass); plain or galvanized as indicated (Class 150, 250 and 300).


G. Steel Flanges/Fittings: ANSI/ASME B16.5, ASTM A234 (Fire Protection) including bolting and gasketing of the following material group, end connection and facing, except as otherwise indicated.

Material Group: Group 1.1.
End Connections: Buttwelding.
Facings: Raised-face.

H. Forged-Steel Socket-Welding and Threaded Fittings: ANSI B16.11, except MSS SP-79 for threaded reducer inserts; rated to match schedule of connected pipe (up to 4 inch pipe size).

I. Wrought-Steel Buttwelding Fittings: ANSI B16.9, except ANSI B16.28 for short-radius elbows and returns; rated to match connected pipe.

J. Pipe Nipples: Fabricated from same pipe as used for connected pipe; except do not use less than Schedule 80 pipe where length remaining unthreaded is less than 1-1/2 inches, and where pipe size is less than 1-1/2 inches, and do not thread nipples full length (no close-nipples).

2.3 COPPER TUBE AND FITTINGS:

A. Copper Tube: ASTM B 88; Type K or L as indicated for each service; hard-drawn temper, except as otherwise indicated.

B. DWV Copper Tube: ASTM B 306.


D. Wrought-Copper Solder-Joint Fittings: ANSI B16.22.

E. Cast-Copper Solder-Joint Drainage Fittings: ANSI B16.23 (drainage and vent with DWV or tube).

F. Wrought-Copper Solder-Joint Drainage Fittings: ANSI B16.29.


H. Bronze Pipe Flanges/Fittings: ANSI B16.24 (Class 150 and 300).

I. Copper-Tube Unions: Provide standard products recommended by manufacturer for use in service indicated.
2.4 CAST-IRON SOIL PIPES AND PIPE FITTINGS:

A. Hubless Cast-Iron Soil Pipe: FS WW-P-401 and CISPI Standards 301 and 310. Pipe and fittings shall be marked with the collective trademark of the cast iron soil pipe institute or receive prior approval of the engineer.

B. Cast-Iron Hub-and-Spigot Soil Pipe: ASTM A 74. Pipe and fittings shall be marked with the collective trademark of the cast iron soil pipe institute or receive prior approval of the engineer.


D. Heavy Duty Hubless Cast Iron Soil Pipe Couplings: Neoprene gasket coupling with ASTM C564. 304 stainless steel shield, minimum 0.15 inches thick, minimum 3 inches wide with 4 sealing bands up to 4 inch pipe, minimum 9 inches wide with 6 sealing bands up to 10 inch pipe.

   1. Basis of Design: Husky SD 4000.


F. Neoprene Compression Gaskets: ASTM C 564.

2.5 MISCELLANEOUS PIPING MATERIALS/PRODUCTS:

A. Welding Materials: Except as otherwise indicated, provide welding materials as determined by Installer to comply with installation requirements.


B. Soldering Materials: All soldering materials shall be lead free and antimony-free.

   1. Melting Range 450-470 degrees F. All-state “Aquasafe” or equal.
   3. Flux: All flux shall be lead free, water soluble, and compatible with the solder and the materials being joined. ASTM B813-93.

C. Gaskets for Flanged Joints: ANSI B16.21; full-faced for cast-iron flanges; raised-face for steel flanges, unless otherwise indicated.

D. Piping Connectors for Dissimilar Non-Pressure Pipe: Elastomeric annular ring insert, or elastomeric flexible coupling secured at each end with stainless steel clamps, sized for exact fit to pipe ends and subject to approval by plumbing code.

   1. Manufacturer: Subject to compliance with requirements, provide piping connectors of the following:
SECTION 15055

a. Husky Technologies (Husky SD 4000):

E. Pipe Thread Sealant Material: Except as otherwise indicated, provide all pipe threads with the sealant material as recommended by the manufacturer for the service.

1. Manufacturer: Subject to compliance with requirements, provide piping thread sealant material of the following:

   a. The Rectorseal Corporation

PART 3 EXECUTION

3.1 EXAMINATION:

A. Verify all dimensions by field measurements. Verify that all water distribution piping may be installed in accordance with pertinent codes and regulations, and original design, and the referenced standards.

B. Examine rough-in requirements for plumbing fixtures and other equipment having water connections to verify actual locations of piping connections prior to installation.

C. Do not proceed until unsatisfactory conditions have been corrected.

3.2 PIPING INSTALLATION:

A. General: Install pipes and pipe fittings in accordance with recognized industry practices which will achieve permanently-leakproof piping systems, capable of performing each indicated service without piping failure. Install each run with minimum joints and couplings, but with adequate and accessible unions for disassembly and maintenance/replacement of valves and equipment. Reduce sizes (where indicated) by use of reducing fittings. Align piping accurately at connections, within 1/16 inch misalignment tolerance.

   1. Comply with ANSI B31 Code for Pressure Piping.

   2. Electrical Equipment Spaces: Do not run piping through transformer vaults and other electrical or electronic equipment spaces and enclosures. Only piping serving this type of equipment space shall be allowed.

   3. Locations and Arrangements: Drawings (plans, schematics, and diagrams) indicate the general location and arrangement of piping systems. Locations and arrangements of piping take into consideration pipe sizing and friction loss, expansion, pump sizing, and other design considerations. So far as practical, install piping as indicated.

   4. Use fittings for all changes in direction and all branch connections.

   5. Install piping at right angles or parallel to building walls. Diagonal runs are not permitted, unless expressly indicated.

   6. Conceal all pipe installations in walls, pipe chases, utility spaces, above ceilings, unless indicated to be exposed to view.
7. Install piping tight to slabs, beams, joists, columns, walls, and other permanent elements of the building. Provide space to permit insulation applications, with 1 inch clearance outside the insulation. Allow sufficient space above removable ceiling panels to allow for panel removal.

8. Locate groups of pipes parallel to each other, spaced to permit applying insulation and servicing of valves.

9. Install piping free of sags or bends and with ample space between piping to permit proper insulation applications.

10. Floor Penetrations:
   a. Install sleeves 2” A.F.F. for all penetrations in rooms with floor drains and for all penetrations in walls surrounding the rooms.
   b. Kitchens– extend 4” A.F.F.
   c. All other areas where piping is exposed, extend ¼” A.F.F.
   d. All existing floors that are core drilled shall comply with a, b and c of this section.

B. Sanitary Waste and Vent Piping:

1. Install plumbing drainage piping with 1/4 inch per foot (2 percent) downward slope in direction of drain for piping 3 inches and smaller, and 1/8 inch per foot (1 percent) for piping 4 inch and larger. Install cast iron pipe in accordance with the Cast Iron Soil Pipe Institute Handbook.

2. Make changes in direction for drainage and vent piping using appropriate 45 degree wyes, half-wyes, or long sweep quarter, sixth, eighth, or sixteenth bends. SANITARY CROSSES OR SHORT QUARTER BENDS SHALL NOT BE USED IN DRAIN PIPING.

3. Where cast iron piping is suspended in excess of 18 inches on single rod hangers, sway bracing shall be provided to prevent shear at the joints.

4. Place bell ends or groove ends of piping facing upstream.

5. Install gaskets in accordance with manufacturer's recommendations for use of lubricants, cements, and other special installation requirements.

C. Condensate Drain Piping:

1. Condensate drain piping from Kitchen Equipment shall be of the sizes shown on the drawings.

3.3 PIPING SYSTEM JOINTS:

A. General: Provide joints of type indicated in each piping system.

B. Thread pipe in accordance with ANSI B2.1; cut threads full and clean using sharp dies. Ream threaded ends to remove burrs and restore full inside diameter. Apply pipe joint compound, or
pipe joint tape (Teflon) where recommended by pipe/fitting manufacturer, on male threads at each joint and tighten joint to leave not more than 3 threads exposed.

C. Copper ≤ 2": Solder copper tube-and-fitting joints with silver solder or 95-5 tin-antimony/free solder. Cut tube ends squarely, ream to full inside diameter, and clean outside of tube ends and inside of fittings. Apply solder flux to joint areas of both tubes and fittings. Insert tube full depth into fitting, and solder in manner which will draw solder full depth and circumference of joint. Wipe excess solder from joint before it hardens.

D. Hubless Cast-Iron Joints: Comply with coupling manufacturer's installation instructions. Use pre-set torque wrench set to 80 in-lbs on heavy duty couplings.

3.4 PIPING APPLICATION:

A. Domestic Hot and Cold Water - Inside Building:
   1. Above Grade Inside Building:
      a. 6 inches and Smaller: Type K, hard drawn copper tube with wrought copper or bronze fittings, 95-5 tin-antimony / silver tin alloy soldered joints.
      b. Provide plastic isolators at all clamps.

B. Sanitary Drainage and Vents - Inside Building:
   1. Above Grade: Service weight cast iron, no-hub type with neoprene gaskets; service weight cast iron, hub and spigot type with neoprene gaskets; or Type “L” copper with wrought copper of cast brass fittings.

C. Interior Exposed or Accessible Natural Gas Piping:
   1) 1-1/2 Inches and Smaller: Schedule 40, ASTM A120, black steel pipe with 150 lb. malleable iron fittings and threaded joints; Joint Seal: Rectorseal or Teflon paste; Unions: Black malleable iron ground joint, bronze to iron seat, 150 lb. class, ANSI B2.1 and ASTM A197.
   2) 2-1/2 Inches and larger: Schedule 40, ASTM A53, Type S Grade B black steel with butt weld fittings ASTM A234 and welded joints; Unions: 150 lb. forged steel weld neck flange, ANSI/B16.5 and ASTM A150.

D. Equipment Drains and Overflows:
   1. Type "L" copper.

3.5 EXPOSED PIPING IN FINISHED AREAS:

A. Plumbing piping and fittings which are exposed (and uninsulated) in finished areas generally occupied by people, shall be installed with a smooth, high polish, durable chrome plated finish.
3.6 PIPING TESTS:

A. General: Provide temporary equipment for testing, including pump and gauges. Test piping system before insulation is installed wherever feasible, and remove control devices before testing. Test each section of each piping system independently but do not use piping system valves to isolate sections where test pressure exceeds valve pressure rating. Fill each section with water and pressurize for indicated pressure and time.

B. Test all piping systems as specified. Correct leaks by remaking joints. Remove equipment not able to withstand test procedure during test.

C. Work to be installed shall remain uncovered until the required tests have been completed.

D. Piping which is to be concealed shall be tested before being permanently enclosed.

E. As soon as work has been completed, conduct preliminary tests to ascertain compliance with specified requirements. Make repairs or replacements as required.

F. Give a minimum of twenty-four hours notice to Engineer of dates when acceptance test will be conducted. Conduct tests as specified for each system in presence of representative of owner, agency having jurisdiction or his representative. Submit three (3) copies of successful tests to the Engineer for his review. Report shall state system tested and date of successful test.

G. Contractor shall obtain certificates of approval, acceptance and compliance with regulations of agencies having jurisdiction. Work shall not be considered complete until such certificates have been delivered by the Engineer to the Owner.

H. All costs involved in these tests shall be borne by Contractor.

I. System Tests

1. Hydrostatic Test: The test shall be accomplished by hand pumping the system to the specified water pressure, and maintaining that pressure until the entire system has been inspected for leaks, but in no case for a time period of less than four hours.
   a. Domestic water systems: 100 psig or 150 percent of system pressure, whichever is greater.

2. Waste, Drain and Vent Piping: All waste and vent piping shall be subjected to a water test. All openings in the piping system shall be tightly closed, except the highest opening, and the system filled with water to the point of overflow. The water shall be kept in the system, or in the portion under test, for at least 15 minutes before inspection starts; the system shall then be tight to all points. No section shall be tested with less than a ten foot head of water

3. Repair piping systems sections which fail required piping test, by disassembly and re-installation, using new materials to extent required to overcome leakage. Do not use chemicals, stop-leak compounds, mastics, or other temporary repair methods.
4. Drain test water from piping systems after testing and repair work has been completed.

3.7 ADJUSTING AND CLEANING:

A. General: Clean exterior surfaces of installed piping systems of superfluous materials, and prepare for application of specified coatings (if any). Flush out piping systems with clean water before proceeding with required tests. Inspect each run of each system for completion of joints, supports and accessory items.

1. Inspect pressure piping in accordance with procedures of ASME B31.

B. Disinfect all potable water mains and water service piping in accordance with local and health department requirements. Submit test results report.

END OF SECTION 15055
PART 1 - GENERAL

1.1 DESCRIPTION OF WORK:

A. This Section includes general duty valves common to most mechanical piping systems.

1.2 SUBMITTALS:

A. Product Data: including body material, valve design, pressure and temperature classification, end connection details, seating materials, trim material and arrangement, dimensions and required clearances, and installation instructions. Submittals must indicate compliance with applicable MSS (Manufacturer Standardization Society) standards.

1.3 QUALITY ASSURANCE:

A. Single Source Responsibility: Comply with the requirements specified in Division-15 Section "Basic Mechanical Requirements," under "Product Options."

B. MSS Standard Practices: Comply with the following standards for valves:
   1. MSS-SP-110: Ball Valves with Flanged or Butt-Welding Ends for General Service
   2. MSS SP-92: MSS Valve User Guide

1.4 DELIVERY, STORAGE, AND HANDLING:

A. Preparation for Transport: Prepare valves for shipping as follows:
   1. Ensure valves are dry and internally protected against rusting and galvanic corrosion.
   2. Protect valve ends against mechanical damage to threads, flange faces, and weld end preps.

B. Storage: Use the following precautions during storage:
   1. Valves shall be stored and protected against all dirt, debris and foreign material at all times.
   2. Do not remove valve end protectors unless necessary for inspection; then reinstall for storage.
   3. Protect valves against weather. Maintain valve temperature higher than the ambient dew point temperature. If outdoor storage is necessary, support valves off the ground or pavement and protect in watertight enclosures.

PART 2 - PRODUCTS

2.1 MANUFACTURERS:

A. Manufacturer: Subject to compliance with requirements, provide products by the manufacturers listed.
1. Ball Valves:
   a. Conbraco (Apollo)
   b. Milwaukee
   c. Nibco
   d. Watts
   e. Jomar
   f. Dynaquip
   g. Hammond
   h. James Bury
   i. Worcester

2.2 VALVE FEATURES:

   A. General: Comply with MSS-92 1980 "Valve Users Manual".

   B. Sizes: Unless otherwise indicated, provide valves of same size as upstream pipe size.
   (Control valves shall be sized for required flow.)

   C. Operators: Provide the following special operator features:

      1. Lever Handle on quarter turn valves 6 inch and smaller, except plug valves. Provide a
         wrench for every plug valve.

   D. Extended Stems: Where insulation is indicated or specified, provide extended stems to allow
      full operation of the valve without interference by the insulation.

   E. End Connections: As specified in the individual valves specifications.


         a. Caution: Where soldered end connections are used, use solder having a melting
            point below 840 degrees F for gate, globe, and check valves and below 421
            degrees F for ball valves.

2.3 BALL VALVES:

   A. Ball Valves – 2 inch and Smaller: 150 WSP, 600 WOG, rated for 150 PSI at 350 degrees F,
      two piece end entry body style, bronze body conforming to ASTM B584, full port solid bored-
      hole, stainless steel ball and trim, 15 percent glass reinforced PTFE seats, PTFE packing,
      adjustable packing nut blow-out proof stem, vinyl covered steel handle. Provide solder ends
      or threaded ends to match piping system. Apollo 77-200

   B. Ball Valves 2-1/2 inch through 4 inches and for all silver soldered or brazed lines: ANSI
      B16.34, 150 WSP, 600 WOG, rated for 150 PSI at 350 degrees F. Three piece body style,
      bronze body conforming to ASTM B584, full port, solid, bored-hole stainless steel ball and trim
      of ASTM A276 type 316, 15 percent glass reinforced RTFE seats, RTFE packing and blow out
      proof stem, vinyl coated steel handle. Provide solder ends or threaded ends to match piping
      material system. Apollo 82-200.
C. Ball valve options/accessories: Provide the following as required or as specifically indicated:
   1. Stem extension.

PART 3 - EXECUTION

3.1 EXAMINATION:
   A. Install valves in accordance with manufacturers instructions.
   B. Examine valve interior through the end ports, for cleanliness, freedom from foreign matter and corrosion.
   C. Actuate valve through an open-close and close-open cycle. Examine functionally significant features, such as guides and seats made accessible by such actuation. Following examination, return the valve closure member to the position in which it was shipped.
   D. Prior to valve installation, examine the piping for cleanliness, freedom from foreign materials, and proper alignment.
   E. Locate valves in accessible locations with adequate clearance around levers for easy operation.
   F. Install isolation valves within 5 feet of the equipment or appliance served.

3.2 VALVE SELECTION:
   A. Selection of Valve Ends (Pipe Connections): Except as otherwise indicated, select valves with the following ends or types of pipe/tube connections:
      1. Copper Tube Size 2 Inch and Smaller: Solder or threaded ends.

3.3 VALVE INSTALLATIONS:

   Valve Application Table

   (Where sizes overlap, contractor has choice of either type)

<table>
<thead>
<tr>
<th>SERVICE</th>
<th>VALVE TYPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plumbing Water Services; 4&quot; or smaller</td>
<td>Ball Valve</td>
</tr>
</tbody>
</table>

   A. Locate valves for easy access.
   B. Install valves and unions for each fixture and item of equipment in a manner to allow equipment removal without system shut-down.
   C. In overhead horizontal piping, ball valves shall be installed with the handle in the side or bottom of the piping. The handle of quarter turn valves shall open in the direction of flow.

3.4 SOLDER CONNECTIONS:
A. Cut tube square and to exact lengths.

B. Clean end of tube to depth of valve socket, using steel wool, sand cloth, or a steel wire brush to a bright finish. Clean valve socket in same manner.

C. Apply proper soldering flux in an even coat to inside of valve socket and outside of tube.

D. Remove the cap and disc holder of swing check valves with composition discs.

E. Insert tube into valve socket making sure the end rests against the shoulder inside valve. Rotate tube or valve slightly to insure even distribution of the flux.

F. Apply heat evenly to outside of valve around joint until solder will melt upon contact. Feed solder until it completely fills the joint around tube. Avoid hot spots or overheating the valve. Once the solder starts cooling, remove excess amounts around the joint with a cloth or brush.

3.5 THREADED CONNECTIONS:

A. Note the internal length of threads in valve ends, and proximity of valve internal seat or wall, to determine how far pipe should be threaded into valve.

B. Align threads at point of assembly.

C. Apply appropriate tape or thread compound to the external pipe threads (except where dry seal threading is specified).

D. Assemble joint wrench tight. Wrench on valve shall be on the valve end into which the pipe is being threaded.

3.6 FIELD QUALITY CONTROL:

A. Testing: After piping systems have been tested and put into service, but before final adjusting and balancing, inspect each valve for leaks. Adjust or replace packing to stop leaks; replace valve if leak persists.

3.7 ADJUSTING AND CLEANING:

A. Cleaning: Clean mill scale, grease, and protective coatings from exterior of valves and prepare to receive finish painting or insulation.

END OF SECTION 15100
PART 1 GENERAL

1.1 DESCRIPTION OF WORK:

A. Extent of piping specialties work required by this section is indicated on drawings and
   schedules and by requirements of this section.

B. Piping specialties furnished as part of factory-fabricated equipment, are specified as part of
   equipment assembly in other Division-15 sections.

1.2 QUALITY ASSURANCE:

A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of piping specialties of
   types and sizes required, whose products have been in satisfactory use in similar service for
   not less than 5 years.

B. Codes and Standards:
   1. FCI Compliance: Test and rate "Y" type strainers in accordance with FCI 73-1
      "Pressure Rating Standard for "Y" Type Strainers". Test and rate other type strainers in
      accordance with FCI 78-1 "Pressure Rating Standard for Pipeline Strainers Other than
      "Y" Type".
   2. ASME B 31.9 "Building Services Piping" for materials, products, and installation.
   3. ASME "Boiler and Pressure Vessel Code", Section IX, "Welding and Brazing
      Qualification" for qualifications for welding processes and operators.

1.3 SUBMITTALS:

A. Product Data: Submit manufacturer's technical product data, including installation
   instructions, and dimensioned drawings for each type of manufactured piping specialty.
   Include pressure drop curve or chart for each type and size of pipeline strainer. Submit
   schedule showing manufacturer's figure number, size, location, and features for each
   required piping specialty.

B. Shop Drawings: Submit for fabricated specialties, indicating details of fabrication, materials,
   and method of support.

C. Maintenance Data: Submit maintenance data and spare parts lists for each type of
   manufactured piping specialty. Include this data, product data, and shop drawings in
   maintenance manual; in accordance with requirements of Divisions 15.

2. PART 2 - PRODUCTS

2.1 MANUFACTURERS:

A. Manufacturer: Subject to compliance with requirements, provide products by one of the
   following:

   1. Pipe Escutcheons:
2. Dielectric Waterways

   a. Victaulic Co.
   b. Perfection Corp.
   c. Flow Design Inc.

2.2 PIPE ESCUTCHEONS:

   A. General: Provide pipe escutcheons as specified herein with inside diameter closely fitting pipe outside diameter, or outside of pipe insulation where pipe is insulated. Select outside diameter of escutcheon to completely cover pipe penetration hole in floors, walls, or ceilings; and pipe sleeve extension, if any. Furnish pipe escutcheons with nickel or chrome finish for occupied areas, prime paint finish for unoccupied areas.

   B. Pipe Escutcheons for Moist Areas: For waterproof floors, and areas where water and condensation can be expected to accumulate, provide cast brass or sheet brass escutcheons, solid or split hinged.

   C. Pipe Escutcheons for Dry Areas: Provide sheet steel escutcheons, solid or split hinged.

2.3 DIELECTRIC WATERWAY:

   A. General: Zinc electroplated nipple with non metallic lining for use in service indicated, which effectively isolate ferrous from non-ferrous piping (electrical conductance), prevent galvanic action, and stop corrosion. Union style not acceptable. Shall conform to ASA B16.8, plated as applicable a minimum of .0005" and have no flow restrictions when assembled.

2.4 FABRICATED PIPING SPECIALTIES:

   A. Pipe Sleeves: Provide pipe sleeves of one of the following:

      1. Sheet-Metal: Fabricate from galvanized sheet metal; round tube closed with snaplock joint, welded spiral seams, or welded longitudinal joint. Fabricate from the following gauges: 3 inches and smaller, 20 gauge; 4 inches to 6 inches 16 gauge; over 6 inch, 14 gauge.

      2. Steel-Pipe: Fabricate from Schedule 40 galvanized steel pipe; remove burrs. Provide fully welded waterstop/anchor ring fabricated from minimum 1/8 plate, extending minimum 1 inch from O.D. of sleeve, where noted in Part 3.

      3. Iron-Pipe: Fabricate from cast-iron or ductile-iron pipe; remove burrs.

      4. Sleeves for use with firestopping shall be fabricated in accordance with the installation instructions of the firestopping system.

PART 3 - EXECUTION
3.1 INSTALLATION OF PIPING SPECIALTIES:

A. Pipe Escutcheons: Install pipe escutcheons on each pipe penetration thru floors, walls, partitions, and ceilings where penetration is exposed to view; and on exterior of building. Secure escutcheon to pipe or insulation so escutcheon covers penetration hole, and is flush with adjoining surface.

B. Dielectric Waterway: Install at each piping joint between ferrous and non-ferrous piping. Comply with manufacturer's installation instructions. Typical locations are at changes in service piping materials.

3.2 INSTALLATION OF FABRICATED PIPING SPECIALTIES:

A. Pipe Sleeves: Do not install sleeves through structural members of work, except as detailed on drawings, or as reviewed by Architect/Engineer. Install sleeves accurately centered on pipe runs. Size sleeves so that piping and insulation will have free movement in sleeve, including allowance for thermal expansion; but not less than 2 pipe sizes larger than piping run. Install length of sleeve equal to thickness of construction penetrated, and finish flush to surface; except floor sleeves where noted below.

1. Interior gypsum board, plaster, and masonry partitions: Install sheet metal sleeves.

2. For core drilled solid concrete or precast concrete with blockouts, no sleeve is required, except provide sheet metal "collar" fastened and caulked to floors required to have extended sleeves.

END OF SECTION 15120
PART 1 - GENERAL

1.1 QUALITY ASSURANCE:

A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of supports and anchors, of types and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.

B. Codes and Standards:

1. Regulatory Requirements: Comply with applicable plumbing codes pertaining to product materials and installation of supports and anchors.

2. NFPA Compliance: Hangers and supports shall comply with NFPA standard No. 13 when used as a component of a fire protection system and NFPA Standard No. 14 when used as a component of a standpipe system. NFPA 99 shall be used for medical gas systems.

3. UL and FM Compliance: Hangers, supports, and components shall be listed and labeled by UL and FM where used for fire protection piping systems.

4. Duct Hangers: SMACNA Duct Manuals

5. MSS Standard Compliance:

   a. Provide pipe hangers and supports of which materials, design, and manufacture comply with MSS SP-69.

1.2 SUBMITTALS:

A. Product Data: Submit manufacturer's technical product data, including installation instructions for each type of support and anchor. Submit pipe hanger and support schedule showing Manufacturer's figure number, size, location, and features for each required pipe hanger and support.

B. Product certificates signed by the manufacturer of hangers and supports certifying that their products meet the specified requirements.

2. PART 2 - PRODUCTS

2.1 MANUFACTURERS:

A. Manufacturer: Subject to compliance with requirements, provide products by one of the following:

   1. Pipe Hangers and Supports:

      a. B-Line Systems Inc.
      b. Grinnell
      c. PHD Manufacturing, Inc.
2. Saddles and Shields:
   a. ANVIL International
   b. Pipe Shields, Inc.
   c. B-Line
   d. Insulated Saddle Shield Insert Product Inc.

3. Concrete Inserts and Anchors:
   a. Unistrut Metal Framing Systems
   b. Power-Strut
   c. ITW Ramset/Red Head
   d. Hilti
   e. B-Line

2.2 PIPE HANGERS & SUPPORTS:

A. Hangers and support components shall be factory fabricated of materials, design, and manufacturer complying with MSS SP-69.

1. Components shall have galvanized coatings where installed for piping and equipment that will not have field-applied finish.

2. Pipe attachments shall have nonmetallic coating for electrolytic protection where attachments are in direct contact with copper tubing.

B. Adjustable Clevis Hanger: MSS Type.

1. Steel Pipe, size 3/8" thru 30", Type 1.
2. Non-insulated Copper Pipe, size 1/2" thru 4", Type 1. (PVC Coated)

C. Adjustable Swivel Ring for Non-insulated Pipe: MSS Type.

1. Steel Pipe, size 1/2" thru 8", Type 7.
2. Copper Pipe, size 1/2" thru 4", Type 7 (PVC Coated)

D. Straps: MSS Type 26.

E. Hanger Rods: Continuous threaded steel, sizes as specified.

F. Hangers:

1. Hot Pipes:
   a. 1/2" through 1-1/2": Adjustable wrought steel ring.
   b. 2" through 5": Adjustable wrought steel clevis.

2. Cold Pipes:
a. 1/2” through 1-1/2": Adjustable wrought steel ring.
b. 2” and Over: Adjustable wrought steel clevis.

3. Multiple or Trapeze: Structural steel channel (with web vertical and engineered for the specific applications), with welded spacers and hanger rods. Provide cast iron roll and base plate for hot pipe sizes six inches and over. Provide hanger rods one size larger than for largest pipe in trapeze. If the deflection at center of trapeze exceeds 1/360 of the distance between the end hangers, install an additional hanger at mid-span or use a larger channel.

2.3 CONCRETE ANCHORS:

A. Anchors: Carbon steel, zinc plated and coated with a clear chromate finish. Installation shall be in holes drilled with carbide-tipped drill bits or by use of self-drilling anchors.

1. Provide anchors suitable for the location of installation and designed to withstand all forces and movements acting in the anchor. Manufacture pipe anchors in accordance with MSS SP 69. Provide a safety factor of four for the anchor installation.

2.4 SADDLES AND THERMAL SHIELD INSERTS:

A. Protection Saddles: MSS Type 39; fill interior voids with segments of insulation matching adjoining insulation.

B. Protection Shields: MSS Type 40; 180 degrees arc, galvanized steel, minimum 12 inches long, to prevent crushing of insulation.

2.5 MISCELLANEOUS MATERIALS:

A. Steel Plates, Shapes, and Bars: ASTM A 36.

B. Heavy-Duty Steel Trapezes: Fabricate from steel shapes selected for loads required; weld steel in accordance with AWS standards.

PART 3 EXECUTION

3.1 INSPECTION:

A. Examine areas and conditions under which supports and anchors are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.2 PREPARATION:

A. Proceed with installation of hangers, supports and anchors only after required building structural work has been completed in areas where the work is to be installed. Correct inadequacies including (but not limited to) proper placement of anchors and other building structural attachments.

3.3 INSTALLATION OF BUILDING ATTACHMENTS:
A. Existing Construction:
   1. In existing concrete construction, drill into concrete slab and insert and tighten expansion anchor bolt. Connect anchor bolt to hanger rod. Care must be taken in existing concrete construction not to sever reinforcement rods or tension wires.

3.4 INSTALLATION OF HANGERS AND SUPPORTS:

A. Install hangers, supports, clamps and attachments to support piping properly from building structure; comply with MSS SP-69. Arrange for grouping of parallel runs of horizontal piping to be supported together on field fabricated, heavy-duty trapeze hangers where possible. Install supports with maximum spacings complying with MSS SP-69. Where piping of various sizes is supported together by trapeze hangers, space hangers for smallest pipe size or install intermediate supports for smaller diameter pipe. Do not use wire or perforated metal to support piping, and do not support piping from other piping.

B. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers and other accessories.

C. Support fire-water piping independently from other piping systems.

D. Prevent electrolysis and abrasion in support of copper tubing by use of hangers and supports which are plastic coated, or with EPDM isolation strips. Duct tape or copper coated hangers are not acceptable.

E. Load Distribution: Install hangers and supports so that piping live and dead loading and stresses from movement will not be transmitted to connected equipment.

F. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes, and so that maximum pipe deflections allowed by ANSI B31.9 Building Services Piping Code is not exceeded.

G. Insulated Piping: Comply with the following installation requirements.
   1. Clamps: Attach clamps, including spacers (if any), to piping with clamps projecting through insulation; do not exceed pipe stresses allowed by ANSI B31.
   2. Shields: Install galvanized steel protection shields, on all insulated piping 2 inches and less, except where required to be clamped. Where necessary to prevent dislocation, strap shield to pipe with wire ties or "Zip Strips".

H. Support horizontal cast iron pipe as follows:
   1. Hub & Spigot: All sizes.
      a. 10 ft. max spacing: min of one (1) hanger per pipe section close to joint on the barrel. Also at change of direction and branch connections.
      b. Use hanger rods same size as for steel pipe.
   2. No-Hub: All sizes
SUPPORTS AND ANCHORS

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a. With Clamp-All and Anaheim Series 4000 stainless steel couplings and MG cast iron couplings: one hanger to each joint.

b. With all other stainless steel band type couplings: one hanger to each side of joint.

c. Support all horizontal cast iron pipe within 18 inches of each joint and with 5 feet maximum spacing between hangers, except that pipe exceeding 5 feet in length shall be supported at intervals no greater than 10 feet.

d. Use hanger rods same size as for steel pipe.

I. Place a hanger within one foot of each horizontal elbow.

J. Use hangers which are vertically adjustable 1-1/2 inch minimum after piping is erected.

K. Where several pipes can be installed in parallel and at same elevation, provide trapeze hangers.

L. Each pipe drop to equipment shall be adequately supported. All supporting lugs or guides shall be securely anchored to the building structure.

M. Securely anchor and support plumbing domestic water piping in chases or walls. Use factory manufactured clamps and brackets connected to fixtures, waste/vent piping or brackets connected to studs. Wires or straps will not be permitted.

1. Prevent copper tubes from making contact with steel brackets using fire retardant polyethylene inserts or other dielectric insulating material. Duct tape shall not be used.

N. Install anchors and fasteners in accordance with manufacturer’s recommendations and the following:

1. In the event a self-drilling expansion shield or machine bolt expansion shield is considered to have been installed improperly, the Contractor shall make an acceptable replacement or demonstrate the stability of the anchor by performing an on-site test under which the anchor will be subjected to a load equal to twice the actual load.

2. Powder-driven fasteners may be used only where they will be concealed after the construction is complete. Where an occasional fastener appears to be improperly installed, additional fastener(s) shall be driven nearby (not closer than 6 inches) in undisturbed concrete. Where it is considered that many fasteners are improperly installed, the Contractor shall test load any 50 successively driven fasteners. If 10 percent or more of these fasteners fail, the Contractor shall utilize other fastening means as approved and at no additional cost to the Owner.

O. Within walls, support vertical pipe every 6 feet where pipe supplies a fixture.

3.5 SHEET METAL DUCT HANGERS AND SUPPORTS:

A. Provide in accordance with SMACNA HVAC duct construction standards.

B. Additional Hanger Requirements:
1. 2" to 24" from flexible connections of fans.
2. 12" to 36" from the main duct to the first hanger of long branch ducts.
3. 2" to 12" from the ends of all branch ducts.

3.6 METAL FABRICATION:

A. Cut, drill, and fit miscellaneous metal fabrications for pipe anchors and equipment supports. Install and align fabricated anchors in indicated locations.

B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.

3.7 ADJUSTING:

A. Hanger Adjustment: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

B. Touch-Up Painting: Immediately after erection of anchors and supports, clean field welds and abraded areas of shop paint and paint exposed areas with same material as used for shop painting to comply with SSPC-PA-1 requirements for touch-up of field-painted surfaces.

1. Apply by brush or spray to provide a minimum dry film thickness of 2.0 mils.

OR

Touch-Up Painting: Cleaning and touch-up painting of field welds, bolted connections, and abraded areas of the shop paint on miscellaneous metal is specified in Division 9 section "Painting" of these specifications.

END OF SECTION 15140
PART 1 - GENERAL

1. QUALITY ASSURANCE:
   A. Manufacturer’s Qualifications: Firms regularly engaged in manufacturer of identification devices of types and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.
   B. Codes and Standards:
      Existing Building Standards: Comply with the lettering size, length of color field, colors and identification method as presently exists in the building unless otherwise indicated.

1.2 SUBMITTALS:
   A. Product Data: Submit manufacturer's technical product data and installation instructions for each identification material and device required.

PART 2 - PRODUCTS

2. MANUFACTURERS:
   A. Manufacturer: Subject to compliance with requirements, provide products by one of the following:
   B. Mechanical Identification:
      2. Seton Name Plate Corp.

2.2 MECHANICAL IDENTIFICATION MATERIALS:
   A. General: Provide manufacturer’s standard products of categories and types required for each application as referenced in other Division-15 sections. Where more than single type is specified for application, selection is Installer's option, but provide single selection for each product category.

2.3 PLASTIC PIPE MARKERS:
   A. Snap-On Type: Provide manufacturer's standard pre-printed, semi-rigid snap-on, color-coded pipe markers, complying with ANSI A13.1.
   B. Insulation: Furnish 1 inch thick molded fiberglass insulation with jacket for each plastic pipe marker to be installed on uninsulated pipes subjected to fluid temperatures of 125 degrees F. or greater. Cut length to extend 2 inches beyond each end of plastic pipe marker.
   C. Small Pipes: For external diameters less than 6 inches (including insulation if any), provide full-band pipe markers, with direction of flow arrows, extending 360 degrees around pipe at each location, fastened by one of the following methods:
1. Snap-on application of pre-tensioned semi-rigid plastic pipe marker.
   a. Setmark Type SNA

2. Taped to pipe (or insulation) with color-coded plastic adhesive tape, not less than 3/4 inch wide; full circle at both ends of pipe marker, tape lapped 1-1/2 inch.

D. Pressure Sensitive Markers: Brady Type 350 flexible vinyl film identification markers and tape, with legend, size and color per ANSI A-13.1.

E. Lettering: Comply with piping system nomenclature as specified, scheduled, shown, or to match existing building lettering nomenclature system and abbreviate only as necessary for each application length.

F. Arrows: Print each pipe marker with arrows indicating direction of flow, either integrally with piping system service lettering (to accommodate both directions), or as separate unit of plastic.

2.4 PLASTIC DUCT MARKERS:

A. General: Provide manufacturer's standard laminated plastic, duct markers.

B. Nomenclature: Include the following:
   1. Direction of air flow.
   2. Duct service (supply, return, exhaust, etc.)

2.5 PLASTIC TAPE:

A. General: Provide manufacturer's standard color-coded pressure-sensitive (self-adhesive) vinyl tape, not less than 3 mils thick.

B. Width: Provide 1-1/2 inches wide tape markers on pipes with outside diameters (including insulation, if any) of less than 6 inches, 2-1/2 inches wide tape for larger pipes.

C. Color: Comply with ANSI A13.1, except where another color selection is indicated.

2.6 PLASTICIZED TAGS:

A. General: Manufacturer's standard pre-printed or partially pre-printed accident-prevention tags, of plasticized card stock with matt finish suitable for writing, approximately 3-1/4 inch x 5-5/8 inch, with brass grommets and wire fasteners, and with appropriate pre-printed wording including large-size primary wording (as examples; DANGER, CAUTION, DO NOT OPERATE).

2.7 ENGRAVED PLASTIC-LAMINATE SIGNS:

A. General: Provide engraving stock melamine plastic laminate, complying with FS L-P-387, in the sizes and thicknesses indicated, engraved with engraver's standard letter style of the sizes and wording indicated, black with white core (letter color) except as otherwise indicated, punched for mechanical fastening except where adhesive mounting is necessary because of substrate.
B. Thickness: 1/8 inch, except as otherwise indicated.

C. Fasteners: Self-tapping stainless steel screws, except contact-type permanent adhesive where screws cannot or should not penetrate the substrate.

2.8 LETTERING AND GRAPHICS:

A. General: Coordinate names, abbreviations and other designations used in mechanical identification work, with corresponding designations shown, specified, scheduled and approved by the Owner/Engineer. Provide numbers, lettering and wording as indicated and approved by the Owner/Engineer for proper identification and operation/maintenance of mechanical systems and equipment.

3. PART 3 - EXECUTION

3.1 GENERAL INSTALLATION REQUIREMENTS:

A. Coordination: Where identification is to be applied to surfaces which require insulation, painting or other covering or finish including valve tags in finished mechanical spaces, install identification after completion of covering and painting. Install identification prior to installation of acoustical ceilings and similar removable concealment.

3.2 DUCTWORK IDENTIFICATION:

A. General: Identify air supply, return, exhaust ductwork and duct access doors with duct markers; or provide stenciled signs and arrows, showing ductwork service and direction of flow, in black or white (whichever provides most contrast with ductwork color). Building identification shall match the method which exists in the building.

B. Location: In each space where ductwork is exposed, or concealed only by removable ceiling system, locate signs near points where ductwork originates or continues into concealed enclosures (shaft, underground or similar concealment), and at 50 foot spacing along exposed runs.

C. Access Doors: Provide duct markers or stenciled signs on each access door in ductwork and housings, indicating purpose of access (to what equipment), other maintenance and operating instructions, and appropriate safety and procedural information.

D. Concealed Doors: Where access doors are concealed above acoustical ceilings or similar concealment, plasticized tags may be installed for identification in lieu of specified signs, at Installer’s option.

3.3 PIPING SYSTEM IDENTIFICATION:

A. General: Install pipe markers of the following type on each system indicated to receive identification, and include arrows to show normal direction of flow. Existing building identification shall match the existing method which exists in the building.

B. Plastic pipe markers, with application system as indicated under "Materials" in this section. Install on pipe insulation segment where required for hot non-insulated pipes.
C. Locate pipe markers and color bands as follows wherever piping is exposed to view in occupied spaces, machine rooms, accessible maintenance spaces (shafts, tunnels, plenums) and exterior non-concealed locations.

D. Near each branch, excluding short take-offs for fixtures and terminal units; mark each pipe at branch, where there could be question of flow pattern.

E. Near locations where pipes pass through walls or floors/ceilings, or enter non-accessible enclosures.

F. At access doors and similar access points which permit view of concealed piping.

G. Near major equipment items and other points of origination and termination.

H. Spaced intermediately at maximum spacing of 25 feet along each piping run, except reduce spacing to 15' in congested areas of piping and equipment.

I. On piping above removable acoustical ceilings.

3.4 MECHANICAL EQUIPMENT IDENTIFICATION:

A. General: Install minimum 2 inch x 4 inch engraved plastic laminate equipment marker on each individual items of mechanical equipment. Provide marker for the following general categories of equipment.

1. Fans.

B. Lettering Size: Minimum 1/4 inch high lettering for name of unit.

C. Text of Signs: In addition to the identified unit, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations.

3.5 LIFT-OUT CEILINGS & ACCESS DOORS:

A. Provide Kroy type adhesive labels on ceiling tee or access door to identify concealed valves or other concealed mechanical components which are directly above nameplate in ceiling space.

B. Use the following colors for specified labels:

1. Isolation, balancing and control valves: 3/8” black letters on white background.
2. Isolation valves for plumbing: 3/8” blue letters on white background.

C. Label shall be installed oriented to read towards the ceiling tile that needs to be removed for access.

3.6 MOTORS CONTROLLED BY ENERGY MANAGEMENT SYSTEM:

A. The University 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.

3.7 ADJUSTING AND CLEANING:

A. Adjusting: Relocate any mechanical identification device which has become visually blocked by work of this division or other divisions.

END OF SECTION 15190
PART 1 - GENERAL

1.1 DESCRIPTION OF WORK:
   A. Extent of mechanical insulation required by this section is indicated on drawings and schedules, and by requirements of this section.
   B. Types of mechanical insulation specified in this section include the following:
      1. Piping System Insulation:
         - Fiberglass.

1.2 QUALITY ASSURANCE:
   A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of mechanical insulation products and systems, of types and sizes required, whose products have been in satisfactory use in similar service for not less than 3 years.
   B. Installer's Qualifications: Firm with at least 5 years successful installation experience on projects with mechanical insulations similar to that required for this project.
   C. Flame/Smoke Ratings: Provide composite mechanical insulation (insulation, jackets, coverings, sealers, mastics and adhesives) with flame-spread index of 25 or less, and smoke-developed index of 50 or less, as tested by ASTM E 84 (NFPA 255) method. In addition, the products, when tested, shall not drip flame particles, and flame shall not be progressive. Provide Underwriters Laboratories Inc., label or listing, or satisfactory certified test report from an approved testing laboratory to prove that fire hazard ratings for materials proposed for use do not exceed those specified.
   D. Insulation Materials: Non-combustible as defined in NFPA Pamphlet 220 and UL listed or labeled.

1.3 SUBMITTALS:
   A. Product Data: Submit manufacturer's technical product data and installation instructions for each type of mechanical insulation. Submit schedule showing manufacturer's product number, k-value, thickness, density, and furnished accessories for each mechanical system requiring insulation. Submit detail product information and installation information for all jacketing systems specified in this section.

1.4 DELIVERY, STORAGE, AND HANDLING:
   A. Deliver insulation, coverings, cements, adhesives, and coatings to site in containers with manufacturer's stamp or label, affixed showing fire hazard indexes of products.
   B. Protect insulation against dirt, water, and chemical and mechanical damage. Do not install damaged or wet insulation; remove from project site.

PART 2 - PRODUCTS
2.1 MANUFACTURERS:

A. Manufacturer: Subject to compliance with requirements, provide product by one of the following:

1. Mechanical Insulation:
   a. Johns Manville Corp.
   b. Owens-Corning Fiberglas Corp.
   c. Knauf Fiber Glass
   d. Manson
   e. Armstrong World Industries, Inc.
   f. Nomaco

2.2 PIPING INSULATION MATERIALS:

A. Fiberglass Piping Insulation: ASTM C 547, Class 1 unless otherwise indicated. "K" factor shall be maximum 0.24 at 75 degrees F. mean temperature, jacket with tensile strength of 35 lbs/in, mullen burst 70 psi, beach puncture 50 oz. in/in, permeability .02 perm factory applied vapor barrier jacket and adhesive self-sealing lap joint.

B. Jackets for Piping Insulation: ASTM C 921, Type I for piping with temperatures below ambient, Type II for piping with temperatures above ambient. Type I may be used for all piping at Installer's option.

1. Fitting Covers: UV resistant PVC, pre-molded fitting covers, flame spread 25, smoke developed 50. PVC tape for cold systems, serrated tacks or PVC tape for hot systems.

C. Staples, Bands, Wires, and Cement: As recommended by insulation manufacturer for applications indicated.

D. Adhesives, Sealers, and Protective Finishes: As recommended by insulation manufacturer for applications indicated and additional finishes as specified.

3. PART 3 - EXECUTION

3.1 INSPECTION:

A. Examine areas and conditions under which mechanical insulation is to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

B. Workmanship shall be first class and of the highest quality, poor installation or bad appearance as determined by the engineer shall be due cause to reject the entire project in whole and retainage will be withheld until corrective action is completed to the engineer's satisfaction.

3.2 PLUMBING PIPING SYSTEM INSULATION:

A. Insulation Omitted: Omit insulation on chrome-plated exposed piping, unions, fire protection piping, and pre-insulated equipment.
SECTION 15250

B. Cold Piping:

1. Application Requirements: Insulate the following cold plumbing piping systems:
   a. Potable and non-potable cold water piping.

2. Insulate each piping system specified above with the following types and thicknesses of insulation:
   a. Above Ground Inside Building Fiberglass; ½ inch thickness.

C. Hot Piping:

1. Application Requirements: Insulate the following hot plumbing piping systems:
   a. Potable hot water and hot water recirculating piping.

2. Insulate each piping system specified above with the following types and thicknesses of insulation:
   a. fiberglass; 1/2 inch for runouts to individual fixtures 12'-0" or less in length, 1 inch thick for pipe sizes up to and including 2 inch, 1-1/2 inch thick for pipe sizes over 2 inches.

3.3 INSTALLATION OF PIPING INSULATION:

A. General: Install insulation products in accordance with manufacturer’s written instructions, and in accordance with recognized industry practices to ensure that insulation serves its intended purpose.

B. Install insulation on pipe systems subsequent to testing and acceptance of tests.

C. Install insulation materials with smooth and even surfaces. Insulate each continuous run of piping with full-length units of insulation, with single cut piece to complete run. Do not use cut pieces or scraps abutting each other.

D. Clean and dry pipe surfaces prior to insulating. Butt insulation joints firmly together to ensure complete and tight fit over surfaces to be covered.

E. Maintain integrity of vapor-barrier jackets on cold pipe insulation, and protect to prevent puncture or other damage.

1. Do not use staples or tacks on vapor barrier jackets.

2. Seal vapor barrier penetrations with vapor barrier finish recommended by the manufacturer.

3. Seal fitting covers with PVC tape.

4. Cover all unions, check valves, and other in-line devices. Mark outer covering with indelible marker to identify item covered.
F. Neatly bevel and seal insulation at all exposed edges.

G. Cover valves, fittings and similar items in each piping system with equivalent thickness and composition of insulation as applied to adjoining pipe run. Install factory molded, precut or job fabricated units (at Installer's option) except where specific form or type is indicated.

H. Extend piping insulation without interruption through walls, floors and similar piping penetrations, except where otherwise indicated.

3.4 EXISTING INSULATION REPAIR:

A. Repair damaged sections of existing mechanical insulation, both previously damaged or damaged during this construction period. Use insulation, install new jacket lapping and sealed over existing.

3.5 PROTECTION AND REPLACEMENT:

A. Replace damaged insulation which cannot be repaired satisfactorily, including units with vapor barrier damage and moisture saturated units.

B. Protection: Insulation Installer shall advise Contractor of required protection for insulation work during remainder of construction period, to avoid damage and deterioration.

END OF SECTION 15250
PART 1 - GENERAL

1.1 DESCRIPTION OF WORK:

A. Products furnished but not installed include sprinkler head cabinet with spare sprinkler heads. Furnish to the Owner's maintenance personnel.

B. The work of this section includes engineering by the Contractor.

1.2 DEFINITIONS:

A. Pipe sizes used in this Specification are Nominal Pipe Size (NPS).

B. Other definitions for fire protection systems are listed in NFPA Standard 13.

C. Working plans as used in this Section means those documents (including drawings and calculations) prepared pursuant to the requirements contained in NFPA 13 for monitoring by the Engineer and for obtaining acceptance by the authority having jurisdiction.

1.3 SYSTEM DESCRIPTION:

A. Modify the existing fire protection system to accommodate revisions to the areas identified on the drawings. In general this consists of replacing sprinklers above an open grid ceiling with recessed pendant sprinklers in a dropped ceiling.

B. Fire protection system is a "wet-pipe" system employing automatic sprinklers attached to a piping system containing water and connected to a water supply so that water discharges immediately from sprinklers opened by fire.

C. Each fire protection system shall be monitored by the building fire alarm system and the University Central Station.

1.4 SUBMITTALS:

A. Product data for each type sprinkler head, valve, piping and piping specialty, fire protection specialty, fire department connection and any equipment installed in accordance with the Contract Documents. Index per specification chapter and item number.

B. Shop drawings prepared in accordance with NFPA 13 identified as "working plans," including detailed riser schematics indicating pipe sizes and lengths; and hydraulic calculations where applicable. Do not proceed with the installation of the work until shop drawing review is complete.

C. Contractor shall stamp shop drawings indicating compliance with applicable codes and contract drawings. Contractor shall stamp drawing "Approved for Construction."

D. If more than two submittals (either for shop drawings or for record drawings) are made by the contractor, the Owner reserves the right to charge the contractor for subsequent reviews by their consultants. Such extra fees shall be deducted from payments by the Owner to the contractor.

E. Maintenance data for each type sprinkler head, valve, piping specialty, fire protection specialty, fire department connection and hose valve specified, for inclusion in operating and
maintenance manual specified in Division 1 and Division-15 Section "Basic Mechanical Requirements."

F. Welder's qualification certificate.

G. Test reports and certificates including "Contractor's Material and Test Certificate for Aboveground Piping" and "Contractor's Materials and Test Certificate for Underground Piping" as described in NFPA 13.

H. Hydraulic calculations and drawings submitted to the Engineer shall be prepared under the direct supervision of and bear the signed stamp of a professional engineer registered in the State of Colorado or a NICET Level IV designer and familiar with this type of installation and with previous similar experience (practicing in the Fire Protection field) certifying that the fire sprinkler system has been designed and hydraulically calculated in compliance with NFPA and governing codes.

I. Fire sprinkler piping design drawings shall show all ductwork, air devices, lighting and electrical panels.

J. Shop drawings and hydraulic calculations shall be reviewed by the local fire prevention authority concurrently to submitting shop drawings to the Architect/Engineer.

K. Partial submittals shall not be acceptable.

L. Equipment submittals shall contain annotated descriptive data to show the specific model, type and size of each item the Contractor proposes to furnish. Catalog cut sheets shall be submitted in a binder and indexed referencing the applicable specification sections. Unclear or partial reproductions of manufacturer's original catalog cuts or descriptive data shall not be accepted. Each item supplied shall be clearly identified on each sheet. Where the submittal material describes items, in addition to the items being submitted, the additional items shall be crossed out and the submittal item shall be identified.

Submit proof of compatibility for equipment components required to be approved as a system.

M. The Contractor shall be responsible for acquiring any general arrangement drawings depicting the building layouts, overall site plan and the detailed building drawings, as necessary to develop complete submittals. Reference drawings may be obtained from the owner if available; Contractor to verify such availability prior to bidding.

N. Submittals processed by the Engineer shall not be considered Change Orders. The purpose of submittals shall demonstrate to the Engineer that the Contractor understands the design concept, and that such understanding is demonstrated by indicating and detailing the fabrication and installation methods intended to be used.

O. Review by the Engineer shall not relieve the Contractor from full compliance with requirements of the contract documents, codes, and standards.

P. Any system piping or components which are installed, purchased or fabricated prior to the Contractor receiving a set of reviewed and approved shop drawings, shall be the responsibility of the Contractor.

Q. System installation shall not commence until the Contractor has obtained required approval of shop drawings.
R. Submit anchoring details and calculations.

S. Drawings shall be minimum size of 24” x 36”, with a minimum scale of 1/8” = 1'-0”. Shop drawings, hydraulic calculations and equipment data sheets shall be submitted for review within a maximum of thirty (30) working days after award of contract. Written approval of the Engineer and the AHJ shall be obtained prior to starting the installation.

T. Drawings shall include a site plan, floor plan/layout drawings, riser diagram(s) and hydraulic calculations based upon the general arrangement drawings provided and other drawings that may be available from the Owner. Drawings shall include column line designations where provided on the contract documents. The site plan drawing shall clearly indicate the required water supply information from NFPA #13.

U. Include details and sections as required to clearly define and clarify the design.

V. Drawings shall be in strict compliance with NFPA #13 and drawn on an Owner approved computer aided drafting (CAD) system computer to a commercial or architectural/engineering drawing standard and the University CAD standards unless waived in writing by the AHJ. Computer drawings shall be full scale and be plotted to a noted scale. For additional details see UCB CAD Standards.

W. An up-dated set of shop drawings (record drawings) approved by the AHJ that incorporates all field changes shall be maintained at the job site, in good condition from the start of construction until all inspections are completed.

X. The drawings shall show the location and ratings of all fire rated floors and walls. Each pipe penetration of these rated assemblies shall be detailed on the drawings showing pipe sleeve and a fire rated penetration seal.

Y. The Contractor shall not proceed with purchase, fabrication, or installation of submittal related work until notified in writing. Re-submit as required until so marked by the Engineer. Work which is executed without required prior acceptance by the Engineer/AHJ shall be subject to rejection. Removal and reconstruction of rejected work shall be at the Contractor’s expense.

Z. Completed State of Colorado Plan Registration Form shall accompany the shop drawing submittal.

1.5 HYDRAULIC DESIGN:

A. The Fire Sprinkler System shall be hydraulically calculated by the Contractor.

B. The Room Design Method and Small Room Method shall not be used.

C. The wet pipe fire sprinkler system for the building shall be hydraulically calculated to comply with NFPA-13 and the following criteria:
   1. Light hazard occupancy for areas unless noted otherwise.
   2. Ordinary hazard Group 1 occupancy for the following:
      a. Where noted or shown on drawings.
D. The final fire protection system demand shall be a minimum of 10 PSI below the water supply curve.

E. Velocities in pipes shall be shown on hydraulic calculations. Velocities in overhead piping shall not exceed 20 feet per second. Velocities in underground piping shall not exceed 16 feet per second.

F. Allow 10 feet of loss for electric water flow switches and note on hydraulic calculations.

G. The Fire Protection Contractor shall provide as many sets of hydraulic calculations as necessary, performed and submitted to prove that the most remote and demanding areas are calculated.

H. Design information shall be permanently affixed to the main riser as described in NFPA Pamphlet 13.

I. Water supply flow test(s) shall be conducted by the contractor and witnessed by the AHJ. Test(s) shall be conducted in strict accordance with NFPA #13 and NFPA #291. The Campus Fire Systems Group shall be invited to witness the test(s). Notify the Campus Fire Systems Group of the time and location of the test(s) prior to operating hydrants. Procedures specific to each project including location, date and time shall be submitted to the AHJ for approval two weeks prior to conducting tests. Such tests may discolor water supply to buildings during the test. As such, if the test date or time coincides with uninterruptible Campus functions, such as research, the owner reserves the right to delay or otherwise reschedule the test.

J. The pipe and valve sizes indicated on the drawings and details are minimum sizes to be used regardless of sizes allowed by hydraulic calculations.

K. The hydraulic calculations shall be calculated back to a looped water main and be based on the available water supply flow test results. In the case of dead-end type mains, calculations shall include piping to the point where the flow test is effective.

L. The hydraulic calculations shall prove the hydraulically most remote and demanding areas of not less than 1,500 sq. ft., to allow for flexibility in building use. Velocity pressure may be neglected in the hydraulic calculations. This may involve submitting auxiliary hydraulic calculations to prove that the most remote and demanding area was calculated.

M. For hydraulic calculation purposes, the friction loss coefficient for existing piping over five (5) years in age, the Hazen-Williams design C values given in NFPA-13 shall be reduced by 10. This includes non-circulating water mains and above ground piping.

N. Inside Hose Streams

1. For Class II standpipe supplied from a sprinkler system, provide 50 gpm at the two most remote outlets or 100 gpm if one hose outlet exists. Flows shall be added at the point of connection to the sprinkler system for hydraulic calculation purposes.

2. For combined standpipe/sprinkler systems, standpipe demands are added to the sprinkler system demand at the point(s) of connection.

3. For Class I, II or III standpipe systems not supplied through a sprinkler system, the minimum demand shall comply with NFPA #14.
O. Piping C-factors for new, existing, above ground, and underground shall be included in contract documents.

NOTE: For existing piping older than 5 years, the C factor is not to exceed 100. The C factor shall be 120 for new steel piping.

1.6 QUALITY ASSURANCE:

A. Installer Qualifications: Installation and alterations of fire protection piping, equipment, specialties, and accessories, and repair and servicing of equipment shall be performed only by qualified installer. The term qualified means a minimum of 5 years experience in projects similar in size and scope to this project), familiar with all precautions required, and has complied with all the requirements of the authority having jurisdiction. The contractor shall be licensed for the design and installation for the specific type of system in the jurisdiction where the work is to be performed and the State of Colorado. Upon request, submit evidence of such qualifications to the Engineer. Refer to Division-1 Section: "Definitions and Standards" for definitions for "Installers." Installer shall have emergency service capability and shall have an office within 100 miles of the university campus which maintains a full complement of spare parts, tools and equipment for the specific project and type of system.

1. The entire fire protection system project including design, calculation, installation and testing, excluding prefabrication, shall be bid by a single firm which has the capabilities to perform all of the work required under this standard. No installation work shall be sub-contracted without prior permission in writing from the Owner.

2. Fire Protection Contractor, individually shall be able to prove bonding capacity equal to the total amount of the fire protection portion of the contract, for the specific project. Refer to Instructions to Bidders.

B. Designer Qualifications:

1. The design of the fire protection systems shall be performed by or under the direction and control of a Colorado registered P.E. or a NICET level IV. Said professionals shall be experienced in fire protection, thoroughly familiar with and experienced in this type of installation. Colorado registered professional engineers or the NICET level IV professionals who are "Members" in the national organization of the Society of Fire Protection Engineers (SFPE) or meet the qualifications for the grade of "Member" in the national organization of the SFPE are preferred.

2. No design related work shall be subcontracted or performed by persons other than bona fide employees working solely for the contractor. Any exception shall be pre-approved by the owner, in writing

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

D. The Contractor shall be ultimately responsible to guarantee the system against freezing for reasons other than that of the building Owner's negligence.

E. Job foremen shall be trained for the installation and operation of each type of system and possess documentation of qualifications and training. Foremen shall have a minimum of three (3) years of successful installation experience on projects with fire protection systems similar in scope and nature to that required for the project.

F. Regulatory Requirements: Comply with the requirements of the following codes:
1. NFPA 13 - Standard for the installation of Sprinkler System, including applicable seismic requirements.

2. UL and FM Compliance: All fire protection system materials and components shall be Underwriter's Laboratories and Factory Mutual listed as well as labeled for the application anticipated.

3. International Building Codes, including applicable seismic requirements.

4. Requirements of the local Building Department and Fire Department.

5. UCB (University of Colorado at Boulder) Construction Standards.

G. Reference and standards listed are minimum requirements. Where more stringent requirements are specified or noted on the drawings, this shall be applicable.

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

1.7 SEQUENCING, SCHEDULING, PROJECT COORDINATION:

A. Schedule rough-in installations with installations of other building components.

B. Minimum time frame for notice of inspections and meetings is five (5) days and list the persons to be notified.

C. Minimum time frame for notice of flow tests is two weeks. See Part 3 of this section.

D. All cutting, notching, etc., of structural elements shall be approved in writing by the Architect/Engineer.

E. Cutting of pipes using heat/ignition generating devices shall not be conducted inside any portion of existing buildings without written approval from the University. Follow the University Central Station and Hot Work Permit Procedures. Welding of pipes on-site is prohibited by NFPA-13 and only shop welding shall be allowed. Brazing and soldering of copper tubes shall not be conducted within the buildings prior to application and acceptance of hot work permits.

1.8 EXTRA STOCK:

A. Heads: For each style and temperature range (and length for dry heads) required, furnish additional sprinkler heads per NFPA-13.

1. Obtain receipt from Owner that extra stock has been received.

2. Wrenches: Furnish 2 spanner wrenches for each type and size of valve connection and fire hose coupling.
PART 2 - PRODUCTS

2.1 MATERIALS AND PRODUCTS:

A. General: Provide piping materials and factory-fabricated piping products of sizes, types, pressure ratings, temperature ratings, and capacities as indicated. Where not indicated, provide proper selection as determined by Installer to comply with installation requirements. Provide sizes and types matching piping and equipment connections; provide fittings of materials which match pipe materials used in fire protection systems.

B. All equipment used on this project shall be new and UL listed unless noted or specified otherwise.

C. New equipment shall be of the same manufacturer, type and style as the existing comparable equipment, including sprinkler heads, pipe schedules, and specialty valves.

2.2 MANUFACTURERS:

A. Manufacturer: Subject to compliance with requirements, provide fire protection system products from one of the following:

   1. Sprinklers:
      a. Match existing sprinklers where possible
      b. Viking Corp.
      c. Globe
      d. Reliable
      e. Tyco

2.3 BASIC SUPPORTS AND ANCHORS:

A. General: Provide supports and anchors complying with Division-15 "Supports and Anchors" in accordance with the following listing:

   1. Adjustable steel clevis hangers, adjustable steel band hangers, or adjustable band hangers, for horizontal-piping hangers and supports.

   2. Two-bolt riser clamps for vertical piping supports.

   3. Steel turnbuckles and malleable iron sockets for hanger-rod attachments.

   4. Concrete inserts, top-beam C-clamps, side beam or channel clamps or center beam clamps for building attachments.

   5. Concrete inserts and other type hangers penetrating into or through structural members shall be submitted (by the Fire Protection Contractor) to and have the approval of the structural engineer contracted for this project.

   6. Powder driven studs shall not be allowed.
2.4 PIPE AND TUBING MATERIALS (INSIDE BUILDING):

A. General: Refer to Part 3 Article "Pipe Applications" for identification of systems where the below specified pipe and fitting materials are used.

B. Steel Pipe: ASTM A 53, A795 or A135, Schedule 40 or Schedule 10, U.S. manufacture, black steel pipe, plain ends.

C. Schedule 5 pipe shall not be allowed.

D. For 2" and smaller piping, threadable thinwall pipe may be used only if the Corrosion Resistance Ratio of the pipe shall be 1.00 or greater, as installed in the system. Documentation shall be presented with product submittal.

E. Schedule 10 pipe shall only be allowed for pipe sizes 2-1/2" and larger.

F. Provide galvanized piping for drain risers.

G. Design, hydraulic data and fabrication documentation shall be submitted on the use of segmentally welded fittings.

H. Threaded and cut-grooved pipes are subject to the limitations of NFPA#13.

I. Face bushings and hexagonal bushings shall not be permitted.

2.5 FITTINGS (INSIDE BUILDING):


B. Malleable-Iron Threaded Fittings: ANSI B16.3, Class 300, standard pattern, for threaded joints. Threads shall conform to ANSI B1.20.1. Install steel pipe with threaded joints and fittings for 2" and smaller and where shown on drawings.

C. Steel Fittings: ASTM A234, seamless or welded, for welded joints.

D. Grooved Mechanical Fittings: ASTM A 536, Grade 65-45-12 ductile iron; ASTM A 47 Grade 32510 malleable iron; or ASTM A53, Type F or Types E or S.

E. Grooved Mechanical Couplings: Consist of ductile or malleable iron housing, a synthetic rubber gasket of a central cavity pressure-responsive design; with nuts, bolts, locking pin, locking toggle, or lugs to secure roll-grooved pipe and fittings. Grooved mechanical couplings including gaskets used on dry-pipe systems shall be listed for dry-pipe service.

F. Grooved Mechanical Fittings and Couplings for the entire fire protection system shall be of the same manufacturer as submitted in shop drawing equipment review.

G. Cast-Iron Threaded Flanges: ANSI B16.1, Class 250; raised ground face, bolt spot faced.
H. Cast Bronze Flanges: ANSI B16.24, Class 300; raised ground face, bolt holes spot faced.
I. Plain end, hooker type, or push-on fittings or couplings shall not be allowed.
J. Bushings and reducing couplings shall not be allowed.
K. UL listed and Factory Mutual approved segmentally welded fittings are acceptable. Friction loss and flow data shall accompany hydraulic calculations.

2.6 JOINING MATERIALS:
A. Welding Materials: Comply with Section II, Part C, ASME Boiler and Pressure Vessel Code for welding materials appropriate for the wall thickness and chemical analysis of the pipe being welded.
B. Gasket Materials: Thickness, materials and type suitable for fluid or gas to be handled, and design temperatures and pressures.

2.7 AUTOMATIC SPRINKLERS:
A. Sprinkler Heads: Fusible link or frangible bulb type, and style as indicated or required by the application. Provide quick response sprinklers unless not allowed by NFPA-13 or the listing of the sprinkler. Unless otherwise indicated, provide heads with nominal 1/2 inch discharge orifice, for "ordinary" temperature range with a minimum temperature of 155 deg. F. Provide "intermediate" temperature heads in attic spaces, Electrical and mechanical rooms, where required as noted in NFPA 13, and as required by the Authority having jurisdiction. All heads shall be of one manufacturer. Sprinklers that contain synthetic, non-metallic o-rings are not acceptable.
B. Sprinkler Head Finishes: Provide heads with the following finishes:
   1. Upright, Pendent and Sidewall Styles: Factory brass, rough bronze finish for heads in unfinished spaces. Heads shall be coated steel where installed exposed to acids, chemicals, or other corrosive fumes.
   2. All new pendant sprinkler heads in ceilings shall be recessed (not concealed), with a chrome plated finish.
C. Sprinkler Head Cabinet and Wrench: Finished steel cabinet, suitable for wall mounting, with hinged cover and space for spare sprinkler heads plus sprinkler head wrench. Provide amounts of each style per NFPA-13. Locate head cabinet on shop drawing submittal.
D. Plastic fire sprinkler escutcheons are not acceptable.
E. Sprinklers subject to damage and/or located within 7'- 0" of the floor and those protecting electrical/mechanical rooms shall be provided with approved guards.

PART 3 - EXECUTION
3.1 EXAMINATION:
A. Examine rough-in for fire hose valves and cabinets to verify actual locations of piping connections prior to installing cabinets.
B. Examine walls for suitable conditions where cabinets are to be installed.

C. Do not proceed until unsatisfactory conditions have been corrected.

3.2 PIPE APPLICATIONS:

A. 2" and smaller: Schedule 40 steel pipe with threaded joints and fittings.
   1. For locations where unions would be required, grooved fittings may be used in place of unions. The number of grooved fittings for 2" and smaller pipe shall not exceed 1% of the total number of fittings installed on the system.
   2. Threaded fitting shall be either malleable or cast iron.
   3. Threadable thinwall pipe may be used if the Corrosion Resistance Ratio is greater than 1.0.

B. 2½" and larger: Schedule 10 or 40 steel pipe with roll-grooved ends and grooved mechanical coupling and fittings.

C. Acceptable alternates to Schedule 40 pipe shall be installed per manufacturer's recommendations.

3.3 PIPING INSTALLATIONS:

A. Deviations from approved "working plans" for sprinkler piping, require written approval of the authority having jurisdiction. Written approval shall be on file with the Engineer prior to deviating from the approved "working plans."
   1. Install sprinkler piping to provide for system drainage in accordance with NFPA 13.

B. Use approved fittings to make all changes in direction, branch takeoffs from mains, and reductions in pipe sizes. Welded outlet branch pipe fittings are acceptable.

C. For welded pipe, all cutouts (coupons) shall be removed prior to installation.

D. Hangers and Supports: Comply with the requirements of NFPA 13. Hanger and support spacing and locations for piping joined with grooved mechanical couplings shall be in accordance with the grooved mechanical coupling manufacturer's written instructions, for rigid systems. Provide protection from damage where subject to earthquake in accordance with NFPA 13.

E. Install mechanical sleeve seal at pipe penetrations in basement and foundation walls. Refer to Division 15 Section "Basic Piping Materials and Methods."

F. All piping penetrating walls to structure shall be sleeved and sealed per specification Section 15055.

G. Install test connections sized and located in accordance with NFPA 13 complete with shutoff valve. Test connections may also serve as drain pipes.

H. The fire protection contractor shall be responsible for the coordination of his installation with all other contractors.
I. Protect adjacent area where pipe cutting and threading takes place (e.g. floors, ceilings, walls, etc.).

J. Install hangers straight and true and piping parallel to building lines.

K. Before any work is installed, determine that equipment will properly fit the space; that required piping grades can be maintained without interferences between systems, with structural elements or with the work of other trades.

L. Verify all dimensions by field measurements.

M. Sequence, coordinate, and integrate installations of fire protection materials and equipment for efficient flow of the work.

N. Coordinate the cutting and patching of building components to accommodate the installation of fire protection equipment and materials.

O. Where mounting heights are not detailed or dimensioned, install overhead fire protection services and equipment to provide the maximum headroom possible. Notify Engineer and Owner of any conditions where headroom of less than 7’-4” will result.

3.4 PIPING REQUIREMENTS:

A. Piping shall be cleaned and kept clean and free of foreign matter before and during erection, including careful removal of dirt, scale, welding icicle or beads, cutting, burrs and similar items.

B. Pipelines with screwed fittings shall be made up with as few joints as possible.
   1. Screwed joints shall have clean machine-cut threads and shall be made up with a piping compound or Teflon pipe thread tape. The threads for opened joints shall be cleaned and new piping compound or Teflon pipe thread tape applied before remaking the joint.

C. Flange bolts shall be evenly tightened with wrenches only.
   1. Flanged joints that have been made up and broken shall be made with new, unused gaskets supplied with no cost added to the contract amount.

D. In cases where pipe sections are cut and removed on the job site for the installation of sprinklers, branch lines, cross mains, etc., the circular pipe sections shall be removed from the pipe, and available for inspection at the time of hydrostatic testing.

E. Pipe outlets shall be reamed to remove burrs and sharp edges, remove burrs to the full interior diameter of the pipe.

F. The system riser shall not be attached to the supply connection until the underground piping is flushed, tested and accepted by the AHJ. Two week notice and rescheduling is required.

3.5 PIPE JOINT CONSTRUCTION:

A. Welded Joints: AWS D10.9, Level AR-3.

B. Threaded Joints: Conform to ANSI B1.20.1, tapered pipe threads for field cut threads. Join pipe, fittings, and valves as follows:
1. Note the internal length of threads in fittings or valve ends, and proximity of internal seat or wall, to determine how far pipe should be threaded into joint.

2. Align threads at point of assembly.

3. Apply appropriate tape or thread compound to the external pipe threads.

4. Assemble joint to appropriate thread depth. When using a wrench on valves place the wrench on the valve end into which the pipe is being threaded.

5. Damaged Threads: Do not use pipe with threads which are corroded or damaged. If a weld opens during cutting or threading operations, that portion of pipe shall not be used.

C. Flanged Joints: Align flange surfaces parallel. Assemble joints by sequencing bolt tightening to make initial contact of flanges and gaskets as flat and parallel as possible. Use suitable lubricants on bolt threads. Tighten bolts gradually and uniformly to appropriate torque specified by the bolt manufacturer.

D. Mechanical Grooved Joints: Roll grooves on pipe ends dimensionally compatible with the couplings.

E. End Treatment: After cutting pipe lengths, remove burrs and fins from pipe ends.

3.6 SPRINKLER HEAD INSTALLATIONS:

A. Any sprinkler heads with any paint on them shall be replaced. The sprinkler system shall then be hydrostatically tested again at the contractor's expense.

B. Sprinkler heads shall be positioned so as to comply with NFPA-13 for any obstructions. This includes, but is not limited to, soffits, surface mounted lights and indirect lighting arrangements. The Fire Protection Contractor is responsible for identifying these obstructions and designing the system accordingly.

C. Run piping concealed above heated furred ceilings and in joists to minimize obstructions. Expose only heads.

D. Protect exposed sprinkler heads against mechanical injury with standard guards. Provide sprinkler head guards in all mechanical, electrical or storage rooms as well as exposed pendant heads which are installed less than 7'-0" A.F.F.

E. Provide 1 inch diameter nipple and 1 inch x 1/2 inch reducing fitting for each upright head. (Excluding mechanical equipment rooms.)

F. Provide heads in "pocketed" areas caused by exposed duct, piping or beams.

G. Sprinkler head deflector distance from face of finished ceiling shall not exceed 4".

H. Sprinkler heads shall be located in the center of all 2' x 2' ceiling tiles and quarter points, along the center line lengthwise of 2' x 4' ceiling tiles.

I. Use proper tools to prevent damage during installations.
J. Install sprinkler piping in a manner such that mechanical equipment, ceiling tiles or lights can be accessed and easily removed. The sprinkler piping shall be installed to provide a minimum of 6" above the top of a finished ceiling.

K. Minimum fire sprinkler head temperature rating for sprinklers in electrical rooms shall be 212°F. Keep sprinklers as far from transformers and/or panels as spacing allows.

L. Sprinklers installed below 7'-4" require permission from the AHJ.

3.7 FIELD QUALITY CONTROL:

A. Flush, test and inspect sprinkler piping systems in accordance with NFPA 13.

B. The Fire Protection Contractor shall conduct and bear the costs of all necessary tests of the fire protection work, furnish all labor, power and equipment. All piping shall be tested with water as required, the tests witnessed by the authority having jurisdiction.

C. The fire protection piping shall be tested under a hydrostatic pressure of not less than 200 psig, for a duration of not less than 2 hours.

D. Replace piping system components which do not pass the test procedures specified, and retest repaired portion of the system at Fire Protection Contractor’s expense.

E. All piping tests (pneumatic and hydrostatic) shall be conducted prior to the application of any painting materials. This will prevent hidden leaks and/or repainting of repaired/ altered piping.

3.8 SYSTEM CERTIFICATION:

A. The Contractor shall provide the Owner with written certification prior to final inspection, that all new equipment:

1. Has been visually inspected and functionally tested as required by the Specifications.

2. Is installed entirely in accordance with the manufacturer’s recommendations within the limitations of the system’s UL listings and NFPA criteria.

3. Is in proper working order.

3.9 FINAL INSPECTION AND TESTING:

A. The Contractor shall make arrangements with the Owner for final inspection and witnessing of the final acceptance tests. The Fire Protection Contractor, the Alarm System Contractor, the Mechanical Engineer, and the Owner will conduct the final inspection and witness the final acceptance test.

B. All tests and inspections required by the referenced Codes and Standards, and the Owner shall be performed by the Contractor.

C. The inspecting committee as referenced above will visit the job site to inspect the work and witness the final acceptance tests when they have been advised by the Contractor that the work is completed and ready for test. If the work is not complete or the test is unsatisfactory, the Contractor shall be responsible for the Consultant’s extra time and expenses for re-
inspection and witnessing the re-testing of the work. Such extra fees shall be deducted from payments by the Owner to the Contractor.

D. After the system has been inspected and tested, a certificate, "Contractor's Material and Test Certificate Sprinkler System - Water Spray System," shall be provided by the contractor and shall be signed by him or his representative, the Owner's representative and by a representative of the fire department if appropriate. Sufficient copies shall be prepared to ensure the Engineer, Owner, all inspecting authorities and the contractor have a copy for their files. The Contractor shall prepare one (1) test report for each inspection performed whether successful or not.

E. The signing of the certificate by the Owner's representative shall in no way prejudice any claim against the contractor for faulty material, poor workmanship, or failure to comply with inspecting authority's requirements or local ordinances.

F. Contractor shall provide at least five (5) working days notice for all tests. For cancellation of a test, at least 48 hours notice is required, or it shall be considered as a re-inspection. The Contractor shall be responsible for costs of re-inspections incurred by the AHJ and the Engineer.

G. All sprinkler supervisory initiating devices shall be functionally tested to verify proper operation.

H. All supervisory functions of each initiating device shall be functionally tested.

I. Receipt of all alarm and trouble signals, initiated during the course of the testing, shall be verified at the fire alarm control panel.

J. Re-inspections:
   1. If a system fails any of the above tests, the same scheduling procedure shall be followed.
   2. If more than two tests are necessary, Contractor shall be responsible for any added costs incurred by the Owner.

K. The Contractor shall supply all necessary equipment, such as ladders and special tools.

L. Specific System Tests (Wet Pipe):
   1. For retrofit installations, a pneumatic test with a maximum pressure of forty (40) psi shall be conducted prior to a hydrostatic test to avoid any water damage due to leaks. This test does not replace the hydrostatic test.
   2. Hydrostatic Test
      a. All piping, including all supply pipe to the fire department connection, shall be hydrostatically tested at fifty (50) psi in excess of the maximum pressure, or 200 psi, whichever is greater. The minimum test duration shall be two (2) hours with no visible leaks or drop in pressure. This test shall be conducted prior to concealing any piping. A complete installation inspection shall be conducted in conjunction with the hydrostatic test while all piping is exposed.
b. If visible signs of leakage occur or the system looses pressure within the 2-hour test period, the test shall be considered as failed and shall require re-testing after correction of the cause of leakage.

3. Final System Inspection:

a. A final inspection shall be performed when the system installation is complete, which includes: a complete functional test of all system components and of all alarms via the inspectors test correction (manual tripping of alarm devices is not acceptable.)

b. A main drain test shall be conducted with the control valve wide open. The main drain valve shall be opened and remain open until the system pressure stabilizes.

3.10 RECORD DRAWINGS:

A. The Contractor shall provide and maintain on the site an up-to-date record set of approved shop drawing prints which shall be marked to show each and every change made to the sprinkler system from the original approved shop drawings. This shall not be construed as authorization to deviate from or make changes to the shop drawings approved by the Owner without written instruction from the Owner in each case. This set of drawings shall be used only as a record set.

B. Upon completion of the work, the record set of prints shall be used to prepare complete, accurate final record drawings reflecting any and all changes and deviations made to the sprinkler system. Submittal of record drawings shall be within 30 days upon completion of sprinkler work.

C. The Owner, at his option and at the Contractor's expense, may require revised hydraulic calculations depending on the extent and nature of field changes.

D. The Record Drawings and Hydraulic Calculations shall have the signed stamp of a Professional Engineer registered in the State of Colorado or NICET Level IV Engineering Technician certifying the Record Drawings and the Hydraulic Calculations accurately represent the completed fire protection system.

E. Upon completion of the work, one set of blueline record drawings and one set of reproducables shall be submitted to the Engineer and AHJ for review.

F. After review and approval of the blueline record drawings, submit the final record drawings on computer disk in University Standard CAD format shall be delivered to the Owner.

3.11 GUARANTEE PERIOD:

A. Guarantee: The Contractor shall guarantee all materials and workmanship for a period of one year beginning with the date of final acceptance by the Owner. The Contractor shall be responsible during the design, installation, testing and guarantee periods for any damage caused by him (or his subcontractors) or by defects in his (or his subcontractors') work, materials, or equipment.

B. Emergency Service: During the installation and warranty period, the Contractor shall provide emergency repair service for the sprinkler system within four hours of a request by the Owner.
for such service. This service shall be provided on a 24 hour per day, seven days per week basis.
3.12 TRAINING:
   A. The Contractor shall conduct a training session of four (4) hours to familiarize the building personnel with the features, operation and maintenance of the sprinkler systems. Training sessions shall be scheduled by the Owner at a time mutually agreeable to the Contractor and the Owner.
   B. The training sessions shall not be performed until the operations and maintenance manual has been reviewed and approved by the Engineer.

3.13 WATER DAMAGE:
   A. The Fire Protection Contractor shall be responsible for any damage to the work of others, to building and property/materials of others caused by leaks in automatic sprinkler equipment, unplugged or disconnected pipes or fittings, and shall pay for necessary replacement or repair of work or items so damaged during the installation, testing or guarantee periods of the automatic sprinkler work.

END OF SECTION 15300
PART 1 - GENERAL

1.1 DESCRIPTION OF WORK:
   A. This Section specifies the water distribution piping system, including potable cold, hot, and re-
circulated hot water piping, fittings, and specialties within the building.
   B. Related Sections: The following Sections contain requirements that relate to this section.
      1. Refer to other Division 15 sections for piping materials; mechanical identification and
dielectric waterways.

1.2 DEFINITIONS:
   A. Water Distribution Piping: A pipe within the building or on the premises which conveys water
from the water service pipe or meter to the points of usage.
   B. Water Service Piping: The pipe from the water main or other source of potable water supply
to the water distributing system of the building served.
   C. Pipe Sizes used in this Specification are Nominal Pipe Size (NPS).

1.3 SUBMITTALS:
   A. Refer to Division 1 and Basic Mechanical Requirements for administrative and procedural
requirements for submittals.
   B. Provide data for each piping specialty and valve specified.
   C. Certification of Compliance with ASME and UL fabrication requirements.
   D. Test reports specified in Part 3 of this Section.
   E. Manufacturer and product data for lead free solder with material breakdown.
   F. Maintenance data for each piping specialty and valve specified for inclusion in operation and
maintenance manual specified in Division 15.

1.4 QUALITY ASSURANCE:
   A. Regulatory Requirements: Comply with the provisions of the following:
      1. Local Plumbing Code and Utility Department requirements.
      3. Latest edition of the Engineering Standards of the Denver Board of Water
Commissioners.

1.5 DELIVERY, STORAGE AND HANDLING:
   A. Store pipe in a manner to prevent sagging and bending.
PART 2 - PRODUCTS

2.1 MANUFACTURERS:

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

1. Backflow Preventers:
   a. Febco

2.2 PIPE AND TUBE MATERIALS:

A. General: Provide pipe material and pipe fittings complying with Division 15, Section 15055.

2.3 BASIC SUPPORTS AND ANCHORS:

A. General: Provide supports and anchors complying with Division 15, Section 15140.

2.4 GENERAL DUTY VALVES:

A. General: Provide valves complying with Division 15, Section 15100.

   B. Backflow Preventers:

   1. BFP-1 (Reduced pressure type): All bronze body with two independently operating, spring loaded check valves and one differential relief valve with automatic intermediate atmospheric vent. Pressure in intermediate zone to activate relief valve when there is a 2 psig. differential between the zone and the upstream side of the first check valve. The relief valve shall remain open until a positive pressure differential is re-established. Assembly to be furnished with full port, positive shut off isolation valves, in-line upstream strainer, union connections, funnel, and all test cocks. Assembly to have approval of National Sanitary Foundation, U.S.C. Foundation for Cross Connection Control, A.S.S.E. State and or Local Authorities.

      a. Febco No. 825Y through 2" size;

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify all dimensions by field measurements. Verify that all water distribution piping may be installed in accordance with pertinent codes and regulations, the original design, and the referenced standards.

B. Examine rough-in requirements for plumbing fixtures and other equipment having water connections to verify actual locations of piping connections prior to installation.

C. Do not proceed until unsatisfactory conditions have been corrected.
3.2 PIPING INSTALLATION:
   A. Refer to Section 15055, "Basic Piping Materials and Methods" for installation of piping.
   B. Install backflow preventers on plumbing lines where contamination of domestic water may occur. Install no greater than 5'-0" AFF.

3.3 HANGERS AND SUPPORTS:
   A. Refer to Section 15140, "Supports and Anchors" for supports and anchors.

3.4 PIPE AND TUBE JOINT CONSTRUCTION:
   A. Refer to Section 15055, "Basic Piping Materials and Methods" for pipe joints.

3.5 VALVE APPLICATIONS:
   A. General Duty Valve Applications: The drawings indicate valve types to be used. Where specific valve types are not indicated the following requirements apply:

3.6 INSTALLATION OF VALVES:
   A. Shutoff Valves: Install shutoff valves on inlet of each plumbing equipment item, and on inlet of each plumbing fixture, and elsewhere as indicated. For shutoff valves 2" and smaller, use gate or ball valves; for shutoff valves 2-1/2" and larger, use gate or butterfly valves.

3.7 INSTALLATION OF PIPING SPECIALTIES:
   A. Install backflow preventers at each connection to mechanical equipment and systems, and in compliance with the plumbing code and authority having jurisdiction. Locate in same room as equipment being connected. Pipe relief outlet thru air gap and without valves, to nearest floor drain.

3.8 EQUIPMENT CONNECTIONS:
   A. Piping Runouts to Fixtures: Provide hot and cold water piping runouts to fixtures of sizes indicated, but in no case smaller than required by Plumbing Code.
   B. Food Service Equipment Connections: Connect hot and cold water piping system to food service equipment as indicated. Provide shutoff valve and union for each connection, provide drain valve on drain connection.

END OF SECTION 15411
PART 1 - GENERAL

1.1 DESCRIPTION OF WORK:

A. This Section specifies building sanitary drainage and vent piping systems, including drains and drainage specialties.

B. Related Sections: The following sections contain requirements that relate to this section:

1. Refer to other Division 15 sections for piping materials and methods; mechanical identification.

1.2 DEFINITIONS:

A. Building Drain: That part of the lowest piping of a drainage system which receives the discharge from soil, waste, and other drainage pipes inside the walls of the building and conveys it to the building sewer to a point 5 feet-0 inches outside the building wall.

B. Building Sewer: That part of the horizontal piping of a drainage system which extends from the end of the building drain and conveys its discharge to a public sewer, private sewer, individual sewage disposal system, or other point of disposal.

C. Drainage System: Includes all the piping within a public or private premises which conveys sewage, rain water or other liquid wastes to a point of disposal. It does not include the mains of public sewer systems or a private or public sewage treatment or disposal plant.

D. Vent System: A pipe or pipes installed to provide a flow of air to or from a drainage system, or to provide a circulation of air within such system to protect trap seals from siphonage and back pressure.

E. See legend on drawings for additional information.

1.3 SUBMITTALS:

A. Product Data: Submit manufacturer's technical product data for all plumbing items including model clearly indicated; operating weights; furnished specialties and accessories; and installation instructions.

B. Shop Drawings: Submit manufacturer's assembly type shop drawings indicating dimensions, required clearances, and methods of assembly of components.

C. Record Drawings: At project closeout, submit record drawings of installed systems products; in accordance with requirements of Division 15.

D. Maintenance Data: Submit maintenance data and parts lists for each type of drain and accessory; including "trouble-shooting" maintenance guide. Include this data, product data and shop drawings in maintenance manual; in accordance with requirements of Division 15.

1.4 QUALITY ASSURANCE:

A. Regulatory Requirements: Comply with the provisions of the following:
1. Plumbing Code Compliance: Comply with applicable portions of Local Plumbing Code.

2. ANSI Compliance: Comply with applicable ANSI standards pertaining to materials, products, and installation of soil and waste systems.

3. ASSE Compliance: Comply with applicable ASSE standards pertaining to materials, products, and installation of soil and waste systems.

4. PDI Compliance: Comply with applicable PDI standards pertaining to products and installation of soil and waste systems.

5. PVC, PP and ABS Pipe: Only Contractor's personnel which have received training in the installation of this material and meet the manufacturer's qualifications shall do the assembly of such material.

1.5 SEQUENCING AND SCHEDULING:

A. Coordinate with installation of sanitary sewer systems as necessary to interface building drains with drainage piping systems.

B. Coordinate all penetrations with Structural Engineer.

C. Coordinate all installations with other trades.

2. PART 2 - PRODUCTS

2.1 MANUFACTURERS:

A. Manufacturer: Subject to compliance with requirements, provide drainage and vent systems from one of the following:

1. Drainage Piping Specialties, including backwater valves, expansion joints, drains, cleanouts, trap primers, flashing flange and vent flashing sleeve:

   c. Zurn Industries Inc; Hydromechanics Div.
   d. Wade

2.2 SANITARY DRAINAGE, VENT AND SUBSURFACE DRAINAGE PIPE AND FITTINGS:

A. General: Provide piping and pipe fittings complying with Division 15, Section 15055.

2.3 BASIC SUPPORTS AND ANCHORS:

A. General: Provide supports and anchors complying with Division 15, Section 15140.

2.4 DRAINAGE PIPING SPECIALTIES:
A. **Trap Primers:** Bronze body valve with automatic vacuum breaker, with 1/2 inch connections matching piping system. Complying with ASSE 1018.

1. Valves shall be easily adjusted to high or low pressure and shall be automatically activated whenever any faucet is opened in the building, causing a pressure drop.

2. Connections: Inlet 1/2 inch male NPT; outlet 1/2 inch female NPT.


4. When more than one (1) trap is to be primed, provide one or more distribution units as required by the manufacturer.

2.5 **CLEANOUTS:**

A. **Cleanout Plugs:** Cast brass, threads complying with ANSI B2.1, and local plumbing code.

B. **Floor Cleanout:** Round, cast iron body with recessed bronze closure plug; scoriated polished bronze frame and cover plate.

C. **Wall Cleanout:** Cleanout tee with raised head brass plug tapped for 1/4-20 thread; flat style chrome plated wall cover plate with holes for 1/4 inch bolt; 1/4-20 threaded bolt with chrome plated flat head.

D. **Line Cleanout:** Cast iron tapped cleanout ferrule with raised head brass plug.

2.6 **FLOOR DRAINS:**

A. Floor drain type designations and sizes are indicated on Drawings.

1. **FD-1 Kitchen and Finished Areas**

   Round cast iron body with flashing collar and cast iron ring, 6 inch round nickel bronze adjustable strainer head with secured square hole grate, bottom waste outlet.

   Jay R. Smith Fig. 2005-A

2. **FD-2 Ice Maker or Drip Pan Drain, Recessed Top Grate**

   Round cast iron body with flashing collar and cast iron ring, 7 inch round nickel bronze adjustable strainer head with loose set recessed square hole grate, bottom waste outlet. Top outside edge of drain to be set flush with finished floor.

   Jay R. Smith Fig. 2005-A-F37

2.7 **FLOOR SINKS:**

A. Floor drain type designations and sizes are indicated on drawings.

1. **FS-1 Indirect Waste Drain - Kitchen Equipment**
Square, cast iron, porcelain enameled interior, sump body drain 6inch deep x 8inch square with flashing collar and cast iron ring, 8inch square nickel bronze removable half top grate, dome button strainer, bottom waste outlet.

Jay R. Smith 3100-12

3.

PART 3 - EXECUTION

3.1 EXAMINATION:

A. General: Install piping in accordance with governing authorities having jurisdiction, except where more stringent requirements are indicated.

B. Inspect piping before installation to detect apparent defects. Mark defective materials with white paint and promptly remove from site.

C. Verify all dimensions by field measurements. Verify that all drainage and vent piping and specialties may be installed in accordance with pertinent codes and regulations, the original design, and the referenced standards.

D. Verify all existing grades, utilities and obstacles conditions prior to installations.

E. Examine rough-in requirements for plumbing fixtures and other equipment having drain connections to verify actual locations of piping connections prior to installation.

F. Examine walls, floors, roof, and plumbing chases for suitable conditions where piping and specialties are to be installed.

G. Do not proceed until unsatisfactory conditions have been corrected.

3.2 INSTALLATION:

A. General Locations and Arrangements: Drawings (plans, schematics, and diagrams) indicate the general location and arrangement of the piping systems. Location and arrangement of piping layout take into account many design considerations. So far as practical, install piping as indicated.

B. All floor drains are to be provided with P-trap the same size as the floor drain unless otherwise noted on mechanical drawings.

C. Lubricate cleanout plugs with mixture of graphite and linseed oil. Prior to building turnover remove cleanout plugs, relubricate and reinstall using only enough force to ensure permanent leakproof joint.

3.3 HANGERS AND SUPPORTS:

A. General: Refer to Section 15140 for supports and anchors.

3.4 INSTALLATION OF PIPING SPECIALTIES:
A. Above Ground Cleanouts: Install in above ground piping and building drain piping as indicated, and extend cleanouts to floor or wall above. Line cleanouts not acceptable.
   1. As required by plumbing code;
   2. At each change in direction of piping greater than 45 degrees below slab;
   3. At minimum intervals of 50 feet;
   4. At base of each vertical soil or waste stack;

B. Cleanouts Covers: Install floor and wall cleanout covers, types as indicated, and in accessible locations.

3.5 PIPE AND TUBE JOINT CONSTRUCTION:
   A. Install pipes and pipe joints in accordance with section 15055.

3.6 INSTALLATION OF FLOOR DRAINS:
   A. Install floor drains in accordance with manufacturer's written instructions and in locations indicated.
   B. Install floor drains at low points of surface areas to be drained, or as indicated. Set tops of drains flush with finished floor.
   C. Trap all drains connected to the sanitary sewer with minimum trap size that of drain connected.
   D. Position drains so that they are accessible and easy to maintain.

3.7 INSTALLATION OF TRAP PRIMERS:
   A. Install trap primers with piping pitched towards drain trap, minimum of 1/8 inch per foot (1 percent). Adjust trap primer for proper flow.

3.8 CONNECTIONS:
   A. Piping Runouts to Fixtures: Provide drainage and vent piping runouts to plumbing fixtures and drains, with approved trap, of sizes indicated; but in no case smaller than required by the plumbing code.
   B. Locate piping runouts as close as possible to bottom of floor slab supporting fixtures or drains.

3.9 FIELD QUALITY CONTROL:
   A. Inspections:
      1. Do not enclose, cover, or put into operation drainage and vent piping system until it has been inspected and approved by the authority having jurisdiction.
      2. During the progress of the installation, notify the plumbing official having jurisdiction, at least 48 hours prior to the time such inspection must be made. Perform tests specified in Section 15055 in the presence of the plumbing official.
a. Rough-in Inspection: Arrange for inspection of the piping system before concealed or closed-in after system is roughed-in, and prior to setting fixtures.

b. Final Inspection: Arrange for a final inspection to observe the tests specified and to insure compliance with the requirements of the plumbing code.

3. Reinspections: Whenever the piping system fails to pass the test or inspection, make the required corrections, and arrange for reinspection.

4. Reports: Prepare inspection reports, signed by the plumbing official.

B. Piping System Test: Test drainage and vent system in accordance with the procedures of the authority having jurisdiction, or in the absence of a published procedure, as follows, and as described in Section 15055.

3.10 ADJUSTING AND CLEANING:

A. Clean interior of piping. Remove dirt and debris as work progresses.

B. Clean drain strainers and traps. Remove dirt and debris.

3.11 PROTECTION:

A. Protect drains during remainder of construction period, to avoid clogging with dirt and debris, and to prevent damage from traffic and construction work.

B. Place plugs in ends of uncompleted piping at end of day or whenever work stops. Piping shall not be left open ended during construction.

END OF SECTION 15420
PART 1 GENERAL

1.1 DEFINITIONS:

A. Pipe sizes used in this Specification are Nominal Pipe Size (NPS).

B. Gas Distribution Piping: A pipe within the building which conveys gas from the point of delivery to the points of usage.

C. Gas Service Piping: The pipe from the gas main or other source of supply including the meter, regulating valve, or service valve to the gas distribution system of the building served.

D. Point of Delivery is the outlet of the service meter assembly, or the outlet of the service regulator (service shutoff valve when no meter is provided).

1.2 SUBMITTALS:

A. Product data for each gas piping specialty and special duty valve. Include rated capacities of selected models, furnished specialties and accessories, and installation instructions.

B. Record Drawings: At project closeout, submit record drawings of installed systems products; in accordance with requirements of Division 15.

C. Maintenance data for gas specialties and special duty valves, for inclusion in operating and maintenance manual specified in Division 15.

D. Welders' qualification certificates, certifying that welders comply with the quality requirements specified under "Quality Assurance" below.

E. Test reports specified in Part 3 below.

1.3 QUALITY ASSURANCE:

A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of natural gas systems products, of types, materials, sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.

B. Installer Qualifications: Installation and replacement of gas piping, gas utilization equipment or accessories, and repair and servicing of equipment shall be performed only by a qualified installer. The term qualified is defined as experienced in such work (experienced shall mean having a minimum of 5 previous projects similar in size and scope to this project), familiar with precautions required, and has complied with the requirements of the authority having jurisdiction. Upon request, submit evidence of such qualifications to the Architect.

C. Qualifications for Welding Processes and Operators: Comply with the requirements of ASME Boiler and Pressure Vessel Code, "Welding and Brazing Qualification."

D. Regulatory Requirements: Comply with the requirements of the following codes:

1. NFPA 54 - National Fuel Gas Code, for gas piping materials and components, gas piping installations, and inspection, testing, and purging of gas piping systems.

2. Local Building Code.
3. Utility Compliance: Fabricate and install natural gas systems in accordance with local gas utility company.

4. ICC Gas Fitter Certification required for work on natural gas piping systems.

1.4 DELIVERY, STORAGE, AND HANDLING:

A. Handling Flammable Liquids: Remove and legally dispose of liquid from a drips in existing gas piping and handle cautiously to avoid spillage or ignition. Notify the gas supplier. Handle flammable liquids used by the installer with proper precautions, and do not leave on the premises from the end of one working day to the beginning of the next.

1.5 SEQUENCING AND SCHEDULING:

A. Notification of Interruption of Service: Except in the case of an emergency, notify all affected users when the gas supply is to be turned off.

B. Work Interruptions: When interruptions in work occur while repairs or alterations are being made to an existing piping system, leave the system in safe condition.

C. Coordinate the installation of pipe sleeves for foundation wall penetrations.

2. PART 2 PRODUCTS

2.1 MANUFACTURERS:

A. Manufacturer: Subject to compliance with requirements, provide products by one of the following:

1. Gas Cocks:
   a. Jenkins Bros.
   b. Lunkenheimer Co.
   c. Nibco, Inc.
   d. Powell Co.
   e. Stockham.

2.2 PIPE, TUBING AND JOINTING MATERIALS:

A. Provide pipes and pipe fitting complying with Division 15, Section 15055.

2.3 NATURAL GAS PIPING SPECIALTIES:

A. Flexible Connectors: Corrugated type 304 stainless steel flexible pipe with stainless steel braid and heavy flexible armor shield.

B. Quick Couplers: One way quick coupler with gas rating in cubic feet per hour equal to equivalent gas appliance rating.
2.4 VALVES:

A. Gas Cocks 2 Inch and Smaller: 150 psi WOG, bronze body, straightaway pattern, square head, threaded ends.

B. Gas Cocks 2-1/2 Inch and Larger: MSS SP-78; 175 psi, lubricated plug type, semi-steel body, single gland, wrench operated, flanged ends.

3. PART 3 EXECUTION

3.1 INSPECTION:

A. General: Examine areas and conditions under which natural gas systems materials and products are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to the Installer.

3.2 PREPARATION:

A. Precautions: Before turning off the gas to the premises, or section of piping, turn off all equipment valves. Perform a leakage test as specified in "FIELD QUALITY CONTROL" below, to determine that all equipment is turned off in the piping section to be affected.

B. Conform to the requirements in NFPA 54, for the prevention of accidental ignition.

3.3 INSTALLATION OF PIPE:

A. Install natural gas piping in accordance with Division 15, Section 15055.

B. Conform to the requirements of NFPA 54 - National Fuel Gas Code.

C. Locations and Arrangements: Drawings (plans, schematics, and diagrams) indicate the general location and arrangement of piping systems. Design locations and arrangements of piping take into consideration pipe sizing, flow direction, slope of pipe, expansion, and other design considerations. So far as practical, install piping as indicated.

D. Concealed Locations: Except as specified below, install concealed gas piping in an air-tight conduit constructed of Schedule 40, black steel with welded joints. Vent conduit to the outside and terminate with a screened vent cap.

1. Above-Ceiling Locations: Gas piping may be installed in accessible above-ceiling spaces (subject to the approval of the authority having jurisdiction), whether or not such spaces are used as a plenum. Valves shall not be located in such spaces.

2. Piping in Partitions: Concealed piping shall not be located in solid partitions. Tubing shall not be run inside hollow walls or partitions unless protected against physical damage. This does not apply to tubing passing through walls or partitions.

3. Prohibited Locations: Do not install gas piping in or through a circulating air duct, clothes chute, chimney or gas vent, ventilating duct, dumb waiter or elevator shaft. This does not apply to accessible above-ceiling space specified above.
E. Drips and Sediment Traps: Install a drip leg at points where condensate may collect, at the outlet of the gas meter, and in a location readily accessible to permit cleaning and emptying. Do not install drips where condensate is likely to freeze.

1. Construct drips and sediment traps using a tee fitting with the bottom outlet plugged or capped. Use a minimum of 3 pipe diameters in length for the drip leg. Use same size pipe for drip leg as the connected pipe.

F. Use fittings for all changes in direction and all branch connections.

G. Install gas piping at a uniform grade upward to risers, and from the risers to the meter, or service regulator when meter is not provided, or the equipment.

H. Connect branch outlet pipes from the top of horizontal lines, not from the bottom or sides.

3.4 NATURAL GAS PIPING SPECIALTIES:

A. Flexible Connectors:

1. Provide flexible connectors with full size quick coupler for all kitchen and heavy moveable gas appliance equipment.

2. Connectors shall be of lengths required to displace equipment for complete cleaning under and around gas appliance.

B. Quick Couplers:

1. Provide quick coupler at service end of flexible connectors.

3.5 VALVE APPLICATIONS:

A. General: The Drawings indicate valve types, locations, and arrangements.

B. Shut-off duty: Use gas cocks.

3.6 VALVE INSTALLATIONS:

A. Install valves in accessible locations, protected from physical damage. Tag valves with a metal tag attached with a metal chain indicating the piping systems supplied.

B. Valves shall be installed with unions or other means to facilitate removal or repair without disassembly of connecting piping.

3.7 TERMINAL EQUIPMENT CONNECTIONS:

A. Install gas cock upstream and within 6 feet of gas appliance. Install a union or flanged connection downstream from the gas cock to permit removal of controls.

B. Sediment Traps: Install a tee fitting with the bottom outlet plugged or capped as close to the inlet of the gas appliance as practical. Drip leg shall be a minimum of 3 pipe diameters in length.
C. Flexible Hose Gas Connectors: For use connecting to vibrating equipment; corrugated Type 304 stainless steel flexible pipe with stainless steel braid.

3.8 ELECTRICAL BONDING AND GROUNDING:

A. Install above ground portions of gas piping systems, upstream from equipment shutoff valves electrically continuous and bonded to a grounding electrode in accordance with NFPA 70 - "National Electrical Code."

B. Do not use gas piping as a grounding electrode.

3.9 FIELD QUALITY CONTROL:

A. Piping Tests: Inspect, test, and purge natural gas systems in accordance with NFPA 54.

B. Submit written results of tests to Architect/Engineer.

END OF SECTION 15488
PART 1 - GENERAL:

1.1 DESCRIPTION OF WORK:

A. Extent of air handling equipment work required by this section is indicated on drawings and schedules, and by requirements of this section.

B. Refer to other Division 15 sections for control system; sequence of operation; testing, adjusting and balancing.

C. Refer to Division 16 section for the following work; not work of this section.
   1. Power supply wiring from power source to power connections at air handling units.

1.2 QUALITY ASSURANCE:

A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of air handling equipment of types and sizes required, whose products have been in satisfactory use in similar service for not less than 3 years.

B. Codes and Standards:
   1. Fans Performance Ratings: Establish flow rate, pressure, power air density, speed of rotation, and efficiency by factory tests and ratings in accordance with AMCA Standard 210/ASHRAE Standard 51 - Laboratory Methods of Testing Fans for Rating.
   2. UL Compliance: Provide air handling equipment which are listed by UL and have UL label affixed.
   3. UL Compliance: Provide air handling equipment which are designed, manufactured, and tested in accordance with UL 805 "Power Ventilators".
   4. NEMA Compliance: Provide motors and electrical accessories complying with NEMA standards.
   6. Nationally Recognized Testing Laboratory and NEMA Compliance (NRTL): Fans and components shall be NRTL listed and labeled. The term "NRTL" shall be defined in OSHA Regulation 1910.7.
   7. Electrical Component Standards: Components and installation shall comply with NFPA 70 "National Electrical Code."

1.3 SUBMITTALS:

A. Product Data: Submit manufacturer's technical data for air handling equipment including specifications, capacity ratings, dimensions, weights, materials, operating & service/access clearance accessories furnished, and installation instructions.
B. Shop Drawings: Submit assembly-type shop drawings showing unit dimensions, construction details, methods of assembly of components, and field connection details.

C. Wiring Diagrams: Submit manufacturer's electrical requirements for power supply wiring to air-handling units. Submit manufacturer's ladder-type wiring diagrams for interlock and control wiring. Clearly differentiate between portions of wiring that are manufacturer-installed and portions to be field-installed.

D. Record Drawings: At project closeout, submit record drawings of installed systems products; in accordance with requirements of Division 15.

E. Maintenance Data: Submit maintenance data and parts list for each type of power and gravity ventilator, accessory, and control. Include this data, product data, shop drawings, and wiring diagrams in maintenance manuals in accordance with requirements of Division 15.

1.4 DELIVERY, STORAGE, AND HANDLING:

A. Lift and support units with the manufacturer's designated lifting or supporting points.

B. Disassemble and reassemble units as required for movement into the final location following manufacturer's written instructions.

C. Deliver fan units as a factory-assembled unit to the extent allowable by shipping limitations, with protective crating and covering.

1.5 SEQUENCING AND SCHEDULING:

A. Coordinate the installation of roof curbs and roof penetrations.

B. Coordinate the size and location of structural steel support members.

1.6 EXTRA MATERIALS:

A. Furnish one additional complete set of belts for each belt-driven fan.

2. PART 2 - PRODUCTS

2.1 MANUFACTURERS:

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

1. Centrifugal Roof Ventilators:
   a. Acme Engineering and Manufacturing Corp.
   b. Aerovent, Inc.
   c. Briedert Co., C.G.
   d. Carnes Company, Inc.
   e. Loren Cook Co.
   f. Jenn Industries, Inc.
   g. Penn Ventilator Co., Inc.
   h. Greenheck
2. Utility Sets:
   a. Acme Engineering And Mfg. Corp.
   b. Aladdin Heating Corp.
   c. Buffalo
   d. Brundage (The) Co.
   e. Loren Cook Co.
   f. ILG Industries, Inc.
   g. New York Blower Co.
   h. Penn Ventilator Co., Inc.
   i. Trane Co.
   j. Twin City Fan and Blower Co.
   k. Greenheck

2.2 FANS, GENERAL:

A. General: Provide fans that are factory fabricated and assembled, factory tested, and factory finished, with indicated capacities and characteristics. The fan nameplate shall indicate maximum permissible RPM. Fans not bearing the AMCA seal indicating ratings are certified will not be accepted.

B. Fans and Shafts: Statically and dynamically balanced and designed for continuous operation at the maximum rated fan speed and motor horsepower.
   1. Fan Shaft: Turned, ground, and polished steel designed to operate at no more than 70 percent of the first critical speed at the top of the speed range of the fan's class.

C. Belt Drives: Factory mounted, with final alignment and belt adjustment made after installation.
   1. Service Factor: 1.5.

D. Belts: Oil-resistant, nonsparking, and nonstatic.

E. Motors and Fan Wheel Pulleys: Adjustable pitch for use with motors through 15 HP; fixed pitch for use with motors larger than 15 HP. Select pulley so that pitch adjustment is at the middle of the adjustment range at fan design conditions. Provide energy efficient motor.
   1. Belt Guards: Provide OSHA-approved belt-drive covers with tachometer access, with side made of expanded metal.
   2. Motor Mounts: All belt-drive motors over 5hp shall have Pusa-Pull adjustment screws for the motor mounts.
   3. Motors shall be located on their respective motor bases allowing for 1/6 of the total motor base travel for installation of new belts with remaining 5/6 of the travel available for belt tightening.
   4. Arc of contact on the smaller sheave should not be less than 120 degrees.
   5. Ratios of sheaves should not exceed 8 to 1.
F. Shaft Bearings: Provide type indicated, having a median life "Rating Life" AFBMA L10 of 100,000 calculated in accordance with AFBMA Standard 9 for ball bearings and AFBMA Standard 11 for roller bearings.

G. Factory Finish: The following finishes are required:
   1. Sheet Metal Parts: Prime coating prior to final assembly.
   2. Exterior Surfaces: Baked-enamel finish coat after assembly.

2.3 CENTRIFUGAL ROOF VENTILATORS:

A. General Description: Belt-driven or direct-drive as indicated, centrifugal consisting of housing, wheel, fan shaft, bearings, motor and disconnect switch, drive assembly, curb base, and accessories.

B. Housing: Heavy-gauge, removable, spun-aluminum, dome top and outlet baffle; square, one-piece, hinged, aluminum base with venturi inlet cone.

C. Fan Wheel: Aluminum hub and wheel with backward-inclined blades.

D. Belt-Driven Drive Assembly: Resiliently mounted to the housing, with the following features:
   1. Pulleys: Cast-iron, adjustable-pitch.
   3. Fan Shaft: Turned, ground, and polished steel drive shaft keyed to wheel hub.
   4. Fan and motor isolated from exhaust air stream.

E. Accessories: The following items are required as indicated:
   1. Disconnect Switch: Nonfusible type, with thermal overload protection mounted inside fan housing, factory-wired through an internal aluminum conduit.
   2. Bird Screens: Removable 1/2-inch mesh, 16-gauge, aluminum or brass wire.
      b. Frame: Extruded aluminum, with waterproof, felt blade seals.
      c. Linkage: Nonferrous metals, connecting blades to counter weight or operator.
      d. Operators: Manufacturer's standard electric motor.
4. Roof Curbs: Prefabricated, heavy-gauge, galvanized steel; mitered and welded corners; 2-inch-thick, rigid, fiberglass insulation adhered to inside walls; built-in cant and mounting flange for flat roof decks; and 2-inch wood nailer. Size as required to suit roof opening and fan base.
   a. Overall Height: 12 inches.

2.4 UTILITY SET FANS:
   A. General Description: Belt-driven, centrifugal fans consisting of housing, wheel, fan shaft, bearings, motor and disconnect switch, drive assembly, and accessories.
   B. Housings: Fabricated from heavy-gauge steel with side sheets fastened to scroll sheets by means of welding or deep lock seam.
      1. Inlet: Round duct collar.
      2. Discharge: Slip-joint duct connection.
      3. Housings Discharge Arrangement: Adjustable to 8 standard positions.
   C. Fan Wheels: Single-width, single-inlet, welded to cast-iron or cast-steel hub and spun steel inlet cone, with hub keyed to the shaft.
      2. Blade Type: Backward-inclined, die-formed.
   D. Shaft Bearings: Prelubricated and sealed, self-aligning, pillow-block-type ball bearings.
   E. Accessories: The following accessories are required where indicated:
      1. Access Doors: Gasketed doors with latch-type handles.
      2. Drain Connections: 3/4-inch, threaded coupling drain connection installed at lowest point of housing.

3. PART 3 - EXECUTION

3.1 EXAMINATION:
   A. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances, housekeeping pads, and other conditions affecting performance of fans.
   B. Do not proceed until unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL:
A. Install fans level and plumb, in accordance with manufacturer's written instructions.
   1. Secure roof-mounted fans to roof curbs with cadmium-plated hardware.

B. Arrange installation of units to provide access space around air handling fans for service and maintenance.

3.3 CONNECTIONS:

A. Duct installations and connections are specified in other Division 15 sections. Make final duct connections on inlet and outlet duct connections with flexible connections.

B. Electrical Wiring: Install electrical devices furnished by manufacturer but not specified to be factory-mounted. Furnish copy of manufacturer’s wiring diagram submittal to Electrical Installer.
   1. Verify that electrical wiring installation is in accordance with manufacturer’s submittal and installation requirements of Division -16 sections. Ensure that rotation is in direction indicated and intended for proper performance. Do not proceed with centrifugal fan start-up until wiring installation is acceptable to centrifugal fan Installer.
   2. Temperature control wiring and interlock wiring are specified in Division 15.
   3. Grounding: Connect unit components to ground in accordance with the National Electrical Code.

3.4 FIELD QUALITY CONTROL:

A. Upon completion of installation of air handling equipment, and after motor has been energized with normal power source, test equipment to demonstrate compliance with requirements. Where possible, field correct malfunctioning equipment, then retest to demonstrate compliance. Replace equipment which cannot be satisfactorily corrected.

B. Manufacturer's Field Inspection: Arrange and pay for a factory-authorized service representative to perform the following:
   1. Inspect the field assembly of components and installation of fans including ductwork and electrical connections.
   2. Prepare a written report on findings and recommended corrective actions.

3.5 ADJUSTING, CLEANING, AND PROTECTING:

A. Startup, test and adjust air handling equipment in presence of manufacturer's authorized representative.

B. Adjust damper linkages for proper damper operation.

3.6 SPARE PARTS:

A. General: Furnish to Owner with receipt one spare set of belts for each belt driven air handling equipment.
3.7 COMMISSIONING:

A. Final Checks Before Start-Up: Perform the following operations and checks before start-up:

1. Remove shipping blocking and bracing.
2. Verify unit is secure on mountings and supporting devices and that connections for ductwork and electrical are complete. Verify proper thermal overload protection is installed in motors, starters, and disconnects.
3. Perform cleaning and adjusting specified in this Section.
4. Disconnect fan drive from motor, verify proper motor rotation direction, and verify fan wheel free rotation and smooth bearings operations. Reconnect fan drive system, align belts, and install belt guards.
5. Lubricate bearings, pulleys, belts, and other moving parts with factory-recommended lubricants.
6. Verify manual and automatic volume control and that fire and smoke dampers in connected ductwork systems are in the full-open position.
7. Disable automatic temperature control operators.

B. Starting procedures for fans:

1. Energize motor; verify proper operation of motor, drive system, and fan wheel. Adjust fan to indicated RPM.
2. Replace fan and motor pulleys as required to achieve design conditions.
3. Measure and record motor electrical values for voltage and amperage.

C. Shut unit down and reconnect automatic temperature control operators.

D. Refer to Division 15 Section “Testing, Adjusting, and Balancing” for procedures for air-handling-system testing, adjusting, and balancing.

END OF SECTION 15851
PART 1 - GENERAL

1.1 DESCRIPTION OF WORK:

A. Extent of metal ductwork is indicated on drawings and in schedules, and by requirements of this section.

<table>
<thead>
<tr>
<th>DUCT SERVICE</th>
<th>TYPE/CONSTRUCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply air between fan and terminal boxes</td>
<td>Galvanized steel, spiral, round or rectangular.</td>
</tr>
<tr>
<td>(medium and high).</td>
<td></td>
</tr>
<tr>
<td>Rectangular supply air from discharge of terminal</td>
<td>Galvanized sheet metal/spiral round and oval or rectangular (lined as noted on drawings.)</td>
</tr>
<tr>
<td>box/fan to air devices (low pressure).</td>
<td></td>
</tr>
<tr>
<td>Return air ductwork.</td>
<td>Galvanized steel (lined where noted on drawings); factory or shop fabricated.</td>
</tr>
<tr>
<td>Kitchen grease exhaust.</td>
<td>Concealed From View: Min 16 GA, carbon steel, all welded construction. Exposed To View: Type 304 stainless steel, min. 18 GA all welded construction, with welds ground smooth for a #4 finish.</td>
</tr>
</tbody>
</table>

B. Exterior insulation of metal ductwork is specified in other Division-15 sections, and is included as work of this section.

C. Refer to other Division-15 sections for ductwork accessories.

D. Refer to other Division-15 sections for fans.

E. Refer to other Division-15 sections for testing, adjusting, and balancing of metal ductwork systems.

1.2 DEFINITIONS:

A. Low Pressure Duct: Duct required by the drawings, specifications, or referenced standards to be constructed to 2" or less, positive or negative pressure class.

B. Medium or High Pressure Duct: Duct required by the drawings, specifications, or referenced standards to be constructed to greater than 2" positive or negative pressure class.

1.3 QUALITY ASSURANCE:

A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of metal ductwork products of types, materials, and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.

B. Installer's Qualifications: Firm with at least 3 years of successful installation experience on projects with metal ductwork systems similar to that required for project.
C. References to SMACNA, ASHRAE and NFPA are minimum requirements, the Contractor shall fabricate, construct, install, seal and leak test all ductwork as described in this specification and as shown on the drawings, in addition to these minimum standard references.

D. Codes and Standards:

1. SMACNA Standards: Comply with SMACNA's "HVAC Duct Construction Standards, Metal and Flexible" for fabrication and installation of metal ductwork. Comply with SMACNA "HVAC Air Duct Leakage Test Manual" for testing of duct systems.


E. SMACNA Industrial Construction Standards.


1.4 SUBMITTALS:

A. Product Data: Submit manufacturer's technical product data and installation instructions for ductwork materials and products. Provide product data for manufactured joining systems. Include sound attenuation by octave band for sound rated flexible duct.

B. Record Drawings: At project closeout, submit record drawings of installed systems, in accordance with requirements of Divisions 1 and 15.

C. Maintenance Data: Submit maintenance data and parts lists for metal ductwork materials and products. Include this data, product data, shop drawings, and record drawings in maintenance manual; in accordance with requirements of Divisions 1 and 15.

1.5 DELIVERY, STORAGE, AND HANDLING:

A. Protection: Protect shop-fabricated and factory-fabricated ductwork, accessories and purchased products from damage during shipping, storage and handling. Prevent end damage and prevent dirt and moisture from entering ducts and fittings. By providing end caps on all open sections, bagging small fittings, surface wrapping and shrink wrapping.

B. Storage: Store ductwork inside elevated from floor on pallets. At no time shall the inside surfaces be exposed, or stored with open ends and protect from weather.

2. PART 2 - PRODUCTS

2.1 MANUFACTURERS:

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

1. Duct Liner:
a. CertainTeed Corp.
b. Manville Products Corp. (Schuller)
c. Owens-Corning Fiberglas Corp.
d. Pittsburgh Corning Corp.

2. Flexible Ducts:
   a. Flexmaster
   b. Thermaflex

3. Duct Take Off Fittings
   a. Hercules Industries
   b. Flexmaster
   c. Thermaflex
   d. Ominair

4. Round Ductwork (low, medium, and high pressure):
   a. Semco Mfg., Inc.
   b. United Sheet Metal Div., United McGill Corp.
   c. Sheet Metal Products Co.
   d. Spiral Pipe of Texas, Inc.
   e. Hercules Industries

2.2 DUCTWORK MATERIALS:

A. Exposed Ductwork Materials: Where ductwork is exposed to view in occupied spaces, provide materials which are free from visual imperfections including pitting, seam marks, roller marks, stains, dents, discolorations, and other imperfections, including those which would impair painting.

B. Sheet Metal: Except as otherwise indicated, fabricate ductwork from galvanized sheet steel complying with ASTM A 527, lockforming quality; with G 90 zinc coating in accordance with ASTM A 525; and mill phosphatized for exposed locations. Provide flat seam construction where standing seams are a hazard to the Owner’s operation personnel.

C. Stainless Steel Sheet: Where indicated, provide stainless steel complying with ASTM A 167; Type 304 or 316; with No. 4 finish where exposed to view in occupied spaces, No. 1 finish elsewhere. Protect finished surfaces with mill-applied adhesive protective paper, maintained through fabrication and installation.

D. Uncoated carbon steel shall comply with ASTM A569, hot rolled steel sheet.

2.3 MISCELLANEOUS DUCTWORK MATERIALS:

A. General: Provide miscellaneous materials and products of types and sizes indicated and, where not otherwise indicated, provide type and size required to comply with ductwork system requirements including proper connection of ductwork and equipment.

B. Fittings: Provide radius type fittings fabricated of multiple sections with maximum 15 deg. change of direction per section. Unless specifically detailed otherwise, use 45 deg. laterals
and 45 deg. elbows for branch takeoff connections. Where 90 deg. branches are indicated, provide conical type tees.

C. Duct Liner: Fibrous glass, complying with Thermal Insulation Manufacturers Association (TIMA) AHC-101; of thickness indicated.

1. Unless otherwise noted, provide 1" thick, 1-1/2 lb density, fiberglass duct liner meeting ASTM C1071 Type I, NFPA 90A and 90B and TIMA (AHC-101) with minimum NRC (noise reduction coefficient) of 0.70 as tested per STM C 423 using an "A" mounting with minimum "K" factor of 0.25. Lining shall be U.L. approved, made from flame attenuated glass fiber bonded with a thermosetting resin and acrylic smooth surface treatment and factory applied edge coating. Materials shall conform to revised NFPA No. 90A Standards, with a maximum flame spread of 25 and maximum smoke development of 50.

D. Duct Liner Adhesive: Comply with ASTM C 916 "Specifications for Adhesives for Duct Thermal Insulation".

E. Duct Liner Fasteners: Comply with SMACNA HVAC Duct Construction Standards, Article S2.11.

F. Duct Sealant: Non-hardening, non-migrating mastic or liquid elastic sealant, type applicable for fabrication/ installation detail, as compounded and recommended by manufacturer specifically for sealing joints and seams in ductwork. All PVC coated exhaust ductwork shall be sealed with an approved chemical resistant sealant as manufactured by Foremost Co. PCD No. 8 duct sealer and wrap with hardcast tape. For outdoor ductwork, sealant shall also be U.V. resistant and weather resistant.

G. Ductwork Support Materials: Except as otherwise indicated, provide hot-dipped galvanized steel fasteners, anchors, rods, straps, trim and angles for support of ductwork.

1. For exposed stainless steel ductwork, provide matching stainless steel support materials.

H. Flexible Ducts: Flexible air ducts shall be listed under UL-181 standards as Class I Air Duct Material and shall comply with NFPA Standards 90A and 90B. Minimum operating pressure rating shall be 6" W.C. through a temperature range of -20° to 150°F; minimum working velocity rating shall be 4000 f.p.m. Contractor shall assume responsibility for supplying material approved by the authority having jurisdiction.

1. All insulated flexible ducts shall be constructed of a metalized ripstop reinforced laminate inner core, 1" thick, 3/4 lb. density fiberglass insulation with "C" factor of 0.23 or less and an outer jacket made exclusively of fire retardant reinforced aluminized material.

a. Flexmaster Type 5M.

I. Duct Takeoff Fittings to Individual Air Inlets & Outlets: Provide conical spin-in fittings at flexible or round sheet metal duct takeoffs. Where specifically shown on drawings, where the duct dimension does not allow for a conical spin-in, or at Contractor's option, provide 45° inlet rectangular to round duct take off fittings, with factory applied gasket. Fittings shall include butterfly type manual volume damper with regulator, and dual locking device. Dual locking device shall consist of two shaft mounted wing nuts, one on each side of the damper. Wing
nuts shall tighten on shafts to lock butterfly in place. Shafts shall be solid metal, rolled metal shafts are not acceptable.

Hercules Model 9000 (conical)

J. See detail on drawings for installation requirement.

K. All fasteners and hardware for stainless steel ductwork shall be made of stainless steel.

2.4 FABRICATION:

A. Fabricate ductwork in 4, 8, 10 or 12-ft lengths, unless otherwise indicated or required to complete runs. Preassemble work in shop to greatest extent possible, so as to minimize field assembly of systems. Disassemble systems only to extent necessary for shipping and handling. Match-mark sections for reassembly and coordinated installation.

B. Fabricate ductwork of gauges and reinforcement complying with SMACNA "HVAC Duct Construction Standards".

C. Where the standard allows the choice of external reinforcing or internal tie rods, only the external reinforcing options shall be used.

D. If manufacturer flange joining systems are used as part of the reinforcing, the EI rating and rigidity class shall be equivalent to the reinforcing requirements of the standard. Submit manufacturer's product data.

E. Fabricate duct fittings to match adjoining ducts, and to comply with duct requirements as applicable to fittings. Except as otherwise indicated, fabricate elbows with center-line radius equal to 1.5 times the associated duct width; and fabricate to include single wall turning vanes in elbows where shorter radius is necessary. Rails shall be 2" wide for elbow up to 12", and 4" wide for elbows over 12" wide. Limit angular tapers to 30 deg. for contracting tapers and 20 deg. for expanding tapers. Divided flow fittings shall be 45° inlet branches, stationary splitters and elbows, or as shown on drawings.

F. Fabricate ductwork with accessories installed during fabrication to the greatest extent possible. Refer to Division-15 section "Ductwork Accessories" for accessory requirements. All stainless steel ductwork shall have stainless steel accessories (including dampers, turning vanes, access doors, etc.) construction.

G. Fabricate ductwork with duct liner in each section of duct where indicated. Laminate liner to internal surfaces of duct in accordance with instructions by manufacturers of lining and adhesive, and fasten with mechanical fasteners. Provide sheet metal nosing on all leading edges preceded by unlined duct, at duct openings, and at fan or terminal unit connections.

2.5 LOW PRESSURE ROUND DUCTWORK:

A. Material: Galvanized sheet steel complying with ASTM A 527, lockforming quality, with ASTM A 525, G90 zinc coating, mill phosphatized. Spiral lockseam construction. Individual runouts to diffusers may be longitudinal seam.

B. Gauge: 28-gauge minimum for round ducts and fittings, 4" through 24" diameter. Minimum 26 gauge where ducts are within a corridor.
2.6 MEDIUM AND HIGH PRESSURE ROUND DUCTWORK:

A. General: Provide factory-fabricated duct and fittings.

B. Duct gauges given below are minimum values; in no case shall the duct gauge be less than recommended by SMACNA for the operation pressures of the systems shown on the drawings, (both positive and negative pressures), including proper reinforcement.

C. Elbows: One piece construction for 90 deg. and 45 deg. elbows 14" and smaller. Provide multiple gore construction for larger diameters with standing seam circumferential joint. Radius to centerline shall be 1.5 times duct diameter. Fully welded construction.

D. Divided Flow Fittings: Full body fittings with solid welded construction or solid welded saddle tap fittings with a minimum 2" flange shaped to fit the main duct. Provide conical laterals, conical tees, 45° inlet tees, wye fittings, or as shown on drawings. Straight tap tees shall not be used.

E. Round Ductwork: Construct of galvanized sheet steel complying with ASTM A527 by the following methods and in minimum gauges listed.

<table>
<thead>
<tr>
<th>Diameter</th>
<th>Minimum Gauge</th>
<th>Method of Manufacture</th>
</tr>
</thead>
<tbody>
<tr>
<td>3&quot; to 14&quot;</td>
<td>26</td>
<td>Spiral Lockseam</td>
</tr>
<tr>
<td>15&quot; to 26&quot;</td>
<td>24</td>
<td>Spiral Lockseam</td>
</tr>
<tr>
<td>27&quot; to 36&quot;</td>
<td>22</td>
<td>Spiral Lockseam</td>
</tr>
</tbody>
</table>

1. Provide locked seams for spiral duct; fusion-welded butt seam for longitudinal seam duct. Provide internal stiffener rings and external reinforcement as required to meet operating static pressures scheduled on drawings.

2. Fittings and Couplings: Construct of minimum gauges listed. Provide continuous welds along seams.

<table>
<thead>
<tr>
<th>Diameter</th>
<th>Minimum Gauge</th>
</tr>
</thead>
<tbody>
<tr>
<td>3&quot; to 14&quot;</td>
<td>24</td>
</tr>
<tr>
<td>15&quot; to 26&quot;</td>
<td>22</td>
</tr>
<tr>
<td>28&quot; to 50&quot;</td>
<td>20</td>
</tr>
</tbody>
</table>
3. PART 3 - EXECUTION

3.1 INSPECTION:

A. General: Examine areas and conditions under which metal ductwork is to be installed. Do not proceed with work until unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF METAL DUCTWORK:

A. Duct Sealing:

1. Seal all low pressure ducts to SMACNA Seal Class "B".
2. Seal all medium and high pressure ducts to SMACNA Seal Class "A".

B. General: Assemble and install ductwork in accordance with recognized industry practices which will achieve air-tight and noiseless (no objectionable noise) systems, capable of performing each indicated service. Install each run with minimum number of joints. Align ductwork accurately at connections, within 1/8" misalignment tolerance and with internal surfaces smooth. Support ducts rigidly with suitable ties, braces, hangers and anchors of type which will hold ducts true-to-shape and to prevent buckling, popping or compressing. Support vertical ducts at every floor.

C. Construct ductwork to schedule of operating pressures as shown on drawings.

D. Field Fabrication: Complete fabrication of work at project as necessary to match shop-fabricated work and accommodate installation requirements.

E. Routing: Locate ductwork runs, except as otherwise indicated, vertically and horizontally and avoid diagonal runs wherever possible. Locate runs as indicated by diagrams, details and notations or, if not otherwise indicated, run ductwork in shortest route which does not obstruct useable space or block access for servicing building and its equipment. Hold ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building. Limit clearance to 1/2" where furring is shown for enclosure or concealment of ducts, but allow for insulation thickness, if any. Where possible, locate insulated ductwork for 1" clearance outside of insulation. Wherever possible in finished and occupied spaces, conceal ductwork from view, by locating in mechanical shafts, hollow wall construction or above suspended ceilings. Do not encase horizontal runs in solid partitions, except as specifically shown. Coordinate layout with suspended ceiling and lighting layouts and similar finished work.

F. Penetrations: Where ducts pass through fire rated walls and do not contain fire or smoke dampers, protect with fire stop material installed in accordance with its listing. Where ducts pass through interior partitions or exterior walls, and are exposed to view, conceal space between construction opening and duct or duct insulation with sheet metal flanges of same gauge as duct. Overlap opening on all four sides by at least 1-1/2". Fasten to duct only. Where ducts penetrate non-fire rated, mechanical, electrical or acoustically sensitive walls, provide 1/2" to 3/4" annular space between duct and wall, pack annular space with mineral wood insulation, and caulk both sides with non-hardening acoustical sealant.
G. Coordination: Coordinate duct installations with installation of accessories, dampers, coil frames, equipment, controls and other associated work of ductwork system.

H. Installation: Install metal ductwork in accordance with SMACNA HVAC Duct Construction Standards and Industrial Construction Standards.

I. Temporary Closure: At ends of ducts which are not connected to equipment or air distribution devices at time of ductwork installation, provide temporary closure of polyethylene film or other covering which will prevent entrance of dust and debris until time connections are to be completed.

3.3 INSTALLATION OF DUCT TAKE-OFF FITTINGS:

A. Fully seal all joints.

B. Sheet metal screw regulator arm to duct after balance is complete. Mark and date position of regulator arm.

C. Insulation over regulator arm is not required.

3.4 INSTALLATION OF DUCT LINER:

A. General: Install duct liner in accordance with SMACNA HVAC Duct Construction Standards.

3.5 INSTALLATION OF FLEXIBLE DUCTS:

A. Maximum Length: For any duct run using flexible ductwork, do not exceed 5' - 0".

B. Installation: Install in accordance with Section III of SMACNA's, "HVAC Duct Construction Standards, Metal and Flexible". Duct shall be secured to collars with metal bands.

3.6 GREASE EXHAUST DUCTS:

A. Install in accordance with International Mechanical Code, NFPA 96, and local modifications to those codes. Connect to hoods in accordance with the hood manufacturer's listing.

B. Horizontal duct less than 75 feet in one run shall be pitched at 1/4" per foot towards the hood or a drain point. Those portions over 75 feet shall be pitched at 1" per foot.

C. Use no turning vanes, tie rods, dampers or other internal structures which will collect grease. All changes in direction shall be made with radiused fittings.

D. Provide cleanouts as follows:

1. Cleanouts shall be installed in the side or top of the duct, whichever is more accessible.

2. When installed on the side, the bottom of the opening shall be a minimum of 1-1/2" above the bottom of the duct.

3. Horizontal ducts shall either have one opening large enough for personnel entrance or minimum 12" x 6" openings at 12' intervals.
4. Openings shall have a flanged frame, extending 1" off the duct wall. Closure panels shall be attached to the flange by means of threaded studs welded to the flange, protruding through holes in the panel and fastened by means of wing nuts. Provide "Fiber Frax" or equivalent high temperature (1500°F) rope type gasket bonded to either the gasket or panel.

3.7 FIELD QUALITY CONTROL:

A. Leakage Tests: Conduct duct leakage test in accordance with SMACNA HVAC Air Duct Leakage Test Manual. Repair leaks and repeat tests until total leakage is less than the maximum permissible leakage as specified below.

B. General:

1. Ductwork pressure tests shall be observed by Architect/Engineer prior to installation of insulation.

2. Ductwork systems in 3" W.G. pressure class and higher shall be tested in their entirety for leaks. Arbitrary sections of ductwork in 2" W.G. and lower pressure class shall be tested as required by Architect/Engineer.

3. Test Failures: Duct systems shall be repaired if test pressure and leakage requirements are not met or if air noise condition is encountered. Repairs and sealing shall be done with sheet metal, tape, sealant or a combination thereof.

C. Test Equipment:

1. Portable rotary type blower or tank type vacuum cleaner with control damper. Equipment shall have sufficient capacity to properly test reasonably large duct system section.

2. Orifice assembly consisting of straightening vanes and calibrated orifice plate mounted in a straight tube with properly located pressure taps.

3. Two (2) U-tube manometers, one to measure drop across calibrated orifice and one to measure S.P. in duct being tested. Provide low differential pressure Dwyer manehelic gauges for low leak testing in lieu of U-tube manometers.

4. Provide Dwyer manehelic gauge with 0-.25" W.C. range for testing 0% leakage ductwork.

D. Testing Pressures and Permissible Leakage:

1. Test pressure shall be equal to the construction class. Negative pressure duct shall be tested at the equivalent positive pressure.

2. Allowable leakage shall be determined from the following equation (or figure 4-1 in the above referenced Standard):

   \[ F = C_L \left( P \right)^{0.65} \]

   Where: \( F = \) Allowable leakage factor CFM/100 Sq. Ft.
   \( C_L = \) Leakage Class
3. Leakage class shall be as follows:
   a. Seal class A, Round or oval duct, \( C_L = 3 \).
   b. Seal class A, Rectangular duct, \( C_L = 6 \).
   c. Seal class B, Round or oval duct, \( C_L = 6 \).
   d. Seal class B, Rectangular duct, \( C_L = 12 \).
   e. Seal class C, Round or oval duct, \( C_L = 12 \).
   f. Seal class C, Rectangular duct, \( C_L = 24 \).

4. Record all tests using the procedure and forms in the above referenced standard.

5. Kitchen exhaust shall be leak tested at 2" S.P. at 5% leakage.

3.8 EQUIPMENT CONNECTIONS:

   A. General: Connect metal ductwork to equipment as indicated, provide flexible connection for each ductwork connection to equipment mounted on vibration isolators, and/or equipment containing rotating machinery. Provide access doors where required for service, maintenance and inspection of ductwork accessories. See section 15910.

3.9 ADJUSTING AND CLEANING:

   A. Clean ductwork internally, unit by unit as it is installed, of dust and debris. Clean external surfaces of foreign substances. Where ductwork is to be painted clean and prepare surface for painting.

   B. Protection:
      1. Store duct a minimum of 4" above ground or floor to avoid damage from weather or spills.
      2. Cover all stored ducts to protect from moisture, dust or debris.
      3. Maintain a cover on all ends of installed ductwork at all times, except when actually connecting additional sections of duct.

   C. Ductwork contaminated or damaged above "shop" or "mill" conditions shall be cleaned, repaired or replaced to the Engineer's satisfaction.
      1. Ductliner pre-installed in stored duct which has become wet may be installed if first allowed to completely dry out.
      2. Ductliner in installed ductwork which has become wet must be completely removed and replaced.
      3. Torn ductliner may be repaired by coating with adhesive if damage is minor and isolated. Extensively damaged liner shall be replaced back to a straight cut joint.

   D. Strip protective paper from stainless ductwork surfaces, and repair finish wherever it has been damaged.
E. Balancing: Refer to Division-15 section "Testing, Adjusting, and Balancing" for air distribution balancing of metal ductwork; not work of this section. Seal any leaks in ductwork that become apparent in balancing process.

END OF SECTION 15891
PART 1 - GENERAL

1. QUALITY ASSURANCE:
   A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of ductwork accessories, of types and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.
   B. Industry Standards: Comply with ASHRAE recommendations pertaining to construction of ductwork accessories, except as otherwise indicated.
   D. SMACNA Compliance: All exhaust ducts comply with "Fire Damper and Heat Stop Guide".

1.2 SUBMITTALS:
   A. Product Data: Submit manufacturer's technical product data for each type of ductwork accessory, including dimensions, capacities, and materials of construction; and installation instructions.
   B. Shop Drawings: Submit manufacturer's assembly-type shop drawings for each type of ductwork accessory showing interfacing requirements with ductwork, method of fastening or support, and methods of assembly of components. Include details of construction equipment and accessories being provided.
   C. Submittals for all damper types specified in this section shall include a schedule for each damper indicating net free area, actual face velocity and pressure drop (at sea level) based on net free area & the maximum air quantity which will be passing through the damper. Submittals without this information will be rejected.
   D. Record Drawings: At project closeout, submit record drawings of installed systems products, in accordance with requirements of Division 15.
   E. Maintenance Data: Submit manufacturer's maintenance data including parts lists for each type of duct accessory. Include this data, product data, and shop drawings in maintenance manual; in accordance with requirements of Division 15.

PART 2 - PRODUCTS

2. MANUFACTURERS:
   A. Manufacturer: Subject to compliance with requirements, provide products by one of the following:
      1. Dampers:
         a. Greenheck
         b. AWV
         c. Air Balance, Inc.
         d. Anemostat
         e. Arrow Louver and Damper; Div. of Arrow United Industries, Inc.
2. Turning Vanes:
   a. Aero Dyne Co.
   b. Airsan Corp.
   c. Barb-Aire
   d. Duro Dyne Corp.
   e. Environmental Elements Corp.; Subs. Koppers Co., Inc.

3. Duct Hardware:
   a. Ventfabrics, Inc.
   b. Young Regulator Co.
   c. Duro-Dyne Corp.

4. Flexible Connections:
   a. Duro Dyne Corp.
   b. Ventfabrics, Inc.
   c. General Rubber Corp. (Process & Exhaust Only)

2.2 MANUAL VOLUME DAMPERS:

A. Low Pressure Rectangular Dampers (less than 2000 FPM and under 2” W.C. S.P. Differential):
   1. For 12” in height or larger, use multiple opposed blade type and close fitted to ducts. The frame and blades shall be constructed of 16 ga. galvanized steel with plated steel shaft mounted with synthetic bearings. Linkage shall be in-jamb fixed type located outside the airstream made of plated steel tie bar and crank plates, with stainless steel pivots. Damper panels shall not exceed 48” wide. Provide jack shafting when duct size required is greater than 48” wide. Provide notched shaft end indicating damper position, locking quadrant to fix damper position and handle. Provide stand off bracket for insulated ducts. For flat oval and round ductwork, provide type C housing.

   2. For ducts less than 12” in height, frame shall be 18 ga. blade galvanized steel, steel axle with synthetic bearings locking quadrant handle and notched shaft end indicating damper position. Provide stand off bracket for insulated ducts.

B. Low Pressure Round Dampers (less than 1800 FPM and under 1” W.C. S.P. differential):
   1. For low pressure spin-in fitting dampers serving individual returns/diffusers, see 15891.

   2. Dampers 4” diameter through 18” diameter shall be 20 ga. galvanized steel frame and blade, utilize multi-blade square dampers with transitions for ducts over 18” diameter. Axle shaft shall be plated steel with retainers mounted on synthetic bearings with notched end shaft indicating damper position, locking quadrant and handle. Provide stand off brackets for insulated ducts.
2.3 TURNING VANES:

A. Fabricated Turning Vanes: Provide fabricated 22 gauge, single blade 4-1/2" radius, 3-1/4" spacing turning vanes and type 2, 4-1/2" wide runners, constructed in accordance with SMACNA "HVAC Duct Construction Standards" Fig 2.3.

B. Turning vanes as a part of PVC coated air systems shall be PVC coated.

C. Do not use trailing edge turning vanes.

D. Provide intermediate support rails if length of vanes exceeds 36".

2.4 DUCT HARDWARE:

A. General: Provide duct hardware, manufactured by one manufacturer for all items on project, for the following:

B. Test Holes: Provide in ductwork at fan inlet and outlet, and elsewhere as indicated, duct test holes, consisting of slot and cover, for instrument tests.

C. Quadrant Locks: Provide for each manual volume damper, quadrant lock device on one end of shaft; and end bearing plate on other end for damper lengths over 12". Provide extended quadrant locks and end extended bearing plates for externally insulated ductwork.

2.5 FLEXIBLE CONNECTIONS:

A. General: Provide flexible duct connections wherever ductwork connects to vibration isolated equipment. Construct flexible connections of neoprene-coated flameproof fabric crimped into duct flanges for attachment to duct and equipment. Make airtight joint. Provide adequate joint flexibility to allow for thermal, axial, transverse, and torsional movement, and also capable of absorbing vibrations of connected equipment. Shelf life shall be verified to not exceed six (6) months. Any sign of cracking on interior or exterior shall be cause for replacement immediately.

B. Use the following product types for each application accordingly:

1. Indoor Equipment Non-Corrosive Air Systems: Heavy glass fabric, double-coated with DuPont's NEOPRENE, non-combustible fabric, fire retardant coating with good resistance to abrasion and flexing. Fabric shall be 30 oz per square yard, capable of operating at -10°F to 200°F, waterproof, air tight, 6 inches wide, complies with NFPA 90 and UL Standard #214. "Ventglas" Model as manufactured by VentFabric, Inc.

2. For flanged fan connections provide round and/or rectangular as required, General Rubber Corporation, style 1092, carbon steel stainless steel back-up bars, 6" face to face, Neoprene elastomers, with UV resistant stabilizer, spark and corrosion resistant, suitable to 225 F. ±2 psi (±55.4" W.C.) pressure rating.

PART 3 - EXECUTION
3.1 INSPECTION:

A. Examine areas and conditions under which ductwork accessories will be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to the Engineer.

3.2 INSTALLATION OF DUCTWORK ACCESSORIES:

A. Install ductwork accessories in accordance with manufacturer's installation instructions, with applicable portions of details of construction as shown in SMACNA standards, and in accordance with recognized industry practices to ensure that products serve intended function.

B. Install turning vanes in square or rectangular 90 deg. elbows in supply, return and exhaust air systems, and elsewhere as indicated.

C. Coordinate with other work, including ductwork, as necessary to interface installation of ductwork accessories properly with other work.

D. Provide balancing dampers at points on low pressure supply, return, and exhaust systems where branches are taken from larger ducts and as required for air balancing.

E. Provide flexible connections immediately adjacent to equipment in ducts associated with fans and equipment subject to forced vibration. Provide matching flanged backing frame with flexible connector where flanged fan connections are provided.

3.3 COORDINATION:

A. Order right/left/top/bottom arrangement as required to minimize field modifications.

3.4 FIELD QUALITY CONTROL:

A. Operate installed ductwork accessories after installation to demonstrate compliance with requirements. Test for air leakage while system is operating. Repair or replace faulty accessories, as required to obtain proper operation and leakproof performance.

3.5 ADJUSTING AND CLEANING:

A. Adjusting: Adjust ductwork accessories for proper settings.

B. Final positioning of manual dampers is specified in Division-15 section "Testing, Adjusting, and Balancing".

C. Cleaning: Clean factory-finished surfaces. Repair any marred or scratched surfaces with manufacturer's touch-up paint.

END OF SECTION 15910
PART 1- GENERAL

1.1 DESCRIPTION OF WORK:

A. Extent of air outlets and inlets work is indicated by drawings and schedules, and by requirements of this section.

B. Types of air outlets and inlets required for project include the following:
   - Ceiling air diffusers.
   - Wall registers and grilles.

C. Refer to other Division 15 sections for ductwork, duct accessories; testing and balancing; not work of this section.

1.2 QUALITY ASSURANCE:

A. Manufacturer’s Qualifications: Firms regularly engaged in manufacture of air outlets and inlets of types and capacities required, whose products have been in satisfactory use in similar service for not less than 5 years.

B. Codes and Standards:
   1. ARI Compliance: Test and rate air outlets and inlets in accordance with ARI 650 "Standard for Air Outlets and Inlets”.
   2. ASHRAE Compliance: Test and rate air outlets and inlets in accordance with ASHRAE 70 “Method of Testing for Rating the Air Flow Performance of Outlets and Inlets”.
   3. ADC Compliance: Test and rate air outlets and inlets in certified laboratories under requirements of ADC 1062 “Certification, Rating and Test Manual”.
   4. ADC Seal: Provide air outlets and inlets bearing ADC Certified Rating Seal.
   5. NFPA Compliance: Install air outlets and inlets in accordance with NFPA 90A "Standard for the Installation of Air Conditioning and Ventilating Systems”.

1.3 SUBMITTALS:

A. Product Data: Submit manufacturer's technical product data for air outlets and inlets including the following:
   1. Schedule of air outlets and inlets indicating drawing designation, room location, number furnished, model number, size, and accessories furnished.
   2. Data sheet for each type of air outlet and inlet, and accessory furnished; indicating construction, finish, and mounting details.
   3. Performance data for each type of air outlet and inlet furnished, including aspiration ability, temperature and velocity traverses, throw and drop, and noise criteria ratings. Indicate selections on data.
B. Shop Drawings: Submit manufacturer’s assembly-type shop drawing for each type of air outlet and inlet, indicating materials and methods of assembly of components.

C. Record Drawings: At project closeout, submit record drawings of installed systems products, in accordance with requirements of Division 15.

D. Maintenance Data: Submit maintenance data, including cleaning instructions for finishes, and spare parts lists. Include this data, product data, and shop drawings in maintenance manuals; in accordance with requirements of Division 15.

1.4 PRODUCT DELIVERY, STORAGE AND HANDLING:

A. Deliver air outlets and inlets wrapped in factory-fabricated fiber-board type containers. Identify on outside of container type of outlet or inlet and location to be installed. Avoid crushing or bending and prevent dirt and debris from entering and settling in devices.

B. Store air outlets and inlets in original cartons and protect from weather and construction work traffic. Where possible, store indoors; when necessary to store outdoors, store above grade and enclose with waterproof wrapping.

2. PART 2 - PRODUCTS

2.1 MANUFACTURERS:

A. Manufacturer: Subject to compliance with requirements, provide products by one of the following:

1. Diffusers, Registers and Grilles:
   a. Anemostat Products Div.; Dynamics Corp. of America.
   b. Price
   c. Carnes Co.; Div. of Wehr Corp.
   d. Krueger; Div. of Philips Industries, Inc.
   e. Titus Products Div.; Philips Industries, Inc.
   f. Metal-Aire
   g. Nailor
   h. Tuttle and Bailey

2.2 CEILING AIR DIFFUSERS:

A. General: Except as otherwise indicated, provide manufacturer’s standard ceiling air diffusers where shown; of size, shape, capacity and type indicated; constructed of materials and components as indicated, and as required for complete installation.

B. Performance: Provide ceiling air diffusers that have, as minimum, temperature and velocity traverses, throw and drop, and noise criteria ratings for each size device as listed in manufacturer’s current data.

C. Ceiling Compatibility: Provide diffusers with border styles that are compatible with adjacent ceiling systems, and that are specifically manufactured to fit into ceiling module with accurate fit and adequate support. Refer to general construction drawings and specifications for types of ceiling systems, which will contain each type of ceiling air diffuser.
D. Types: Provide ceiling diffusers of type, capacity, and with accessories and finishes as listed on air device schedule.

2.3 REGISTERS AND GRILLES:

A. General: Except as otherwise indicated, provide manufacturer's standard registers and grilles where shown; of size, shape, capacity and type indicated; constructed of materials and components as indicated, and as required for complete installation.

B. Performance: Provide registers and grilles that have, as minimum, temperature and velocity traverses, throw and drop, and noise criteria ratings for each size device as listed in manufacturer's current data.

C. Wall Compatibility: Provide registers and grilles with border styles that are compatible with adjacent wall systems, and that are specifically manufactured to fit into wall construction with accurate fit and adequate support. Refer to general construction drawings and specifications for types of wall construction, which will contain each type of wall register and grille.

D. Types: Provide registers and grilles of type, capacity, and with accessories and finishes as listed on air device schedule.

PART 3 - EXECUTION

3.1 INSPECTION:

A. Examine areas and conditions under which air outlets and inlets are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected.

3.2 INSTALLATION:

A. General: Install air outlets and inlets in accordance with manufacturer's written instructions and in accordance with recognized industry practices to insure that products serve intended functions.

B. Coordinate with other work, including ductwork and duct accessories, as necessary to interface installation of air outlets and inlets with other work.

C. Locate ceiling air diffusers, registers, and grilles, as indicated on general construction "Reflected Ceiling Plans". Unless otherwise indicated, locate units in center of acoustical ceiling modules.

END OF SECTION 15932
PART 1 - GENERAL

1.1 DESCRIPTION OF WORK:

A. This section covers testing and balancing of environmental systems described herein and specified under Division 15. The testing and balancing of all environmental systems shall be the responsibility of one Testing, Balancing and Adjusting firm.

1. Test, adjust and balance the following mechanical systems and the mechanical equipment associated with these systems:


   b. Air Side Systems and Equipment

      1) Supply/Return Air Systems
      2) Kitchen Hood Exhaust Systems

   c. Electrical Components

      1) Manual and magnetic starters

   d. Control Systems and Equipment

      1) General

1.2 QUALIFICATIONS OF CONTRACTOR:

A. The General Contractor shall procure the services of an independent testing and balancing agency specializing in the testing, adjusting and balancing of environmental systems to perform the above mentioned work. An independent contractor is defined as an organization that is not engaged in engineering design or is not a division of a mechanical contractor entity, which installs mechanical systems.

B. The actual fieldwork shall be performed by qualified technicians who are currently certified by the Testing, Adjusting and Balancing Bureau (TABB), the National Environmental Balancing Bureau (NEBB), or the Associated Air Balance Council (AABC) certification agencies. The work shall be executed under the direct supervision of a Registered Professional Engineer having an established professional office in the State of Colorado and having an experience record of not less than five (5) years in the mechanical contracting industry, in testing, adjusting and balancing or air and hydronic mechanical systems for not less the two (2) years of that time.

C. The Testing & Balancing Contractor shall have a minimum of three years experience in testing and balancing mechanical systems.

1.3 APPROVAL OF CONTRACTOR:

A. The following firms are approved contractors to complete the work.

1. Checkpoint Balance
2. Lawrence H. Finn & Assoc.
3. TAB Services, Inc.
B. The test and balance contractor shall do the work under the general contractor, not the mechanical contractor.

1.4 CODES AND STANDARDS:

1.5 PRELIMINARY SUBMITTALS:
   A. Within ten (10) days of award of the contract the Mechanical Contractor shall submit the name of the Test and Balance Contractor who will be performing the work. The submittal shall include a complete list of all technicians who will be performing the field work and include a photocopy of their current certification by either NEBB, AABC, or TABB certification agencies. Only those technicians included in the submittal shall perform the work. Any personnel or staff used to perform the work without prior approval of the Engineer, who are not included in the submittal, shall be grounds for rejecting the test and balance report and the project in whole.
   B. Meet all requirements of Section 15010 as applicable.
   C. Submit a list of all instrumentation to be used on an individual project and include calibration dates. Submit calibration curves. If more than one instrument of a similar type is used, a comparison of individual readings should be made. The variation between instrument readings should not exceed plus or minus 5%.
   D. The contractor shall review the contract documents and submittals for location and type of balancing devices being installed by the sheet metal and mechanical contractors, and issue a letter to the engineer and UCB indicating they are adequate or shall identify deficiencies needing attention.

1.6 FINAL REPORTS:
   A. Refer to Division 1 for supplemental requirements.
   B. The Testing and Balancing Contractor shall submit six (6) bound copies of the final testing and balancing report at least fifteen (15) calendar days prior to substantial completion, unless noted otherwise in Division 1. Report contents shall be per Part 3 of this Section.
   C. Meet all requirements of Section 15010 as applicable.
   D. If more than two reports are made by the contractor, the Owner reserves the right to charge the contractor for subsequent reviews by their consultants. Such extra fees shall be deducted from payments by the Owner to the contractor.

1.7 SEQUENCING AND SCHEDULING:
   A. Notify Contractor/Engineer/Architect in writing of conditions detrimental to the proper completion of the test and balance work. Provide the Contractor/Architect/Engineer with a copy of the notification.
B. Prepare a project schedule. Schedule shall indicate critical path of the balancing process and shall incorporate both requirements of other contractors necessary to meet test and balance commitments and process flow of test and balance work. Coordinate with general and mechanical contractors and insert critical steps into project master schedule.

2. PART 2 - PRODUCTS

2.1 BELTS, SHEEVES, IMPELLERS:

A. Refer to specific equipment sections and Section 15010 for additional requirements.

B. The Testing & Balancing Contractor shall coordinate with the Mechanical Contractor to supply correctly sized drive belts and sheeves. Impellers shall be trimmed or replaced by the mechanical contractor and shall be correctly re-sized and coordinated by the Test and Balancing Contractor per the hydronic systems and equipment portion of this section.

3. PART 3 - EXECUTION

3.1 PRELIMINARY PROCEDURES – REMODEL WORK:

A. In remodel area, a complete preliminary test and balance report shall be accomplished prior to any work. Any obvious deficiencies shall be identified at that time. A complete report of all readings, recommendations, etc. shall be submitted to the Engineer.

3.2 GENERAL SYSTEM AND EQUIPMENT PROCEDURES:

A. Balance all air and water flows at terminals within +10% to -5% of design flow quantities. Notify Contractor/Engineer/Architect in writing of conditions detrimental to the proper completion of the test and balance work. Provide the Contractor/Architect/Engineer with a copy of the notification.

B. Pressure relationships indicated on drawings shall take priority over air quantities.

C. Mark equipment settings with paint, including damper control positions, balancing cocks, circuit setters, valve indicators and similar controls and devices, to show final settings at completion of test-adjust-balance work.

D. Patch holes in insulation and ductwork which have been cut or drilled for test purposes, in a manner recommend by the original installer.

E. Measure, adjust and report equipment running motor amps and power factor, KW, rated motor amperage, listed motor power factor, voltage, and all nameplate data. Perform these measurements for all equipment operational modes.

F. Check and adjust equipment belt tensioning.

G. Check keyway and setscrew tightness. Report any loose screws and notify Mechanical Contractor prior to equipment balancing.

H. Record and include in report all equipment nameplate data.
I. Verify that all equipment safety and operating controls are in place, tested, adjusted and set prior to balancing.

J. Verify that manufacturer start-up has occurred per specification prior to balancing.

K. Replace all adjustable sheaves on multiple belt drives with fixed-speed sheaves.

3.3 AIR SIDE SYSTEMS AND EQUIPMENT PROCEDURES:

A. In addition to the procedures identified under each specific heading below, provide general data required by 3.2 above.

B. Supply/Return Air Systems:

1. Balance and report supply and return diffuser/grille quantities. Air diffusion patterns shall be set as noted on drawings and to minimize objectionable drafts and noise.


3. Report design air device inlet or outlet size, actual inlet or outlet size, design and actual velocity through the orifice, for each terminal in the system.

C. Air Handling Units:

1. For units with integral outside air intake and relief dampers, measure, adjust, set and report outside air, return air and relief air quantities. Perform this as specified under supply air systems.

2. Balance and report supply and return fan CFM, upstream static pressure and downstream static pressure.

3. Measure and report static pressure upstream and downstream of all AHU components such as coils, filters (clean and simulated dirty), dampers, etc.

4. After system and fan balance is complete, perform pitot traverses on all coils in 100% heating and cooling modes.

5. Balance all air handling unit coils and report per hydronic portions of this section.

6. Balance and report all temperatures of airside and hydronics during normal operating modes.

7. Measure, adjust, set, balance and report outside air, return air and exhaust/relief air quantities for air handling systems identified on plan.

Air quantities shall be determined by pitot traverse/direct airflow measuring procedures where ever possible, where duct/inlet conditions do not allow for accurate direct measurement of outside air the following method shall be used:

Outside Air CFM = Supply Fan Total CFM - Return Fan Total CFM
In addition to the direct measuring of airflow quantities, measure and record outside air, return air and mixed air temperatures, determine thermal/mass energy balance and provide calculations to verify measured airflow quantities. Adjusting and setting the outside air quantity as a percentage of damper position will not be acceptable.

D. Kitchen Hood Exhaust Systems:

1. General Requirements:
   a. Balance all rooms to required pressure relationships as noted on the drawings. Document in the test and balance report that all pressure relationships have been set as specified.
   b. Performance testing of the hood exhaust system shall be performed after the mechanical system modifications are complete. All systems shall have been calibrated, tested and balanced before performance testing begins.
   c. Set, measure and report flows for all hoods.
   d. Perform full pitot tube traverses upstream of exhaust fans and balance and report air quantities.
      1) In welded high temperature systems provide air quantities upstream of exhaust fans by summing the flows at all hoods.
   e. Measure and report hood capture velocity profiles.

2. Exhaust system performance evaluation.
   a. Verify room pressure relationships with smoke tests and report. The testing shall be performed in each room under the following conditions:
      1) Door closed
      2) Door open
      3) Thermostat set to its minimum set point
      4) Thermostat set to its maximum set point
      5) If the correct pressure relationships cannot be demonstrated, the room shall be retested after the problem has been corrected.
   b. Verify hood capture velocities are adequate with smoke tests and report.
   c. Verify that the exhaust fans on the roof are operating properly. The fans shall be operating smoothly without surging or vibrating excessively.

3.4 ELECTRICAL COMPONENTS ASSOCIATED WITH MECHANICAL SYSTEMS:

A. Manual and Magnetic Starters:
   1. Check all new and existing thermal overloads. Identify improperly protected equipment in report. Furnish and exchange thermals as required for proper motor protection.

3.5 CONTROL SYSTEMS AND EQUIPMENT:

A. General:
1. Operate all temperature control systems with the temperature control contractor’s representative for proper sequence of operation. Be responsible for calibration of flow measurement devices used as input to the temperature control system.

3.6 REPORT OF WORK:

A. The Testing and Balancing Contractor shall submit six (6) bound copies of the final testing and balancing report at least fifteen (15) calendar days prior to the Mechanical Contractor’s request for final inspection.

B. A complete reduced set of mechanical contract drawings (showing each system) shall be included in the report with all equipment, flow measuring devices, terminals (outlets, inlets, coils, fan coil units, schedules, etc.) clearly marked and all equipment designated. The test and balance contractor can obtain drawing files from Cator, Ruma, & Associates for development of these drawings.

C. Data shall be reported per Part 3 of this Section on standard NEBB forms. Generate custom forms that contain the information in this Section when a standard NEBB form does not exist for a piece of equipment. All NEBB forms shall be fully filled out for this report. When additional information is required by this Section, it shall be provided.

D. The report shall include all test and balance data as well as information on any discrepancy from specifications or performance standards. All discrepancies shall be included in a separate section. As a minimum, the following items shall be included:

1. Belt and drive sheave information (as installed and as changed), fan nameplate information, motor nameplate information, and amperage and voltage to all motors (in various operating modes where applicable). Also, maximum and minimum RPM settings on VFD units.

2. Static pressure drops across all components of the air systems. Static pressure profile for each air handling unit system.

3. Required and final balanced CFM at each system terminal unit. Include the terminal size, inlet static pressure, temperature and velocities read to attain the required CFM.

4. Pump and motor nameplate information, amperage and voltage to all motors, flow and pressure drop across all system terminal, pressure rise across all system terminals, pressure rise across the pump in psi and feet of head, both operating and shut-off, and maximum operating GPM.

5. Overload protection data for all motors shall be recorded. Starter brand, model, enclosure type, installed overload devices, original ratings and set points (and revised device ratings and set points when applicable) shall be recorded. If the starters were furnished by the mechanical contractor, the overloads shall be verified and changed to the correct size when necessary, and so noted in the report. If the starters were furnished by the electrical contractor, the correct overload device sizes and settings shall be noted in the report and the electrical contractor shall be advised of all discrepancies.

E. The report shall include a list of all equipment used in the testing and balancing work.
F. Substantial completion of this project will not take place until a satisfactory report is received. The Testing & Balancing Contractor shall respond and correct all deficiencies within seven (7) days of receiving the Engineer’s written review of the balancing report. Failure to comply will result in holding retainage of the final payment until all items have been corrected to the satisfaction of the Engineer.

G. The report shall be signed by the supervising registered professional engineer and affixed with their registration stamp, signed and dated in accordance with state law.

3.7 FIELD VERIFICATION:

A. Upon request of the Owner or Engineer, a representative of the balancing firm performing the work shall demonstrate to him fluid flow quantities shown in the report by reading back outlets or terminals selected at random. It is understood that the operating mode of the system shall be the same for readback as it was during balancing and the number of readings verified will not exceed 10% of the total in the report.

B. When deemed necessary by the Owner or Engineer, the balancing firm shall run temperature, pressure, and/or humidity recordings, and shall be prepared to verify any of the report test results in the presence of the Owner and/or Engineer when requested.

3.8 GUARANTEE OF WORK:

A. The Testing & Balancing Contractor shall guarantee the accuracy of the tests and balance for a period of 90 days from date of final acceptance of the test and balance report. During this period, the Testing & Balancing Contractor shall make personnel available at no cost to the Owner to correct deficiencies that may become apparent in the system balance.

END OF SECTION 15990
PART 1 - GENERAL:

1.1 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section and all subsequent Division 16 sections.

1.2 SUMMARY:

A. This Section specifies the basic requirements for electrical installations and includes requirements common to more than one section of Division 16. It expands and supplements the requirements specified in sections of Division 1 through 15.

1.3 ACCESSIBILITY:

A. Install equipment and materials to provide required code clearances and access for servicing and maintenance. Coordinate the final location with piping, ducts, and equipment of other trades to insure proper access for all trades. Coordinate locations of concealed equipment, disconnects, and boxes with access panels and doors. Allow ample space for removal of parts, fuses, lamps, etc. that require replacement or servicing.

B. Extend all conduits so that junction and pull boxes are in accessible locations.

C. Install access panel or doors where equipment or boxes are concealed behind finished surfaces.

1.4 ROUGH-IN:

A. Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be connected.

B. Refer to equipment specifications in Divisions 2 through 15 for rough-in requirements.

1.5 REQUIREMENTS OF REGULATORY AGENCIES:

A. Electrical installations, inspections, and testing shall meet, at a minimum, the versions of the following in effect at the date of these contract documents except where otherwise specified:

1. Underwriters Laboratories (UL)
2. Federal and State Regulations
3. OSHA
4. NFPA
5. NEMA
6. IEEE
7. ANSI
8. NESG
9. CBM
10. NECA
11. ICEA
12. NETA
13. University of Colorado Standards
B. All material used on this project shall be UL listed and labeled and be acceptable to the authority having jurisdiction as suitable for the use intended.

C. After entering into contract, Contractor will be held to complete all work necessary to meet these requirements without additional expense to the Owner.

1.6 PERMITS AND FEES:

A. Contractor shall arrange for and pay for all inspections, licenses and certificates required in connection with the work.

1.7 ELECTRICAL INSTALLATIONS:

A. Drawings are diagrammatic in character and do not necessarily indicate every required conduit, box, fitting, etc.

B. Drawings and specifications are complementary. Whatever is called for in either is binding as though called for in both.

C. Drawings shall not be scaled for rough-in measurements or used as shop drawings. Where drawings are required for these purposes or have to be made from field measurement, take the necessary measurements and prepare the drawings.

D. Before any work is begun, determine that equipment will properly fit the space and that conduit can be run as contemplated without interferences between systems, with structural elements or with the work of other trades.

E. Coordinate the installation of electrical materials and equipment above and below ceilings with suspension system, luminaires and other building components. Ductwork and piping shall not be installed above electrical panelboards, switchboards, motor control centers, and transformers.

1. Coordinate ceiling cavity space carefully with all trades. In the event of conflict, space for mechanical and electric systems within the cavity shall be allocated in the following order:

   a. Plumbing waste, vent piping and roof drain mains and leaders.
   b. Supply, return and exhaust ductwork.
   c. Fire sprinkler mains and leaders.
   d. Electrical conduit.
   e. Domestic hot and cold water.
   f. Pneumatic control piping.
   g. Fire sprinkler branch piping and sprinkler runouts.

F. Verify all dimensions by field measurements.

G. Arrange for chases, slots, and openings in other building components to accommodate electrical installations.

H. Coordinate the installation of required supporting devices and sleeves to be set in poured-in-place concrete and other structural components, as they are constructed.
I. Sequence, coordinate, and integrate installations of electrical materials and equipment for efficient flow of the work. Give particular attention to large equipment requiring an access path for positioning prior to closing-in the building or space.

J. Coordinate the cutting and patching of building components to accommodate the installation of electrical equipment and materials.

K. Where mounting heights are not detailed or dimensioned, install electrical conduits, boxes, and overhead equipment to provide the maximum headroom possible. In general, keep installations tight to structure.

L. Install electrical equipment to facilitate maintenance and repair or replacement of equipment components. As much as practical, connect equipment for ease of disconnecting and removal with minimum of interference with other installations.

1.8 ELECTRICAL COORDINATION DRAWINGS:

A. Prepare and submit a set of coordination drawings showing major elements, components, and systems of electrical equipment and materials in relationship with other building components. Prepare 30"x42" drawings to an accurate scale of 1/8"=1'-0" or larger. Indicate the locations of all equipment and materials, including clearances for servicing and maintaining equipment. Indicate movement and positioning of large equipment into the building during construction.

B. Prepare floor plans, reflected ceiling plans, elevations, sections, and details to conclusively coordinate and integrate all installations. Indicate locations where space is limited, and where sequencing and coordination of installations are of importance to the efficient flow of the Work.

C. Prepare coordination drawings for specific equipment installations, including, but not limited to the following:

1. Equipment connections
2. Circuit and motor disconnects
3. Panelboards and feeder conduits

D. Wiring Diagrams: Provide wiring diagrams indicating field installed electrical power and control wiring and cabling layouts, overcurrent protective devices, equipment, and equipment connections.

1.9 CUTTING AND PATCHING:

A. This Article specifies the cutting and patching of electrical equipment, components, and materials to include removal and legal disposal of selected materials, components, and equipment.

B. Refer to the Division 1 Section covering cutting and patching for general requirements.

C. Do not endanger or damage installed Work through procedures and processes of cutting and patching.

D. When coring is required or identified, an x-ray of the area is to be taken prior to the performance of the work operation. X-ray work requires an MOP and protection.

E. Arrange for repairs required to restore other work, because of damage caused as a result of electrical installations.
F. No additional compensation will be authorized for cutting and patching Work that is necessitated by ill-timed, defective, or non-conforming installations.

G. Perform cutting, fitting, and patching of electrical equipment and materials required to:
   1. Uncover Work to provide for installation of ill-timed Work;
   2. Remove and replace defective Work;
   3. Remove and replace Work not conforming to requirements of the Contract Documents;
   4. Remove samples of installed Work as specified for testing;
   5. Install equipment and materials in existing structures;
   6. Upon written instructions from the Architect/Engineer, uncover and restore Work to provide for Architect/Engineer observation of concealed Work.

H. Cut, remove and legally dispose of selected electrical equipment, components, and materials as indicated, including, but not limited to removal of conductors, conduit, luminaires, boxes, devices and other electrical items made obsolete by the new Work.

I. Protect the structure, furnishings, finishes, and adjacent materials not indicated or scheduled to be removed.

J. Provide and maintain temporary partitions or dust barriers adequate to prevent the spread of dust and dirt to adjacent areas.

K. Locate, identify, and protect mechanical and electrical services passing through remodel or demolition area and serving other areas required to be maintained operational.

1.10 TEMPORARY FACILITIES:

A. Light, Heat, Power, Etc.
   1. Responsibility for providing temporary electricity, heat and other facilities shall be as identified in these specifications, as shown on the drawings and as specified in Division 1.

B. Building distribution equipment and devices (existing or new) shall not be used without written permission of the Owner. If used for temporary power, the equipment shall be properly maintained and any damage resulting from use shall be repaired by the Contractor. The guarantee period for new equipment shall not begin until the equipment is turned over to the Owner.

C. All new luminaires utilized for temporary lighting shall comply with University of Colorado Standard 16501 2.2A.

1.11 ELECTRICAL SUBMITTALS:
A. Refer to the Conditions of the Contract (General and Supplementary) and Division 1 Section covering shop drawings, product data, and samples for submittal definitions, requirements, and procedures.

B. The manufacturer's material or equipment listed first in the specifications or on the drawings are the types to be provided for the establishment of size, capacity, grade and quality. If alternates are used in lieu of the first names, the cost of any changes in construction required by their use shall be borne by this Contractor.

C. All equipment shall conform to the State and/or local Energy Conservation Standards.

D. Submittal of shop drawings, product data, and samples will be accepted only when submitted by the Contractor. Each submittal shall be reviewed for general conformance with contract requirements and stamped by the respective contractor prior to submittal to the Architect/Engineer. Data submitted from subcontractors and material suppliers directly to the Architect/Engineer will not be processed unless written prior approval is obtained by the Contractor.

E. Before starting work, prepare and submit to the Architect/Engineer four (4) sets of all shop drawings, descriptive product data, and samples required for the project. Continue to submit four (4) sets, after each Architect/Engineer's action, until a "No Exception Taken" or "Make Correction Noted" action is received with the exception of Fire Alarm submittals which must be submitted until a "NO EXCEPTION TAKEN" action is received. The Engineer will complete an initial review and, if required, a single subsequent review of the resubmittal. If the submittal requires a third review or additional reviews, the University may withhold amount(s) necessary from Contractor's final request for Payment to reimburse the Engineer at their standard hourly rates. Submittals shall include the following specified materials and, in addition, any materials not listed below but which are specified in the individual sections of Division 16 which follow.

1. Raceways including surface raceways and wireways
2. Cabinets, boxes, fittings, etc.
3. Wiring devices, including tele/data/power poles
4. Electrical equipment signs and labels
5. Panelboards with door-in-door covers
6. Disconnect Switches
7. Circuit breakers and fused switches for installation in existing panelboards or distribution centers
8. Lighting
9. Emergency power supplies including unit type equipment
10. Fire alarm and detection system
11. Lighting control system including individual wall dimmers
12. Supporting devices

F. Submit letters certifying compliance with ANSI standards for medium or high voltage gear. These letters shall be signed by a corporate officer and shall list applicable standards. Letters signed by local representatives will not be acceptable.

G. Submit proposed changes to electrical room or other equipment room layouts when revised from contract documents prior to installation.

H. Mark submittals with designations as shown on the drawings and identify as required by Specification Sections. Identification shall contain the information as required in details and
each label shall be submitted in list form with disconnects, panelboards, overcurrent protection
devices and utilization equipment.

I. All electrical submittals shall be assembled into a single package.

1. Submittals shall be provided in expandable, three-post, hard back binders.

2. Each submittal shall be tabbed by the electrical specification section it is specified in.

3. An index shall be provided which includes:
   a. Product
   b. Plan Code (if applicable)
   c. Specification Section
   d. Manufacturer and Model Number

J. Submittals shall be provided for review within four (4) working weeks from award of contract to
successful bidder.

1.12 PRODUCT OPTIONS AND SUBSTITUTIONS:

A. The burden of proof that proposed equipment is equal in size, capacity, performance, and
other pertinent criteria for this specific installation, or superior to that specified is up to the
Contractor. Substituted equipment will only be allowed where specifically listed in a written
addendum. If substitutions are not granted, the specified materials and equipment must be
installed. Where substituted equipment is allowed, it shall be the Contractor’s responsibility to
notify all related trades of the accepted substitution and to assume full responsibility for all
costs caused as a result of the substitution.

B. Unless otherwise specified, all materials and equipment shall be of domestic (USA)
manufacture.

1.13 PRODUCT LISTING:

A. Prepare a list of major electrical equipment and materials for the project. A sample schedule
is included at the end of this Section to complete this requirement.

B. Provide a product listing within one (1) week from award of contract to successful bidder.

C. Submit this listing as a part of the submittal requirement specified in the Division 1 Section on
Products and Substitutions.

D. When two or more items of same material or equipment are required they shall be of the same
manufacturer. Product manufacturer uniformity does not apply to raw materials, bulk
materials, sheet metal, steel bar stock, welding rods, solder, fasteners and similar items used
in Work, except as otherwise indicated.

E. For conduit, wire and fittings, the Contractor shall select a prime and alternate manufacturer
from the list of acceptable manufacturers provided in the appropriate sections of this Division.
The prime and alternate manufacturers shall be identified in the product listing. The contractor
shall make every effort to use the prime manufacturer for the entire project. If products from
this manufacturer are unavailable, the Contractor shall use the listed alternate with the
following provisions.
1. Wire: All wire placed in a single conduit or installed in multiple conduits making up parallel feeders shall be of the same manufacturer.

2. Conduit and Fittings: All conduits and fittings installed exposed within the same room or immediate area shall be of the same manufacturer.

F. Provide products which are compatible within systems and other connected items.

1.14 SCHEDULE OF VALUES:

A. Provide preliminary schedule of values to Engineer according to the following descriptions:

1. Demolition
2. Service/Distribution
3. Lighting - Interior
4. Basic Materials/Devices/Equipment Connections (Mechanical)
5. Fire Alarm (Material/Installation)
6. Miscellaneous

1.15 NAMEPLATE DATA:

A. Provide equipment with permanent operational data nameplate on each item of power operated equipment, indicating manufacturer, product name, model number, serial number, capacity, operating and power characteristics, labels of tested compliances, and similar essential data. Install equipment so that nameplate is readily visible.

1.16 DELIVERY, STORAGE AND HANDLING:

A. Refer to the Division 1, Sections on Transportation and Handling and Storage and Protection.

B. Deliver products to project properly identified with names, model numbers, types, grades, compliance labels, and similar information needed for distinct identifications; adequately packaged and protected to prevent damage during shipment, storage, and handling.

C. Store equipment and materials at the site, unless off-site storage is authorized in writing. Protect stored equipment and materials from damage and weather.

D. Coordinate deliveries of electrical materials and equipment to minimize construction site congestion. Limit each shipment of materials and equipment to the items and quantities needed for the smooth and efficient flow of installations.

1.17 RECORD DOCUMENTS:

A. Refer to the Division 1 Section on Project Closeout or Project Record Documents for requirements. The following paragraphs supplement the requirements of Division 1.

B. Mark Drawings to indicate revisions to conduit size and location both exterior and interior; actual equipment locations, dimensioned from column lines; concealed equipment, dimensioned to column lines; distribution and branch electrical circuitry; fuse and circuit breaker size and arrangements; support and hanger details; Change Orders; concealed control system devices, and any other relevant deviations from the Contract Documents.
C. Mark shop drawings to indicate approved substitutions; Change Orders; actual equipment and materials used.

D. Mark luminaire schedule on drawings to indicate manufacturer and complete catalog numbers of installed equipment.

E. Mark schedules including panelboard, switchboard, motor control center, mechanical, kitchen and similar equipment schedules on drawings to indicate installed equipment and materials used, and any deviations or revisions to electrical load data and calculations.

F. During construction, the contractor shall maintain at the job site a set of updated construction documents for the singular purpose of recording the above information. All record drawings shall be completed in erasable pencil. These changes shall be updated weekly.

G. Revisions to the Contract Documents shall be legible and shall be prepared using the following color scheme.

1. Red shall indicate new items, deviations and routing.
2. Green shall indicate items removed or deleted.
3. Blue shall be used for relevant notes and descriptions.

H. The Contractor shall have available at the job site current information on the following at all times:

1. Addenda
2. Change Orders
3. Submittals
4. Inspection Reports
5. Test Results
6. Outage Information and Requests.

I. At the completion of the project, submit these documents to the Architect/Engineer. This contract will not be considered completed until these record documents have been received and reviewed by the Architect/Engineer.

1.18 OPERATION AND MAINTENANCE DATA:

A. Refer to the Division 1 Section on project closeout or operation and maintenance data for procedures and requirements for preparation and submittal of maintenance manuals.

B. In addition to the information required by Division 1 for Maintenance Data, include the following information:

1. As part of the operation and maintenance manuals for the project, the Contractor shall be required to submit schematic diagrams and point-to-point wiring diagrams for the following systems. Submittal shall be in the form of blacklines, furnish reproducible copy (mylar sepia), and AutoCAD latest version.

   a. Fire Detection/Alarm Systems

2. Description of function, normal operating characteristics and limitations, fuse curves, engineering data and tests, and complete nomenclature and commercial numbers of all replaceable parts.
3. Manufacturer's printed operating procedures to include start-up, break-in, routine and normal operating instructions; regulation, control, stopping, shut-down, and emergency instructions; and summer and winter operating instructions.

4. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions.

5. Servicing instructions and lubrication charts and schedules.

6. Complete list of parts and wiring diagrams.

7. Names, addresses and telephone numbers of the Contractor, Sub-contractors and local company responsible for maintenance of each system or piece of equipment.

8. All information shall be permanently bound in a 3-ring binder. The job name and address and contractor's name and address shall be placed on the cover and spine of each binder in a permanent manner. Dymo-tape is not acceptable.

9. Copies of all test reports shall be included in the manuals.

10. Provide manuals with dividers for major sections and special equipment. Mark neatly in ink the individual equipment when more than one model or make is listed on a page. Provide detailed table of contents.

C. This contract will not be considered completed nor will final payment be made until all specified material, including test reports, is provided and the manual is reviewed by the Architect/Engineer.

1.19 TESTING:

A. Submit test reports as outlined in Division 1 Sections on Quality Control Services and other sections of this Division.

B. Testing as required by these specifications shall pertain to all equipment, wiring, devices, etc. installed under this contract and being reused.

C. Failure to Meet Test:

1. Any system material or workmanship which is found defective on the basis of performance tests shall be reported directly to the Architect.

2. Contractor shall replace the defective material or equipment and have test repeated until test proves satisfactory without additional cost to the Owner.

D. Field test and/or operational check shall apply to the following Division 16 sections:

1. 16475 - Overcurrent Protective Devices

Field tests and/or operational checks for the above equipment are listed as follows:

1. 16475 - OVERCURRENT PROTECTIVE DEVICES
a. TEST AND OPERATIONAL CHECK:

1) Check cleanliness of all parts. Remove any excess packing, shipping bolts, etc.

2) Verify proper operating condition of all equipment mechanically and electrically including, but not limited to:

   a) Verify operation of each circuit breaker trip device with an accurately metered timed instrument (by passing 300% rated current through each pole).

   b) Verify relay operation by introduction of accurately metered currents into both overcurrent and ground fault circuitry at values which will enable accurate determination of the tripping characteristics.

3) If any equipment is found defective during operational check, it shall be replaced by the Contractor without cost to the Owner and tests repeated without cost to the Owner until satisfactory results are obtained.

1.20 DEMOLITION/REMODEL WORK:

A. Refer to Division 1 Section on Summary of work for requirements on working in Owner-occupied areas of the existing building and Division 2 section on selective demolition. The following are additions and modifications.

B. The project involves renovation and remodel of the existing building. On the drawings, work may be denoted by showing items as bold or light line weight and certain renovation symbols are used. These indications and symbols are amplified as follows:

1. Bold Print (when used): Work included in this contract is denoted in bold print or line weight.

2. Light Print (when used): Work shown lightly indicates existing conditions to remain.

   R = Existing items to be removed. Contractor shall remove the existing item and the associated existing wiring. Where the raceway serving the equipment is accessible (via removal of suspended ceiling, crawl space, etc.) the raceway shall also be removed. Where the removal of a raceway leaves visible evidence on an existing surface which is not being repaired or replaced by the General Contractor, this contractor shall repair the surface. Where the existing raceway is concealed, the outlet box shall be cleaned, and a blank coverplate installed. Where the concealed raceway is uncovered by demolition performed by the General Contractor, the raceway shall be removed (or extended to new location if appropriate).

   E = Existing item to remain in place. Contractor shall perform the following function based upon the item to remain:

   Luminaires   -   Leave in place.
   Switches     -   Maintain circuit continuity.
   Receptacle   -   Remove devices if required for new work and reinstall.
   Clock        -   Clean and reinstall.
ER = Existing item to remain in place; replace device. Contractor shall perform the following function based upon the item to remain:

- Luminaires: Clean and install new lamps.
- Switches: Remove and replace with new in existing box.
- Receptacles: Remove and replace with new in existing box.
- Clock: Clean and replace.

RL = Existing item to be relocated. Contractor shall remove the existing item, and store in a safe place. The existing item shall be relocated to the new position as called for on the drawings. At Contractor's option, the existing wiring may be extended, or new wiring may be run from the source. Based upon the item to be relocated, the Contractor shall perform the following function:

- Luminaires: Clean and install new lamps.
- Switches: Replace.
- Receptacles: Replace.
- Clocks: Clean and relocate.

C. Existing equipment that is removed and not scheduled to be reused shall remain the property of the Owner and be delivered for disposition unless specifically indicated otherwise and shall be stored in a location designated by the Owner. Items which are removed and not wanted by the Owner shall become the property of the Contractor and shall be removed from the site.

D. Existing equipment that is removed and is to be reused shall be cleaned, serviced and operable before being reinstalled.

E. Revise panelboard schedules to reflect removal or relocation of equipment. Circuit integrity of equipment in adjacent areas shall be left intact. Provide updated type-written panel directories for each panel affected.

F. Where remodeling interferes with existing circuits and equipment which are not to be removed, such circuits and equipment shall be reworked and relocated as required to complete the project.

G. The Contractor shall remove all distribution equipment, conductors, etc., which are indicated to be removed or which must be removed to accommodate demolition. Equipment to be removed may require reworking conduit and wiring in order to maintain service to other equipment.

H. Where remodeling interferes with circuits serving areas outside of the project or phase limits or which are remodeled in later phases of the project, circuits shall be reworked or temporary circuits provided as required.

I. Existing equipment and circuiting shown are based on field surveys and/or Owner furnished drawings. The Contractor shall verify conditions as they exist with necessary adjustments being made to the drawing information.

J. Coordinate the routing of all conduits with the existing mechanical and plumbing systems in order to avoid conflicts with ducts, pipes, etc. Where existing electrical boxes, conduit, or equipment interfere with installation of new ducts, plumbing, walls, soffits, luminaires, outlets, etc., the Contractor shall resolve the conflict with the appropriate trade.
K. Reuse of existing luminaires, devices, conduits, boxes, or equipment will be permitted only where specifically indicated on the drawings or allowed under the appropriate section of the specifications.

L. Electrical Outages: Electrical outages must be held to a minimum. The Contractor shall submit a Method of Procedure (MOP) for each outage to the Owner detailing the reasons for the outage, areas affected, sequence of procedures to accomplish work, estimated maximum length of time, the date and time of day outage will occur. The Contractor shall meet with the Owner to set a schedule and date for the outage based on the MOP. Due to the critical implications of power outages, the Owner may direct the Contractor as to the time of day or night and date an outage may take place.

1. The Contractor will be responsible for providing temporary power required for the duration of the outages. The required outages to connect and disconnect the temporary power will require a MOP as described above.

M. PCB type ballasts may be present in existing luminaires. If PCB ballasts are discovered by the Contractor, report such overcurrence to the Architect and the Electrical Engineer immediately. The Contractor shall remove and dispose of PCB type ballasts at an E.P.A. (Environmental Protection Agency) approved site in the prescribed manner acceptable to the EPA. The Contractor shall pay all fees associated with this work.

N. If other suspected hazardous material, in any form, is discovered by this Contractor in the process of his work, he shall report such occurrence to the Architect immediately. The Engineer will determine the action to be taken. Hazardous material removed is not a part of the work to be done under this Division.

O. When called for in the specifications, or on the drawings, the Contractor shall meter the points indicated for seven consecutive days using a three phase digital analyzer (Dranetz #808, BMI 3030 or equal). The analyzer shall be set up to record volts, amperes, kw, and power factor for each phase at 15 minute intervals. Also recorded shall be the demand for each 15 minute interval. The maximum daily demands shall be listed in a summary printed once a day at midnight. The Contractor shall compile a summary report listing maximum readings and submit the report and tape to the Electrical Engineer. The analyzer shall have been calibrated within the previous 60 days. Submit documentation of the calibration to the Engineer.

P. Contractor is responsible for sending removed lamps to be recycled. The Contractor should ensure the recycling agency meets RCRA and CERCLA regulations. Provide certificate of compliance in O&M Manuals.

Q. The existing load shed capabilities of the building shall be maintained unless otherwise indicated on the drawings.

1.21 WARRANTIES:

A. Refer to the Division 1 Section on Warranties and Bonds for procedures and submittal requirements for warranties. Refer to individual equipment specifications for warranty requirements. In no case shall the warranty for the total electrical system be less than one year from date of acceptance by the Owner.

B. Compile and assemble the warranties specified in Division 16, into a separated set of vinyl covered, three ring binders, tabulated and indexed for easy reference.
C. Provide complete warranty information for each item. Information to include product or equipment description, date of beginning of warranty or bond; duration of warranty or bond; and names, addresses, and telephone numbers and procedures for filing a claim and obtaining warranty services.

1.22 CLEANING:

A. Refer to the Division 1 Section on project closeout or final cleaning for general requirements for final cleaning.

B. Clean all luminaires, lamps and lenses prior to final acceptance. Replace all inoperative lamps.

1.23 PROJECT CLOSEOUT:

A. The contractor shall be responsible for providing the items listed on the checklist prior to final observation. Required test reports shall be included in the O & M manuals. (Checklist is located at the end of this section.)

B. Punch Lists:

1. Final payment will not be authorized until all items on the final punch list have been completed, and routine maintenance procedure and spare parts have been received.

C. Cleaning and Painting:

1. Clean all electrical equipment, such as switches, panelboards, luminaires, etc., of construction dirt, dust, paint smears, etc., and touch-up or repaint all scars, blemishes, rust spots, etc., to original state of finish.

D. Operation and Maintenance Manuals:

1. Compile a complete list of product data and shop drawings, acceptance tests, warranties, certificates, sub-contractor and supplier information (i.e. name, address, and phone no.).

E. Guarantees and Warranties:

1. Furnish to the Owner a formal warranty covering the electrical system installed under this contract, to be free from defective materials and workmanship for a period of one year after date of acceptance of installation by Owner. During this period provide all labor and new materials required to repair or replace all defects to the satisfaction of the Owner at no cost to Owner.

1.24 SPECIAL ELECTRICAL PROVISIONS:

A. Bidding Requirements:

1. The bidder shall give evidence of being able to be bonded to (1-1/2 times job value). A letter shall be provided by the bonding agency assuring capability of bonding this level and associated rates.
2. The successful firm shall be capable of starting work immediately upon receipt of contract award and have the resources to complete the total project in accordance with the general contractor’s construction schedule. (Allowance will be made for material delays caused by problems outside of contractor’s control, with proper documentation.)

B. Qualification Requirements:

1. Contractors bidding this project must complete AIA Document A305-1986 "Contractor’s Qualification Statement" and submit it with their proposal for information purposes.

2. In addition to the information requested in Item 1., the Contractor must provide a statement(s) indicating they meet the following minimum requirements.

   a. List a minimum of two projects completed in the last five years which were similar in size (or larger), complexity and type. For each project list:

      1) Name and location of project.
      2) Name, address and phone number of client/owner and owner’s representative.
      3) Contract type (prime or subcontract) and contract value (or subcontract value).
      4) Year in which work was performed.

   b. If required, list two projects on which the contractor as the prime Contractor (may be the same projects listed in paragraph (a), if applicable).

   c. The firm and its operating officers (above the level of Project Manager) shall have been involved in Electrical Contracting for at least five years.

   d. List project values (or subcontract values, if applicable) which total at least five times job value of electrical work in the last five years completed by the firm or its operating officers.

C. General Requirements:

1. The successful firm shall provide a project supervisor of proven experience, and be willing to leave him (or her) on the project for the duration of the project, unless acceptable alternative arrangements are made with the University.

2. The successful firm must have a business office which is staffed during normal working hours (8:00-5:00 Monday through Friday).

3. The project manager of the successful firm shall have paging capability during normal working hours.

D. Craftsman Regulations:

1. Contractors shall include no more than one indentured apprentice per journeyman electrician. Apprentices shall be under the direct supervision of a licensed electrician at all times.
2. Helpers may be assigned to the project as required to do laboring type tasks, but may not do any installation type electrical work.

3. High voltage cable splicers must be certified by the Director of Facilities Management or his (her) Designated Representative, before either cable splicing or terminating begins. Certification requirement may be satisfied by supplying credentials illustrating knowledge or by a test demonstration of capabilities. Upon completion of requirements, a certification card will be issued by the Department of Facilities Management.

1.25 CONSTRUCTION REQUIREMENTS:

A. The contractor shall maintain and have available at the jobsite current information on the following at all times:

1. Construction Plans and Specifications
2. Addenda
3. Change Orders
4. Submittals
5. Inspection Reports
6. Test Results
7. Outage Information and Requests
8. Record Drawings (showing all changes)
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The following is a listing of equipment and materials which will be used on the above-referenced project. This product listing does not remove the requirement for submittal of Shop Drawings, Product Data or Samples as may be called for elsewhere in these specifications. Provide this list to Architect/Engineer within 2 weeks of contract award.

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END SECTION 16010
PART 1 - GENERAL

1.1 SUMMARY:

A. Extent of raceway work is indicated by drawings and schedules. Provide complete conduit systems for all conductors unless otherwise specified.

B. Types of raceways specified in this section include the following:
   1. Flexible metal conduit.
   2. Surface metal raceways.
   3. Prohibited Materials

1.2 QUALITY ASSURANCE:

A. Manufacturers: Firms regularly engaged in manufacture of raceway systems of types and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.

B. Installer's Qualifications: Firm with at least 3 years of successful installation experience on projects with electrical raceway work similar to that required for this project.

1.3 SUBMITTALS:

A. Product Data: Submit manufacturer's technical product data, including specifications and installation instructions, for each type of raceway system required. Include data substantiating that materials comply with requirements.

B. Shop Drawings: Submit dimensioned drawings of surface metal raceway systems showing layout of raceways and fittings, spatial relationships to associated equipment, and adjoining raceways, if any. Show connections to electrical power panels and feeders.

PART 2 - PRODUCTS

2.1 MANUFACTURERS:

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

1. EMT Conduit:
   a. Allied
   b. Republic
   c. Triangle
   d. LTV

2. Steel Fittings:
   a. O/Z Gedney
   b. Raco
   c. Appleton
   d. EPT
   e. Midwest
   f. Picoma
   g. Steel City
3. Conduit Bodies:
   a. O/Z Gedney
   b. Killark
   c. Regal
   d. Appleton
   e. Crouse Hinds

4. Surface Metal Raceways:
   a. Wiremold Co.
   b. Airey Thompson Co.
   c. B-Line Systems, Inc.
   d. Isoduct Energy Systems
   e. Square D. Co.
   f. Mono-Systems, Inc.

2.2 METAL CONDUIT AND TUBING:

A. Electrical Metallic Tubing (EMT):


2. Fittings: Steel compression fittings for raintight and concrete-tight applications. Steel set-screw for all other connections. Set-screw quick fit type for 2-1/2" and larger may be used. Bushings shall be threaded and have nylon insulated throat or nylon bushing.

B. Flexible Metal Conduit:

1. Conduit: Continuous spiral wound, interlocked, zinc-coated steel, approved for grounding.

2. Fittings: Cadmium plated, malleable iron. Straight connector shall be one-piece body, female end with clamp and deep slotted machine screw for securing conduit, and threaded male end provided with a locknut. Angle connectors shall be two piece body with removable upper section, female end with clamp and deep slotted machine screw for securing conduit, and threaded male end provided with a locknut. All fittings shall be terminated with threaded bushings having nylon insulated throats.

2.3 CONDUIT BODIES:

A. General: Types, shapes and sizes, as required to suit individual applications and NEC requirements. Provide matching gasketed covers secured with corrosion-resistant screws.

B. Metallic Conduit and Tubing: Use malleable iron conduit bodies. Use bodies with threaded hubs for threaded raceways and in hazardous locations.

2.4 SURFACE METAL RACEWAYS:

A. General: Sizes and channels as indicated. Provide fittings that match and mate with raceway. All circuits either factory or field installed shall have a separate neutral conductor.

1. Surface Metal Raceway: Galvanized steel with snap-on cover. Provide raceways of suitable size based on fill for circuits indicated on the drawings. Provide all necessary boxes, covers, extensions, fittings, etc. to form a complete assembly. Coordinate factory finish paint with the UCB Department of Facilities Management.
B. Boxes for Surface Raceways: Designed, manufactured and supplied by raceway manufacturer for use with specified raceway.

2.5 CONDUIT SIZES:

A. Conduit sizes shall be as shown on the drawings. If the conduit size is not given on the drawings, the conduit shall be sized in accordance with NEC based on insulation type RH, RHW, RHH and the number of conductors enclosed plus a parity sized equipment ground conductor and be subject to the following minimum sizes:

1. Rigid, Intermediate, and EMT Conduit: 3/4” for all runs except lighting switch legs, 277 volt lighting branch circuits, temperature control and fire alarm which may be 1/2”.

2. Flexible Conduit: Minimum 2” for all runs. Runs shall be limited to 3 feet except lighting connections which may be a maximum of 6 feet. 3/8” flexible conduit is permitted if furnished as part of a manufactured equipment connection (including lighting equipment).

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

2.6 PROHIBITED MATERIALS:

A. Aluminum conduit
B. ENMT
C. MC and AC cable

PART 3 - EXECUTION

3.1 INSPECTION:

A. Examine areas and conditions under which raceways are to be installed, and substrate which will support raceways. Notify Contractor in writing of conditions detrimental to proper completion of the work. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.2 CONDUIT SCHEDULE:

A. Raceways in locations subject to mechanical injury: Rigid steel galvanized conduit. Locations subject to mechanical injury include, but are not limited to, the following:

1. Exposed conduits outdoors.

2. Exposed conduits in dock areas and high/medium bay locations up to 25 feet above finished floor.

B. Motor, Mechanical Equipment and Lighting: Flexible metal conduit, or PVC jacketed liquid-tight flexible metallic conduit with liquid tight connectors in outdoor, wet, damp, corrosive locations or subject to oil drip. Final 3 foot connection to sprinkler or pre-action valves shall be in PVC jacketed liquid-tight flexible metallic conduit.
C. Raceways in all other areas shall be electrical metallic tubing unless otherwise noted.

D. Emergency Circuits: All emergency circuits shall be run totally in metal conduit and shall be in a completely separate raceway system from non-emergency circuits.

E. Rework or extensions of existing conduit shall include the use of similar materials to the existing conduit type unless otherwise noted.

3.3 INSTALLATION OF CONDUITS:

A. General: Install electrical raceways in accordance with manufacturer’s written installation instruction, applicable requirements of NEC, and as follows:

1. Conceal all conduit unless indicated otherwise, within finished walls, ceilings, and floors. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot water pipes. Install raceways level and square and at proper elevations.

2. Elevation of Raceway:
   a. Where horizontal raceway is installed near water and steam piping, route raceway above piping and as close to structure as possible and practical.
   b. Route raceway as close to structure as possible.

3. Complete installation of electrical raceways before starting installation of conductors within raceways.

4. Provide supports for raceways as specified elsewhere in Division 16.

5. Prevent foreign matter from entering raceways by using temporary closure protection.

6. Make bends and offsets so the inside diameter is not effectively reduced. Unless otherwise indicated, keep the legs of a bend in the same plane and the straight legs of offsets parallel. Bends in conduit larger than 1-1/4” shall be factory-made elbows unless otherwise specifically approved. Bends in 1-1/4” and 1” runs shall be made in an approved bending machine or factory made. Hickey bends will not be permitted in conduits larger than 3/4”.

7. Use raceway fittings that are types compatible with the associated raceway and suitable for the use and location. Install expansion fittings across all structural construction joints and expansion/deflection couplings across all structural expansion joints and in every 200 foot of linear conduit run. A flexible bonding jumper at least three-times the nominal width of the joint shall be installed.

8. Run raceways parallel and perpendicular to building elements and other equipment with a minimum of bends in the shortest practical distance considering the type of building construction and obstructions except as otherwise indicated.

9. Install exposed raceways parallel and perpendicular to nearby surfaces or structural members and follow the surface contours as much as practical.

10. Run exposed and parallel raceways together. Make bends in parallel runs from the same center line so that the bends are parallel. Factory elbows may be used only where they can be installed parallel. In other cases provide field bends for parallel raceways.
11. Make raceway joints tight. Where joints cannot be made tight, use bonding jumpers to provide electrical continuity of the raceway system. Make raceway terminations tight. Where terminations are subject to vibration, use bonding bushings or wedges to assure electrical continuity. Where subject to vibration or dampness, use insulating bushings to protect conductors.

12. Tighten set screws of threadless fittings with suitable tool.

13. Terminiations: Where raceways are terminated with locknuts and bushings, align the raceway to enter squarely and install the locknuts with dished part against the box. EMT shall be secured with one locknut and shall have nylon insulated throats or threaded nylon bushings from 1/2" to 1". 1-1/4" and above shall be metal with nylon insulated throats.

14. Where terminating in threaded hubs, screw the raceway or fitting tight into the hub so the end bears against the wire protection shoulder. Where chase nipples are used, align the raceway so the coupling is square to the box, and tighten the chase nipple so no threads are exposed.

15. Provide nylon pull string with printed footage indicators having not less than 200 pounds tensile strength. Leave not less than 12 inches of slack at each end of the pull string. Identify with tags at each end the origin and destination of each empty conduit and indicate same on all empty or spare conduits on the record drawings.

16. Install raceway sealing fittings in accordance with the manufacturer's written instructions. Locate fittings at suitable, approved, accessible locations and fill them with UL-listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings at the following points and elsewhere as indicated:

   a. Where required by the NEC.

17. Flexible Connections: Use short length (maximum of 6 ft.) of flexible conduit for recessed and semi-recessed lighting fixtures, (maximum of 3 ft.) for equipment subject to vibration, noise transmission, or movement; and for all motors. Install separate ground conductor across flexible connections.

18. Where conduits are to be installed through structural framing members, the Contractor shall provide sleeves. The Architect/Engineer's written approval must be obtained prior to cutting, notching or drilling of structural framing members.

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

20. Conduits shall not cross pipe shafts or ventilation duct openings. Where conduits must penetrate air-tight spaces or plenums, seal around the conduit with a mastic acceptable to the Architect/Engineer.

21. Install an insulated ground conductor in all conduits.

22. Where individual conduits penetrate existing fire-rated walls and floors, pack void around conduit with fire rated insulation and seal opening around conduit with UL listed forma silicone elastomer compound. Conduits on trapeze type support system shall require fire taping only.
23. Provide separate raceway systems for each of the following:
   a. Lighting
   b. Power Distribution
   c. Communications and Data
   d. Emergency
      1) Lighting
      2) Power Distribution
         a) Equipment branch
   e. Fire Alarm
   f. HVAC Control

3.4 INSTALLATION OF SURFACE RACEWAYS:

A. Surface Raceways: Mechanically assemble metal enclosures and raceways to form continuous electrical conductor and connect to electrical boxes, fittings and cabinets as to provide effective electrical continuity and rigid mechanical assembly.

1. Where practicable, avoid use of dissimilar metals throughout system to eliminate possibility of electrolysis. Where dissimilar metals are in contact, coat all surfaces with corrosion inhibiting compound before assembling.

2. Install expansion fittings in all raceways wherever structural expansion joints are crossed.

3. Make changes in direction of raceway run with proper fittings, supplied by raceway manufacturer. Field bends of raceway sections are not permitted.

4. Properly support and anchor raceways for their entire length by structural materials. Raceways are not to span any space unsupported.

5. Use boxes as supplied by raceway manufacturer wherever junction, pull or device boxes are required. Standard electrical "handy" boxes, etc., are not permitted for use with surface raceway installations.

6. Install an insulated grounding conductor in all wireways and surface raceways. Bond grounding conductor to all wireways and surface raceways.

7. Surface raceways are acceptable only where specifically indicated on the drawings. The proposed use of surface raceways shall be submitted for review by the Engineer prior to installation.

3.5 ADJUSTING AND CLEANING:

A. Upon completion of installation of raceways, inspect interiors of raceways; clear all blockages and remove burrs, dirt and construction debris.
PART 1 - GENERAL

1.1 SUMMARY:
A. This section includes wires, cables, and connectors for power, lighting, signal, control, and related systems rated 600 volts and less.

1.2 QUALITY ASSURANCE:
A. Manufacturers: Firms regularly engaged in manufacture of electrical wire and cable products of types, sizes, and ratings required, whose products have been in satisfactory use in similar service for not less than 5 years.
B. Installer’s Qualifications: Firm with at least 3 years of successful installation experience with projects utilizing electrical wiring and cabling work similar to that required for this project.
C. Conform to applicable code regulations regarding toxicity of combustion products of insulating materials.

1.3 DELIVERY, STORAGE, AND HANDLING:
A. Deliver wire and cable properly packaged in factory-fabricated type containers, or wound on NEMA-specified type wire and cable reels.
B. Store wire and cable in clean dry space in original containers. Protect products from weather, damaging fumes, construction debris and traffic.
C. Handle wire and cable carefully to avoid abrading, puncturing and tearing wire and cable insulation and sheathing. Ensure that dielectric resistance integrity of wires/cables is maintained.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS:
A. Manufacturers: Subject to compliance with requirements, provide products by the following (for each type of wire, cable, and connector):

1. Wire and Cable:
   a. Triangle - PWC
   b. American Insulated Wire
   c. Anaconda-Ericsson Inc; Wire and Cable Div.
   d. Belden Div; Cooper Industries.
   e. Brand-Rex Div; Pyle National Co.
   f. General Cable Corporation.
   g. Hitemp Wires, Inc.
   h. Phelps Dodge Cable and Wire Co.
   i. Rome Cable Corp.
   j. Southwire Company

2. Connectors:
   a. O-Z/Gedney Co.
2.2 WIRES AND CABLES:

A. General: Provide wire and cable suitable for the temperature, conditions, and location where installed. Building wire shall be insulated with THW/THHN/THWN/RH/RHW/RHH/XHHW insulation, rated 600 volt.

B. Conductors: Provide solid conductors for power and lighting circuits 12 AWG and smaller. Provide stranded conductors for 10 AWG and larger.

C. Conductor Material: Provide copper for all wires and cables.

2.3 CONNECTORS:

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

PART 3 - EXECUTION

3.1 WIRE AND CABLE INSTALLATION SCHEDULE:

A. Building Wire: Install all building wire in raceway regardless of location.

3.2 INSTALLATION OF WIRES AND CABLES:

A. General: Install electrical cables, wires and connectors in compliance with applicable requirements of NEC, NEMA, UL, and NECA’s "Standard of Installation", and in accordance with recognized industry practices.

B. Coordinate wire/cable installation work, including electrical raceway and equipment connection work, with other work.

C. Pull conductors simultaneously where more than one is being installed in same raceway. Use pulling compound or lubricant, where necessary; compound used must not deteriorate conductor or insulation. Conduits shall be swabbed clean before wire is pulled.

D. Use pulling means including, fish tape, cable, rope and basket weave wire/cable grips which will not damage cables or raceway. Do not use rope hitches for pulling attachment to wire or cable.

E. Keep conductor splices to minimum. Splice only in accessible junction boxes. No splices are allowed in feeder, control or fire alarm wiring. Connect unspliced wire to numbered terminal strips at each end.

F. Install splices and taps which possess equivalent or better mechanical strength and insulation ratings than conductors being spliced.

G. Use splice and tap connectors which are compatible with conductor material.
H. Tighten electrical connectors and terminals, including screws and bolts, in accordance with manufacturer’s published torque tightening values. Where manufacturer’s torquing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL Std 486A for copper and 486B for aluminum.

I. Provide adequate length of conductors within electrical enclosures and train the conductors to terminal points with no excess. Bundle multiple conductors, with conductors larger than No. 10 AWG cabled to individual circuits. Make terminations so there is no bare conductor at the terminal.

J. Use solderless pressure connectors with insulating covers for copper wire splices and taps, 8 AWG and larger. For 10 AWG and smaller, use insulated spring wire connectors with plastic caps.

K. Use copper compression connectors for copper wire splices and taps, 1/0 AWG and larger. Tape uninsulated conductors and connectors with electrical tape to 150 percent of the insulation value of the conductor.

L. Make splices, taps and terminations to carry full ampacity of conductors without perceptible temperature rise.

M. Thoroughly tape the ends of spare conductors in boxes and cabinets.

N. Install exposed cable, parallel and perpendicular to surfaces, or exposed structural members, and follow surface contours, where possible.

O. Make all ground, neutral and line connections to receptacle and wiring device terminals as recommended by manufacturer. Provide ground jumper from outlet box to individual ground terminal of devices.

P. Branch circuits whose length from panel to first outlet exceeds 75 feet for 120 volt circuits shall be #10 or larger, as required to comply with the National Electrical Code.

Q. Parallel conductors shall be cut to the same length.

R. All splices in control panels, terminal junction boxes, low voltage control circuits and fire alarm conductors shall be on numbered terminal strip.

S. Each branch circuit serving receptacles or multi-outlet assemblies shall be furnished with a dedicated neutral conductor. Neutrals common to more than one circuit shall only be permitted for non-receptacle circuits and where specifically noted.

T. At least 6" of free conductor shall be left at each outlet, junction box and switch for splices or connection of fixtures and devices.

U. In a multi-wire branch circuit where a circuit extends through a receptacle, all conductors shall be pigtailed so downstream load does not go through receptacles.

3.3 FIELD QUALITY CONTROL:

A. Prior to energization of circuitry, check installed wires and cables with megohm meter to determine insulation resistance levels to ensure requirements are fulfilled. The megger values obtained shall be compared to the minimum values listed in NETA. All phase conductors and cables shall be meggered after installation, and prior to termination.
B. Prior to energization, test wires and cables for electrical continuity and for short-circuits.

C. Subsequent to wire and cable hook-ups, energize circuitry and demonstrate functioning in accordance with requirements. Where necessary, correct malfunctioning units, and then retest to demonstrate compliance.

3.4 COLOR CODING SCHEDULE:

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

<table>
<thead>
<tr>
<th>120/208 Volts</th>
<th>Phase</th>
<th>277/480 Volts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black</td>
<td>A</td>
<td>Brown</td>
</tr>
<tr>
<td>Red</td>
<td>B</td>
<td>Orange</td>
</tr>
<tr>
<td>Blue</td>
<td>C</td>
<td>Yellow</td>
</tr>
<tr>
<td>White</td>
<td>Neutral</td>
<td>Gray</td>
</tr>
<tr>
<td>Green</td>
<td>Ground</td>
<td>Green</td>
</tr>
</tbody>
</table>

B. Conductors 10 AWG and smaller shall be solid color for entire length.

C. Conductors 8 AWG and larger shall be black with color coding at each termination and in each box or enclosure. for a distance of 6 inches use half-lapped 3/4” plastic tape in the specified color. Do not cover cable identification markings. Adjust tape locations to prevent covering of markings.

END OF SECTION 16120
PART 1 - GENERAL

1.1 SUMMARY:

A. This section includes cabinets, boxes, and fittings for electrical installations and certain types of electrical fittings not covered in other sections. Types of products specified in this Section include:

1. Outlet and device boxes.
2. Pull and junction boxes.
3. Floor boxes and service fittings.
5. Hinged door enclosures.

B. Conduit-body-type electrical enclosures and wiring fittings are specified in the Division 16 Section on Raceways.

1.2 DEFINITIONS:

A. Cabinets: An enclosure designed either for surface or for flush mounting and having a frame, or trim in which a door or doors may be mounted.

B. Device Box: An outlet box designed to house a receptacle device or a wiring box designed to house a switch.

C. Enclosure: A box, case, cabinet, or housing for electrical wiring or components.

D. Hinged Door Enclosure: An enclosure designed for surface mounting and having swinging doors or covers secured directly to and telescoping with the walls of the box.

E. Outlet Box: A wiring enclosure where current is taken from a wiring system to supply utilization equipment.

F. Wiring Box: An enclosure designed to provide access to wiring systems or for the mounting of indicating devices or of switches for controlling electrical circuits.

1.3 SUBMITTALS:

A. Submit product data for cabinets and enclosures with classification higher than NEMA 1.

B. Shop drawings for floor boxes and boxes, enclosures and cabinets that are to be shop fabricated, (nonstock items). For shop fabricated junction and pull boxes, show accurately scaled views and spatial relationships to adjacent equipment. Show box types, dimensions, and finishes.

PART 2 - PRODUCTS

2.1 MANUFACTURERS:

A. Manufacturers: Subject to compliance with requirements, provide products by the following:
1. Cabinets:
   b. Erickson Electrical Equipment Co.
   c. Electric Panelboard, Inc.
   e. Spring City Electrical Mfg. Co.
   f. Square D Co.
   g. Circle AW

2.2 CABINETS, BOXES, AND FITTINGS, GENERAL:

   A. Electrical Cabinets, Boxes, and Fittings: Of indicated types, sizes, and NEMA enclosure classes. Where not indicated, provide units of types, sizes, and classes appropriate for the use and location. Provide all items complete with covers and accessories required for the intended use. Provide gaskets for units in damp or wet locations. Cabinets over 12" in any dimension shall also have 1/4 turn latches.

2.3 MATERIALS AND FINISHES:

   A. Sheet Steel: Flat-rolled, code-gage, galvanized steel.
   B. Fasteners for General Use: Corrosion resistant screws and hardware including cadmium and zinc plated items.
   C. Fasteners for Damp or Wet Locations: Stainless steel screws and hardware.
   D. Cast Metal for Boxes, Enclosures, and Covers; Copper-free aluminum except as otherwise specified.
   E. Painted Interior Finish: Where indicated, white baked enamel. Emergency system cabinets and boxes shall be red.
   F. Fittings for Boxes, Cabinets, and Enclosures: Conform to UL 514B. Malleable iron or zinc plated steel for conduit hubs, bushings and box connecters.

2.4 METAL OUTLET, DEVICE, AND SMALL WIRING BOXES:

   A. General: Conform to UL 514A, "Metallic Outlet Boxes, Electrical," and UL 514B, "Fittings for Conduit and Outlet Boxes." Boxes shall be of type, shape, size, and depth to suit each location and application.
   B. Steel Boxes: Conform to NEMA OS 1, "Sheet Steel Outlet Boxes, Device Boxes, Covers, and Box Supports." Boxes shall be sheet steel with stamped knockouts, threaded screw holes and accessories suitable for each location including mounting brackets and straps, cable clamps, exterior rings and fixture studs. Minimum size box shall be 4" square by 2" deep with plaster ring. Gang boxes for number of outlets or switches shown.

2.5 PULL AND JUNCTION BOXES:

   A. General: Comply with UL 50, "Electrical Cabinets and Boxes", for boxes over 100 cubic inches volume. Boxes shall have screwed or bolted on covers of material same as box and shall be of size and shape to suit application.
2.6 CABINETS:

A. Comply with UL 50, "Electrical Cabinets and Boxes."

B. Construction: Sheet steel, NEMA 1 class except as otherwise indicated. Cabinet shall consist of a box and a front consisting of a one piece frame and a hinged door. Arrange door to close against a rabbet placed all around the inside edge of the frame, with a uniformly close fit between door and frame. Provide concealed fasteners, not over 24-inches apart, to hold fronts to cabinet boxes and provide for adjustment. Provide flush or concealed door hinges not over 24-inches apart and not over 6-inches from top and bottom of door. For flush cabinets, make the front approximately 3/4 inch larger than the box all around. For surface mounted cabinets make front same height and width as box. For television, telephone and other communication cabinets provide 3/4” thick plywood backboard painted matte white.

C. Doors: Double doors for cabinets wider than 24-inches. Telephone cabinets wider than 48-inches may have sliding or removable doors.

D. Locks: Combination spring catch and key lock, with all locks for cabinets of the same system keyed alike. Locks may be omitted on signal, power, and lighting cabinets located within wire closets and mechanical-electrical rooms. Locks shall be of a type to permit doors to latch closed without locking.

2.7 STEEL ENCLOSURES WITH HINGED DOORS:

A. Comply with UL 50, "Cabinets and Enclosures" and NEMA ICS 6, "Enclosures for Industrial Controls and Systems."

B. Construction: Sheet steel, 16 gage, minimum, with continuous welded seams. NEMA class as indicated; arranged for surface mounting.

C. Doors: Hinged directly to cabinet and removable, with approximately 3/4-inch flange around all edges, shaped to cover edge of box. Provide handle operated, key locking latch. Individual door width shall be no greater than 24-inches. Provide multiple doors where required.

D. Mounting Panel: Provide painted removable internal mounting panel for component installation.

E. Enclosure: NEMA 1 except as indicated. Where door gasketing is required, provide neoprene gasket attached with oil-resistant adhesive, and held in place with steel retaining strips. For all enclosures of class higher than NEMA 1, use hubbed raceway entrances.

3. PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL:
A. Locations: Install items where indicated and where required to suit code requirements and installation conditions.

B. Cap unused knockout holes where blanks have been removed and plug unused conduit hubs.

C. Support and fasten items securely in accordance with Division 16 Section on Supporting Devices.

D. Sizes shall be adequate to meet NEC volume requirements, but in no case smaller than sizes indicated.

E. Remove sharp edges where they may come in contact with wiring or personnel.

F. Provide blank cover plates on unused boxes.

3.2 APPLICATIONS:

A. Cabinets: Flush mounted, NEMA enclosure type 1 except as otherwise indicated.

B. Hinged Door Enclosures Indoor: NEMA type 1 enclosure except as indicated.

C. Outlet Boxes and Fittings: Install outlet and device boxes and associated covers and fittings of materials and NEMA types suitable for each location and in conformance with the following requirements:

1. Interior Dry Locations: Sheet steel, NEMA Type 1.

2. Locations Exposed to Weather or Dampness: Cast metal, NEMA type 3R.

3. Wet Locations: NEMA Type 4 enclosures.

D. Pull and Junction Boxes: Install pull and junction boxes of materials and NEMA types suitable for each location except as otherwise indicated.

3.3 INSTALLATION OF OUTLET BOXES:

A. Outlets at Windows and Doors: Locate close to window trim. For outlets indicated above doors center outlets above the door opening except as otherwise indicated.

B. Locations in Special Finish Materials: For outlet boxes for receptacles and switches mounted in desks or furniture cabinets or in glazed tile, concrete block, marble, brick, stone or wood walls, use rectangular shaped boxes with square corners and straight sides. Install such boxes without plaster rings. Saw cut all recesses for outlet boxes in exposed masonry walls.

C. Gasketed Boxes: At the following locations use malleable or cast metal, threaded hub type boxes with gasketed weatherproof covers:

1. Exterior locations.

2. Where surface mounted on unfinished walls, columns or pilasters. (Cover gaskets may be omitted in dry locations).

3. Where exposed to moisture laden atmosphere.

4. At food preparation equipment within four ft. of steam connections.

5. Where indicated.
D. Mounting: Mount outlet boxes for switches with the long axis vertical or as indicated. Mount boxes for receptacles vertically, except above counter receptacles to be mounted horizontally. Three or more gang boxes shall be mounted with the long axis horizontal. Locate box covers or device plates so they will not span different types of building finishes either vertically or horizontally. Locate boxes for switches near doors on the side opposite the hinges and close to door trim, even though electrical floor plans may show them on hinge side. Provide far side box supports for electrical boxes installed on metal studs.

E. Cover Plates for Surface Boxes: Use plates sized to box front without overlap.

F. Protect outlet boxes to prevent entrance of plaster, and debris. Thoroughly clean foreign material from boxes before conductors are installed.

G. Extension rings are prohibited on new construction.

H. Existing Outlet Boxes: One extension ring is permitted on remodel work to extend existing installations. Where more than one box is needed to flush out installation, provide a large (i.e. 6”x6”) box to flush out the existing box and nipple over to a new box.

I. Existing Outlet Boxes: Where extension rings are required to be installed, drill new mounting holes in the rings to align with the mounting holes on the existing boxes where existing holes are not aligned.

J. Back to back outlet boxes are not permitted. Separate boxes a minimum of 6” in standard walls and 24” in acoustical walls.

3.4 INSTALLATION OF PULL AND JUNCTION BOXES:

A. Box Selection: For boxes in main feeder conduit runs, use sizes not smaller than 8-inches square by 4-inches deep. Do not exceed 6 entering and 6 leaving raceways in a single box. Quantities of conductors (including equipment grounding conductors) in pull or junction box shall not exceed the following:

<table>
<thead>
<tr>
<th>Size of Largest Conductors in Box</th>
<th>Maximum no. of Conductors in Box</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. 4/0 AWG</td>
<td>30</td>
</tr>
<tr>
<td>250 MCM</td>
<td>20</td>
</tr>
<tr>
<td>500 MCM</td>
<td>15</td>
</tr>
<tr>
<td>Over 500 MCM</td>
<td>10</td>
</tr>
</tbody>
</table>

B. Cable Supports: Install clamps, grids, or devices to which cables may be secured. Arrange cables so they may be readily identified. Support cable at least every 30-inches inside boxes.

C. Mount pull boxes in inaccessible ceilings with the covers flush with the finished ceiling.

D. Size: Provide pull and junction boxes for telephone, signal, and other systems at least 50 percent larger than would be required by Article 370 of NEC, or as indicated. Locate boxes strategically and provide shapes to permit easy pulling of future wires or cables of types normal for such systems.
3.5 INSTALLATION OF CABINETS AND HINGED DOOR ENCLOSURES:

A. Mount with fronts straight and plumb.
B. Install with tops 78-inches above floor.
C. Set cabinets in finished spaces flush with walls.
D. Provide protective pocket inside front cover with schematic diagram, connection diagram and layout drawing of control wiring and components within enclosure.
E. Provide recessed cabinets in all finished areas.

3.6 GROUNDING:

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

3.7 CLEANING AND FINISH REPAIR:

A. Upon completion of installation, inspect components. Remove burrs, dirt, and construction debris and repair damaged finish including chips, scratches, abrasions and weld marks.
B. Galvanized Finish: Repair damage using a zinc-rich paint recommended by the tray manufacturer.
C. Painted Finish: Repair damage using matching corrosion inhibiting touch-up coating. Pull and junction box covers shall be painted as follows:

1. Fire Alarm Red
2. Emergency Yellow
3. Telephone Green
4. Television Violet
5. Computer/Data Blue
6. 277/480V Systems Orange
PART 1 - GENERAL

1.1 SUMMARY:

A. Extent of electrical connections for equipment is indicated by drawings and schedules. Electrical connections are hereby defined to include connections used for providing electrical power to equipment.

B. Applications of electrical power connections specified in this section include the following:
   1. To lighting equipment.
   2. Other connections as shown.

1.2 QUALITY ASSURANCE:

A. Manufacturers: Firms regularly engaged in manufacture of electrical connectors and terminals, of types and ratings required, and ancillary connection materials, including electrical insulating tape, soldering fluxes, and cable ties, whose products have been in satisfactory use in similar service for not less than 5 years.

B. Installer's Qualifications: Firms with at least 2 years of successful installation experience with projects utilizing electrical connections for equipment similar to that required for this project.

1.3 DEFINITIONS:

A. Load voltage wiring shall be defined as:
   Conduit and wiring required to carry power to motors and other equipment or devices. Wiring from control devices to equipment that carry power to drive that equipment such as line voltage thermostats, etc., shall be included as load voltage wiring. Wiring that provides power to control panels, control transformers, control relays, time clocks, etc., shall also be included as load voltage wiring.

1.4 DELIVERY, STORAGE, AND HANDLING:

A. Deliver electrical connection products wrapped in proper factory-fabricated type containers.

B. Store electrical connection products in original cartons and protect from weather, construction traffic and debris.

C. Handle electrical connection products carefully to prevent breakage, denting, and scoring finish.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS:

A. Manufacturer: Subject to compliance with requirements, provide circuit and motor disconnects by one of the following:
   1. Square D Company
   2. Cutler-Hammer Inc.
ELECTRICAL CONNECTIONS FOR EQUIPMENT

SECTION 16142

2.2 GENERAL:

A. Overcurrent Protective Devices (OCPDs): Provide type, rating, and features as indicated. Comply with Division 16 Section on Overcurrent Protective Devices, with OCPDs adapted to equipment connection installation. Tandem circuit breakers shall not be used. Multiple breakers shall have common trip.

2.3 MATERIALS AND COMPONENTS:

A. General: For each electrical connection indicated, provide complete assembly of materials, including but not necessarily limited to, pressure connectors, terminals (lugs), electrical insulating tape, electrical solder, electrical soldering flux, heat-shrinkable insulating tubing, cable ties, solderless wire-nuts, disconnect, starter, contactor, relays, etc., and other items and accessories as needed to complete splices and terminations of types indicated.

B. Metal Conduit, Tubing and Fittings:

1. General: Provide metal conduit, tubing and fittings of types, grades, sizes and weights (wall thicknesses) indicated for each type service. Provide products complying with Division-16 section on Raceways.

C. Wires, Cables, and Connectors:

1. General: Provide wires, cables, and connectors complying with Division-16 section on Wires and Cables.

2. Wires/Cables: Unless otherwise indicated, provide wires/cables (conductors) for electrical connections which match, including sizes, ratings, and material of wires/cables which are supplying electrical power.

3. Connectors and Terminals: Provide electrical connectors and terminals which mate and match, including sizes and ratings, with equipment terminals and are recommended by equipment manufacturer for intended applications.

4. Electrical Connection Accessories: Provide electrical insulating tape, heat-shrinkable insulating tubing and boots, electrical solder, electrical soldering flux, wirenuts and cable ties as recommended for use by accessories manufacturers for type services indicated.

PART 3 - EXECUTION

3.1 INSPECTION:

A. Inspect area and conditions under which electrical connections for equipment are to be installed and notify Contractor in writing of conditions detrimental to proper completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to Installer.

3.2 INSTALLATION OF ELECTRICAL CONNECTIONS:

A. Furnish, set in place, and wire (except as may be otherwise indicated) all heating, ventilating, air conditioning, plumbing and fire protection, elevator, etc., motors and controls in accordance with the
following schedule and in accordance with equipment manufacturer's written instructions and with recognized industry practices, and complying with applicable requirements of UL, NEC and NECA's "Standard of Installation" to ensure that products fulfill requirements. Carefully coordinate with work performed under the Mechanical Division of these Specifications.

B. Coordinate with other work, including wires/cables, raceway and equipment installation, as necessary to properly interface installation of electrical connections for equipment with other work.

C. Connect electrical power supply conductors to equipment conductors in accordance with equipment manufacturer's written instructions and wiring diagrams. Mate and match conductors of electrical connections for proper interface between electrical power supplies and installed equipment.

D. Maintain existing electrical service and feeders to equipment serving occupied areas and operational facilities, unless otherwise indicated, or when authorized otherwise in writing by Owner, or Architect/Engineer. Provide temporary service during interruptions to existing facilities. When necessary, schedule momentary outages for replacing existing wiring systems with new wiring systems. When that "cutting-over" has been successfully accomplished, remove, relocate, or abandon existing wiring as indicated.

E. Cover splices with electrical insulating material equivalent to, or of greater insulation resistivity rating, than electrical insulation rating of those conductors being spliced.

F. Prepare cables and wires, by cutting and stripping covering armor, jacket, and insulation properly to ensure uniform and neat appearance where cables and wires are terminated. Exercise care to avoid cutting through tapes which will remain on conductors. Also avoid "ringing" copper conductors while skinning wire.

G. Trim cables and wires as short as practicable and arrange routing to facilitate inspection, testing and maintenance.

H. Tighten connectors and terminals, including screws and bolts, in accordance with equipment manufacturers published torque tightening values for equipment connectors. Accomplish tightening by utilizing proper torquing tools, including torque screwdriver, beam-type torque wrench, and ratchet wrench with adjustable torque settings. Where manufacturer's torquing requirements are not available, tighten connectors and terminals to comply with torquing values contained in UL’s 486A.

3.3 FIELD QUALITY CONTROL:

A. Upon completion of installation of electrical connections, and after circuitry has been energized with rated power source, test connections to demonstrate capability and compliance with requirements. Ensure that direction of rotation of each motor fulfills requirement. Correct malfunctioning units at site, then retest to demonstrate compliance.

END OF SECTION 16142
PART 1 - GENERAL

1.1 SUMMARY:

A. The extent of wiring device work is indicated by drawings and schedules. Wiring devices are defined as single discrete units of electrical distribution systems which are intended to carry but not utilize electric energy.

B. Types of electrical wiring devices in this section include the following:
   1. Receptacles.
   2. Switches.
   3. Wallplates.

1.2 QUALITY ASSURANCE:

A. Manufacturers: Firms regularly engaged in manufacture of electrical wiring devices, of types, sizes, and ratings required, whose products have been in satisfactory use in similar service for not less than 3 years.

B. Installer's Qualifications: Firm with at least 2 years of successful installation experience on projects utilizing wiring devices similar to those required for this project.

C. Listing and Labeling: Provide products that are listed and labeled for their applications and installation conditions and for the environments in which installed.

   1. The Terms "Listed" and "Labeled": As defined in the "National Electrical Code", Article 100.
   2. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" (NRTL) as defined in OSHA Regulation 1910.7.

1.3 SUBMITTALS:

A. Product Data: Submit manufacturer's data on electrical wiring devices.

B. Operation and maintenance data for materials and products specified in this Section to include in the "Operating and Maintenance Manual" specified in Division 1.

1.4 COORDINATION:

A. Wiring Devices for Owner Furnished Equipment: Match devices to plug connectors for Owner-furnished equipment.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS:

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

   1. Devices:
      a. Harvey Hubbell Inc.
      b. Leviton Mfg Co.
2.2 WIRING DEVICES:

A. Receptacles:

1. All duplex, single, and special receptacles shall be heavy duty, specification grade listed by Underwriter's Laboratories, and have a metal mounting strap with self-grounding and have a hex-head green grounding screw and be side and back wired. Each device shall bear the UL/FS (W-C-596E) Label.

2. Convenience Receptacle Configuration: NEMA WD 1; Type 5-20R, specification grade with ivory nylon face. All receptacles connected to emergency circuits shall have a red face. Color selection shall be verified with Architect/Engineer prior to ordering. Dedicated outlets shall be gray.

3. Specific-use Receptacle Configuration: NEMA WD 1 straight blade OR WD 5 locking; as indicated on drawings, black face.

4. Receptacles shall be in accordance with the following schedule, where indicated on drawings:

<table>
<thead>
<tr>
<th>Device Type</th>
<th>Hubbell Catalog No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duplex receptacle, 20A, 125V</td>
<td>5362</td>
</tr>
<tr>
<td>Duplex receptacle, 20A, 125V, Isolated Ground</td>
<td>IG-5362</td>
</tr>
<tr>
<td>Duplex receptacle, 20A, 125V, Ground Fault</td>
<td>GF-5362</td>
</tr>
<tr>
<td>Single receptacle, 50A, 250V, Locking</td>
<td>CS-6370</td>
</tr>
<tr>
<td>Single receptacle, 15A, 125V</td>
<td>5262</td>
</tr>
<tr>
<td>Single receptacle, 30A, 125V, Ground Fault</td>
<td>IG-9308</td>
</tr>
<tr>
<td>Single receptacle, 20A, 125V</td>
<td>5361</td>
</tr>
<tr>
<td>Single receptacle, 60A, 250V</td>
<td>9460</td>
</tr>
<tr>
<td>Single receptacle, 30A, 125V</td>
<td>9308</td>
</tr>
<tr>
<td>Single receptacle, 30A, 125/250V</td>
<td>9430</td>
</tr>
<tr>
<td>Single receptacle, 30A, 250V</td>
<td>9330</td>
</tr>
<tr>
<td>Single receptacle, 50A, 250V</td>
<td>9367</td>
</tr>
<tr>
<td>Single receptacle, 50A, 125/250V</td>
<td>9450</td>
</tr>
</tbody>
</table>

B. Switches:

1. Wall Switches for Lighting Circuits: NEMA WD1; FS W-S-896E; AC quiet type specification grade listed by Underwriter's Laboratories with toggle handle, rated 20 amperes at 120-277 volts AC, unless noted otherwise. Mounting straps shall be metal and be equipped with a green hex-head ground screw. Each switch shall bear the UL/FS Label.

2. Handle: Ivory for normal power circuits, red for emergency power circuits. Verify color with Architect/Engineer prior to ordering.

3. Switches shall have color coded bodies as follows: 20A – Red; 30A – Green

4. Switches shall be in accordance with the following schedule, where indicated on drawings:
Device Type          Hubbell Catalog No.
Single pole switch         1221
Single pole switch with pilot light (120V - load on)   1221-PLC
2-pole switch          1222
3-way switch          1223
4-way switch          1224
3-position switch (momentary contact)     1557
4-position switch (momentary contact)     1557-L
Single pole switch (locking)       1221-L
2-pole switch (locking)        1222-L
3-way switch (locking)        1223-L
4-way switch (locking)        1224-L
Single pole switch with pilot light (277V – load on)   1222-PL7
3-position switch (maintained contact)     1385
3-position switch (maintained contact)     1385-L

2.3 WIRING DEVICE ACCESSORIES:
A. Wallplates: Provide wallplates for single and combination wiring devices, of types, sizes, and with ganging and cutouts as indicated. Select plates which mate and match wiring devices to which attached. Construct with metal screws for securing plates to devices; screw heads colored to match finish of plates. Identify all wall plates used for receptacles with branch circuit number per requirements of section on Electrical Identification. Provide blank wall plates for all cable, data, telephone and junction and outlet boxes. Where cables are routed through the wallplate, provide grommets in wallplate openings to protect cables. Provide plates possessing the following additional construction features:

1. Material and Finish:
   a. Smooth Metal: 0.04" thick, type 302 satin finished stainless steel.

PART 3 - EXECUTION

3.1 INSTALLATION OF WIRING DEVICES:
A. Install wiring devices as indicated, in accordance with manufacturer's written instructions, applicable requirements of NEC and in accordance with recognized industry practices to fulfill project requirements.
B. Coordinate with other work, including painting, electrical boxes and wiring work, as necessary to interface installation of wiring devices with other work.
C. Install wiring devices only in electrical boxes which are clean; free from excess building materials, dirt, and debris.
D. Install wiring devices after wiring work is completed.
E. Install wallplates after painting work is completed.
F. Tighten connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque tightening values for wiring devices. Where manufacturer's torquing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL Stds 486A.
G. Provide GFCI type outlets for each above counter duplex receptacle shown within 6'-0" of sinks/lavatories. For above counter multi-outlet assemblies which do not contain duplex receptacles that can be replaced with GFCI devices, provide GFI circuit breakers on the branch circuit(s) feeding the assembly.

H. Provide circuit and panelboard identification on the outside of all wall plates with electronic label maker.

3.2 PROTECTION OF WALLPLATES AND RECEPTACLES:

A. Upon installation of wallplates and receptacles, advise Contractor regarding proper and cautious use of convenience outlets. At time of Substantial Completion, replace those items which have been damaged, including those burned and scored by faulty plugs.

3.3 GROUNDING:

A. Provide equipment grounding connections for wiring devices, unless otherwise indicated. Tighten connections to comply with tightening torques specified in UL Std 486A to assure permanent and effective grounds.

3.4 CLEANING:

A. Internally clean devices, device outlet boxes and enclosures. Replace stained or improperly painted wall plates or devices.

3.5 TESTING:

A. Prior to energizing circuitry, test wiring for electrical continuity, and for short-circuits. Ensure proper polarity of connections is maintained. Subsequent to energization, test wiring devices to demonstrate compliance with requirements. Operate each operable device at least six (6) times.

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

C. Replace damaged or defective components.

END OF SECTION 16143
PART 1 - GENERAL

1.1 SUMMARY:

A. This Section includes secure support from the building structure for electrical items by means of hangers, supports, anchors, sleeves, inserts, seals, and associated fastenings.

1.2 SUBMITTALS:

A. Product data for each type of product specified.
   1. Hanger and support schedule showing manufacturer’s figure number, size, spacing, features, and application for each required type of hanger, support, sleeve, seal, and fastener to be used.

PART 2 - PRODUCTS

2.1 MANUFACTURERS:

A. Manufacturers: Subject to compliance with requirements, provide products by the following:
   1. Slotted Metal Angle and U-Channel Systems:
      a. Allied Tube & Conduit
      b. B-Line Systems, Inc.
      c. GS Metals Corp.
      d. Unistrut Diversified Products
   2. Conduit Sealing Bushings:
      a. O-Z/Gedney
      b. Cooper Industries, Inc.
      c. GS Metals Corp.
      e. Madison Equipment Co.
      f. Raco, Inc.
      g. Spring City Electrical Mfg. Co.
      h. Thomas & Betts Corp.

2.2 COATINGS:

A. Coating: Supports, support hardware, and fasteners shall be protected with zinc coating or with treatment of equivalent corrosion resistance using approved alternative treatment, finish, or inherent material characteristic. Products for use outdoors shall be hot-dip galvanized.

2.3 MANUFACTURED SUPPORTING DEVICES:

A. Raceway Supports: Clevis hangers, riser clamps, conduit straps, threaded C-clamps with retainers, ceiling trapeze hangers, wall brackets, and spring steel clamps.

B. Fasteners: Types, materials, and construction features as follows:
   1. Expansion Anchors: Carbon steel wedge or sleeve type.
2. Toggle Bolts: All steel springhead type.


C. Conduit Sealing Bushings: Factory-fabricated watertight conduit sealing bushing assemblies suitable for sealing around conduit, or tubing passing through concrete floors and walls. Construct seals with steel sleeve, malleable iron body, neoprene sealing grommets or rings, metal pressure rings, pressure clamps, and cap screws.

D. Cable Supports for Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug for non-armored electrical cables in riser conduits. Provide plugs with number and size of conductor gripping holes as required to suit individual risers. Construct body of malleable-iron casting with hot-dip galvanized finish.

E. U-Channel Systems: 12-gage steel channels, with 9/16-inch-diameter holes, at a minimum of 8 inches on center, in top surface. Provide fittings and accessories that mate and match with U-channel and are of the same manufacture.

F. Supports: Provide supporting devices of types, sizes and materials indicated; and having the following construction features:

1. One-Hole Conduit Straps: For supporting 3/4" and smaller rigid metal conduit; galvanized steel.

2. Two-Hole Conduit Straps: For supporting 1" and larger rigid metal conduit, galvanized steel; 3/4" strap width; and 2-1/8" between center of screw holes.

2.4 FABRICATED SUPPORTING DEVICES:

A. General: Shop- or field-fabricated supports or manufactured supports assembled from U-channel components.

B. Steel Brackets: Fabricated of angles, channels, and other standard structural shapes. Connect with welds and machine bolts to form rigid supports.

2.5 FIRE SEALS:

A. Material: Firestopping material shall be asbestos free, 100% intumescent, have code approval under BOCA, ICBO, SSBC, NFPA 101, NFPA 70, and be capable of maintaining an effective barrier against flame and gases in compliance with the following requirements.

B. Flame Spread: 25 or less, ASTM E84

C. Fire Resistance and Hose Stream Tests: Firestopping materials shall be rated "F" and "T" in accordance with ASTM E 814 or UL 1479. Rating periods shall conform to the following:

1. (F) 3 (T) 3 Time-rated floor or wall assemblies.

2. (F) 3 (T) 3 Openings between floor slabs and curtain wall.

D. Manufacturers: Subject to compliance with requirements, provide fire seals of the following:

1. 3M Company
PART 3 - EXECUTION

3.1 INSTALLATION:

A. Install supporting devices to fasten electrical components securely and permanently in accordance with NEC requirements.

B. Coordinate with the building structural system and with other electrical installation.

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

1. Conform to manufacturer's recommendations for selection and installation of supports.

2. Strength of each support shall be adequate to carry present and future load multiplied by a safety factor of at least four. Where this determination results in a safety allowance of less than 200 lbs, provide additional strength until there is a minimum of 200 lbs safety allowance in the strength of each support.

3. Install individual and multiple (trapeze) raceway hangers and riser clamps as necessary to support raceways. Provide U-bolts, clamps, attachments, and other hardware necessary for hanger assembly and for securing hanger rods and conduits.

4. Support parallel runs of horizontal raceways together on trapeze-type hangers. Use 3/8" diameter or larger threaded steel rods for support.

5. Support individual horizontal raceways by separate pipe hangers. Spring steel fasteners may be used in lieu of hangers only for 1-1/2-inch and smaller raceways serving lighting and receptacle branch circuits above suspended ceilings only. For hanger rods with spring steel fasteners, use 1/4-inch-diameter or larger threaded steel. Use spring steel fasteners that are specifically designed for supporting single conduits or tubing. For hanger rods supporting 1-1/2" or larger conduits provide 3/8" minimum threaded steel rods with pipe hangers.

6. Space supports for raceways in accordance with NEC. When there are 4 or more 2" conduits in a trapeze, supports shall be spaced 5' O.C.

7. In all runs, arrange support so the load produced by the weight of the raceway and the enclosed conductors is carried entirely by the conduit supports with no weight load on raceway terminals.

8. Threaded rod supports to have bottoms cut off at a maximum length equal to rod diameter below bottom nut.

D. Miscellaneous Supports: Support miscellaneous electrical components separately and as required to produce the same structural safety factors as specified for raceway supports. Install metal channel racks for mounting cabinets, panelboards, disconnects, control enclosures, pull boxes, junction boxes, transformers, and other devices.

E. In open overhead spaces, support metal boxes directly from the building structure or by bar hangers. Where bar hangers are used, attach the bar to raceways on opposite sides of the box and support the raceway with an approved type of fastener not more than 24 inches from the box.
F. Fastening: Unless otherwise indicated, fasten electrical items and their supporting hardware securely to the building structure, including but not limited to conduits, raceways, cables, boxes, disconnect switches, and control components in accordance with the following:

1. Fasten by means of wood screws or screw-type nails on wood, toggle bolts on hollow masonry units, concrete inserts or expansion bolts on concrete or solid masonry, and machine screws, welded threaded studs, or spring-tension clamps on steel. Threaded studs driven by a powder charge and provided with lock washers and nuts may be used instead of expansion bolts and machine or wood screws, where authorized by the Owner and structural engineer. Do not weld conduit, pipe straps, or items other than threaded studs to steel structures. In partitions of light steel construction, use sheet metal screws.

   a. Anchoring methods as follows:
      
      1) Hollow Masonry: Toggle Bolts.
      2) Solid Masonry: Lead expansion anchors or preset inserts.
      3) Metal Surfaces: Machine screws, bolts or welded studs.
      4) Wood Surfaces: Wood screws.
      5) Concrete Surfaces: Lead expansion or self-drilling anchors.
      6) Metal Studs: Sheet metal screws.

   b. Raceways shall be supported every 10 feet and within 36 inches of each outlet, ell, fitting, panel, etc.

   c. Conduit shall not be supported or attached from ceiling support wires.

   d. Raceways or equipment shall not be suspended from piping or ductwork.

   e. Drilling of structural steel members is prohibited.

2. Holes cut to depth of more than 1-1/2 inches in reinforced concrete beams or to depth of more than 3/4 inch in concrete shall not cut the main reinforcing bars. Fill holes that are not used.

3. Ensure that the load applied to any fastener does not exceed 25 percent of the proof test load. Use vibration- and shock-resistant fasteners for attachments to concrete slabs.

3.2 PERSONNEL PROTECTION:

   A. Where U-channel systems, angles, brackets or other standard structural metal shapes are readily accessible and exposed to personnel, provide plastic or rubber end caps.

   B. Where threaded rod supports are readily accessible and exposed to personnel, provide plastic or rubber end caps.
3.3 **FIRESTOPPING LOCATIONS:**

A. **Preparation:**

1. **Coordination:** Coordinate the work with other trades. Firestopping materials at penetrations of insulated pipes and ducts can be applied after insulation is in place. If insulation is composed of combustible material, the thickness of firestopping materials must be equivalent to that of the insulation. If the insulation is composed of non-combustible material, it may be considered as part of the penetrating item.

2. **Surface Preparation:** Surface Preparation to be in contact with firestopping materials shall be free of dirt, grease, oil, loose material or other substances that may affect proper fitting or the required fire resistance.

B. **Installation:** Install firestopping materials in accordance with the manufacturer’s instructions and the requirements of Division 7 Section “Firestopping”.

C. **Cleaning:** After completion of firestopping work in any area, equipment shall be reviewed and walls, ceilings and all other surfaces not to receive firestopping shall be cleaned of deposits of firestop materials.

D. **Inspection:** The architect may select and the Owner will pay an independent testing laboratory to examine firestopped areas to ensure proper installation prior to concealing or enclosing the firestopped areas.

END OF SECTION 16190
PART 1 - GENERAL

1.1 SUMMARY:

A. This Section includes identification of electrical materials, equipment, and installations. It includes requirements for electrical identification components including but not limited to the following:

1. Identification labeling for raceways, cables, and conductors.
2. Operational instruction signs.
3. Equipment labels and signs.

1.2 QUALITY ASSURANCE:

A. ANSI Compliance: Comply with requirements of ANSI Standard A13.1, "Scheme for the Identification of Piping Systems," with regard to type and size of lettering for raceway and cable labels.

PART 2 - PRODUCTS

2.1 MANUFACTURERS:

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

1. Ideal Industries, Inc.
2. LEM Products, Inc.
3. Markal Corp.
4. Panduit Corp.
5. W.H.Brady, Co.
6. 3M Company

2.2 ELECTRICAL IDENTIFICATION PRODUCTS:

A. Adhesive Marking Labels for Raceway and Busway: Pre-printed, flexible, self-adhesive labels with legend indicating voltage and service (Emergency, Lighting, Power, Power d.c., HVAC, Communications, Control, Fire).

1. Label Size: as follows:
   a. Raceways: Kroy or Brother labels 1" high by 12 inches long. (minimum)

2. Color: As specified for various systems.

B. Colored Adhesive Marking Tape for banding Raceways, Wires, and Cables: Self-adhesive vinyl tape not less than 3 mils thick by 1 inch to 2 inches in width.

C. Pretensioned Flexible Wraparound Colored Plastic Sleeves for Cable Identification: Flexible acrylic bands sized to suit the cable diameter and arranged to stay in place by pre-tensioned gripping action when coiled around the cable.

D. Wire/Cable Designation Tape Markers: Vinyl or vinyl-cloth, self-adhesive, wraparound, cable/conductor markers with preprinted numbers and letter.
E. Engraved, Plastic-Laminated Labels, Signs and Instruction Plates: Engraving stock melamine plastic laminate, 1/16-inch minimum thick for signs up to 20 square inches, or 8 inches in length; 1/8-inch thick for larger sizes. Engraved legend in black letters on white face for normal and white letters on red face for emergency and punched for mechanical fasteners. Where required for ground connections, provide engraved legend in white letters on green face. Identification shall be the name of the device, panelboards, etc. in 2” high letters. The “voltage, load served” line also shall include the name of the feeding panel, switchboard, etc. in 1/4” high letters.

F. Fasteners for Plastic-Laminated and Metal Signs: Self-tapping stainless steel screws or number 10/32 stainless steel machine screws with nuts and flat and lock washers.

G. Cable Ties: Fungus-inert, self-extinguishing, one-piece, self-locking nylon cable ties, 0.18-inch minimum width, 50-lb minimum tensile strength, and suitable for a temperature range from minus 50°F to 350°F. Provide ties in specified colors when used for color coding.

H. Adhesive Marking Tape for Device Cover Plates: Kroy tape or Brother labels with 3/16 inch minimum height letters. Kroy tape shall have black letters for normal and red letters for emergency. Brother labels shall be white letters on black background for normal and on red background for emergency. Embossed Dymo-Type labels are not acceptable.

PART 3 - EXECUTION

3.1 INSTALLATION:

A. Degrease and clean surfaces to receive nameplates and labels.

B. Install nameplates parallel to equipment lines.

C. Secure nameplates to equipment using screws or rivets. Locate nameplates on outside face of panelboard doors in finished locations.

D. Electronic labels will be permitted only for identification of disconnects, individual wall switches (in unfinished areas), control station devices and starters, and on outside face of receptacles and wall switch plates.

E. Lettering and Graphics: Coordinate names, abbreviations, colors, and other designations used in electrical identification work with corresponding designations specified or indicated. Install numbers, lettering, and colors as approved in submittals and as required by code.

F. Install identification devices in accordance with manufacturer’s written instructions and requirements of NEC.

G. Sequence of Work: Where identification is to be applied to surfaces that require finish, install identification after completion of finish work.

H. Conduit Identification: Use adhesive marking tape labels at 10 foot intervals to identify all conduits run exposed or located above accessible ceilings. Conduits located above non-accessible ceiling or in floors and walls shall be labeled within 3 feet of becoming accessible. Labels for multiple conduits shall be aligned. Use the following colors:

1. 600 Volt and Below Normal: White letters on black background indicating feeder identification and voltage.
2. 600 Volt and Below Emergency: White or black letters on red background indicating feeder identification and voltage.
3. Fire Alarm: Red letters on white background indicating "FIRE ALARM".
4. Temperature Control: White or black letters on blue background indicating "TEMP. CONTROL."
5. Other Systems: Provide color banding as specified in item (I) below.

Where conduits enter or exit a panelboard, pull or junction box, switchboard, or other distribution equipment, conduit labels shall include circuit number in addition to feeder identification and voltage.

I. Identify System Raceways with Color Banding: Band exposed or accessible raceways, cables and bare conductors of the following systems for identification. Bands shall be pretensioned, snap-around colored plastic sleeves, colored adhesive marking tape, or a combination of the two. Make each color band 2 inches wide, completely encircling conduit, and place adjacent bands of two-color markings in contact, side by side. Install bands at changes in direction, at penetrations of walls and floors, at each junction box and at 20-foot maximum intervals in straight runs. Apply the following colors:

- Computer and Data System: Green and Blue
- Telephone System: Green and Yellow
- Ground: Green

J. Identify Junction, Pull and Connection Boxes: Identification of systems and circuits shall indicate system voltage and identity of contained circuits on outside of box cover. Color code shall be same as conduits for pressure sensitive labels. Use self adhesive marking tape labels at exposed locations and indelible black marker at concealed boxes. Junction box covers shall be color coded according to the following schedule:

1. Fire Alarm - Red
2. Emergency circuitry - Yellow
3. Computer Data - Blue

K. Circuit Identification: Tag or label conductors as follows:

1. Future Connections: Conductors indicated to be for future connection or connection under another contract with identification indicating source and circuit numbers.
2. Multiple Circuits: Where multiple branch circuits, control wiring or communications/signal conductors are terminated or spliced in a box or enclosure, label each conductor or cable with circuit number. For control and communications/signal wiring, use wire/cable marking tape at terminations in wiring boxes, troughs and control cabinets. Use consistent letter/number conductor designations throughout on wire/cable marking tapes.
3. Match identification markings with designations used in panelboards shop drawings, Contract Documents, and similar previously established identification schemes for the facility's electrical installations.

L. For panelboards, provide framed, typed circuit schedules (label all spares and spaces in pencil) with explicit description and identification of items controlled by each individual breaker.

M. Install labels at locations as required and at locations for best convenience of viewing without interference with operation and maintenance of equipment.
N. Provide tape labels for identification of individual receptacle wallplates. Locate tape on front of plate and identify branch circuit serving the receptacle.
PART 1 GENERAL

1.1 SUMMARY:
   A. This Section includes lighting and power panelboards and associated auxiliary equipment rated 600 V or less.

1.2 DEFINITIONS:
   A. Overcurrent Protective Device (OCPD): A device operative on excessive current that causes and maintains the interruption of power in the circuit it protects.

1.3 SUBMITTALS:
   A. Product data for each type panelboard, accessory item, and component specified.
   B. Shop drawings from manufacturers of panelboards including dimensioned plans, sections, and elevations. Show tabulations of installed devices, major features, and voltage rating. Include the following:
      1. Enclosure type with details for types other than NEMA Type 1.
      2. Bus configuration and current ratings.
      4. Features, characteristics, ratings, and factory settings of individual protective devices and auxiliary components.
   C. Wiring diagrams detailing schematic diagram including control wiring, and differentiating between manufacturer-installed and field-installed wiring.
   D. Report of field tests and observations.
   E. Panel schedules for installation in panelboards. Submit final versions after load balancing.

1.4 QUALITY ASSURANCE:
   A. Listing and Labeling: Provide products specified in this Section that are listed and labeled.
      1. The terms "listed" and "labeled" shall be defined as they are in the National Electrical Code, Article 100.
   B. Manufacturer's Qualifications: Firms regularly engaged in manufacture of panelboards and enclosures, of types, sizes and ratings required, whose products have been in satisfactory use in similar service for not less than 5 years.
   C. Installer's Qualifications: A firm with at least 3 years of successful installation experience on projects utilizing panelboards similar to those required for this project.

1.5 EXTRA MATERIALS:
   A. Keys: Furnish six spares of each type for panelboard cabinet locks.
   B. Touch-up Paint for panelboards: One half-pint container.
2. PART 2 - PRODUCTS

2.1 MANUFACTURERS:

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

1. Square D Co.
2. General Electric Co.

2.2 PANELBOARDS, GENERAL REQUIREMENTS:

A. Overcurrent Protective Devices (OCPDs): Provide type, rating, and features as indicated. Comply with Division 16 Section on Overcurrent Protective Devices, with OCPDs adapted to panelboard installation. Tandem circuit breakers shall not be used. Multiple breakers shall have common trip.

B. Enclosures: Cabinets, flush or surface mounted as indicated. NEMA Type 1 enclosure, except where the following enclosure requirements are indicated. Provide galvanized sheet steel cabinet type enclosures, in sizes and NEMA types as indicated, code-gauge, minimum 16-gauge thickness. Construct with multiple knockouts and wiring gutters. Provide baked gray enamel finish over a rust inhibitor coating. Design enclosures for recessed mounting. Provide enclosures which are fabricated by same manufacturer as panelboards, which mate and match properly with panelboards to be enclosed.

C. Front: Hinged trim type, secured to box with 1/4-20-large head slotted captive screws except as indicated. Front for surface-mounted panels shall be same dimensions as box. Fronts for flush panels shall overlap box except as otherwise specified. Provide fronts with hinged trim construction and door with flush locks and keys, all panelboard enclosures keyed alike, with concealed door hinges on inner door, piano hinge on outer trim door, and door swings as indicated.

D. Directory Frame: Metal, mounted inside each panel door with card and clear plastic cover. Directory shall match panelboard configuration, i.e. top to bottom, left to right. Provide permanent panelboard labels for each circuit number.

E. Bus Material: Provide tin plated hard-drawn copper of 98 percent conductivity.

1. Provide an add/alternate to provide tin-plated, high-strength, electrical grade aluminum alloy bus in lieu of copper.

F. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment ground conductors. Bonded to box.

G. Provide copper lugs for incoming feeders and grounds.

H. Provide minimum short circuit current ratings as indicated.
I. Provision for Future Devices: Equip with mounting brackets, bus connections, and necessary appurtenances, for the OCPD ampere ratings indicated for future installation of devices.

J. Special Features: Provide the following features for panelboards as indicated.

1. Provide two bolt compression lugs for incoming feeders on main lug only (MLO) panelboards, and ground connections.

2.3 LIGHTING AND APPLIANCE BRANCH CIRCUIT PANELBOARDS:

A. Branch OCPDs: Bolt-on circuit breakers, replaceable without disturbing adjacent units.

2.4 IDENTIFICATION:

A. General: Refer to Division 16 Section on electrical identification for labeling materials.

B. UL nameplates shall be provided for all panelboards. Information shall include, but not be limited to, manufacturer, model number, serial number, plant or manufacturing location, ampere rating, voltage rating, wire and phase identification and bus short circuit bracing rating.

PART 3 EXECUTION

3.1 INSTALLATION:

A. General: Install panelboards and accessory items in accordance with NEMA PB 1.1, "General Instructions for Proper Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less" and manufacturers' written installation instructions.

B. Mounting: Plumb and rigid without distortion of box. Mount flush panels uniformly flush with wall finish.

C. Circuit Directory: Typed and reflective of final circuit changes required to balance panel loads. Obtain approval before installing.

D. Install filler plates in unused spaces.

3.2 IDENTIFICATION:

A. Identify field-installed wiring and components and provide warning signs in accordance with Division 16 Section on electrical identification.

3.3 GROUNDING:

A. Connections: Make equipment grounding connections for panelboards as indicated.

B. Provide ground continuity to main electrical ground bus indicated.

3.4 CONNECTIONS:
A. Tighten electrical connectors and terminals, including grounding connections, in accordance with manufacturer's published torque-tightening values. Where manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.5 FIELD QUALITY CONTROL:

A. Upon completing installation of the system, perform the following tests:
   1. Make insulation resistance tests of panelboard buses, components, and connecting supply, feeder, and control circuits.
   2. Make continuity tests of circuits.

B. Procedures: Make field tests and inspections and prepare panelboard for satisfactory operation in accordance with manufacturer's recommendations and these specifications.

C. Schedule tests with at least one week in advance notification.

D. Reports: Provide report written reports of tests and observations. Report defective materials and workmanship and unsatisfactory test results. Include records of repairs and adjustments made.

E. Labeling: Upon satisfactory completion of tests and related effort, apply a label to tested components indicating results of tests and inspections, responsible organization and person, and date.

F. Visual and Mechanical Inspection: Include the following inspections and related work:
   1. Inspect for defects and physical damage, labeling, and nameplate compliance with requirements of up-to-date drawings and panelboard schedules.
   2. Exercise and perform of operational tests of all mechanical components and other operable devices in accordance with manufacturer's instruction manual.
   3. Check panelboard mounting, area clearances, and alignment and fit of components.
   4. Check tightness of bolted electrical connections with calibrated torque wrench. Refer to manufacturer's instructions for proper torque values.
   5. Verify that proper grounding bushings/bonding/ and panel enclosure bonding is complete.
   6. Verify isolated neutral bar and neutral connections.

G. Electrical tests: Include the following items performed in accordance with manufacturer's instruction:
   1. Insulation resistance test of buses. Insulation resistance less than 100 megohms is not acceptable.
   2. Ground resistance test on system and equipment ground connections.
3. Test main overcurrent protective devices in accordance with Section "Overcurrent Protective Devices."

H. Retest: Correct deficiencies identified by tests and observations and provide retesting of panelboards by testing organization. Verify by the system tests that the total assembly meets specified requirements.

3.6 CLEANING:

A. Upon completion of installation, inspect interior and exterior of panelboards. Remove paint splatters and other spots, dirt, and debris. Touch up scratches and marks of finish to match original finish.

END OF SECTION 16470
PART 1 - GENERAL

1.1 SUMMARY:

A. This Section includes overcurrent protective devices (OCPDs) rated 600 V and below and switching devices commonly used with them.

B. Panelboards: Application, installation, and other related requirements for overcurrent protective device installations in distribution equipment are specified in other Division 16 sections.

1.2 DEFINITIONS:

A. Overcurrent Protective Device (OCPD): A device operative on excessive current that causes and maintains the interruption of power in the circuit it protects.

B. Ampere-Squared-Seconds: An expression of available thermal energy resulting from current flow. With regard to current-limiting fuses and circuit breakers, the ampere-squared-seconds during fault current interruption represents the energy allowed to flow before the fuse or breaker interrupts the fault current within its current limiting range.

1.3 SUBMITTALS:

A. Product data for fuses, circuit breakers, and OCPD accessories specified in this Section, including descriptive data and time-current curves for all protective devices and let-through current curves for those with current limiting characteristics. Include coordination charts and tables and related data.

1.4 QUALITY ASSURANCE:

A. Manufacturers: Firms regularly engaged in manufacture of overcurrent protective devices of types, sizes, and ratings required, whose products have been in satisfactory use in similar service for not less than 5 years.

B. Each type of OCPD shall be the product of a single manufacturer.

PART 2 - PRODUCTS

2.1 MANUFACTURERS:

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

1. Molded-Case Circuit Breakers:
   a. Square D Co.
   b. General Electric Co.
   c. Siemens Energy & Automation, Inc.
   d. Westinghouse Electric Corp.

2. Combination Circuit Breaker and Ground Fault Circuit Interrupters:
   a. Square D Co.
   b. General Electric Co.
   c. Siemens Energy & Automation, Inc.
   d. Westinghouse Electric Corp.
3. When Mounting overcurrent protective devices in panelboards, provide equipment of same manufacturer as equipment into which they are being mounted.

2.2 OVERCURRENT PROTECTIVE DEVICES (OCPDs), GENERAL:

A. General: Provide OCPDs in indicated types, as integral components of panelboards and other related equipment; and also as individually enclosed and mounted single units.

B. Enclosures: NEMA 250 "Enclosures for Electrical Equipment (1,000 Volts Maximum)."

C. Where OCPD's are to be installed in existing panelboards they shall be of the same manufacture and type as those existing in the equipment. If this is not possible, provide devices which are compatible with the existing equipment and when installed will not void the U.L. label or reduce the short circuit rating of the equipment.

D. Provide 100% rated equipment and feeder breakers unless otherwise noted.

E. Provide standard rated branch circuit breakers unless otherwise noted.

F. All overcurrent devices shall be individually rated for the available fault current unless otherwise noted. Series ratings of equipment will only be allowed where specifically called out.

2.3 MOLDED-CASE CIRCUIT BREAKERS:

A. General: UL 489, "Molded Case Circuit Breakers and Circuit Breaker Enclosures," and NEMA AB 1, "Molded Case Circuit Breakers."

B. Construction: Bolt-in type, except breakers 225-ampere frame size and larger may be plug-in type if held in place by positive locking device requiring mechanical release for removal.

C. Characteristics: Indicated frame size, trip rating, number of poles, and a short-circuit interrupting capacity rating of 10,000 amperes symmetrical for 120 and 208 volt devices, unless a greater rating is indicated or required to match existing devices or equipment.

D. Tripping Device: Quick-make, quick-break toggle mechanism with inverse-time delay and instantaneous overcurrent trip protection for each pole.

E. Enclosure for Switchboard or Panelboard Mounting: Suitable for panel mounting in panelboards where indicated.

F. Enclosure for Independent Mounting: NEMA Type 1 enclosure, except as otherwise indicated or required to suit environment where located.

2.4 COMBINATION CIRCUIT BREAKERS AND GROUND FAULT CIRCUIT INTERRUPTERS:

A. General: UL 943 "Ground Fault Circuit Interrupters," arranged for sensing and tripping for ground fault current in addition to overcurrent and short-circuit current. Provide features as follows:

1. Match features and module size of panelboard breakers and provide clear identification of ground fault trip function.
2. Trip Setting for Ground Fault: 4 to 6 milliamperes, listed and labeled as a class A, type 1 device.
2.5 OCPD ACCESSORIES:

A. Lock-Out Devices: Provide padlocking provisions on each overcurrent protective device, lockable in the open or closed position. Provide 3 sets of lockout/tagout devices for each type of breaker or switch provided. Include tags, locks and all accessories necessary.

PART 3 - EXECUTION:

3.1 INSTALLATION:

A. Independently Mounted OCPDs: Locate as indicated and install in accordance with manufacturer's written installation instructions. Install OCPDs level and plumb.

B. Install fuses in fusible devices as indicated. Arrange fuses so that fuse ratings are readable without removing fuse.

3.2 IDENTIFICATION:

A. Identify components in accordance with Division 16 Section on electrical identification.

3.3 CONNECTIONS:

A. Check connectors, terminals, bus joints, and mountings for tightness. Tighten field-connected connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque tightening values. Where manufacturer's torquing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL 486A and UL 486B.

3.4 GROUNDING:

A. Provide equipment grounding connections for individually mounted OCPD units as indicated and as required by NEC. Tighten connectors to comply with tightening torques specified in UL Standard 486A to assure permanent and effective grounding.

3.5 FIELD QUALITY CONTROL:

A. Reports: Prepare written reports on tests and observations. Report defective materials and workmanship and unsatisfactory test results. Include complete records of repairs and adjustments made. Tests shall be made on all new and existing OCPD's provided and/or connected under this project in accordance with this section.

B. Labeling: Upon satisfactory completion of tests and related effort, apply a label to tested components indicating test results, date, and responsible organization and person.

C. Schedule visual and mechanical inspections and electrical tests with at least one week's advance notification.

D. Upon completing installation of the system, perform the following tests:

   1. Visual and mechanical inspection:

      a. Inspect for defects and physical damage, NRTL labeling, and nameplate compliance with current single line diagram.
b. Exercise and perform operational tests of all mechanical components and other operable
devices in accordance with manufacturer's instruction manual.

c. Check tightness of electrical connections of OCPDs with calibrated torque wrench. Refer
to manufacturer's instructions for proper torque values.

d. Clean OCPDs using manufacturer's approved methods and materials.

2. Electrical Tests: Perform the following tests in accordance with manufacturer's instructions:

a. Make insulation resistance tests of OCPD buses, components, and connecting supply,
feeder, and control circuits.

b. Make continuity tests of circuits.

E. Activate auxiliary protective devices such as ground fault or undervoltage relays, to verify operation
of shunt-trip devices.

F. Check stored-energy charging motors for proper operation of motor, mechanism, and limit switches.

G. Retest: Correct deficiencies identified by tests and observations and provide retesting of OCPDs by
testing organization. Verify by the system tests that specified requirements are met.

3.6 CLEANING:

A. Upon completion of installation, inspect OCPDs. Remove paint splatters and other spots, dirt, and
debris. Touch up scratches and mars of finish to match original finish.

END OF SECTION 16475
PART 1 - GENERAL

1.1 SUMMARY:

A. Extent, location, and details of lighting work are indicated on drawings and in schedules.

B. Types of lighting in this section include the following:
   1. Fluorescent.
   2. LED

1.2 SUBMITTALS:

A. Product Data: Submit manufacturer's product data and installation instructions on each type of luminaire and component.

B. Shop Drawings: In addition, submit shop drawings in booklet form with separate sheet for each luminaire, assembled by "luminaire type" with proposed luminaire and accessories clearly indicated on each sheet. Submit details indicating compatibility with ceiling grid system. Submit shop drawings from manufacturers detailing luminaire dimensions, weights, methods of field assembly, components, features and accessories.

C. Maintenance Data: Submit maintenance data and parts list for each luminaire and accessory; including "trouble-shooting" maintenance guide. Include that data, product data, and shop drawings in a maintenance manual; in accordance with general requirements of Division 1.

1.3 QUALITY ASSURANCE:

A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of lighting of sizes, types and ratings required, whose products have been in satisfactory use in similar service for not less than 5 years.

B. Installer's Qualifications: Firms with at least 3 years of successful installation experience on projects with lighting work similar to that required for this project.

1.4 DELIVERY, STORAGE, AND HANDLING:

A. Deliver lighting in factory-fabricated containers or wrappings, which properly protect luminaires from damage.

B. Store lighting in original packaging. Store inside well-ventilated area protected from weather, moisture, soiling, extreme temperatures, humidity, laid flat and blocked off ground.

C. Handle lighting carefully to prevent damage, breaking, and scoring of finishes. Do not install damaged units or components; replace with new.

1.5 SEQUENCING AND SCHEDULING:

A. Coordinate with other work including wires/cables, electrical boxes and fittings, and raceways, to properly interface installation of lighting with other work.

B. Sequence lighting installation with other work to minimize possibility of damage and soiling during remainder of construction.
PART 2 - PRODUCTS

2.1 MANUFACTURERS:

A. Luminaire Manufacturers: Subject to compliance with requirements, provide luminaires as listed in the luminaire schedule or elsewhere on the drawings or specification.

B. Manufacturers:

1. Fluorescent Lamps:
   a. General Electric
   b. Phillips
   c. OSRAM/Sylvania
   d. Others only by approval of University

2. Electronic Ballasts:
   a. Advance
   b. Motorola
   c. Magnetek

3. LED Lamps:
   a. LED lamps shall be provided as part of the specified product. LED lamps and electronic drivers shall be provided with the specified luminaire as a complete “system.” The LED lamp color temperature and CRI shall be as specified on the “Luminaire Schedule.”

2.2 EQUIPMENT:

A. General: Provide lighting of sizes, types and ratings indicated; complete with, but not limited to, housings, energy-efficient lamps, lamp holders, reflectors, energy efficient ballasts, starters and wiring. Ship luminaires factory-assembled, with those components required for a complete installation. Design luminaire with concealed hinges and catches, with metal parts grounded as common unit, and so constructed as to dampen ballast generated noise.

B. Wiring: Provide electrical wiring within luminaire suitable for connecting to branch circuit wiring as follows:

   1. NEC Type TFN for 120 volt and shall be minimum No. 18 AWG.

C. Lamps:

   1. Fluorescent: Provide T-8 Energy Saving fluorescent lamp types or as specified in the luminaire schedule and types compatible with luminaires. Lamps shall be low mercury type. Provide 3500°K color temperature lamps unless otherwise noted in schedules or on drawings. Lamps shall have a color rendering index (CRI) or 73 or greater.

D. Fluorescent Electronic Ballasts:

   1. Provide electronic ballasts for all fluorescent lamps with voltage as indicated on the plans and luminaire schedule. The ballast shall deliver normal lamp life and must be interchangeable with electromagnetic ballasts. The light output shall not vary in response to an input voltage variance of less than 10% rated voltage. Drive output shall be greater than 25 KHz with lamp flicker less than 2%.
2. The ballast total harmonic distortion shall be less than 10% with the third harmonic (180 Hz) distortion less than 8%.

3. The ballast shall have a crest factor of less than 1.5 and shall have transient protection which meets IEEE 587, Category A (ANSI C62.41) requirements.

4. The ballast shall have a power factor of 0.98 or higher, and shall have a ballast efficiency of 90% or higher.

5. The ballast shall be UL listed Class P and shall have a sound rating better than A.

6. The ballast electromagnetic interference shall be less than 54 db from 450 KHz to 30 MHz (FCC CFR 47, Part 18 requirements).

7. The ballasts shall be Electronic/Motorola or Advance. All other manufacturers shall request prior approval and supply test data from an independent testing laboratory and comparison report to substantiate compliance with specifications and specified equipment.

8. The ballast shall contain no PCB's.

9. The manufacturer shall provide a full three year warranty beginning at time of substantial completion. The manufacturer shall replace any and all failed ballasts within 48 hours of notification. The manufacturer shall provide the labor for warranty replacements, phone and fax number to report these outages and updates of those numbers.

PART 3 - EXECUTION

3.1 EXAMINATION:

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

3.2 INSTALLATION:

A. Install lighting at locations and heights as indicated, in accordance with manufacturer's written instructions, applicable requirements of NEC, NECA's "Standard of Installation", NEMA standards, and with recognized industry practices to ensure that lighting fulfills requirements.

B. Provide luminaires and/or outlet boxes with hangers to properly support luminaire weight. Submit design of hangers, method of fastening, other than indicated or specified herein, for review by Architect.

1. Luminaires shall be positively attached to the suspended ceiling system. The attachment device shall have a capacity of 100% of the luminaire weight acting in any direction.

2. When intermediate systems are used, No. 12 gauge hangers shall be attached to the grid members within 3" of each corner of each luminaire.

3. When heavy-duty systems are used, supplemental hangers are not required if a 48" modular hanger pattern is followed. When cross runners are used without supplemental hangers to
support luminaires, these cross runners shall provide the same carrying capacity as the main runner.

4. Luminaires weighing less than 56 pounds shall have, in addition to the requirements above, two No. 12 gauge hangers connected from the luminaire housing to the structure above. These wires may be slack.

5. Luminaires weighing 56 pounds or more shall be supported directly from the structure above by four No. 12 gauge hangers connected from the luminaire housing to the structure above. These wires may be slack.

C. Install flush mounted luminaires properly to eliminate light leakage between frame and finished surface.

D. Tighten connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque tightening values for equipment connectors. Where manufacturer's torquing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL Stds 486A and B, and the National Electrical Code.

E. Set units plumb, square, level and secure according to manufacturer's written instructions and shop drawings.

3.3 FIELD QUALITY CONTROL:

A. At Date of Substantial Completion, replace lamps in lighting which are observed to be noticeably dimmed after Contractor's use and testing, as judged by Architect.

1. Refer to Division-1 sections for the replacement/ restoration of lamps in lighting where used for temporary lighting prior to Date of Substantial Completion.

B. Furnish stock or replacement lamps amounting to 15%, but not less than 4 lamps in each case, of each type and size lamp used in each type luminaire. Deliver replacement stock as directed to Owner's storage space.

3.4 ADJUSTING AND CLEANING:

A. Clean lighting of dirt and construction debris upon completion of installation. Clean fingerprints and smudges from lenses and reflectors.

B. Protect installed luminaires from damage during remainder of construction period.

3.5 GROUNDING:

A. Provide equipment grounding connections for lighting as indicated. Tighten connections to comply with tightening torques specified in UL Std 486A to assure permanent and effective grounds.

3.6 WARRANTY:

A. The Contractor shall guarantee all equipment including ballasts, lamps, luminaires, wiring, etc. free from inherent mechanical and electrical defects. Warranty period shall be from date of acceptance as set forth in the general conditions with periods as follows:

1. Lamps - Per Paragraph 3.3
2. Luminaires, wiring, etc. - 1 year
3. Ballasts - The manufacturer shall provide a full three year warranty beginning at time of substantial completion. The manufacturer shall replace any and all failed ballasts within 48 hours of notification. The manufacturer shall provide the labor for warranty replacements.

3.7 DEMONSTRATION:

A. Upon completion of installation of lighting and after building circuitry has been energized, apply electrical energy to demonstrate capability and compliance with requirements. Where possible, correct malfunctioning units at site, then retest to demonstrate compliance; otherwise, remove and replace with new units, and proceed with retesting.

END OF SECTION 16515
PART 1 - GENERAL

1.1 SUMMARY:

A. Types of emergency luminaires in this section include the following:

1. Unitized battery powered units
2. Exit lights
3. Emergency fluorescent lamp power supply.

1.2 QUALITY ASSURANCE:

A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of emergency luminaires and equipment of types and ratings required, whose products have been in satisfactory use in similar service for not less than 5 years.

B. Installer's Qualifications: Firm with at least 3 years of successful installation experience on projects with emergency lighting work similar to that required for project.

1.3 SUBMITTALS:

A. Product Data: Submit manufacturer's technical product data on emergency lighting.

B. Shop Drawings: Submit shop drawings in booklet form with separate sheet for each luminaire, assembled in luminaire "type" alphabetical, or numerical order, with proposed luminaire and accessories clearly indicated on each sheet.

C. Maintenance Data: Submit maintenance data and parts list for each emergency lighting and accessory including "trouble-shooting" maintenance guide. Include this data, product data, and shop drawings in maintenance manual; in accordance with requirements of Division 1.

1.4 DELIVERY, STORAGE AND HANDLING:

A. Handle emergency lighting carefully to prevent damage, breaking, and scoring. Do not install damaged luminaires or components; replace with new.

B. Store in clean dry place. Protect from weather, dirt, fumes, water, construction debris, and physical damage.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS:

A. Manufacturers: Subject to compliance with requirements, provide emergency lighting of one of the following (for each type of emergency luminaire):

1. Unitized Battery Powered Fixtures:
   a. Dual-Lite Spectron (per University of Colorado Standards).
   b. Substitutions will not be accepted.
2. Exit Signs:
   a. As specified in Luminaire Schedule.

3. Emergency Fluorescent Lamp Power Supplies:
   a. Bodine
   b. Dual-Lite Inc.
   c. Lithonia Lighting Inc.
   d. Siltron Illumination Inc.

2.2 EMERGENCY LIGHTING:

   A. General: Provide lighting of sizes, types and ratings indicated; complete with, but not limited to, housings, energy efficient lamps, lamp holders, reflectors, energy-efficient ballasts, starters and wiring.

   B. Wiring: Provide wiring within fixtures for connection to branch circuit wiring as follows:

      1. NEC Type TFN for 120 & 277 volt, minimum No. 18 AWG.

   C. Emergency Battery Powered Units: Provide battery powered, self-contained, self-testing, self-diagnostic units with solid-state, fully automatic charger, unit “Ready” light, transfer/brownout circuit and low-voltage battery disconnect.

      1. Power Supplies:
         a. Provide unit with universal transformer for 120 or 277 VAC operation.
         b. Battery: Provide maintenance free lead-calcium battery for 12 VDC operation capable of supplying connected load for period of 1-1/2 hours to end voltage or 87-1/2 percent of nominal battery voltage.

      2. Charger: Provide automatic battery charger with full recharging capability in 12 hours, or less after full discharge.

      3. Enclosure: Provide enclosure constructed in accordance with NEMA 1 standards. Provide low profile brushed aluminum canopy capable of being mounted on standard 3-1/2” or 4” octagonal, or 4” square wall box, or being fastened directly to wall.

      4. Lamps: Provide two, unit mounted 12-volt, 7.2 watt sealed beam lamps.

      5. Accessories: Provide following accessories mounted on unit cabinet:
         a. Unit test switch
         b. Voltmeter
         c. Ammeter
         d. AC "ON" pilot light
         e. High Charge Pilot Light
         f. Battery life expectancy alarm
         g. Heavy-duty wall mounting bracket
         h. Self-diagnostic, Self-testing.
2.3 EMERGENCY FLUORESCENT LAMP POWER SUPPLY:

A. General: Provide self-contained battery powered inverter unit for direct mounting in designated fluorescent luminaires. Provide unit with fully automatic two rate charger, nickel-cadmium battery, AC "ON" pilot light, and test switch. Unit shall automatically transfer to battery supply on loss of normal AC power and shall operate one or two rapid start F32 fluorescent lamps with minimum output of 1350 lumens. Unit shall have minimum output of 3000 lumens for single high output lamp applications.

3. PART 3 - EXECUTION

3.1 INSPECTION:

A. Examine areas and conditions under which emergency lighting is to be installed, and substrate which will support lighting luminaires. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.2 INSTALLATION OF EMERGENCY LIGHTING UNITS:

A. Install emergency lighting units at locations and heights as indicated, in accordance with manufacturer's written instructions, applicable requirements of NEC, NECA's "Standard of Installation", NEMA standards, and with recognized industry practices to ensure that lighting fulfills requirements.

B. Coordinate with other electrical work as appropriate to properly interface installation of emergency lighting with other work.

C. Coordinate mounting of test switch indicator light and ballast prior to installation.

3.3 ADJUSTING AND CLEANING:

A. Clean emergency lighting of dirt and debris upon completion of installation.

B. Protect installed units from damage during remainder of construction period.

3.4 GROUNDING:

A. Provide equipment grounding connections for emergency lighting as indicated. Tighten connections to comply with tightening torques specified in UL Std 486A to assure permanent and effective grounds.

3.5 FIELD QUALITY CONTROL:

A. Upon completion of installation of emergency lighting and after building circuitry has been energized with normal power source, apply electrical energy to demonstrate capability and compliance with requirements. Test emergency lighting to demonstrate operation under emergency conditions. Where possible, correct malfunctioning units at site, then retest to demonstrate compliance; otherwise, remove and replace with new units, and proceed with retesting.
3.6 WARRANTY:
   
   A. The Contractor shall guarantee all equipment including ballasts, lamps, luminaires, wiring, etc. free from inherent mechanical and electrical defects for five (5) years. Warranty period shall be from date of acceptance as set forth in the general conditions.

END OF SECTION 16535
PART 1 - GENERAL

1.1 SUMMARY:

A. Extent of fire alarm systems work is indicated by drawings.

B. All existing electrical equipment to be reused must comply with current codes and standards and be tested as part of this project.

1.2 QUALITY ASSURANCE:

A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of fire alarm systems of types, sizes, and electrical characteristics required, and whose products have been in satisfactory use in similar service for not less than 5 years.

B. Installer's Qualifications: Firm with at least 5 years of successful installation experience on projects with fire alarm systems work similar to that required for this project.

1. Firm with manufacturer's factory trained personnel.

2. Firm with factory authorized service organization and spare parts stock within 50 miles of the University and with a 24 hour response time.

3. Electrical journeymen shall have at least 2 years of documented fire alarm installation experience.

C. Codes and Standards:

1. Each and every item of the fire alarm system shall be listed as the product of a single fire alarm system manufacturer under the appropriate category by Underwriters Laboratory, Inc. (UL) and shall bear the UL label on all devices, appliances and panels comprising the system. All control equipment shall be listed under the category UOJZ as a single control unit and cross listed with the base loop fire alarm system. Partial listings shall be unacceptable.

2. The complete installation shall conform to the applicable sections of NFPA and Local Code Requirements, and the National Electrical Code with particular attention to article 760. All control equipment must have transient protection to comply with UL 864 requirements or Standard #497B as applicable.

3. The fire alarm system and devices shall comply with ADA 1990 and UL 1971 requirements.


5. University of Colorado Standards for Fire Alarm and Detection Systems (Section 16720) located at: http://www.colorado.edu/facilitiesmanagement/pdc/construction/standards/electrical.html

5. All other applicable codes and standards.

1.3 SUBMITTALS:

A. Product Data: Submit manufacturer's technical product data, including specifications and installation instructions, for each type of fire alarm system equipment. Submit a complete list of
equipment to be furnished, including quantities of equipment, annotated catalog weights and physical sizes. Include standard or typical riser and wiring diagrams, and operation and maintenance instructions for inclusion in maintenance manuals.

B. Shop Drawings: Provide shop drawings within 30 days after award of contract showing system components, locations and full schematic of system wiring showing conductor routings, color coding, quantities, and connection details. Provide updated room names and numbers that match the names and numbers as labeled at the building. Room names and numbers shown on the contract documents are not necessarily those that are currently being used in the building. All conduit routing must be submitted to, and accepted by, the Architect/Engineer. Shop drawing documents must be submitted simultaneously with sprinkler system documents and prior to installation.

This information shall be submitted on 1/8" = 1'-0" scale building floor plans. No other systems shall be included on these plans. Reproduction of contract drawing will not be acceptable.

C. Submit manufacturer’s installation instructions, including outlet or back box requirements for each piece of equipment.

D. Submit manufacturer’s certificate that system meets or exceeds specified requirements.

E. Submit verification of system operation by manufacturer or his authorized representative.

F. Submit back-up battery calculations.

G. All shop drawings and battery calculations shall be submitted to the authority having jurisdiction for review after review by the Architect/Engineer.

H. Submit three copies of test results and data to Architect/Engineer no later than seven days after conclusion of tests described in this section.

I. Maintenance Data: Submit maintenance data and parts lists for each type of fire alarm equipment installed, including furnished specialties and accessories. Include this data, product data, and shop drawings in maintenance manual; in accordance with requirements of Division 1.

1. At time of demonstration and testing the Contractor shall turn over to the University O & M Manuals which shall contain the following (as a minimum submittal).

   a. Building fire alarm prints with Workman's notes.

   b. Provide three sets of Owner operation and maintenance manuals in three ring binders. The operation and maintenance manuals shall as a minimum contain the following:

       1) Record Drawings:

       a) Complete, reproducible (24" x 36") as-built plans and CAD disks showing conduit routing and number of conductors per conduit. Show all devices including known future devices and indicate as such.

       b) Revised schematic, wiring, and interconnection diagrams of all circuits, internal and external, for all equipment installed and exact location for all devices. Provide manufacturer’s technical information drawings. These schematics shall
include the conductor color coding and terminal identification system, location of all terminal boxes complete with numbering.

c) Complete, as-installed, riser diagrams indicating the wiring sequence of all alarm-initiating devices, supervisory devices, and all signaling appliances on all signaling circuits.

d) A complete description of the system operation, including a schedule of relay abbreviations used on the drawings, list of relay functions, and the sequence of relay operation during supervisory trouble and alarm conditions.

e) As-built point-to-point wiring diagrams depicting every device, conduit routing, wire sizes, and all equipment locations, on CAD disks and reproducible drawings with CAD backgrounds provided by the Architect or Engineer, complete with room numbers. Turn over the workman's set with their notes to the University.

2) All maintenance data including cut sheets for all components; all technical wiring diagrams and schematics for all related equipment and components.

3) Certification of equipment that it is UL approved on manufacturer's letter head including UL reference number.

4) Fixture cuts of all devices and components.

5) Warranty system, all parts and labor for a period of one year, free of defects in materials and workmanship at no cost to the University.

1.4 DELIVERY, STORAGE, AND HANDLING:

A. Handle fire alarm equipment carefully to prevent damage, breaking, and scoring. Do not install damaged equipment or components; replace with new.

B. Store fire alarm equipment in clean, dry place. Protect from weather, dirt, fumes, water, construction debris, and physical damage.

1.5 OPERATION:

A. The system alarm operation subsequent to the alarm activation of any manual station, automatic detection device, or sprinkler flow switch shall be as follows:

1. All audible (voice evacuation) alarm indicating appliances shall sound a distinctive and continuous fire alarm signal until silenced by the alarm silence switch at the control panel.

2. All visible alarm indicating appliances shall flash continuously until the system is reset. Visual alarm devices shall continue to operate when audible devices are silenced. Any subsequent zone alarm after reset shall reactivate the alarm indicating appliances.
PART 2 - PRODUCTS

2.1 EXISTING CONTROL PANEL MANUFACTURER:
   A. Simplex-Grinnell
   B. Fire Alarm Cable
      1. West Penn
      2. Belden
      3. Annixter

2.2 FIRE ALARM AND DETECTION SYSTEMS:
   A. General: Provide complete fire alarm system products of types, sizes, and capacities indicated, which comply with manufacturer's standard design, materials, components; construct in accordance with published product information, and as required for complete installation. Provide fire alarm and detection systems for applications indicated.

   B. Wiring System Materials: Provide basic wiring materials which comply with Division-16 Basic Electrical Materials and Methods sections, "Raceways" and "Electrical Boxes and Fittings"; types to be selected by Installer.
      1. Provide wire and cable in accordance with requirements of manufacturer. Wire insulation shall comply with NEC Article 760.
      2. Provide copper conductors, solid #14 AWG minimum. Refer to table in 16721.3.3.E for color coding of wires.

2.3 ALARM SIGNAL DEVICES:
   A. Fire Alarm Speaker/Strobe Combination: Provide high impact resistant red LEXAN horn/strobe combination devices as shown on the plans. Each assembly shall consist of two independent devices which are manufactured as compatible with each other and with the control equipment. Each assembly shall provide a terminal strip or wire leads for true in-out wiring connections. The strobe unit shall have a candela-second rating in compliance with ADA requirements and be rated at 24 VDC. Strobes shall be clear with red letters "FIRE" on two sides.
      1. Provide wall mounting as shown on the plans. Verify manufacturer mounting requirements prior to rough in.

   B. Individual Strobe Unit: Provide strobe units mounted where shown. Units shall match those used in the combination horn/strobe or speaker/strobe specified.

   C. Where multiple strobe units are visible from a single location and the potential visible flash rate is 5 hz or more, provide synchronizing modules and strobes compatible for synchronizing as required. Provide additional wiring, conduit, and power supplies as necessary.
PART 3 - EXECUTION

3.1 EXAMINATION:

A. Examine areas and conditions under which fire alarm systems are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.2 INSTALLATION OF BASIC IDENTIFICATION:

A. Install electrical identification in accordance with Division-16 Basic Electrical Materials and Methods section "Electrical Identification."

3.3 INSTALLATION OF BASIC WIRING SYSTEM MATERIALS:

A. Install wiring, raceways, and electrical boxes and fittings in accordance with Division-16 Basic Electrical Materials and Methods sections, "Raceways", "Wires and Cables", and "Electrical Boxes and Fittings" for wiring of non-power limited circuits. Install all wiring in conduit or entrance raceway.

B. Addressable wiring may be tapped with written permission of the UCB Fire Alarm Shop. Failure to obtain permission will result in the Contractor rewiring the device per CU direction at their own cost (no cost to the University).

C. General wire requirements are:
   1. Minimum conduit shall be 3/4" for all horizontal floor/device runs. All risers/distribution conduits shall be a minimum 3/4" to 8" x 8" minimum J-boxes.
   2. Contractor shall not pull fire alarm wiring through conduits with line voltage circuits.

D. Fire alarm circuit conductor terminations:
   1. Wires in control panels are to be landed on numbered terminal strips with one conductor per screw terminal pressure connector. Arrange wiring neatly using clips and harnesses as required. Identify conductors and the terminal landed upon per Section 16195 - Identification. Include wiring diagram on inside cover of panels and in O&M's.
   2. All junction boxes larger than 4" x 4" shall be provided with numbered terminal strips with all wires numbered and landed on corresponding terminal strip (one conductor per screw terminal strip). If a 4" x 4" junction box is not large enough due to wire fill requirements, the next minimum size junction box shall be 8" x 8". Only one extension ring is allowed on a 4" x 4" box with one extension ring, then an 8" x 8" box upgrade with terminal strips is required. Include wiring diagram on inside cover of boxes and in O&M's.

E. Color code wire sizes for fire alarm system as follows, all wire is solid copper:

<table>
<thead>
<tr>
<th>Circuit Type</th>
<th>Colors</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fire Alarm Zones</td>
<td>(+)Red (-)Black</td>
<td>14 THHN</td>
</tr>
<tr>
<td>Mapnet</td>
<td>(+)Red (-)Black</td>
<td>18 Twisted Shielded</td>
</tr>
</tbody>
</table>
### Communications Lines

<table>
<thead>
<tr>
<th></th>
<th>(+)White or Red</th>
<th>(-)Black</th>
<th>18 Twisted Shielded</th>
</tr>
</thead>
</table>

### Audio Risers (panel to floor terminal cabinet or floor to floor riser)

<table>
<thead>
<tr>
<th></th>
<th>(+)Red</th>
<th>(-)Black</th>
<th>12 Twisted Shielded</th>
</tr>
</thead>
</table>

### Horns

<table>
<thead>
<tr>
<th></th>
<th>Twisted-Jacketed (+)Red</th>
<th>(-)Black</th>
<th>14 THHN</th>
</tr>
</thead>
</table>

### Strobes (visuals)

<table>
<thead>
<tr>
<th></th>
<th>(+)Yellow w/stripes</th>
<th>(-)Brown w/stripes</th>
<th>14 THHN</th>
</tr>
</thead>
</table>

### Speakers (floor wiring-riser to device)

<table>
<thead>
<tr>
<th></th>
<th>(+)Red</th>
<th>(-)Black</th>
<th>14 Twisted Shielded</th>
</tr>
</thead>
</table>

### Remote test Switches

<table>
<thead>
<tr>
<th></th>
<th>White/White</th>
<th>14 THHN</th>
</tr>
</thead>
</table>

### Remote Lights

<table>
<thead>
<tr>
<th></th>
<th>(+)Red</th>
<th>(-)Black</th>
<th>14 THHN</th>
</tr>
</thead>
</table>

### Damper Controls

<table>
<thead>
<tr>
<th></th>
<th>Same as Fans</th>
<th>14 THHN</th>
</tr>
</thead>
</table>

### INSTALLATION OF FIRE ALARM SYSTEMS:

A. Install fire alarm system as indicated, in accordance with equipment manufacturer’s written instructions and complying with applicable portions of NEC and NECA's "Standard of Installation."

B. Wiring: Wiring of fire alarm system is work of this section, but is not specifically detailed on drawings.

1. Complete wiring in accordance with manufacturer’s requirements. Color code wiring and install per manufacturer’s point-to-point wiring diagram and cable/terminal strip schedule. Connect each device with sufficient wiring to complete its intended operation.

2. Where there are a number of power requiring devices such as smoke detectors, fan relays, door holders and smoke damper operators installed in a circuit, group in numbers so power required does not exceed 80% of manufacturer's power supply rating. Provide extra wiring, or extra power supplies required to fulfill that requirement. In addition, provide extra or larger size wiring to alleviate voltage drops which makes device operate beyond voltage limits for which it was designed. Determine above with manufacturer's representative while equipment is being installed.

3. The existing system shall remain in operation while the new systems are being installed, tested, and accepted.

C. Mount devices per UFAS
3.5 FIELD QUALITY CONTROL:

A. All contractors shall have documented a minimum of five (5) years commercial or industrial fire alarm installation experience. Journeyman shall have a minimum of two (2) years documented fire alarm installation experience. Documentation shall be submitted if requested.

B. Notify the Department of Facilities Management two (2) weeks prior to request of scheduling of final testing. Notify Facilities Management’s Service Desk and University Fire Alarm Technician at (303) 492-5522 three working days prior to any interruption or modification of any existing fire alarm system for scheduling of work.

C. All wiring is to be done by experienced personnel under supervision of manufacturer’s representative. The fire alarm equipment supplier shall make a thorough inspection and test of the completed fire alarm system prior to final interconnection to the central station. All conduit shall be installed by a licensed electrician. This does not require the foreman to be licensed.

D. Limit downtimes as much as possible and schedule all downtimes with UCB at least 2 weeks in advance.

3.6 SYSTEM TEST AND APPROVAL:

A. System installation shall be verified as complete by contractor as follows:

1. Installation is complete with all devices.
2. Wiring is checked for opens, shorts, ground faults, improper branching, etc.
3. Fill out and sign attached Fire Alarm Certification and Description form and turn over to CU Facilities Management before 100% test. Manufacturers approved equal form will be acceptable.

B. Before final interconnection, the Contractor shall perform a complete system check with the manufacturer’s technician present. This test shall be completed without the involvement of the Owner and prior to scheduling the final test with the Owner. This test shall include setting every device into alarm individually, operating each pull station, operating all audible systems, operating all functions in the FACP, etc. The purpose of this test is to ensure that the entire system is functioning properly prior to the final test. This “preliminary” test shall be documented as to what was tested, the testing procedure used and all detector sensitivities. This test documentation and the attached Fire Alarm Certificate and description form shall be submitted to the Owner for review prior to scheduling a final test.

C. 100% System Operation Test:

1. The 100% fire alarm test shall be scheduled only after receipt of the "Fire Alarm System Certification and Description Form" by Facilities Management Electrical Engineering and Project Manager. The 100% fire alarm test shall be scheduled by the Facilities Management Project Manager. Contractor shall notify all parties of scheduled test times, dates, and locations. All tests shall be conducted by the contractor/manufacturer and witnessed by the University. The Contractor shall submit to Facilities Management Project Manager, and electrical engineer the proposed date/agenda/schedule of the test and a letter stating proposed method of testing all devices a minimum of two weeks prior to the date of test.

2. The Contractor shall furnish all test equipment necessary including an electric detector tester and canned smoke to set the detector into an alarm condition. In cases where a system was remodeled or added to, all new devices shall be 100% tested and a representative quantity of
existing devices, as determined by UCB, shall be re-tested to ensure proper operation still remains.

3. Final testing shall be performed in accordance to UCB Standards and all compliance forms completely filled out. (See attached forms)

D. The following tests shall be required, depending upon the particular installation, and the following parties shall be required to attend. Attendance by others indicated as optional may be desirable.

1. Initiation of All Other Devices:
   a. Devices to be tested include:
      1) Speaker/strobes
   b. Attendance required by:
      1) Contractor
      2) CU - Fire Alarm
   c. Inform the following:
      1) CU - Owner's Rep.

2. Speaker/Speaker Audibility Test:
   a. Attendance required by:
      1) Contractor
      2) CU - Fire Alarm
   b. Inform the following:
      1) CU - Owner's Rep.

E. A punch list shall be developed during the 100% test. The final punch list will come from the design engineer within two weeks and shall incorporate all relevant University items. The Contractor shall correct all items on the punch list and reschedule through the Project Manager retesting of all devices to show compliance with the punch list (first retest). All costs incurred for all retests above and beyond the first retest shall be borne and paid for by the Contractor. After all punch list items have been corrected all parties shall sign the "Building Fire Alarm Acceptance Form" (included at the end of this section). The Contractor shall turn this form over to the Facilities Management Project Manager with a copy to Facilities Management Electrical Engineer. The contract cannot be closed out without this form.

3.7 INSTALLATION DOCUMENTATION FOR FINAL ACCEPTANCE:

A. Operating and maintenance manuals shall be furnished as specified herein. Four (4) manuals and four (4) sets of drawings for each fire alarm system shall be provided. One copy shall be encased in an accessible plastic envelope permanently affixed to the FACP and sub-panels. All other copies shall be delivered with the final indexed copies of approved shop drawings and catalog data in a
hard-back cover 3-ring binder which is clearly labeled to designate to building for which it is intended. Manuals shall be as approved by the Engineer and the University. The working field set with workman’s notes shall be turned over to the University. All technical information shall include the manufacturers logos.

B. Record Drawings:

1. One (1) set of complete reproducible (24”x36”) record drawings the same size as the original drawings and one (1) CAD disk showing conduit routing and number of conductors per conduit. Show all devices including known future devices and indicate as such.

2. Provide as-built point-to-point wiring diagrams depicting every device (CAD backgrounds provided by Architect or Engineer, complete with room numbers.) Provide revised schematic, wiring, and interconnection diagrams of all circuits, internal and external for all equipment installed and exact locations for all devices. These schematics shall include the conductor color coding and terminal number identification system, location of all terminal boxes complete with numbering and each device address.

3. Complete, as-installed, riser diagrams indicating the wiring sequence of all alarm initiating devices, supervisory devices, and all signaling appliances on all signaling circuits.

4. A complete description of the system operation, including a schedule of relay abbreviations used on the drawings, list of relay functions, and the sequence of relay operation during supervisory trouble and alarm conditions.

5. Complete wiring and control diagrams for control and shutdown circuits for fan systems.

6. Completed UCB certificate of compliance and testing. (See attached forms)

7. The manufacturer’s representative and CU Facilities Management representative shall walk through the building and spot check 5-10% of device locations against the as-builts. If devices are not as shown, the drawings shall be rejected for a redraw. Upon re-submital, another spot check will be done. If deficiencies are still found, an independent audit to the system by the system manufacturer will be required and the cost of the audit will be the responsibility of the installing contractor.

C. Parts List:

1. Recommended spare parts list shall be received with the record drawings, including:

   a. Complete parts catalog of installed parts (include quantities).

   b. Complete parts price list.

   c. Recommended spare parts list.

3.8 GENERAL OPERATION AND MAINTENANCE PROCEDURES:

A. Conduct instruction to the Owner’s representatives on all normal maintenance and trouble shooting procedures down to circuit board level of equipment included in contract (1 to 4 hours as required for remodeled systems).
B. Failure to comply with all contractual obligations resulting in costs incurred by the University, shall result in those costs being transferred to the appropriate Contractor for payment.

C. Contractor shall follow Owner's shut down procedures as outlined within specification section and Owners' standards. Contractor shall provide a fire watch when required by written guidelines.

D. Contractor shall be financially responsible for all fees assessed to the University by Boulder Fire Department, and all lost research due to false alarms.

END OF SECTION 16721
The above listed Contractor and Manufacturers Representative hereby acknowledge that they have completely Pre-tested the following devices and functions for proper operation (check mark indicates completion of testing for all devices in listed category):

### DEVICES
- [ ] Smoke detectors tested for Alarm
- [ ] Heat detectors tested for Alarm
- [ ] Duct Detectors tested for Alarm
- [ ] Manual Pull Stations tested for Alarm
- [ ] Duct Detector Remote LED/Test Switches
- [ ] Tamper Switches tested for Supervisory
- [ ] Water Flow Switches Tested for Alarm
- [ ] Pre-Action Low Air for Supervisory
- [ ] Pre-Action APS tested for Alarm

### SIGNALS
- [ ] Audible appliances for audibility and operation
- [ ] Visual appliances for operation
- [ ] Outside Water Flow Bell tracks Main Water Flow Switch

### AUXILIARY FUNCTIONS
- [ ] Fan shutdown operations
- [ ] Damper operations
- [ ] Primary Elevator recall
- [ ] Alternate Elevator recall
- [ ] Elevator Shunt
- [ ] Door Holder Operations

We are applying for a final acceptance test with the University of Colorado Fire Systems and Life Safety groups. The requested date of the final acceptance test is _____/_____/_____, starting at (time)_______.

Foreman: ___________________________  Date: ______________________
Manufacturer Rep: ___________________________  Date: ______________________

**Note:** No exceptions are allowed—all devices and functions to be 100% tested PRIOR to applying for final acceptance test.
University of Colorado
CERTIFICATION OF SYSTEM OPERATION

Building____________________________________________________________

Date _________________________________

Contractor: __________________________  System Model_______________________________

All operational features and functions of this system were tested and found to be operating properly (checked below) in accordance with the job specifications.

- Smoke detectors tested for Alarm
- Heat detectors tested for Alarm
- Duct Detectors tested for Alarm
- Manual Pull Stations tested for Alarm
- Water Flow Switches tested for Alarm
- Tamper Switches tested for Supervisory
- Pre-Action Low Air for Supervisory
- Pre-Action APS tested for Alarm
- Duct Detector Remote LED/Test Switches
- Audible appliances for audibility and operation
- Visual appliances for operation
- Fan shutdown operations
- Damper operations
- Primary Elevator recall
- Alternate Elevator recall
- Elevator Shunt
- Door Holder Operations

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<th>Date:</th>
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</table>

<table>
<thead>
<tr>
<th>Department of Facilities management Fire Systems (Devices and Functions):</th>
<th>Signed:</th>
<th>Date:</th>
</tr>
</thead>
</table>

| Department of Facilities Management: | Signed: | Date: |
SECTION 167400- ELECTRICAL FOR COMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes electrical work required to support the Communications Systems specified in Division 27.

1.2 DESCRIPTION OF WORK

A. The Electrical Contractor shall provide electrical work and equipment as called for in the following Division 27 Specification Sections.
   1. Basic Communications Requirements
   2. Bidding
   3. Quality Assurance
   4. Common Work - Sleeves, Penetrations, and Firestopping
   5. Common Work - Hangers and Supports
   6. Electrical Technology - General Requirements
   7. Electrical Technology - Grounding and Bonding
   8. Electrical Technology - Conduit and Boxes

B. The requirements of these Sections are additional to, different from, or otherwise supplement the requirements of similar work specified in Division 16.

C. The requirements of these Sections serve as the basis for the requirements of this Section, and are incorporated by reference into this specification Section.

PART 2 - MATERIALS

2.1 THIS SECTION NOT USED

PART 3 - EXECUTION

3.1 THIS SECTION NOT USED

END OF SECTION
PART 1 - GENERAL

1.1 SUMMARY

A. This Section specifies the basic requirements for communications installations as indicated or required, and includes requirements common to more than one Specification Section of this Division (such as related documents, related Sections, definitions, governing requirements, Contractor requirements, warranty requirements, submittal requirements/procedures, and project closeout requirements/procedures, as well as other requirements).

1.2 RELATED DOCUMENTS

A. The General Requirements of the Contract (including General and Supplementary Conditions, and the requirements of Division 1), apply to the work of this Division.

B. This Section may expand upon or supplement the General Requirements of the Contract. In the event of a conflict or discrepancy between this Section and the General Requirements of the Contract, the General Requirements of the Contract shall govern. However, if the requirement of this Section (or portion thereof) exceeds that of the General Requirements of the Contract, and is furthermore not contrary to the General Requirements of the Contract, then the requirement of this Section (or portion thereof) shall prevail.

C. Examine the Construction Documents in their entirety (including Drawings and Specification Sections in the other Divisions) for requirements or work which may affect work under this Section, regardless of whether such requirements or work are specifically indicated in this Section.

1.3 RELATED SECTIONS

A. All Specification Sections in this Division.

B. The following Sections in other Divisions:
   1. Division 16 – Electrical for Communications Systems

1.4 COMMUNICATIONS SYSTEMS

A. The following systems are included within this Division. Following each system is the name of the Division 27 series of Drawings relating to that system:
   1. Communications Cabling: T-Series
   2. Electrical Technology: ET-Series

1.5 INTENT AND INTERPRETATIONS
A. It is the intent of the Construction Documents that the Contractor shall include all items necessary for the proper execution and completion of the Work by the Contractor, resulting in complete and fully operational system(s) ready for the Owner’s use, in full compliance with all applicable standards, codes and ordinances.
   1. Work or product not specifically indicated in the Construction Documents, but which are necessary to result in complete and fully operational system(s) ready for the Owner’s use, shall be provided by the Contractor.
   2. The specification of certain products in the Construction Documents shall not be construed as a release from furnishing such additional products and materials necessary to furnish complete and fully operational system(s) ready for the Owner’s use.

B. The Construction Documents include certain conventions in the use of language and the intended meaning of certain terms, words, and phrases when used in particular situations or circumstances. These conventions include:
   1. Abbreviated Language: Language used may be abbreviated. Implied words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be interpreted as the sense requires. Singular words shall be interpreted as plural and plural words interpreted as singular where applicable and where the full context so dictates.
   2. Imperative and Streamlined Language: Imperative and streamlined language is used generally. Requirements expressed in the imperative mood are to be performed by the Contractor. At certain locations in the text, for clarity, subjective language is used to describe responsibilities that must be fulfilled indirectly by the Contractor, or by others when so noted.
   3. Abbreviations and Names: Trade association names and titles of general standards are frequently abbreviated. Where abbreviations and acronyms are used, they mean the recognized name of the trade association, standards generating organization, authority having jurisdiction, or other entity applicable to the context.
   4. Words used in the singular shall also mean the plural, wherever the context so indicates, and likewise words in the plural shall also mean the singular, wherever the context so indicates.
   5. Unless otherwise stated, words which have well known technical or construction industry meanings are used in accordance with such recognized meanings.
   6. The terms “directed”, “required”, “permitted”, “ordered”, “designated”, or “prescribed”, as well as similar words shall mean the direction, requirement, permission, order, designation or prescription of the Engineer.
   7. The terms “approved”, “acceptable”, “satisfactory”, and similar words shall mean approved by, acceptable, or satisfactory to the Engineer.
   8. The terms “necessary”, “reasonable”, “proper”, “correct” and similar words shall mean necessary, reasonable, proper, or correct in the judgment of the Engineer.

C. Assignment of Specialists: The individual Specification Sections may require that certain specific construction activities be performed by specialists who are recognized experts in the operations to be performed. The specialists must be engaged for those activities, and such assignments are requirements over which the Contractor has no choice or option. Nevertheless, the ultimate responsibility for fulfilling the contract requirements shall remain with the Contractor.
   1. This requirement shall not be interpreted to conflict with the enforcement of local building codes and similar regulations governing the work.

D. Drawings:
   1. Drawings are diagrammatic and approximate in character, are not intended to show all features of required work, and do not necessarily indicate every required component.
2. Symbols used on the Drawings are defined in the legend on the Drawings. Symbols indicated on the legend may not necessarily be required.

E. Drawings and Specifications are complementary. Items required by either are binding as though they are required by both.

1.6 DEFINITIONS

A. The definitions below are applicable to this Division:

1. General
   a. Accepted/Acceptable: Work or materials conforming with the intent of the project, and in general, conforming to the pertinent information in the Construction Documents.
   b. Approved/Approval: The written approval of the Engineer.
   c. Accessible: Easy access. Access attained without requiring extensive removal of other materials to gain access.
   d. Accessible Ceiling: Acoustical tile hanging ceilings ("Hard-lid" ceilings (concealed spine or sheetrock/gypsum ceilings), even when provided with access panels, are not considered an Accessible Ceiling.)
   e. Agreement: The contractual agreement between the Owner and the Contractor.
   f. Concealed: Hidden from sight in interstitial building spaces, chases, furred spaces, shafts, crawl spaces, etc.
   g. Construction Documents: Collective term for the entire set of bound or unbound material describing the construction and services required, including all Drawings, Specifications, addenda issued prior to execution of the contract, and modifications issued after execution of the Contract (such as change orders, construction change directives, supplemental instructions, etc.).
   h. Contract Documents: The Agreement (including other documents listed in the Agreement), Conditions of the Contract (General, Supplementary and other conditions), and the Construction Documents.
   i. The Contract: The Contract Documents form the Contract. The Contract represents the entire and integrated agreement between the Owner and the Contractor and supersedes any prior negotiations, representations or agreements, either written or oral. The Contract shall not be construed to create a contractual relationship of any kind (1) between the Engineer and the Contractor, (2) between the Owner and a subcontractor, or (3) between any persons or entities other than the Owner and Contractor.
   j. Contractor: The party responsible for providing the system(s) as indicated herein.
   k. Drawings: The graphic and pictorial portions of the Contract Documents, wherever located and whenever issued, showing the design, location and dimensions of the Work, generally including (but not limited to) plans, elevations, sections, details, schedules and/or diagrams.
   l. Engineer: The party responsible for producing the communication system(s) Construction Documents.
   m. Exposed: Not concealed (see above) and not installed underground.
   n. Final Completion: The date when the Engineer confirms in writing that the Contractor has completed the work in accordance with the Construction Documents, including completion of all punch list items, cleanup work and delivery of all required guarantees, warranties, licenses, releases and other required deliverables.
   o. Furnish: To purchase, supply, and deliver to the project materials in new and operable condition, ready for installation.
2. Communications Systems

a. Communications Cabling System: Includes (but is not limited to) communications cables and patch cables, connectors, terminations and termination equipment and panels, equipment racks and distribution equipment, equipment required for the build-out of communications rooms and spaces, and other incidental and miscellaneous product and labor as required.

b. Communications Infrastructure System: A Communications Cabling System in conjunction with a Communications Pathway System.

c. Electrical for Communications Systems

1) Communications Pathway System: Includes (but is not limited to) device boxes, pull boxes, conduit, cable tray, duct/ductbank, and other pathway and raceway components necessary to provide pathway for, support, and route communications cables.

2) Telecommunications Grounding System: Includes (but is not limited to) providing a permanent grounding and bonding infrastructure for the Communications Cabling System.

1.7 ABBREVIATIONS

A. Refer to the individual Specification Sections and Drawings for abbreviations and their definitions.

1.8 GOVERNING REQUIREMENTS

A. All work shall be executed in compliance with the applicable portions of the following Governing Requirements:

1. General
   a. ACI: American Concrete Institute (www.aci-int.org)
   b. AHJ: Authority Having Jurisdiction
   c. ANSI: American National Standards Institute (www.ansi.org)
   d. ASTM: American Society for Testing and Materials (www.astm.org)
   e. BELLCORE: Bell Communications Research (www.telecordia.com)
   f. BICSI: A Telecommunications Association (www.bicsi.org)
   g. ETL: Electrical Testing Laboratories
   h. IBC: International Building Code
   i. ICEA: Insulated Cable Engineers Association (www.icea.net)
   j. IEEE: Institute of Electrical and Electronic Engineers (www.ieee.org, www.standards.ieee.org)
   k. IES: Illuminating Engineering Society of North America (www.iesna.org)
   l. IFC: International Fire Code
   m. FCC: Federal Communications Commission Rules and Regulations
   n. NAB: National Association of Broadcasters
   o. NFPA: National Fire Protection Association (www.nfpa.org)
   r. NEMA: National Electrical Manufacturers Association (www.nema.org)
   s. OSHA: Occupational Safety and Health Administration (www.osha.gov)
   t. RUS: Rural Utilities Service (http://www.usda.gov/rus/)
   w. State and local codes, ordinances, and regulations
   x. Requirements and guidelines of local utility companies
   y. Applicable state, local and/or federal laws, regulations, and/or specifications
   z. Manufacturer installation requirements, guidelines and recommendations

2. Communication System Specific: The following portions of the General Governing Requirements above are particularly relevant to a given Communications System. Omission from this list does not alleviate the Contractor from responsibility for executing all Work for all Communications Systems in compliance with all applicable portions of the Governing Requirements above:

a. Communications Cabling
   1) TIA/EIA 568: Commercial Building Telecommunications Cabling Standard
   2) TIA/EIA 569: Commercial Building Standard for Telecommunication Pathways and Spaces
   3) TIA/EIA 606: The Administration Standard for the Telecommunications Infrastructure of Commercial Buildings
4) ANSI J-STD-607: Commercial Building Grounding and Bonding Requirements for Telecommunications
5) ANSI/EIA 310-D: Cabinets, Racks, Panels and Associated Equipment
6) TIA/EIA: Technical Service Bulletins (TSBs) (related to the above TIA/EIA standards)
7) IEEE 802.3 (series): Local Area Network Ethernet Standards
10) BICSI: Telecommunications Distribution Methods Manual
11) NFPA 70: NEC: National Electrical Code (NFPA Article 70)
12) NFPA 75: Protection of Electronic Computer and Data Processing Equipment
13) NFPA 78: Lightning Protection Code
14) FCC Part 68: Connection of Terminal Equipment to Telephone Network.
15) FCC Part 76.611: CFR Title 47 Radiation Leakage Standards

b. Electrical for Communications:
1) TIA/EIA 569: Commercial Building Standard for Telecommunication Pathways and Spaces
2) TIA/EIA 606: The Administration Standard for the Telecommunications Infrastructure of Commercial Buildings
3) ANSI J-STD-607: Commercial Building Grounding and Bonding Requirements for Telecommunications
4) TIA/EIA: Technical Service Bulletins (TSBs) (related to the above TIA/EIA standards)
5) BICSI: Telecommunications Cabling Installation Manual
6) BICSI: Telecommunications Distribution Methods Manual
7) NFPA 70: NEC: National Electrical Code (NFPA Article 70)
8) NFPA 75: Protection of Electronic Computer and Data Processing Equipment
9) NFPA 78: Lightning Protection Code
10) UL 467: Grounding and Bonding Equipment

3. Owner Specific: The Contractor shall comply with the following Owner requirements. These requirements shall be incorporated by reference into these Specifications and shall be hereinafter considered a Governing Requirement:
   a. University of Colorado at Boulder:
      1) UCB Telecommunications Standards:
         (http://www.colorado.edu/facilitiesmanagement/pdc/construction/standards/documents/Division27CommunicationsSpecifications.pdf)
         a) Work shall be executed and inspected in compliance with the UCB Telecommunications Standards (available at above hyperlink or through UCB ITS), including, but not limited to:
            i. UCB Division 27 Telecommunications Standards
            ii. UCB Construction Drawings As-built Requirements
            iii. UCB Cable Footage and Count Information
            iv. UCB Construction Inspection Report
            v. UCB Approved Rack Details
            vi. UCB ITS Telecom CAD Standards Guidelines
            vii. UCB Labeling and Testing Document
            viii. UCB Jack Numbering Document (T-5)
            ix. UCB Typical Telecommunications Conduit Layouts Drawing
         b) UCB Safety Requirements
         c) These Specifications may expand upon or supplement the UCB Telecommunications Standards.
For bidding purposes, in the event of a conflict or discrepancy between these Specifications and the UCB Telecommunications Standards, the UCB Telecommunications Standards shall govern. However, if the requirement of these Specifications (or portion thereof) exceeds that of the UCB Telecommunications Standards, and is furthermore not contrary to the UCB Telecommunications Standards, then the requirement of these Specifications (or portion thereof) shall prevail.

For installation purposes, in the event of a conflict or discrepancy between these Specifications and the UCB Telecommunications Standards, the Contractor shall notify the Engineer and await approval to proceed.

B. Nothing in the Governing Requirements and Construction Documents shall be construed to permit work not conforming to all governing codes and regulations.

C. Errors or omissions in the Construction Documents do not relieve the Contractor from executing the work in accordance with the Governing Requirements, including all governing codes and regulations.

D. The applicable portions of the Governing Requirements shall be incorporated by reference into each related Specification Section in this Division.

1.9 PERMITS AND FEES

A. The Contractor shall obtain and pay for all licenses, permits and inspections required by the laws, ordinances and rules governing work specified herein. Such fees shall be included in the bid amount.

B. The Contractor shall pay all fees, including but not limited to fees for local utility service installation, connection charges, etc. Such fees shall be included in the bid amount.

C. Notations on permit or review documents shall be observed. Additional requirements noted by the Governing Authority shall be made part of the requirements for construction of the Project. Additional costs for implementing these requirements, if any, shall be submitted for review prior to construction.

D. Engineering Fees: The Specifications may identify work required of the Engineer due to improper action(s), lack of action(s), and/or deficiencies on the Contractor's part. Such instances will be identified in the Specifications and the Contractor shall be responsible for these fees if they are incurred by the Engineer.

1. Fees charged to the Contractor will be at the Engineer's billing rates at the time the services are performed. Travel time will be included, if applicable. Mileage will be charged for required automobile travel at the standard IRS mileage rate in effect at the time the services were performed. Expenses will be billed at cost plus 10 percent markup.

2. Fees will either be paid directly to the Engineer or will be deducted directly from payments (or the final payment) to the Contractor.
A. The requirements below expand upon and/or supplement the requirements in Division 1.

B. Substitution of product and deviations from the methods of construction specified which are used in the Contractor’s bid shall be at the sole risk of the Contractor, and as such are subject to rejection without consideration.

C. Proposed substitution and deviation requests shall be reviewed during the time of Submittal review:
   1. Conditions for Consideration: Substitution and deviation requests will be received and considered only when one or more of the following conditions are satisfied:
      a. A substantial advantage is offered to the Owner, in terms of cost, time, or other considerations of merit.
      b. The specified product or method of construction cannot be provided with the contract period.
      c. The specified product or method of construction cannot receive necessary approval by a Governing Authority, and the requested substitution can be approved.
      d. The specified product or method of construction cannot be provided in a manner that is compatible with other materials.
      e. The product as specified includes the statement, “Or Equal.”
   2. Conditions for Rejection: Substitution and deviation requests will be rejected for the following reasons, among others:
      a. The conditions for consideration (see above) have not been met.
      b. Extensive revisions to the Construction Documents are required to support the proposed changes.
      c. The proposed changes do not comply with the general intent of the Construction Documents.
      d. The substitution request is for product which does not include the statement, “Or Equal”, or is specified as “no substitute”, “substitutions are not acceptable”, “provide as specified” or similar.
      e. The proposed change is solely for the convenience or economic gain of the Contractor.

D. The Contractor shall not proceed with a substitution or deviation without written approval.
   1. Upon approval of the request, the Contractor shall be responsible for fees incurred by the Engineer for re-design work or modifications to the Construction Documents if necessitated by the nature of the request.

1.11 SUBMITTALS

A. The requirements below expand upon and/or supplement the requirements in Division 1.

B. General:
   1. Submittal review is a courtesy extended to the Contractor for the limited purpose of checking for general conformance with the design concept and the information shown in the Construction Documents.
   2. The Contractor shall provide submittal information as soon as practicable after the date of Notice to Proceed and prior to the purchase, delivery, fabrication, and installation of product and materials.
3. In the event of discrepancies or conflict between Submittals and the Construction Documents, either prior to or after review, the requirements of the Construction Documents shall prevail.

4. Submission of material for review, regardless of the outcome of the review, does not alter the Contractor’s obligation to follow the intent of the Construction Documents, nor the Contractor’s responsibility to comply with the Construction Documents.

5. Submittals will not be reviewed and will be returned to the Contractor without review for the following reasons:
   a. Submittal package does not conform to the requirements listed herein.
   b. Submittal is for a product or method of construction not required by the Construction Documents.
   c. Submittal is partial or incomplete.
   d. Submittal contains information concerning the proposed implementation of means, methods, procedures, sequences or techniques, temporary aspects of the construction process, or other items, which are the sole responsibility of the Contractor.
   e. Submittal was not carefully reviewed by the Contractor prior to submission, as evidenced by poor organization, obvious or numerous errors, lack of correlation or cross-referencing, lack of clarity in presentation, or containing Shop Drawings which do not meet the standard of the Construction Drawings.
   f. Submittal was submitted directly from the Contractor’s subcontractor(s) or vendor(s).
   g. Subcontractor and/or vendor submittal information was not carefully reviewed and/or approved by the Contractor.
   h. Submittal does not bear the Contractor’s approval stamp, and/or contains subcontractor and/or vendor submittal information which does not bear the Contractor’s approval stamp.
   i. Submittal contains substitution and/or deviation requests, which are not clearly identified as substitution or deviation requests in a separate “Substitution and Deviation Requests” section of the Submittal.

6. Submittals shall be submitted as a single package and shall include subcontractor and vendor submittal information.

7. Each submittal (or re-submittal) set shall bear a unique Contractor’s submittal sequence number.

8. Requests for substitution shall only be included under the “Substitution and Deviation Requests” section of the submittal (see below) and shall comply with the requirements of Part 1 – General: Substitutions and Deviations herein. Submission of substitution requests in any other portion of the Submittal does not constitute an acceptable or valid request for substitution, nor will review of such information constitute approval in any manner.

C. Submittal Format:
1. Submittals shall be bound in one letter-sized (8-1/2 inch by 11 inch) document and under separate cover from submittals furnished under other Divisions.
2. Front cover of Submittal shall indicate the name of the project, the project number, the name of the Owner, year of completion, the title “Telecommunications Submittals”, and the names of the Engineer and Contractor, as well as the General Contractor.
3. Submittals shall include a table of contents identifying sections, Specification Sections, and page numbers.
4. Information provided in the submittal shall follow the same general order of the Specifications.
5. Submittals shall be sectionalized (Indexed with titled tab dividers (by section name – not numbered and not handwritten)).
a. Sections shall be (see Submittal Sections below for more detail regarding each section):
   1) Product Data
   2) Shop Drawings
   3) Samples
   4) Substitution and Deviation Requests
   5) Test Reports
   6) Other Information

b. Within each section, information shall be organized by Specification Section and/or Drawing to which the information applies.

c. Within each section, where section is not applicable (e.g. shop drawings, technical drawings, etc.), the section shall include a page denoting same.

6. Pages shall be numbered.

7. Drawings (except for full and half-size Shop Drawings), if not in 8-1/2 inch by 11 inch size, shall be bound and accordion folded to 8-1/2 inch by 11 inch size.

8. Quantity: Submit copies in quantities per the requirements of Division 1.

D. Submittal Sections: Submittals shall be sectionalized and shall include sections for Product Data, Shop Drawings, Substitution and Deviation Requests, and Samples, Other Information (see Submittal Format herein).

1. Product Data: Submit Product Data information as called for in the individual Specification Sections. Product Data shall include:
   a. For product which is being provided as specified, do not provide product data. Instead, provide a list of all products to be provided as specified and state in writing that each product in the list is being provided as specified.
   b. For all other product other than that specified, provide the following product information (as applicable):
      1) Specification Section to which the product applies.
      2) Catalog cut sheets, manufacturer data sheets, and/or specification sheets detailing the product, item, assembly and installation.
      3) Manufacturer’s printed recommendations (if not included in the above).
      4) Written description.
      5) Notation of dimensions verified by field measurement.
      6) Notation of coordination requirements.
      7) Compliance with recognized trade association and testing agency standards.
      8) Highlighted details within the product data that identifies compliance with the Construction Documents or the intent of the Construction Documents.
      9) Highlighted details within the product data that identifies deviations from the Construction Documents or the intent of the Construction Documents.
   c. For products for which the Contractor is proposing a substitution, include the product as specified in the Submittal per the above requirements and list the reference to the proposed substitution in the “Substitution and Deviation Requests” section of the Submittal (see below).
   d. Do not provide product quantities – quantities are the sole responsibility of the Contractor and will not be reviewed.

2. Shop Drawings: Submit Shop Drawings that are newly prepared, drawn to accurate scale, and that fully illustrate the Contractor’s understanding of the intent and requirements of the Construction Documents (i.e. Shop Drawings shall not be based upon or consist of a reproduction of the Construction Documents or standard printed data). Submit Shop Drawings as called for in the individual Specification Sections. Shop Drawings shall include:
   a. Identification of products and materials
   b. Schedules, including but not limited to:
1) Equipment and components
2) Cables: identify manufacturer, model number, outside diameter and connector
   c. Notation of coordination requirements
   d. Notation of dimensions established by field measurement
   e. Notation of details that identify compliance with the Governing Requirements
   f. Notation of details that identify compliance with the Construction Documents or the intent of the Construction Documents.
   g. Notation of deviations from the Construction Documents or the intent of the Construction Documents. *Highlight, encircle, or otherwise clearly indicate such deviations*
   h. Roughing-in and setting diagrams
   i. Fabrication, installation, and adaptation details including, but not limited to:
      1) Electronic equipment to be mounted within racks
      2) Cable routing between electronic equipment in racks or housings
      3) Equipment to be mounted within furniture
      4) Wall and ceiling mounted devices
      5) System labels, including but not limited to engraved, laminoid, silk screen and paper labels
      6) Suspended loudspeaker mounting, including but not limited to tilt angle, splay angle, height above finished floor, coverage pattern, and assembled weight
      7) Non-standard manufactured or adapted equipment
      8) Dimensions
      9) Other details as necessary to establish the intent of the Construction Documents
   j. One-line diagrams detailing the interconnections of system components, including the identification of all devices, cabling, terminations, and termination techniques as required for fully functional systems
   k. Applicable software block diagrams representing the internal operation of devices such as, but not limited to, control processors and digital signal processors
   l. Templates
   m. Floor plans identifying equipment locations, *if not shown on the Construction Documents*
   n. Reflected ceiling plans identifying equipment locations, *if not shown on the Construction Documents*
   o. Indication of sectionalized manufacturing of equipment (i.e. for oversized equipment that cannot be installed as a single component).
   p. Shop drawings shall be provided in form, format and size identical to that of the Construction Drawings (the Construction Drawings set the standard). Shop Drawings that do not meet this standard shall be rejected without review.
      1) Title Block: May be the Contractor’s Title Block, but shall indicate Project name, manufacturer’s name and logo, date of submittal, content of sheet, and sheet number.
      2) Floor Plans: Plan titles, scales, north arrows, column lines, line types, fonts, and room names and numbers shall match that of the Construction Drawings.
   q. For methods of construction for which the Contractor is proposing a deviation, include the method of construction as specified per the above requirements and list the reference to the proposed deviation in the “Substitution and Deviation Requests” section of the Submittal (see below).
   3. Substitution and Deviation Requests: For each substitution and/or deviation request, include the following:
a. Whether the request is for substitution of product or a deviation from a construction method.
b. The Specification Section(s) or Drawing to which the request applies.
c. Reason for the request. (Note: the reason must conform to the requirements of Part 1 – General: Substitutions and Deviations herein.)
d. If a substitution, provide:
   1) Specified product to which the proposed substitution applies.
   2) Product Data for the substituted product.
   3) Notation of differences between the proposed substitution and the specified item. *Highlight, encircle, or otherwise clearly indicate the substitution.*
e. If a deviation, provide:
   1) Specified Drawing and/or method of construction to which the proposed deviation applies.
   2) Shop Drawings showing the deviation.
   3) Notation of differences between the proposed deviation and the specified drawing and/or construction method. *Highlight, encircle, or otherwise clearly indicate the deviation.*
f. Written statement signed by the Contractor stating that the proposed substitution or deviation is equivalent or superior in function, appearance, and quality to the specified product or construction method and that the proposed substitution or deviation will be at no additional cost to the Owner.

4. Samples: Submit Samples as called for in the individual Specification Sections.
   a. Samples shall be indexed in this section and provided as an attachment to the Submittal.

5. Test Reports:
   a. Submit full-size mock-ups of the test reports that will be used to document the testing.

6. Other Information:
   a. Contractor Statement of Qualifications, per Division 27 Specification Section Contractor Qualifications.
   b. Bid Form or Bid Supplement Form, per Division 27 Specification Section Bidding.
   c. Owner Specific: Submit other information as required by Owner Specific Governing Requirements.
   d. Submit additional information as called for in the individual Specification Sections.

E. Submittal review:
   1. The submittal review will not include review of the accuracy or completeness of details, such as quantities, dimensions, weights or gauges, fabrication processes, construction means or methods, coordination of work with other trades, or construction safety precautions, all of which are the sole responsibility of the Contractor.
   2. Corrections or comments made on the Submittal by the reviewer during the submittal review do not relieve the Contractor from compliance with the requirements of the Construction Documents.
   3. Review of a specific item shall not indicate that the reviewer has reviewed the entire assembly of which the item is a component.
   4. Review does not relieve the Contractor from responsibility for errors, which may exist in the submitted data.
   5. Review of substitutions and deviations:
      a. The reviewer shall not be responsible for review of substitutions and/or deviations that were not brought to the attention of the reviewer by specific inclusion of the substitution and/or deviation in the Substitution and Deviation Requests section of the Submittal.
b. Where a substitution and/or deviation is not included in the Substitution and Deviation Requests section of the Submittal, the procurement and installation of the substitution and/or deviation is at the sole risk of the Contractor.

c. If the reviewer does not specifically note substitutions and/or deviations, it remains the Contractor’s responsibility to comply with the Construction Documents.

6. After review, submittals shall be returned together with review comments and specific actions (if required) to be taken by the Contractor. Typical comments and actions will be:
   a. No Exception Taken
   b. Revise - Resubmittal Required
   c. Revise - Resubmittal Not Required
   d. Submit Specified Item
   e. Rejected
   f. Not Reviewed

7. The Contractor shall perform no portion of the Work requiring a submittal until the respective submittal has been reviewed and approved. Such Work shall be in accordance with the approved submittal.

F. Re-submission of submittals:
   1. Submittals shall continue to be re-submitted and reviewed until all submitted items are marked by the Engineer as ‘No Exceptions Taken’ or ‘Revise - Re-submittal Not Required’.
   2. Re-submittals shall be clearly identified as a re-submittal and shall identify changes on a separate Revisions page inserted after the Table of Contents page(s).
   3. The Contractor shall be responsible for fees incurred by the Engineer resulting from subsequent review of re-submittals that fail to meet the requirements herein. Such fees will be incurred after the Engineer has reviewed the original submission and one re-submission.
   4. Re-submittals do not entitle the Contractor to additional time, nor are they considered cause for delay of the project.

1.12 RECORD DOCUMENTS

A. The requirements below expand upon and/or supplement the requirements in Division 1.

B. The Contractor shall maintain a set of Record Documents showing all additions, changes, and deletions that have been made to the original Drawings and Specifications throughout the course of construction, as well as reviewed Submittal data, including but not limited to Shop Drawings.
   1. Items to be noted shall include but shall not be limited to:
      a. Final device box, pull box, floor box, sleeve and conduit stub/ poke thru locations
      b. Final locations, sizes, and dimensions of equipment, including concealed equipment
      c. Routing of concealed raceways/pathways
      d. Raceways/pathways located more than 2 feet from where shown on the original Construction Documents
      e. Raceways and main pathways (pathways with more than 30 cables) not shown on the Drawings
      f. Building outline changes
TELECOMMUNICATIONS

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BASIC COMMUNICATIONS REQUIREMENTS

2. Notations shall be in a neat, legible and logical manner. Areas affected by the change shall be clouded.

C. Record Documents shall:
   1. Be kept current (i.e. no more than one week behind actual construction) throughout the course of construction.
   2. Be retained at the job site until Final Acceptance.
   3. Be made readily available at all times to the Owner’s representative.
   4. Not be the Contractor’s working documents.
   5. Be protected from deterioration and loss in a secure, fire-resistant location.
   6. Be made readily available to the Engineer for review of completeness and accuracy throughout the course of construction.
   7. At project closeout, be updated with the items on the Known Exceptions/Deviations List per the requirements of Part 3 – Execution: Project Close-Out, herein. Include only those items marked “Approved” by the Engineer.

   1. Handwritten notations on the Record Drawings shall be CAD drafted by the Contractor onto a final, fresh set of Construction Drawings prior to submission. Record Drawings shall be provided in form, format, size, and CAD version identical to that of the Construction Drawings (the Construction Drawings set the standard). Record Drawings that do not meet this standard shall be rejected without review.
   2. The Record Drawings shall be reviewed by the Contractor for accuracy and completeness prior to submission.

E. Owner Specific:
   1. Record Drawings shall be reformatted by Contractor to fully conform to UCB ITS Telecom CAD Standards for Documentation and Construction Projects.
   2. Submit other information as required by Owner Specific Governing Requirements.

F. Submit additional information as called for in the individual Specification Sections.

1.13 OPERATING AND MAINTENANCE (O&M) MANUALS

A. General:
   1. O&M Manuals shall be submitted in accordance with the applicable portions of Division 1.
   2. O&M Manuals shall be submitted as a single package and shall include subcontractor and vendor O&M information.
   3. O&M Manuals shall be prepared by personnel who are:
      a. Completely familiar with the requirements of this Section
      b. Trained and experienced in the maintenance and operation of the described products
c. Skilled as a technical writer to the extent required to communicate essential data

d. Skilled as a draftsperson competent to prepare the necessary Drawings

4. Catalog pages and data included in O&M Manuals shall be originals. Where not possible to obtain original copies in sufficient quantity, catalog pages and data shall be neat, clean copies of the originals.

5. O&M Manuals shall include the following:

a. Table of Contents

b. Operations: Assemble operations and instructions data which shall include all procedures necessary for activating and controlling each system and/or component in all modes of operation and for fulfilling all functional requirements.

c. Product Data: Include the product data provided in the original Submittal(s) reflecting product as supplied and installed, as well as additional information such as manufacturer, installation, operation, routine maintenance information, and technical specifications.

d. Shop Drawings: Include the Shop Drawings provided in the original Submittal(s) reflecting the system and/or components as installed.

e. Service Information: Assemble service information (cleaning, adjustments, frequency, etc.) for each device requiring service. For devices requiring qualified service, compile an index of qualified service providers (and their contact information) able to service these devices. Provide a recommended maintenance schedule for each device.

f. Spare Parts: Assemble a list of spare parts. Compile an index of spare parts providers (and their contact information) able to provide the spare parts.

g. Tests Results: Assemble all test documentation made for each system, device, and/or component requiring testing.

h. Calibration/Configuration Settings: Assemble and document all calibration/configuration settings made for each system, device and/or component requiring calibration and/or configuration. Include ‘normal’ settings for each component.

i. Record Documents: Provide Record Documents per the requirements of Part 1 – General: Record Documents herein.

j. Final punchlist: Provide the final punchlist including all corrective action taken and Contractor initials per the requirements of Part 3 – Execution: Project Close-Out.

k. Certificates of Inspection: Provide certificates of inspection and final approval from all applicable Governing Authorities, the Manufacturer(s), the Contractor’s RCDD, etc.

l. Warranty: Provide warranty documentation per the requirements of Division 27 Specification Section Warranty and the individual Specification Sections.

m. Software, including but not limited to:

1) All source code for custom programs. Source code shall be provided on CD-ROM.

2) System software

3) Computer system operating software

4) Application software

5) Version Documentation: Provide a spreadsheet in MS Excel format documenting all software and firmware versions for all programmable devices. Provide in both printed format and on CD-ROM.

n. Other Information:

1) Submit additional information as called for in the individual Specification Sections.
2) Owner Specific: Submit other information as required by Owner Specific Governing Requirements.

6. O&M Manual contents shall also be submitted in both hard copy and soft copy on CD-ROM.

B. O&M Manual format:
   1. O&M Manuals shall be bound in one letter-sized (8-1/2 inch by 11 inch) hard cover (hard back or loose leaf) binder.
   2. Separate O&M Manuals shall be provided for each communications system (i.e. Communications Cabling, etc.)
   3. Front cover of the O&M Manual shall indicate the name of the project, the project number, the name of the Owner, the title of the O&M Manual indicating the communications system (Communications Cabling System O&M Manual, etc.), the year of completion, the name of the Engineer, the name of the Contractor, and as applicable the names of the Architect and the General Contractor.
   4. Side cover of the O&M Manual shall indicate the name of the project, the project number, the name of the Owner, and the title of the O&M Manual.
   5. O&M Manual shall include each section defined under O&M Manual Requirements above.
   6. O&M Manuals shall include tab dividers, titled (not numbered) for each section. Tab dividers shall not be handwritten.
   7. O&M Manuals shall include a table of contents identifying sections and page numbers.
   8. Pages within each section shall be numbered.
   9. Drawings (excluding full size Record Drawings) shall be bound and accordion folded to 8-1/2 inch by 11 inch size.

C. O&M Manual submission:
   1. The Contractor shall submit one draft copy of the O&M Manual for review and approval by the Engineer.
      a. The submission will be reviewed for accuracy, completeness, and compliance to the requirements herein. A submission which fails to meet these requirements will be rejected and returned to the Contractor together with review comments and specific actions to be taken by the Contractor. The Contractor shall revise the O&M Manual and re-submit for review and approval.
      b. The O&M Manual shall continue to be re-submitted and reviewed until such time as the O&M Manual is approved by the Engineer.
      c. The Contractor shall be responsible for fees incurred by the Engineer resulting from subsequent review of O&M Manuals that fail to meet the requirements herein. Such fees will be incurred after the Engineer has reviewed the original submission and one re-submission.
   2. Upon approval of the draft copy, the Contractor shall submit final copies in quantities per the requirements of Division 1.

D. Final payment to the Contractor will not be authorized until the final copies of the O&M Manuals (including Record Documents) have been received and approved by the Engineer.

PART 2 - MATERIALS

2.1 GENERAL

A. Where one or more products are listed for a specified component:
1. The product listed first shall establish size, capacity, grade, quality, technical specifications, and the basis of design.
2. Products not listed first shall be considered “other acceptable” products. Should the Contractor choose to use those products, costs for changes to the construction required to support the use of these products shall be borne by the Contractor.

B. If no product is listed, then any manufacturer able to meet the listed Specifications is acceptable.

C. Where product is specified without the statement “or equal”, substitutions will not be entertained.

2.2 MATERIALS

A. The Contractor is responsible for providing all incidental and/or miscellaneous tools, scaffolding, consumable items, testing equipment appliances, and other hardware not explicitly specified or shown on the Drawings required for the installation of a complete and operable systems ready for the Owner’s use.

B. Products shall be:
   1. New and unused, free from blemish and defects.
   2. Standard products of manufacturers regularly engaged in the production of such products.
   3. Of the manufacturers latest standard design at the time of procurement,
   4. Designed to ensure satisfactory operation and life in the environmental conditions that prevail in their installation location.
   5. Designed for application in commercial/professional systems, except as otherwise specifically noted.

C. All products, whether stock or custom, shall be supported by replacement parts and manufacturer schematic drawings as applicable. “Black box” and/or unidentified components are not acceptable.

D. All products of the same or similar type shall be the product of one manufacturer.

E. All component products within a unified system shall be the product of one manufacturer.

F. Equipment shall be UL listed, or equivalent.

2.3 DELIVERY, STORAGE, AND HANDLING

A. Prior to ordering and delivery of equipment, the Contractor shall:
   1. Verify that the equipment shall adequately pass through building openings and passageways with unobstructed access to the final equipment location. When building openings and passageways will not permit the equipment to pass through unobstructed, equipment shall be manufactured and shipped in sections for final assembly at the equipment location.
   2. Verify that the equipment shall properly fit the space allocated, that required clearances can be maintained, and that the equipment can be located without interference from other systems, structural elements, or the work of other trades.
B. The Contractor shall arrange deliveries in accordance with the construction schedule. Deliveries shall be scheduled to maintain the progress of work, to avoid conflict with the work of other Trades, and to accommodate site conditions.
   1. The Contractor shall be responsible for coordinating and scheduling the timely delivery of products and materials indicated to be furnished by others or by the Owner.

C. Deliver, store and handle products and materials in full compliance with the manufacturer’s recommendations and/or instructions, using means and methods that will prevent damage, deterioration, and loss (including theft).

D. The Contractor shall protect products and materials until Final Acceptance. Such protection is the sole responsibility of the Contractor, and the Contractor shall be responsible for replacing damaged, deteriorated, stolen or lost product at no additional cost to the Owner.
   1. Where products and materials are indicated to be furnished by others or by the Owner, the Contractor shall make a complete and careful check of all materials delivered. The Contractor shall provide a written and signed receipt acknowledging acceptance of the delivery and the condition of the materials delivered. After receipt, the Contractor shall assume full responsibility for the materials.

E. Products and materials subject to damage by the elements shall be stored above ground, under cover, in a weather tight enclosure, with ventilation adequate to prevent condensation. Temperature and humidity shall be maintained within the manufacturer’s recommendations.

F. The Contractor shall make provisions for receiving and storing products and materials, including products and materials to be furnished by the Owner (or by others) to be installed by the Contractor as part of the work.

G. Products and materials shall be carefully inspected for damage upon delivery. Defective or damaged products and materials shall be marked ‘Rejected’, removed from the site, and shall not be installed.

H. Products and materials shall be delivered to the site in the manufacturer’s original containers, complete with labels and instructions for the proper handling, storage, unpacking, protection and installation.

I. The Contractor shall ensure that products and materials to be installed are not temporarily used as steps, ladders, platforms, scaffolds, or for storage by the Contractor or by other trades during the construction process. Materials found to be used in such a manner will be considered “damaged”, shall not be installed, and shall be replaced at no additional cost to the Owner.

PART 3 - EXECUTION

3.1 GENERAL

A. Work shall comply with the applicable portions of the Governing Requirements in effect at the time of construction, including all addenda, errata, annexes, and technical service bulletins (TSBs), etc., except where a specific date, version, or edition is otherwise indicated, or where otherwise mandated by a Governing Authority.
B. In the event of a conflict between a code and the other Governing Requirements, or between a code and a requirement of the Construction Documents, the code requirement shall govern. However, if the non-code requirement (or portion thereof) exceeds that of the code, and is furthermore not contrary to the code, the non-code requirement (or portion thereof) shall prevail.

C. Installation shall be performed by workers skilled in the trade, familiar with the particular techniques and methods of construction applicable to the work of the trade.

D. Completed work shall present a neat and professionally installed appearance. The appearance of the work shall be of equal importance to its operation. Failure to present a neat and professionally installed appearance shall be considered sufficient reason for rejection of the system in part or in whole.

E. Completed work shall demonstrate quality workmanship. Quality workmanship shall be of equal importance to its operation. Failure to demonstrate quality workmanship shall be considered sufficient reason for rejection of the system in part or in whole.

F. In the event that supplemental information is required to confirm the intent of the Construction Documents, the Contractor shall notify the Engineer and await the Engineer’s response prior to procurement of materials and performance of the related work. Procurement of materials and work performed without such interpretation and/or clarification is at the sole risk of the Contractor, and as such, the Contractor shall correct such work at no additional cost to the Owner should the materials or work not conform to the intent of the Construction Documents.

G. The Contractor shall order and install materials and equipment with long lead times and/or those having a major impact on work by other trades so as not to jeopardize the project or project schedule.

H. The Contractor is responsible for ensuring that each installed component’s performance is within the Manufacturer’s published specifications, the Governing Requirements, and all other requirements as specified within this Division.

I. The Contractor is solely responsible for the safety of the public and workers in accordance with all applicable rules, regulations, building codes and ordinances, and Governing Requirements, including but not limited to employee training and Safety Program development, documentation and execution.

J. Notwithstanding any other provisions of the Contract Documents, the Contractor shall be solely responsible for location and protecting any and all utility service lines (both Owner controlled and Public) in the work area.

3.2 IDENTIFICATION

A. All Contractor personnel shall be clearly identified by uniform and/or company badge with photo ID, employee’s name, and company name. Contractor vehicles shall be equipped with signs on both sides of vehicle identifying the Contractor’s company name.

B. The Contractor may also be issued and required to wear Owner provided Contractor ID’s for the duration of the project (coordinate this requirement with the Owner prior to any on site work). Such identification will be for the purposes of entry into card access controlled locations and/or identification of authorized Contractor personnel. All Owner
provided Contractor ID’s shall be returned to the Owner prior Final Acceptance. The Work will not be considered complete until all ID’s are returned.

3.3 SUPERVISION

A. The Contractor shall appoint a Project Manager who will be the single point of contact for all work accomplished under this Project and will be vested by the Contractor with the authority to make decisions on behalf of the Contractor.

1. The Project Manager will be responsible to represent the Contractor and coordinate all aspects of this Project, including but not limited to:
   a. Overall and specific project responsibility
   b. Thorough knowledge of Project Specifications and Drawings
   c. Creation and maintenance of a project schedule, including milestones, task definitions and resource allocations
   d. Attendance at all Project Management meetings
   e. Supervision and direction of all Contractor personnel
   f. Documentation, including submittals and change orders
   g. Quality assurance of Project

2. The Project Manager initially assigned to the Project shall be assigned to the Project for the duration of the Project. Once assigned by the Contractor, the Project Manager shall not be changed by the Contractor without Engineer and Owner approval.

B. The Contractor shall assign a qualified Foreman to the Project and shall keep the Foreman on site and in charge of the work at all times. The Foreman shall be equipped with a mobile phone during project working hours.

1. The Foreman initially assigned to the Project shall be assigned to the Project for the duration of the Project. Once assigned by the Contractor, the Foreman shall not be changed by the Contractor without Engineer and Owner approval.

3.4 PERMITS AND FEES

A. The Contractor shall make arrangements to obtain and pay for necessary permits, licenses, and inspections.

B. No work shall be started prior to obtaining necessary permits and payment of required fees. Work installed prior to obtaining proper permits shall, if required by the Governing Authority (AHJ), be redone in compliance with requirements at no additional cost to the Owner.

3.5 INSTALLATION

A. The Contractor shall notify the Engineer and wait for direction/instruction prior to proceeding with procurement and installation for any portion of the Work which could be affected by the following:

1. Required items and/or details have been omitted from the Construction Documents.

2. Discrepancies or conflicts exist between the requirements of the Drawings and the Specifications, between the Governing Requirements and the Construction Documents, and/or between the various Governing Requirements.

3. Discrepancies or conflicts between the requirements of this Division and those of Division 1.
B. Dimensions and clearances:
   1. Equipment dimensions and dimensions indicated for the installation of equipment are restrictive dimensions. Verify that the equipment will fit within the indicated locations and spaces.
   2. Maintain, at a minimum, code required clearances.
   3. Promptly notify the Engineer of any potential dimension or clearance conflicts, and await the Engineer’s direction prior to purchase and rough-in of the equipment.

C. Access:
   1. Install equipment such that it is readily accessible for operation and maintenance.
   2. Access to equipment shall not be blocked or concealed by conduits, supporting devices, boxes, or other items.
   3. Do not install equipment such that it interferes with the normal operation or maintenance requirements of other equipment.

D. Equipment shall be installed level, plumb, parallel, and perpendicular to building structures and to other building systems and components, except where otherwise indicated.

E. Equipment shall be securely fastened. Select fasteners so that the load applied to any one fastener does not exceed 25 percent of the proof-test load.

F. Place equipment labels and/or other identification where the label and/or identification can be easily seen and read without difficulty.

G. Grounding/Bonding: Bond all non-current carrying raceway to the nearest TGB.

H. Attachment of hanger rods, support cables, diagonal wall bracing, and any other connections made to the building structure after the application of fireproofing/firestopping materials, shall be made with minimal impact to the fireproofing/firestopping materials. The Contractor making such connections shall remove only as much fireproofing/firestopping as required for the attachment, and for scoring and over-cut only as required for the connection. The Contractor shall be held responsible for costs associated with patching of excessively removed fireproofing/firestopping material.

I. Cables, conduits, and other raceway shall be firmly secured and cleaned where penetrating fire rated barriers.

3.6 DRAWINGS

A. Drawings shall not be scaled for rough-in measurements or equipment locations. Field verification of dimensions, locations, and levels to suit field conditions is required. Final placement of devices, outlets, equipment, etc. shall be coordinated with field conditions.

B. Unless specifically dimensioned or detailed, Drawings indicate approximate locations, arrangement, and general character. To avoid interference with structural members and equipment of other trades, or for the convenience of the Owner, it may be necessary to adjust the locations shown on the Drawings prior to installation. Unless specifically dimensioned or detailed, and with the exception of locations of equipment and raceway in specialized communications rooms and spaces (such as Telecommunications Rooms, Data Centers, etc.), the Contractor may make minor location adjustments without obtaining the Engineer’s prior approval. All other adjustments require prior approval from the Engineer.
1. Minor adjustments are defined as distances not to exceed:
   a. 1 foot at grade, floor ceiling, and roof level in any direction in the horizontal plane
   b. 1 foot on walls in a horizontal direction within the vertical plane.
2. Particular attention shall be paid to door swings, piping, ductwork, structural steel, and other ceiling conflicts:
   a. In general, waste and vent lines, large pipe mains, and ductwork shall be given priority for the locations and spaces shown.
   b. In general, electrical lighting fixtures shall be given priority for ceiling space.
3. Where minor location adjustments are required, such adjustments shall be made at no additional cost to the Owner.

3.7 ASBESTOS/LEAD

A. The Owner manages asbestos/lead identification, removal and control. Normally the site of work operations will be identified by the Owner as suitable for construction to proceed and Owner EH&S documentation is provided for the Contractor to file. The Contractor shall refer to and comply with the EH&S report from UCB prior to performing any work. If that documentation is not available, the Contractor shall not proceed with the work until that documentation is available.

B. The Contractor shall be aware of and comply with Owner specific procedures and policies related to asbestos and lead (contact EH&S at 303-492-0215).

C. The Owner requires appropriate asbestos awareness training of Contractor employees. This training shall be provided to Contractor employees at no additional cost to the Owner.

D. In the event the Contractor encounters suspected asbestos/lead containing materials which have not been rendered harmless, the Contractor shall immediately stop work in the area affected and report the condition to the Owner verbally followed by written notice. If in fact the material contains asbestos/lead and has not been rendered harmless, the work in the affected area shall not be resumed except by written agreement between the Owner and the Contractor. In the absence of asbestos/lead, or after it has been rendered harmless, work shall be resumed by written agreement between the Owner and the Contractor.

3.8 RESTORATION

A. The Contractor shall restore all floors, ceilings, walls, furniture, grounds, pavement, etc. affected or damaged by the Contractor’s work. All such areas shall be restored to original condition at no additional cost to the Owner.

B. The Contractor shall restore to original finish all new products, materials, and equipment scratched, chipped, or otherwise marred by the Contractor.

C. Restoration in every instance consists of completing the work to match and blend with the adjoining existing work insofar as methods, materials, colors, and workmanship are concerned.

D. Restoration work shall be performed by workers qualified and skilled in the trades involved.
E. Where restoration work requires painting: Painting shall consist of cleaning, surface preparation, painting (primer, intermediate, and finish) and finishing surfaces, for items both new and existing, affected by the work of the Contractor. Surface painting shall match and blend with existing adjoining surfaces. The areas around penetrations, once sealed, shall be painted.

F. The Contractor shall be responsible for replacing improperly matched, blended, or poorly constructed restorative work at no additional cost to the Owner.

3.9 HOUSEKEEPING

A. During the course of construction:
   1. The Contractor shall keep the building, premises and surrounding area free from accumulated surplus, waste materials and rubbish at all times.
   2. At the conclusion of each work shift, remove empty boxes, crates, surplus and waste materials, and other debris, and sweep clean all work areas affected by the Contractor’s work.
   3. In occupied areas affected by the Contractor’s work, the Contractor shall remove all evidence of the Contractor’s work in those areas at the end of each work shift, including tools, equipment and scaffolding, leaving the area clean, unobstructed and fully useable by the occupants.

B. At project completion, and prior to Final Acceptance:
   1. Remove all tools, equipment and scaffolding.
   2. Remove temporary labels and adhesives.
   3. Thoroughly vacuum the interior of enclosures to remove debris.
   4. Clear surplus product, materials and debris from the job site.
   5. Turn over equipment to the Owner in unblemished condition.
   6. Thoroughly clean equipment and facilities inside and out, and remove all residue -- all areas affected by the Work shall cleaned.
   7. Turn over the Work to the Owner in a fully operational state.

C. All final cleanup work shall be performed by professional cleaners qualified and skilled in the trade. The Contractor shall not make use of unqualified personnel for cleanup work.

D. The Project shall not be considered complete until all area affected by the Work are left in a clean, neat, orderly, and fully operable condition.

3.10 SUBSTANTIAL COMPLETION

A. Due to the technical nature of the Work, as well as the requirement that certain Owner provided equipment, systems, and training may necessitate use of the Work by the Owner prior to Substantial Completion, the Owner reserves the right to use the Work prior to Substantial Completion (when ready for use) without obligation to the Contractor and without implying Acceptance of the Work.

B. Pre-Substantial Completion Submittal: Three weeks prior to Substantial Completion, the Contractor shall prepare and submit the following:
   1. Known Exceptions/Deviations List:
      a. The Contractor shall compile a thorough list of known exceptions/deviations (in materials, construction, and/or workmanship) from that specified in the Contract Documents, and for which there was not associated documentation in the form of Change Orders (CO),
Construction Change Directives (CCD), Architects Supplemental Instructions (ASI), or responses to a Request for Information (RFI).

b. The Contractor shall submit the list to the Engineer for review. The Engineer shall review each item and mark as either Accepted or Not Approved.
   1) Items marked “Not Approved” shall be corrected by the Contractor to conform with the intent of the Contract Documents at no additional cost to the Owner.
   2) The Contractor shall perform corrective action for “Not Approved” items prior to notifying the Engineer that the work is Substantially Complete.

2. Other information as called for in the individual Specification Sections.

3. Owner Specific: Submit other information as required by Owner Specific Governing Requirements.

C. Notice of Substantial Completion: When the Work nears Substantial Completion, the Contractor shall notify the Engineer in writing the date that the work will be Substantially Complete and ready for review by the Engineer.

3.11 PROJECT CLOSE-OUT

A. Punchlist:
   1. Once notice of Substantial Completion is received, the Engineer shall visit the site to review the Work, and shall prepare a punchlist of items determined to be incomplete, deficient or otherwise not in compliance with the intent of the Contract Documents.
      a. During the review of the Work, if the Engineer finds that the Known Exceptions/Deviations List provided by the Contractor was insufficiently thorough, that the Work is not Substantially Complete, or that deficiencies in the work are excessive, the Engineer will cease review and inform the Contractor that the work is not Substantially Complete. The Contractor shall be responsible for fees incurred by the Engineer for this partial review.
   2. The Contractor shall perform corrective action for each item noted in the punchlist. When complete, the Contractor shall submit the original punchlist with each item initialed attesting to the fact that the item was corrected.
      a. If necessary, the Engineer will perform a subsequent review after receipt of the Contractor initialed punchlist.
   3. Should additional reviews beyond the original punchlist review be required of the Engineer due to the Contractor’s failure to correct all incomplete, deficient, or non-compliant work, the Contractor shall be responsible for fees incurred by the Engineer for the additional reviews.

B. Provide O&M Manuals per the requirements of Part 1 – General: Operating & Maintenance (O&M) Manuals herein.

END OF SECTION
SECTION 270020 - CONTRACTOR QUALIFICATIONS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section defines Contractor qualifications and requirements for bidding the various systems in this Division.

1.2 QUALIFICATIONS FOR BIDDING

A. Contractors must be qualified to bid per the requirements of Part 1 – General: Contractor Qualifications herein.

1. Contractors shall submit their Statement of Qualifications (see Part 1 – General, Statement of Qualifications herein) with their bid. Bids which are submitted without a Statement of Qualifications or bids submitted with a Statement of Qualifications that is incomplete or does not clearly demonstrate that the qualification requirements have been met shall be rejected.

1.3 CONTRACTOR QUALIFICATIONS

A. General

1. Experience:

a. Governing Requirements: The Contractor shall have demonstrated, in-depth and working knowledge of the applicable portions of the Governing Requirements as noted in Division 27 Specification Section Basic Communications Requirements and as they pertain to the systems to be installed by the Contractor. The Contractor shall provide a signed statement stating same.

b. Design and Installation Practices: The Contractor shall have demonstrated, in-depth and working knowledge of the generally accepted design and installation practices for the systems to be installed by the Contractor. The Contractor shall provide a signed statement stating same.

c. Contractor References:

1) Project: The Contractor shall provide references for no less than five similar projects (in terms of size and construction cost) performed by the Contractor within the past three years.

   a) The reference list shall detail, for each project:

      i. Project name and location

      ii. Construction cost

      iii. A brief description of the project and the components involved

      iv. Contact names, phone numbers, and addresses

      v. Date completed

   b) A minimum of two of the references shall be in the vicinity of the Project and shall be available for the Owner and Engineer to visit and inspect the installation. The Contractor shall highlight or otherwise make note of these particular references.

2) Service Department: The Contractor shall provide a minimum of two references for the Contractor’s Service Department. A
minimum of one of the references shall be in the vicinity of the Project.

2. Manufacturer(s) Certification:
   a. The Contractor shall be trained and certified by the Manufacturer(s) to install, test, and maintain the major components of the system, shall be certified to perform service and equipment modifications without voiding the Manufacturer(s) warranty, and shall be certified by the Manufacturer(s) to provide these services in the location in which the Work is to be performed. The Contractor shall provide evidence of same for each major component Manufacturer – statements on letterheads from distributor, importer or local sales representatives are not acceptable.

3. Offices:
   a. Locations: Provide locations of all regularly/fully staffed and operational offices and the number of administrative staff and technical personnel in each. Indicate which office(s) have a Service Department, and of those offices, indicate the number and type of personnel staffing the Service Department.
   b. Service Department: The Contractor shall maintain a permanently staffed and equipped Service Department, regularly providing services for the systems to be installed by the Contractor. The Contractor shall provide a signed statement stating same.
   c. The Contractor shall be licensed, bonded, and insured in the State in which the Work is to be performed. The Contractor shall provide evidence of same.
   d. If required by the locality, the Contractor shall be licensed by the locality. The Contractor shall provide evidence of same.

4. Personnel:
   a. Project Manager: The Contractor’s Project Manager assigned to this project shall have a minimum of three years continuous contracting project management experience on projects of similar size and complexity. The Project Manager shall have the authority to act for the Contractor, shall serve as the technical liaison between the Contractor and the Engineer, shall represent the Contractor at all meetings, shall be responsible for supervision of all work required to execute the Contract, shall review and approve all submittals prior to submission, and shall be present at the job site during final inspection. The Contractor shall provide a resume for the Project Manager which shall include:
      1) A summary of the Project Manager’s experience, including education, with emphasis on key skills relating to project management and the technical aspects of the systems for which the Project Manager will have responsibility.
      2) A listing of continuous projects (with dates) over the past three years on which the Project Manager performed project management duties. Project information shall include:
         a) Project name and location
         b) Construction cost
         c) A brief description of the project and the components involved
         d) Contact names, phone numbers, and addresses
         e) Date completed
   b. Foreman: The Contractor’s Foreman assigned to this project shall have a minimum of three years continuous supervision experience on projects of similar size and complexity. The Contractor shall provide a resume for the Foreman which shall include:
      1) A summary of the Foreman’s experience, including education, with emphasis on key skills relating to installation supervision and the technical aspects of the systems for which the Project Foreman will have responsibility.
2) A listing of continuous projects (with dates) over the past three years on which the Foreman performed supervisory duties. Project information shall include:
   a) Project name and location
   b) Construction cost
   c) A brief description of the project and the components involved
   d) Contact names, phone numbers, and addresses
   e) Date completed

c. Employee Certification: Contractor personnel directly involved with the supervision, installation, testing, and certification of the system shall be trained and certified by the major component Manufacturer(s). The Contractor shall provide evidence of same.

B. Systems Specific Qualifications: Additional Contractor Qualifications are required for each system as follows:

1. Communications Cabling
   a. The Contractor shall be completely familiar with and have extensive working knowledge of the TIA/EIA standards for telecommunications systems, the design and installation practices as defined in the BICSI Telecommunications Distribution Methods Manual, and the installation practices as defined in the BICSI Telecommunications Cabling Installation Manual. The Contractor shall provide a signed statement stating same.
   b. RCDD: The Contractor shall assign an RCDD (Registered Communications Distribution Designer) to the project. The RCDD shall be a permanent member of the Contractor’s staff (i.e. an RCDD consultant/sub-contractor to the Contractor is not acceptable) and shall be in current good standing with BICSI. The Contractor shall provide the name of and evidence of certification for the Contractor’s RCDD to be assigned to the project.
   c. Manufacturer Certification: The Contractor shall be trained and certified by the specified communications cabling system Manufacturer to install, test, and maintain the communications cabling system, shall be certified by the Manufacturer to provide the Manufacturer’s most comprehensive performance and product warranty per the requirements of Division 27 Specification Section Warranty and its related sub-sections, and shall be certified by the Manufacturer to provide this warranty in the location in which the work is to be performed. The Contractor shall provide evidence of same.
      1) The Contractor shall be Manufacturer Certified as one or more of the following:
         a) Hubbell/Mohawk Mission Critical Certified Installer (CI)
   d. Employee Certification: Contractor personnel shall be trained and certified by the Manufacturer as follows. The Contractor shall provide evidence of same:
      1) Project Foreman and Supervisors: All (100 percent) shall be trained/certified by the Manufacturer for design, installation and testing.
      2) Technicians (responsible for testing, termination, connectorization, and determination of pathway/routing, and technical labor): All (100 percent) shall be trained/certified by the Manufacturer for installation and testing.
      3) Installers (responsible for cable installation, non-technical labor, etc.): Not required (subject to the requirements of the Manufacturer’s warranty and that of the next paragraph). However, these technicians must be directly supervised by a certified Installation Technician in an on site ratio of not less than one
Manufacturer certified Installation Technician per two non-certified installers.

4) Other personnel: Personnel not directly responsible for installation supervision, installation, testing or certifying the communications cabling system (i.e. project managers, cleanup crew, etc.) are not required to be manufacturer trained and certified.

2. Electrical
   a. Refer to Division 16 for Electrical Contractor requirements.

1.4 STATEMENT OF QUALIFICATIONS (SOQ)

A. The Contractor shall prepare a Statement of Qualifications which shall include all documentation verifying compliance with the requirements of and as called for in Part 1 – General: Contractor Qualifications herein. The Statement of Qualifications shall include, at a minimum:
   1. General:
      a. Governing Requirements Statement
      b. Design and Installation Practices Statement
      c. Contractor Project References
      d. Contractor Service Department References
      e. Evidence of Manufacturer(s) Certification
      f. Office locations and information
      g. Service Department Statement
      h. Evidence of licensing, bonding, and insurance
      i. Project Manager Resume
      j. Foreman Resume
      k. Evidence of Manufacturer(s) Training/Certification for those personnel for which training/certification is required.

   2. Systems Specific Statement of Qualifications: There are additional SOQ requirements for each system. The Contractor shall include the following system specific documentation within the Statement of Qualifications specified above:
      a. Communications Cabling
         1) TIA/EIA Standards and BICSI Practices Statement
         2) Evidence of certification for the Contractor’s RCDD assigned to the project
         3) Evidence of Manufacturer(s) Certification and Warranty
         4) A list of personnel to be assigned to the project, the type of work they will be performing, and evidence of Manufacturer(s) Training/Certification for those personnel for which training/certification is required.
      b. Electrical
         1) No additional information is required.

B. A Statement of Qualifications that is incomplete or does not clearly demonstrate that the qualification requirements have been met shall be rejected

1.5 SUBMITTALS

A. Provide the following per the criteria set forth in Submittals in Division 27 Specification Section Basic Communications Requirements:
   1. Other Information:
      a. Provide a Statement of Qualifications for each Contractor and for each system to be provided by the Contractor.
PART 2 - MATERIALS

2.1 THIS SECTION NOT USED

PART 3 - EXECUTION

3.1 THIS SECTION NOT USED

END OF SECTION
SECTION 270030 - BIDDING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section provides requirements for bidding, including a format and definitions for the presentation of pricing for the base bid, and where applicable, alternate bid(s) and unit pricing. The contents of this Section are intended to establish pricing breakdowns which are useful to the Owner and the Engineer for evaluating bid responses.

B. Information as called for in this Section shall be provided per the requirements of the General Provisions of the Contract, Bidding Documents, Contract Forms, General Conditions, and the Construction Documents.

1.2 BASIS OF BID

A. The Contractor shall determine all existing conditions affecting the work, the type of construction to be used, and the nature and extent of work provided by other trades. Failure to do so shall be construed as willingness to provide complete and fully operational system(s) within the amount bid by the Contractor.

B. The Contractor shall notify the Engineer a minimum of ten (10) days prior to the bid date in the event of any of the following circumstances:
   1. Required items or details have been omitted from the Construction Documents
   2. Discrepancies or conflicts between the requirements of the Drawings and the Specifications, between the Governing Requirements and the Construction Documents, and between the various Governing Requirements.
   3. Discrepancies or conflicts between the requirements of this Division (27) and those of Division 0 or Division 1.

C. Where omissions, discrepancies, or conflicts are not brought to the attention of the Engineer, it shall be assumed that the most stringent requirement(s) constitute the basis for the Contractor’s bid, and as such shall be construed as willingness by the Contractor to provide complete and fully operational system(s) within the amount bid.

D. Fees for necessary or required licenses, permits, and inspections shall be included in the bid amount.

E. Bids shall be based on products, materials and methods of construction as specified. Bids based upon substitution of product and materials, as well as deviations from the methods of construction specified, shall be at the sole risk of the Contractor and as such are subject to rejection without consideration at the time of submittal review – should the Contractor be awarded the contract.

F. If the bidder proposes to sub-contract portions of the work, sub-contractors shall be identified and their Statement of Qualifications (per Division 27 Specification Section Contractor Qualifications) submitted as part of the Bidder’s bid submission.
   1. The Contractor is responsible for any and all work performed by a sub-contractor, and shall provide direct and continuous supervision of the sub-contracted work.
Furthermore, this clause applies to any work provided by the Manufacturer(s) for equipment installation at the Contractor’s request.

G. By submitting a Bid, the Contractor agrees:
1. To honor the Contractor’s Bid for 90 days subsequent to the date that bids are opened.
2. To enter into and execute a Contract, if awarded, and to furnish all bonds and insurance required by the Contract Documents.
3. To accomplish the Work in accordance with the Contract Documents.
4. To complete the Work within the schedule stipulated by the Contract.

1.3 BID FORMAT

A. The Bid shall contain the following mandatory documentation. Bids submitted without this documentation (in whole or in part) may be rejected without review. The documentation shall be provided in addition to any forms/documents required by the General Provisions of the Contract and/or the contracting authority.

1. **Statement of Qualifications:** Provide per Division 27 Specification Section Contractor Qualifications and/or its sub-sections.
2. **Bid Form:** A bid form summarizing the Contractor’s bid as required by the General Provisions of the Contract and/or the Contracting Authority.
3. **Bid Supplement:** Complete the Bid Supplement attached to the end of this Section.
   a. The Bid Supplement shall be completed in addition to any forms/documentation required by the General Provisions of the Contract and/or the contracting authority.
4. Additional Information:
   a. **Subcontractor Identification:** Identify sub-contractors and their responsibilities. Submit their Statement of Qualifications per Division 27 Specification Section Contractor Qualifications and its sub-sections.
   b. **Bill of Materials (BOM):** The BOM shall include each item individually priced, and shall reflect any and all required modifications, accessories, and labor for the item. Each item listed shall be complete with the following information:
      1) Description
      2) Part number (if applicable)
      3) Quantity included in bid
      4) Material cost (including all required modifications, accessories and incidental materials)
      5) Labor cost to install (if applicable)
      6) Total installed price

1.4 UNIT PRICING

A. Unit pricing is a price per unit of measurement for materials, equipment and/or labor added to or deducted from the Contract Sum by appropriate modification. Unit pricing is to be provided for common items which may be added or deleted during the course of construction.

1. It is the intent that components added by unit price during construction shall result in complete and operable components ready for the Owner’s use. It is further the intent that components deducted by unit pricing shall not adversely impact the remaining or adjacent work.
2. Unit prices shall include all costs of related coordination, modification, or adjustment of the Work to accommodate and completely integrate the
component into the project, and shall include, but shall not be limited to, all necessary materials, labor, programming, incidentals, delivery, insurance, applicable taxes, overhead, markups and profit.

3. Unit pricing shall remain in effect until Final Acceptance.

B. Provide unit prices for the addition/deduction of the items specified below. Unit pricing is broken out by the system(s) to which they pertain.

1. Communications Cabling:
   a. Horizontal Outlet: Cable, faceplate, connectors (station and patch panel), terminations, incidental materials, testing, labeling, etc. for any location (regardless of distance from the Telecommunications Room). Provide pricing by outlet type and port quantities as follows: :
      1) Prior to walls covered and ceiling installed:
         a) 1-port
         b) 2-port
         c) 3-port
         d) 4-port
      2) After walls covered and ceiling installed:
         a) 1-port
         b) 2-port
         c) 3-port
         d) 4-port
   b. Cable Pathway Firestopping Device: One device, installed.

2. Electrical:
   a. Outlet Box Raceway: One recessed single gang 4 inch by 4 inch deep outlet box at the horizontal outlet location with conduit raceway from the outlet box location to:
      1) Stub to accessible ceiling space
      2) Cable tray
      3) Telecommunications Room
   b. Cable Pathway Firestopping Device: One device, installed.

PART 2 - MATERIALS

2.1 THIS SECTION NOT USED

PART 3 - EXECUTION

3.1 THIS SECTION NOT USED
# Project Information

<table>
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## Contractor Information

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<tr>
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## Addenda Received

Acknowledge each Addenda Received

## Base Bid Breakdown (before applicable taxes)

Enter a bid amount for each system listed below - if not bidding on a given system, check the "No Bid" box for that system

<table>
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<th>#</th>
<th>DATE RECEIVED</th>
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<td>Electrical Infrastructure</td>
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## Required Attachments

- Statement of Qualifications
- Subcontractor(s) Identification
- Bill of Materials
- Bid Bond
- Performance Bond
- Pre-Approval Statement

## Signature

The undersigned, having carefully examined the Contract Documents, and being familiar with all conditions affecting the Work including but not limited to the availability of materials and labor, and furthermore being fully authorized to act on behalf of the bidder, agrees to furnish all labor and materials required for the construction of the Work in accordance with the accompanying Contract Documents, and further agrees that the information provided on all pages of this Bid Supplement is correct and will be honored by the Contractor, and as such is incorporated into and made part of the Contractor's Bid.

<table>
<thead>
<tr>
<th>SIGNATURE</th>
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<th>PRINTED TITLE</th>
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**Pre-Approval Statement**

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| Statement of Qualifications
| Subcontractor(s) Identification
| Bill of Materials
| Bid Bond
| Performance Bond
| Pre-Approval Statement

**Addenda Received**

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**BASE BID**

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**BONDING**

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**BID TOTAL**

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Unit Pricing

The Base Bid may be increased or decreased by the following Unit Prices. If bidding more than one system, the Add/Deduct amounts for a given Unit Price line item shall represent the sum total for all systems that are applicable to that line item. The Unit Prices listed may not be applicable to all systems. Unit Prices applicable to a given system will be indicated by a bullet (●) in the ‘Applies to this System’ column. Provide all Unit Prices required for each system being bid. Refer to the ‘Bidding’ section of the Specifications for a more detailed description of these Unit Prices.

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<tr>
<th>ALTERNATES</th>
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<td>Horizontal Outlet (prior to walls covered), 4-port, each</td>
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<td>Horizontal Outlet (after walls covered), 1-port, each</td>
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<td>Horizontal Outlet (after walls covered), 4-port, each</td>
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<td>Outlet Box Raceway, Stub to Telecom Room (each)</td>
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<tr>
<td>Cable Pathway Firestopping Device, each</td>
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END OF SECTION
SECTION 270040 - WARRANTY

PART 1 - GENERAL

1.1 SUMMARY

A. This Section defines general warranty requirements for the Communications System(s).

1.2 GENERAL

A. Warranty

1. The Contractor shall warrant the Work against all defects in materials, equipment and workmanship in compliance with the applicable requirements of Division 1.

2. Manufacturer Warranties: The Contractor’s Warranty shall include all Manufacturer Warranties. The Contractor shall represent and act on the Owner’s behalf in any and all Manufacturer warranty/replacement proceedings.

3. Manufacturer Support Contract(s): The Contractor shall provide any manufacturer backed maintenance, warranty and/or technical support contract necessary for the Contractor to configure, operate, service, repair and/or replace any component of the Communication System(s). The contract shall be valid for the duration of the warranty period. The Contractor shall purchase the contract in the Owner’s name and provide documentation and renewal information to the Owner at acceptance testing.

4. The Contractor shall comply with the Submittal portions of Division 27 Specification Section Basic Communications Requirements.

5. All labor, materials, equipment, and other costs and services necessary for the fulfillment of the Warranty shall be provided at no charge to the Owner.

B. Warranty Period

1. Unless otherwise noted, the minimum Warranty Period shall be 1 year or as otherwise called for in the General Provisions of the Contract.

2. The Warranty Period shall commence upon Final Acceptance.

3. Manufacturer Warranties:
   a. The Contractor shall honor Manufacturer Warranties for the full term established by the Manufacturer when said term is greater than the Warranty Period.
   b. In cases where Manufacturer Warranties are less than the Warranty Period, the Contractor is liable for and shall warrant the Manufacturer’s equipment for the entire term of the Warranty Period.
   c. Where the Contractor has modified equipment, the Manufacturer’s warranty may be voided. In such cases, the Contractor shall warrant the Manufacturer’s equipment for a term equivalent to that of the original Manufacturer Warranty term, or for the entire Warranty Period, whichever is greater.

C. Warranty Certificate

1. The Contractor shall provide a written Warranty Certificate on the Contractor’s letterhead, signed by the Contractor, with terms and conditions of the Warranty complying with the requirements detailed herein.

2. The Warranty Certificate shall include copies of all Manufacturer Warranties. Manufacturer Warranties shall be activated by the Contractor in the Owner’s name.
3. The Warranty Certificate shall be submitted as part of the O&M Manual submission.

D. Warranty Fulfillment
1. The Contractor shall provide a Warranty service visit within 24 hours of notification.
2. Defects shall be remedied within 72 hours of notification.

1.3 SYSTEM SPECIFIC

A. The Contractor shall include the following additional system specific items as part of the Warranty above:
1. Communications Cabling
   a. Communications Cabling System Manufacturer Warranty: The Contractor shall provide a communications cabling system extended product, performance/application, and labor Manufacturer Warranty that shall warrant all passive components used in the communications cabling system. Additionally, this Warranty shall cover all components not manufactured by the Manufacturer, but approved by the Manufacturer for use in the communications cabling system (i.e. “Manufacturer Approved Alternative Products”).
      1) The Manufacturer Warranty shall warrant:
         a) That the products will be free from manufacturing defects in materials and workmanship.
         b) That all cabling products of the installed system shall exceed the specification of TIA/EIA 568 performance standards. For copper based cabling products, the TIA/EIA 568 Category rating of the specified system shall be exceeded.
         c) That the installation shall exceed TIA/EIA 568 installation standards.
         d) That the system shall be application independent and shall support both current and future applications that use the TIA/EIA 568 component and link/channel specifications for cabling.
         e) That all labor and materials and other costs attributable to the fulfillment of the Manufacturer Warranty shall be provided at no additional cost to the Owner.
      2) The Manufacturer Warranty shall be:
         a) Hubbell Mission Critical 25-Year Warranty and System Performance Guarantee
      3) Manufacturer Warranty Period:
         a) The Manufacturer Warranty Period shall commence upon Final Acceptance or a Warranty Certificate being issued by the Manufacturer, whichever is later.
      4) Manufacturer Warranty Certificate:
         a) The Manufacturer Warranty Certificate shall be included with the Contractor Warranty.

2. Electrical
   a. No additional warranty items required.

PART 2 - MATERIALS

2.1 THIS SECTION NOT USED
PART 3 - EXECUTION

3.1 THIS SECTION NOT USED

END OF SECTION
SECTION 270050 - QUALITY ASSURANCE

PART 1 - GENERAL

1.1 SUMMARY

A. This Section defines processes and procedures for quality assurance applicable to Division 27.

1.2 GENERAL QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

A. Design Intent Meeting
   1. The Contractor shall schedule and attend a meeting to review the design with the Engineer, Owner, and the General Contractor. The purpose of the meeting will be to ensure that the Contractor fully understands the design intent as detailed in the Contract Documents. The Contractor shall thoroughly review the Contract Documents prior to the meeting, and shall document questions, comments, and/or concerns to be discussed at the meeting. The meeting shall take place prior to Submittal preparation and submission. Attendees shall include:
      a. Communications Contractor(s)
         1) Communications Cabling
      b. Electrical Contractor
      c. General Contractor
      d. Engineer
      e. Owner

B. Pre-installation Meeting
   1. Prior to beginning work in a given area (or areas), the Contractor shall schedule and attend a pre-installation meeting to review and coordinate work within that area with the other trades. The purpose of the meeting will be to review the communications pathway/raceway layout and identify and resolve any potential conflicts, to have each trade verify that the pathway/raceway sizing is sufficient for the cabling to be installed within, to ensure a consistent installation for all cabling, to minimize interference with adjacent materials and equipment, and to ensure that communications cabling and equipment is accessible to the Owner for future modifications and maintenance. The meeting shall take place a minimum of 30 days prior to communications pathway/raceway rough-in. Attendees shall include:
      a. Communications Contractor(s)
         1) Communications Cabling
      b. Electrical Contractor
      c. General Contractor
      d. HVAC/Mechanical Contractor
      e. Plumbing Contractor
      f. Engineer
      g. Owner

C. Inspections
   1. The Contractor shall schedule and coordinate all inspections of the work as required by the Governing Authorities. The Contractor shall be solely responsible for scheduling inspections by the Governing Authorities at times appropriate to the stage of construction and the work to be inspected. The
Contractor shall provide all assistance as required by the inspector(s) during their inspection(s).

a. Should the Governing Authorities require remedial action on the Contractor's part due to the failure of the Contractor to schedule inspections at appropriate times, such work shall be at no additional cost to the Owner.

b. The Contractor is solely responsible for scheduling inspections such that, should the work fail inspection, enough time remains in the project schedule to take remedial action and re-inspect the installation.

D. Observation of Work

1. Work will be observed by the Engineer on a periodic basis. Work not found to be in compliance with the Construction Documents, or not in compliance with the intent of the Construction Documents, shall be brought into compliance at no additional cost to the Owner.

2. The Contractor shall notify the Engineer at least one week in advance of the covering of concealed work so that the Engineer may schedule on-site observation of the work to be concealed. Work shall not be concealed until work has been tested (if applicable), observed by the Governing Authorities (if applicable), and at the Engineer's discretion, observed by the Engineer. Should work be concealed prior to such testing and observation, it shall be uncovered, tested, observed, and restored by the Contractor to the finished condition at no additional cost to the Owner.

E. Coordination

1. The Contractor shall thoroughly examine the Construction Documents, including Drawings and Specification Sections of other Divisions, for construction details and methods that are dependent upon or will affect the work of other trades. The Contractor is responsible for identifying coordination issues and dependencies, and for preparing Shop Drawings, work plans and schedules to accommodate or mitigate coordination issues and dependencies before they arise. Changes necessitated by the failure of the Contractor to coordinate with the work of other trades shall be at no additional cost to the Owner.

2. The Contractor shall confer and cooperate with the other trades, throughout the entire construction process, in order to coordinate the work in the proper sequence. Typical coordination issues include but are not limited to:

   a. Electrical work, including but not limited to electrical receptacles, power panels, transformers, the telecommunications grounding system, and the installation of raceway, device boxes, conduits, cable tray, ladder racking and sleeves.

   b. Mechanical work, including but not limited to HVAC systems and ductwork, piping, and mechanical chases.

   c. Ceiling cavity spaces.

   d. Installation of acoustical ceiling tiles and similar finishes that may conceal the work.

   e. Build-in of oversized equipment during structure construction.

   f. Required separation distances.

   g. Access routes for equipment through the construction.

   h. Cutting/coring of floor, ceiling or wall structures.

3. Verify that the physical dimensions of each item of equipment fit the available space, promptly notify the Engineer of any potential conflicts, and await the Engineer's direction prior to purchase and rough-in of the equipment.

4. Coordinate locations of devices with field conditions, unless such locations are specifically dimensioned or otherwise noted in the Construction Documents. If so noted, verify location with other affected trades and against existing field conditions, promptly notify the Engineer of any potential conflicts, and await the Engineer's direction prior to purchase and rough-in of the equipment.
5. Coordinate locations for chases, slots, sleeves, and openings in the building structure. For new concrete coordinate, locate and provide chases, slots, sleeves, and openings prior to the pouring of the concrete.

6. Outages shall be coordinated and scheduled in advance with the Owner at a time and duration acceptable to the Owner. Outages scheduled at times other than the normal working hours shall not entitle the Contractor to additional compensation beyond the original amount bid. Outages without advance notice and prior approval by the Owner are not acceptable.

7. Furniture and Casework: Prior to procurement and installation of materials and equipment within furniture and casework, the Contractor shall coordinate with other trades and verify all locations, pathway requirements, etc. Materials and equipment installed in furniture and casework without prior coordination are solely at the Contractor’s risk, and as such, are subject to possible rejection by the Engineer. Rejected materials and equipment shall be replaced and modified furniture and casework shall be restored to its original condition at no additional cost to the Owner.

F. Verification and Validation

1. Measurements
   a. The Contractor shall physically verify and validate all measurements on site (i.e. actual measurements vs. those of the Drawings). Where discrepancies exist which could affect the Work or the Intent of the Construction Documents, the Contractor shall notify the Engineer and await the Engineer’s direction, prior to procurement and installation of materials.

2. Raceway/Pathway Sizes
   a. Prior to procurement and installation of raceway/pathway, the Contractor is responsible for verifying and validating raceway/pathway (conduit, sleeves, cable tray, surface raceway, etc.) sizes with any and all trades which will make use of them.
      1) The Contractor, in conjunction with the various trades, shall determine the quantity, types, and outside diameters of the cables to be installed within each raceway/pathway, and shall verify the cable fill ratios for each pathway based upon this information. The cable fill ratios shall include spare capacity as required elsewhere within these Specifications or on the Drawings.
      2) Where the calculated cable fill ratios exceed that recommended by the NEC and TIA/EIA 569, where the ratios indicate that the raceway/pathway is of insufficient size, and/or where discrepancies exist between the raceway/pathway sizes shown on the Drawings and the Contractor’s calculated sizes, the Contractor shall notify the Engineer and await the Engineer’s direction prior to procurement and installation of the raceway/pathway or cable.

3. Equipment locations
   a. Prior to the installation of equipment, the Contractor shall coordinate with other trades and subsequently verify all equipment locations that mount on walls or within ceilings. This work shall include but shall not be limited to:
      1) Structural elements such as lighting devices, HVAC equipment, fire protection devices, and cable tray.
      2) Structural support elements for ceiling mounted devices such as but not limited to speakers, cameras, projectors and projection screens.
      3) Backing Board for wall mounted devices such as but not limited to equipment panels, equipment panels, power supplies, head-end equipment, flat panel displays, speakers, and equipment room devices.

4. No additional compensation will be approved for additional work or materials required due to the Contractor’s failure to verify and validate the above.
G. Examination

1. The Contractor shall carefully examine the project site and the Construction Documents and shall be responsible for identifying all utility, state, and local requirements that will affect the Work.

2. The Contractor shall become familiar with the local conditions under which the work is to be performed and correlate those conditions with the requirements of the Construction Documents. No allowance will be made for claims of concealed conditions which the Contractor, exercising reasonable due diligence while examining the site, observed or should have observed.

3. The Contractor shall be responsible for determining if the Work will affect the operation or code compliance of existing systems. Where this is the case, the Contractor shall notify the Engineer and await the Engineer's direction prior to procurement and installation.

1.3 SYSTEMS SPECIFIC QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

A. In addition to the quality assurance processes and procedures specified above, the Contractor shall provide the following for each system:

1. Communications Cabling
   a. Coordination:
      1) The Contractor shall review the Drawings and Specifications of other Divisions for locations of devices and equipment requiring communications connectivity not specified or shown on the Drawings of this Division. The Contractor shall coordinate the locations of these items with the other trades, and shall verify locations with the Engineer and Owner prior to rough-in.
      2) The Contractor shall facilitate and coordinate Service Providers installations with the Owner and with the Service Provider(s).
   b. Verification: The Contractor shall physically verify the following on site, prior to procurement and installation:
      1) Backbone Cable: Verify total run lengths for each backbone cable (inside and outside plant) from origination to destination using the pathways provided (ductbank, conduits, raceway, conduit, cable-tray, sleeves, open/accessible pathways, etc.), and including slack loops, vertical transitions, jogs, etc. Pre-cut cables of insufficient length are the sole responsibility of the Contractor.
      2) Station Cable: Verify total run lengths for each station cable from outlet location to communications room using the pathways provided (conduit, cable tray, sleeves, open pathways, etc.), and including slack loops, vertical transitions, jogs, etc. For run lengths which may exceed 270 feet, the Contractor shall obtain the Engineer’s direction prior to proceeding with the installation.
   c. Contractor RCDD Periodic Review:
      1) During the course of construction, the Contractor’s RCDD shall periodically perform an on-site review of the construction in progress and certify that the construction conforms to the requirements of the Governing Requirements, and in particular the TIA/EIA standards. The RCDD shall provide a written report to the Owner/Engineer on company letterhead that details the work reviewed and states that the work is in conformance with the Governing Requirements. The work in progress shall be reviewed and a report delivered to the Owner/Engineer on a bi-weekly basis.
   d. Inspections:
      1) Inspections shall occur no later than one week after Substantial Completion. Furthermore, inspections shall be completed and
certified no later than three weeks prior to the scheduled use of the system by the Owner.

a) Manufacturer Inspection: The installation is required to pass all Manufacturer certification requirements.
   i. The completed installation shall be inspected by Manufacturer personnel, shall pass the Manufacturer inspection, and shall be certified by the Manufacturer to meet and be covered by the Manufacturer extended product warranty.
   ii. The Contractor is solely responsible for all costs associated with scheduling the Manufacturer inspection, the inspection itself, and for making any modifications to the installation as required by the Manufacturer at no additional cost to the Owner.

b) RCDD Inspection: The installation is required to comply with the Governing Requirements.
   i. The Contractor’s RCDD shall inspect the completed installation and prepare a certificate on company letterhead certifying that the work complies with the Governing Requirements. The written certification shall be complete with the RCDD’s stamp/certification number and shall bear the RCDD’s signature across the face of the stamp. The certification shall be submitted with the O&M documentation.

2. Electrical
   a. Raceway/Pathway Size Validation: The Electrical Contractor is responsible for ensuring that the Raceway/Pathway sizes have been validated by all trades per the criteria set forth in Part 1 – General: General Quality Assurance/Quality Control (QA/QC), Verification and Validation, Raceway/Pathway Sizes above.
      1) Where discrepancies exist between the raceway/pathway sizes shown on the Drawings and the Contractor’s calculated sizes, the Contractor shall notify the Engineer and await the Engineer’s direction prior to procurement and installation of the raceway/pathway.

PART 2 - MATERIALS

2.1 THIS SECTION NOT USED

PART 3 - EXECUTION

3.1 THIS SECTION NOT USED

END OF SECTION
SECTION 270060 - TRAINING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section defines training requirements for the various communications systems.

1.2 GENERAL REQUIREMENTS

A. Trainer/Instructor

1. The Instructor leading the training session(s) shall be a qualified and experienced trainer. Where the Contractor does not have a qualified and experienced trainer on staff, the Contractor shall arrange to have appropriate Manufacturer Representative(s) lead the training session(s).

2. The Contractor shall have the Project Manager and/or Foreman present during the training session(s) in order to assist the Instructor by providing “hands-on” operational knowledge of the installation and operations of the systems.

3. For complex/sophisticated equipment, the Contractor shall arrange to have the appropriate Manufacturer Representatives present during the training session(s).

B. Schedule and Location

1. The data and time of the training session(s) shall be coordinated with and approved by the Owner and Engineer. The Engineer may attend the training session(s) at the Engineer’s discretion.

2. The training session(s) shall occur within one month of Substantial Completion, unless otherwise approved by the Owner.

3. Training session(s) shall occur at the site, in order to provide the participants with “hands-on” experience.

4. Training may not necessarily occur in contiguous periods, depending upon the needs of the Owner (e.g. if a total of 8 hours of training is required, depending upon the needs of the Owner, it may be that two 2-hour periods and one 4-hour period spread across several weeks may be necessary).

PART 2 - MATERIALS

2.1 GENERAL

A. The final version of the O&M Manual(s) shall be used as the primary training aid.

B. Training materials and presentations shall be professional in appearance, organized, bound, and suitable for re-use by the Owner in the future. Provide training materials to each participant, plus an additional 10 copies to the Owner for future use. Training materials shall be provided on CD-ROM in addition to hardcopy.

PART 3 - EXECUTION
3.1 GENERAL

A. The Contractor shall provide training on the proper operation and routine maintenance of the various communications systems. Training shall include “hands-on” demonstrations.

B. Training shall not commence until the communications system(s) are complete, tested, and fully operational.

3.2 TRAINING

A. Provide training for each system as follows:
1. Communications Cabling
   a. Training Session(s)
      1) Provide a total of 1.5 hour(s) of training, broken out approximately as follows:
         a) Overview of the Communications Cabling System and Warranty process: Provide 0.5 hour(s) of training
         b) Horizontal Cabling: Provide 0.5 hour(s) of training
         c) Communications Rooms and Spaces: Provide .5 hour(s) of training
      b. Videotaping: Not required.
      c. Follow-up Training: Not required.

2. Electrical
   a. Not required.

END OF SECTION
PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes specific requirements for sleeves and penetrations common to the communications systems.

1.2 RELATED SECTIONS

A. The firestopping requirements of this Section are additional to, different from, or otherwise supplement the Section(s) in Division 7 which pertain(s) to thermal protection systems, such as firestopping and fire-resistive materials. The applicable requirements of these Section(s) shall serve as the basis for the requirements of this Section, and are incorporated by reference into this Section.

1.3 SUBMITTALS

A. Provide the following per the criteria set forth in Submittals in Division 27 Specification Section Basic Communications Requirements:

1. Product Data
2. Samples
   a. Provide samples of each type of Cable Pathway Firestopping Device.
   b. Provide samples of all firestop products/materials.
3. Other
   a. Submit locations where new penetrations are required in existing structural concrete walls, parapets, and suspended slabs.
   b. Submit locations where new penetrations are required in existing roofs and roofing materials.

1.4 DEFINITIONS

A. EMT: Electrical Metallic Tubing

B. RMC: Rigid Metal Conduit

PART 2 - MATERIALS

2.1 GENERAL

A. Part Numbers: Refer to the equipment schedule at the end of this Section for specific part numbers. If no part number is provided, then any part meeting the requirements and manufacturers specified is acceptable.

2.2 SLEEVES
A. Provide sleeves for all locations where cable must pass-through building barriers such as walls, floors or foundations.

B. Sleeves consist of a penetration/opening in a barrier and a conduit section, or Cable Pathway Firestopping Device passing through the penetration/opening.

C. Conduit sections used for sleeves shall be per the requirements of Division 27 Specification Section Electrical Technology - Conduit and Boxes.

D. Conduit Sleeves shall be:
   1. Cast-in-place: Provide RMC conduit sections unless otherwise shown on the Drawings
   2. Cored: Provide EMT conduit sections unless otherwise shown on the Drawings
   3. Non fire-rated barriers:
      a. Without cable tray: Provide EMT conduit sections unless otherwise shown on the Drawings

E. Fire-rated Sleeves shall be:
   1. Cable Pathway Firestopping Device
      a. Devices shall be pre-manufactured enclosed fire rated pathway devices with a built-in fire sealing system sufficient to maintain the hourly rating of the barrier being penetrated. The self-contained sealing system shall automatically adjust to the installed cable loading and shall permit cables to be installed, removed, or maintained without the need to remove or reinstall firestop materials. The pathway shall be UL classified and FM/Systems approved, and shall be examined and tested to the requirements of ASTM E814 (UL1479). Use shall be per local codes. Sleeves shall be:
         1) Specified Technologies, Inc.: EZ-Path

2.3 FIRESTOPPING

A. General:
   1. Provide firestopping material for all through and membrane penetrations of fire-rated barriers.
   2. Firestopping material used to seal open penetrations through which cable passes shall be re-usable/re-enterable.
   3. Provide through-penetration firestop products that are compatible with one another, with the substrates forming openings, and with the penetrating items.
   4. Provide firestop products that upon curing do not re-emulsify, dissolve, leach, breakdown or otherwise deteriorate over time from exposure to atmospheric moisture, sweating pipes, ponding water or other forms of moisture characteristic during and after construction.
   5. Provide firestop sealants sufficiently flexible to accommodate motion such as pipe vibration, water hammer, thermal expansion and other normal building movement without damage to the seal.
   6. Materials or sealants shall not contain flammable solvents or sodium silicate.
   7. Products specified in this Section shall be UL Listed and Labeled.
   8. Part Numbers: Refer to the equipment schedule at the end of this Section for specific part numbers. If no part number is provided, then any part meeting the requirements specified is acceptable.

B. Firestopping Materials
   1. Material shall conform to both Flame (F) and Temperature (T) ratings as required by local building codes and as tested by nationally accepted test agencies per
ASTM E814 or UL 1479 fire test in a configuration that is representative of the actual field conditions. Materials shall be complete with necessary accessory materials, as applicable, for complete UL listed and approved assemblies.

a. Firestopping materials shall be:
   a) Hilti Re-enterable Putty

PART 3 - EXECUTION

3.1 GENERAL

A. Work shall comply with the Governing Requirements as defined in Division 27 Specification Section Basic Communications Requirements. Governing Requirements of particular relevance to this Section include, but are not limited to:
   1. NEC: National Electrical Code (NFPA Article 70)
   2. TIA/EIA 569: Commercial Building Standard for Telecommunication Pathways and Spaces

B. Installation shall be such that communications circuits, when installed in the pathways and penetrations specified herein, are able to fully comply with the following:
   1. TIA/EIA 568: Commercial Building Telecommunications Cabling Standard

3.2 SLEEVES

A. Provide sleeves for all locations where free hung cable must pass through building barriers such as walls, floors or foundations.

B. The Contractor shall provide all cutting, rough patching and finish patching as required for the installation of sleeves, and shall provide all penetrations, including core drilling, roto-hammering, etc. as required.

C. Sleeves shall be sealed and firestopped (as appropriate to the fire rating of the barrier) between the conduit section (or cable pathway firestopping device) and the barrier penetration/opening.

D. Unless otherwise noted on the Drawings or specified herein, sleeves shall be sized according to the quantity and outside diameter of the cable(s) they are to support per NEC fill ratios and TIA/EIA 569 cable capacity standards, plus an additional 25 percent for future expansion.

E. Sleeve size shown on the Drawings reflects the size of the conduit or device passing through, not the size of the penetration/opening.

F. Conduit section sleeves:
   1. Conduits shall be installed per the requirements of Division 27 Specification Section Electrical Technology - Conduit and Boxes.
   2. Unless otherwise noted on the Drawings, sleeve size through floors shall be 4 inch diameter.

G. Cable Pathway Firestopping Device:
   1. Provide where cable trays must pass through fire rated barriers. Transition from cable tray to Cable Pathway Firestopping Devices at fire rated barriers.
a. Provide devices in sufficient quantity such that the combined useable volume of the devices is greater than or equal to the volume of cable tray to be served.

2. Provide where free hung cables must pass through fire rated barriers.
   a. Provide devices in sufficient quantity such that the combined useable volume of the devices is greater than one and one-half times the volume of the cable to be served.

H. Fire Rated Floor Penetration Assembly:
   1. Provide where shown on Drawings.
   2. Install strictly in accordance with Manufacturer’s installation guide and applicable codes.

3.3 PENETRATIONS

A. Properly size and locate penetrations required as construction progresses. For new concrete or masonry the Contractor shall coordinate, locate and provide required openings prior to the pouring of concrete or construction of masonry.

B. Penetration of concrete and structural elements shall be avoided where possible. Where not possible, obtain written approval from the Structural Engineer/Architect prior to penetration. Such penetrations shall be performed in a manner that will not reduce structural element load-carrying capacity or load-deflection ratio.

C. Penetrations shall be performed by workers qualified and skilled in the trades involved.

D. Penetrations (through and membrane) of fire rated barriers shall be firestopped and sealed. The fire rating of the barrier shall be strictly maintained.

E. Penetrations shall not be exposed on the exterior or in occupied spaces in a manner that would, in the Engineer’s opinion, reduce the aesthetic qualities of the structure or result in visual evidence of penetration and patching.

F. Penetrations shall be constructed using methods least likely to damage elements to be retained or adjoining construction.
   1. Provide temporary support for the work to be penetrated.
   2. In general, where cutting is required, use hand or small power tools designed for sawing or grinding, not for hammering or chopping. Cut holes and slots neatly to required size with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
   3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring of existing finished surfaces.
   4. Cut through concrete and masonry using a cutting device such as a Barborundum saw or diamond core drill.

G. Voids around penetrations shall be properly sealed, caulked or grouted as required.

H. Existing elements:
   1. The Contractor shall be responsible for identifying, locating, and protecting existing elements such as embedded conduits, pipe, ductwork, etc. when penetrating existing structures.
   2. Cap, valve, plug or seal remaining portions of cut pipes or conduit to prevent entrance of moisture or other foreign matter.
   3. The Contractor shall be responsible for repairing or replacing existing conduits, pipe, ductwork, etc. damaged by the Contractor during construction of
penetrations. Repair or replacement shall be made at no additional cost to the Owner.

I. Penetrations (and subsequent patching) resulting from the Contractor’s failure to properly coordinate penetrations shall be at no additional cost to the Owner.

J. Penetrations shall be laid out and installed in advance to facilitate the installation of raceway through the penetrations.

3.4 FIRESTOPPING

A. Work shall be in accordance with the UL Fire Resistance Directory, fire test reports, fire resistance requirements, acceptable sample installations, manufacturer’s recommendations, local fire and building authorities, and codes.

B. Application of sealing material shall be accomplished in a manner acceptable to the local fire and building authorities.

C. The fire rating of all penetrated fire barriers shall be strictly maintained. All through penetrations as well as membrane penetrations of fire rated barriers shall be firestopped and sealed.

D. Installation shall be performed in strict accordance with manufacturer’s detailed installation procedures. Prepare surfaces per manufacturer’s instructions. After installation, clean all surfaces adjacent to sealed openings to be free of excess firestopping materials and soiling.

E. Personnel installing firestopping products shall be certified by the Manufacturer to install such products.

F. Install firestopping in open penetrations and in the annular space of penetrations for fire rated barriers.

G. Seal all openings or voids made by penetrations to ensure an air and water resistant seal.

H. Install firestopping such that the performance and effectiveness of other thermal and fire protective devices (such as fire/smoke dampers) in the area are fully maintained.

I. Protect materials from damage on surfaces subjected to traffic.

J. Apply a suitable bond-breaker to prevent three-sided adhesion in applications where this condition might occur such as the intersection of a gypsum wallboard/steel stud wall to floor or roof assembly where the joint is backed by a steel ceiling runner or track.

K. Where joint application is exposed to the elements, fire resistive joint sealant must be approved by the manufacturer for use in exterior applications and shall comply with ASTM C-920.

L. Do not install firestop products when ambient or substrate temperatures are outside limitations recommended by the manufacturer.

M. Do not install firestop products when substrates are wet due to rain, frost, condensation or other causes.
N. Schedule installation of firestopping after completion of penetrating item installation but prior to covering or concealing openings.

O. Firestopping devices shall not act as supports.
## EQUIPMENT SCHEDULE - FS

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END OF SECTION
SECTION 270406 - COMMON WORK - HANGERS AND SUPPORTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes specific requirements for hangers and supports within the Communications Pathway System. General requirements are covered in Division 27 Specification Section Electrical - General Requirements.

1.2 RELATED SECTIONS

A. The requirements of Division 27 Specification Section Electrical Technology- General Requirements shall serve as the basis for the requirements of this Section, and are incorporated by reference into this Section.

1.3 SUBMITTALS

A. Provide the following per the criteria set forth in Submittals in Division 27 Specification Section Basic Communications Requirements:
   1. Product Data

1.4 DEFINITIONS

A. Hanger/Support System: All equipment, materials, and incidentals required to support the raceway/pathway and cabling systems, including but not limited to metallic hangers and supports, conduit, cable tray, conduit, pull boxes, device boxes, u-channels, threaded rods, clamps, concrete inserts, anchor bolts, cables, backing boards, etc.

PART 2 - MATERIALS

2.1 GENERAL

A. Part Numbers: Refer to the equipment schedule at the end of this Section for specific part numbers. If no part number is provided, then any part meeting the requirements and manufacturers specified is acceptable.

2.2 HANGERS AND SUPPORTS

A. A complete Hanger/Support System shall be provided to support all components of the raceway/pathway and cabling systems.

B. The Contractor shall provide all materials, labor and incidentals as required for a complete Hanger/Support System.
C. The Hanger/Support System shall be of corrosion resistant or galvanized steel, shall be of an approved standard design, and shall be constructed to maintain the supported load in proper position and alignment under all operating conditions. Manufacturer shall be:
   1. B-line
   2. Caddy/Erico
   3. Kindorf
   4. Unistrut
   5. or Equal

2.3 CABLE SUPPORTS (STRAPS)

A. J-Hooks are not allowed.

B. Cable supports shall only be permitted where shown on Drawings.

C. Cable straps within Communications Equipment Rooms:
   1. Cable Straps shall be used within communications rooms and spaces and shall be provided for strapping groups of cables to raceway and for controlling/managing patch cables. The use of plastic tie wraps for this purpose is not acceptable. Cable straps shall be self-gripping, reusable, constructed of Velcro, and hook-and-loop style. Cable straps to be used in plenum air handling spaces shall be plenum rated. Cable straps shall be manufactured by:
      a. Hubbell
      b. Velcro
      c. Approved Equal

2. Size: Cable strap size shall be:
   a. For Patch Cables: ½ inch wide and minimum 8/maximum 12 inches in length.
   b. For Horizontal Cables: ½ inch wide and minimum 8/maximum 12 inches in length.
   c. For Backbone Cables: ¾ inch wide and minimum 12/maximum 18 inches in length.

3. Color: Cable strap color shall be the same color as the cable color of the bundle to be strapped.

PART 3 - EXECUTION

3.1 HANGERS AND SUPPORTS

A. Hanger/Support system shall be installed in such a manner as to prevent any strain being imposed on the equipment supported.

B. Coordinate with the building structure and the work of other trades.

C. Install individual and multiple trapeze raceway hangers and riser clamps as necessary to support raceways. Provide all incidental materials as necessary for hanger assembly and for securing hanger rods and conduits. Use 3/8 inch diameter or larger all-thread rods for support.

D. Hangers and supports shall be installed at intervals in compliance with NEC requirements.
E. Strength of each support shall be adequate to support a minimum of five times the present and future load. A minimum of 200 pound safety allowance for each support is required.

F. Cut threaded rods such that the bottoms have a maximum length of thread below the bottom nut equal to that of the rod diameter (i.e. a 3/8 inch rod would have a maximum length of 3/8 inches below the bottom nut).

G. Conduit and box support installation shall prevent displacement of conduit and box in any direction.

H. Provide plastic or rubber end caps for all Hanger/Support System components which are readily accessible and exposed to personnel.

I. Anchor Methods:
   1. Hollow Masonry: Toggle bolts or spider type expansion anchors.
   3. New Concrete: Preset inserts with machine screws and bolts.
   4. Existing Concrete: Steel expansion bolts or explosive powder driven inserts.
   5. Wood surfaces: Wood screws.
   6. Steel: Welded threaded studs or galvanized steel clamps.
   7. Light Steel: Sheet metal screws.

J. Firestopping devices shall not act as supports.

3.2 CABLE SUPPORTS (STRAPS)

A. Exterior to Communications Equipment Rooms:
   1. J-Hooks are not allowed.
   2. Install conduits from device box to cable tray or associated telecommunications room.
   3. Where cable pathways are shown on the Drawings, the Contractor shall follow the indicated pathways as closely as possible, subject to field conditions. Pathways, where not shown, including pathways for small cable counts, shall be designed and documented on the As-built drawings maintained by the Contractor. Supports shall be installed parallel and perpendicular to building lines.

B. Within Communications Equipment Rooms:
   1. J-Hooks are not allowed.
   2. Install Screw-Mount, Reusable Cable Ties on the equipment racks and where required by UCB.
   3. Install cable straps to secure cable bundles (see below) to cable runway and other supporting equipment. The use of plastic tie wraps for this purpose is not acceptable.
      a. Bundling:
         1) Cables shall be bundled by application (patch, horizontal, backbone) and by cable type (Cat 3, Cat 5E, Cat 6, Cat 6a, MM Fiber, SM Fiber, etc.). Cable applications and types shall not be intermixed within a bundle.
         2) Cable bundles (of a given application and cable type) shall consist of relatively even cable quantities.
      b. Quantity of cable per cable bundle shall be as follows:
         1) For Patch Cables: 24 to 48 patch cables per cable bundle with straps applied at 1 foot intervals.
2) For Horizontal Cables: 50 to 100 horizontal cables per cable bundle with straps applied at 3 foot intervals.
3) For Backbone Cables: 4 to 8 backbone cables per cable bundle with straps applied at 3 foot intervals.
c. Provide excess cable straps to Owner.
### EQUIPMENT SCHEDULE - JS

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END OF SECTION
PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes general requirements for raceway, pathways, grounding and bonding, and other electrical infrastructure necessary for the support of communications systems.

1.2 RELATED SECTIONS

A. The requirements of this Section are additional to, different from, or otherwise supplement similar Section(s) in Division 16. The applicable requirements of those Section(s) shall serve as the basis for the requirements of this Section, and are incorporated by reference into this Section.

B. Division 27 Specification Section Common Work - Sleeves, Penetrations and Firestopping. Provide sleeves, penetrations, and firestopping as required to support the work of this Section.

C. Division 27 Specification Section Common Work – Hangers and Supports. Provide hangers and supports as required to support the work of this Section.

1.3 SUBMITTALS

A. Provide the following per the criteria set forth in Submittals in Division 27 Specification Section Basic Communications Requirements:

1. Product Data
2. Shop Drawings:
   a. Raceway/pathway routing plan (including underslab, underfloor, and OSP conduit/ducts):
      1) Provide a routing if such plan has not been shown on the Drawings, or if the Contractor is proposing a deviation from that shown. The routing plan shall include:
         a) Complete floor plans or detail drawings showing the proposed routing and raceway sizes and locations, submitted in a manner equal to that of the Construction Drawings.
         b) A statement that the proposed routing has been coordinated with electrical, HVAC, plumbing, and other trades, and that comparable changes have been made to the cabling systems making use of the routing. Specifically note each location where the proposed routing is different from the Drawings, and the reason for the deviation.
         c) Routing deviations must be approved in writing by the Engineer prior to proceeding with installation.
      2) If a routing plan is not required, submit written documentation stating that:
         a) The raceway/pathway routing will be provided as shown on the Drawings,
b) The Contractor has reviewed the routing shown on the Drawings with the other applicable trades and that it does not create conflicts between the trades
c) The raceway/pathway routing meets applicable codes, regulations and standards.

3. Other:
a. Owner Specific: Submit other information as required by Owner Specific Governing Requirements in Specification Section Basic Communications Requirements.

PART 2 - MATERIALS

2.1 THIS SECTION NOT USED

PART 3 - EXECUTION

3.1 GENERAL

A. Work shall comply with the Governing Requirements as defined in Division 27 Specification Section Basic Communications Requirements. Governing Requirements of particular relevance to this Section include, but are not limited to:
1. NEC: National Electrical Code (NFPA Article 70)
2. TIA/EIA 569: Commercial Building Standard for Telecommunication Pathways and Spaces
3. TIA/EIA 606: The Administration Standard for the Telecommunications Infrastructure of Commercial Buildings
4. ANSI J-STD-607: Commercial Building Grounding and Bonding Requirements for Telecommunications

B. Installation shall be such that communications circuits, when installed in the pathway systems specified herein, are able to fully comply with the following:
1. TIA/EIA 568: Commercial Building Telecommunications Cabling Standard

C. The Contractor shall pay particular attention to and comply with the following Owner Governing Requirements:
1. University of Colorado at Boulder:
   a. UCB Telecommunications Standards: (http://www.colorado.edu/facilitiesmanagement/pdc/construction/standards/documents/Division27CommunicationsSpecifications.pdf)
   b. UCB Construction Inspection Report
   c. UCB Construction Drawings As-Built Requirements

D. Telecommunications pathways shall be dedicated for use for telecommunications cabling only. No other type of cabling (e.g. intercom, audio, video, security, fire, etc.) may be placed in telecommunications pathways without prior written Owner approval.

E. Unless otherwise noted on the Drawings or specified herein, communications raceway/pathways (conduit, sleeves, cable tray, surface raceway, etc.) shall be sized according to the quantity and outside diameter of the cable(s) they are to support per NEC fill ratios and TIA/EIA 569 cable capacity standards, plus an additional 25 percent for future expansion.
F. Firestopping: All penetrations of fire rated barriers shall be firestopped and sealed. The fire rating of all fire barriers shall be strictly maintained.

G. Labels/identification: Label and identify components of the pathway system per TIA/EIA 606.

END OF SECTION
PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes specific requirements for the Telecommunications Bonding Infrastructure to provide a permanent bonding infrastructure for communications systems.

B. The Telecommunications Bonding Infrastructure is bonded to the building grounding system and performance is dependent upon the building grounding system – the AC Electrode Grounding System and the Equipment Grounding System specified in Division 16 Specification Electrical – Grounding and Bonding for Electrical Systems.

C. General requirements are covered in Division 27 Specification Section Electrical Technology- General Requirements.

1.2 RELATED SECTIONS

A. The requirements of Division 27 Specification Section Electrical Technology- General Requirements shall serve as the basis for the requirements of this Section, and are incorporated by reference into this Section.

B. The requirements of Division 16 Specification Section Electrical - Grounding and Bonding for Electrical Systems shall serve as the basis for the requirements of this Section, and are incorporated by reference into this Section.

C. This Section may expand upon or supplement the requirements of Division 16 Specification Section Electrical - Grounding and Bonding for Electrical Systems. In the event of a conflict or discrepancy between this Section and the requirements of Division 16 Specification Section Electrical - Grounding and Bonding for Electrical Systems, the requirements of Division 16 Specification Section Electrical - Grounding and Bonding for Electrical Systems shall govern and notification of such discrepancy shall be submitted to the Engineer. However, if the requirement of this Section (or portion thereof) exceeds that of the requirements of Division 16 Specification Section Electrical - Grounding and Bonding for Electrical Systems, and is furthermore not contrary to the requirements of Division 16 Specification Section Electrical - Grounding and Bonding for Electrical Systems, then the requirement of this Section (or portion thereof) shall prevail.

1.3 SUBMITTALS

A. Comply with the Submittal portion of Division 27 Specification Section Basic Communications Requirements. Provide submittal information for the following:
   1. Product Data

1.4 DEFINITIONS
A. BCT: Bonding Conductor for Telecommunications: Conductor that bonds the TMGB to the AC Grounding Electrode System.

B. EF: Entrance Facility: Entrance to a building for both public and private network service cables. May be located in an ER or TR.

C. ER: Equipment Room: Environmentally controlled centralized space of telecommunications equipment. Sometimes referred to as Main Distribution Frame (MDF), Data Center (DC), or server room.

D. GE: Grounding Equalizer: Bonding conductor that bonds TGBs on the same floor of a structure.

E. TBB: Telecommunications Bonding Backbone: Bonding conductor that bonds the Telecommunications Main Grounding Busbar to one or more Telecommunications Grounding Busbars.

F. TE: Telecommunication Enclosure: Floor or tenant serving space (enclosure or cabinet) that provides a connection point between backbone and horizontal infrastructures. Sometimes referred to as an Intermediate Distribution Frame (IDF) or Floor Distributer (FD).

G. TEBC: Telecommunications Equipment Bonding Conductor: Bonding conductor that bonds all non-current carrying metal telecommunications equipment and materials to the nearest TGB or TMGB.

H. TGB: Telecommunications Grounding Busbar: Busbar used to connect TEBCs and TBBs in a specific room. TGB is generally connected (bonded) to building structural steel, the nearest low-voltage electrical distribution panel and to the Telecommunications Main Grounding Busbar via the TBB. There is typically one (possibly more) Telecommunications Grounding Busbar per telecommunication room or equipment room.

I. TMGB: Telecommunications Main Grounding Busbar: Busbar bonded to the electrical service ground (Intersystem Bonding Termination). Origination of the TBB. There is typically one Telecommunications Main Grounding Busbar per building, located in near the communications entrance facility (EF) or in the main telecommunications room (MDF) or Building Distributer (BD).

J. TR: Telecommunication Room: Floor or tenant serving space that provides a connection point between backbone and horizontal infrastructures. Sometimes referred to as an Intermediate Distribution Frame (IDF) or Floor Distributer (FD).

PART 2 - MATERIALS

2.1 GENERAL

A. Manufacturer: Communications grounding and bonding equipment and materials shall be manufactured by a single Manufacturer unless specifically stated otherwise. The manufacturer shall be:
   1. Chatsworth Products, Inc. (CPI)
B. Part Numbers: Refer to the equipment schedule at the end of this Section for specific part numbers. If no part number is provided, then any part meeting the requirements and manufacturers specified is acceptable.

C. Labels/Identification: Provide labels to identify all components of the communications grounding and bonding system. Labels shall be permanent (i.e. not subject to fading or erasure) and permanently affixed. Handwritten labels are not acceptable.

D. Equipment and materials in this Section shall be UL Listed and Labeled.

2.2 BCT

A. Provide insulated green, insulated green with yellow strip, or un-insulated - copper conductor properly sized according to length of conductor and size of AC Grounding Electrode Conductor for the electrical service per NEC, TDMM, and IAEI calculations.

2.3 TEBC

A. Provide insulated green or insulated green with yellow strip - 6 AWG copper conductor not to exceed 100 feet in length.

PART 3 - EXECUTION

3.1 GENERAL

A. Work shall comply with the Governing Requirements as defined in Division 27 Specification Section Basic Communications Requirements. Governing Requirements of particular relevance to this Section include, but are not limited to:

1. ANSI J-STD-607: Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications
2. NEC: National Electric Code (NFPA Article 70)
3. UL 467: Grounding and Bonding Equipment

B. Contractor shall ensure that positive bonding connections are made to bare metallic surfaces, equipment, materials and hardware by removing surface corrosion, oxidation and paint prior to connection.

C. Where possible, bonds to structural steel shall be exothermic.

D. Where possible, exothermic or irreversible compression-type connections and two-hole lugs shall be used to terminate bonding conductors.

E. Labels/Identification: Label and identify all components of the communications grounding and bonding system.

3.2 TEBC

A. TEBC’s shall be used to bond all non-current carrying metal telecommunications equipment and materials to the nearest TGB. Route along the shortest and straightest
path possible with minimal bends. Bends shall be sweeping. TEBC’s shall be continuous (without splices), and shall be insulated from their support.

B. Label with "WARNING! TELECOMMUNICATIONS EQUIPMENT BONDING CONDUCTOR (TEBC). DO NOT REMOVE OR DISCONNECT!" Labels shall be affixed at both ends and at accessible intermediate points.

3.3 QUALITY ASSURANCE AND TESTING

A. Visual inspection and correction of:
1. Loose connections
2. Corrosion
3. Physical damage
4. System modifications
5. Correct and visible labeling

B. Test Integrity of Bonding Connections
1. Perform two-point bonding measurements using an earth grounding resistance tester configured for continuity test per manufacturer’s recommendations setup and safety precautions.
   a. Measure between TMGB or TGB and nearest available grounding electrode (e.g., structural steel). Maximum value between two points shall be 0.1 ohm.
   b. Measure between equipment, equipment racks, ladder racks, rack grounding busbars and TMGB or TGB. Maximum value between two points shall be 0.1 ohm.
   c. Bonding resistance between any two conductive points in the EF, ER, TE, or TR shall not exceed 0.1 ohms.
2. Forward copy of test results to Engineer.

END OF SECTION
SECTION 270533 - ELECTRICAL TECHNOLOGY - CONDUIT AND BOXES

PART 1 - GENERAL

1.1 SUMMARY
A. This Section includes specific requirements for conduits and boxes within the Communications Pathway System. General requirements are covered in Division 27 Specification Section Electrical - General Requirements.

1.2 RELATED SECTIONS
A. The requirements of Division 27 Specification Section Electrical - General Requirements shall serve as the basis for the requirements of this Section, and are incorporated by reference into this Section.

1.3 SUBMITTALS
A. Comply with the Submittal portion of Division 27 Specification Section Basic Communications Requirements. Provide submittal information for the following:
   1. Samples:
      a. Provide one full size installation sample/mock-up for each of the following components. All samples are to be fully labeled per the Specifications and shall be complete with all associated components necessary to make a complete mock-up. Samples will be used to set the standard for the quality of work required of the Contractor throughout the project. Installation work not meeting the sampled standard will be rejected and shall be replaced by the Contractor at no additional cost to the Owner.
         1) Outlet box: Provide a mock-up of the box assembly. The sample assembly shall be complete with box, extension ring, mudring, and a 12 inch length of conduit.

1.4 DEFINITIONS
A. EMT: Electrical Metallic Tubing
B. RMC: Rigid Metal Conduit
C. RNC: Rigid Nonmetallic Conduit
D. IMC: Intermediate Metal Conduit

PART 2 - MATERIALS

2.1 GENERAL
A. Part Numbers: If no part number is provided, then any part meeting the requirements and manufacturers specified is acceptable.

2.2 CONDUIT

A. Conduit types:
1. EMT shall be steel, hot-dipped galvanized or electro-galvanized, with an inner coating to protect cables and aid pulling, UL listed, and meeting the requirements of UL 797 and ANSI C80.3.
2. RMC shall be steel, hot-dipped galvanized inside and outside with factory threaded ends full cut and galvanized after threading, UL listed, and meeting the requirements of UL 6 and ANSI C80.1.
3. RNC shall be PVC Schedule 40 rigid plastic unless otherwise noted on the Drawings, shall be rated for use with 90 degree C wire, and shall conform to UL 651, WC-1094C and NEMA TC 2. Only RNC shall be used in concrete floors without prior written permission from Engineer or Owner.
4. RNC Type EB-20 shall be provided as shown on the drawings, shall be ETL listed, tested to UL-651-A, and shall meet the requirements of NEMA TC-6 and ASTM F-512.
5. Flexible (flex) conduit: Flex conduit is not approved and not acceptable. Where, in rare instances, flex conduit is the only remaining viable raceway option, the Contractor shall notify the Engineer and await the Engineer’s direction prior to procurement and installation.
6. Condulets (LB’s): Condulets (LB’s) are not approved and are not acceptable.

B. Fittings:
1. Provide fittings as follows:
   a. EMT fittings shall be steel compression type with a nylon insulated throat for rain-tight and concrete-tight applications, steel set screw type or steel compression type for all other connections. Conduit ends shall be fitted with bushings – bushings shall be threaded and have a nylon insulated throat.
   b. RMC fittings shall be threaded galvanized steel. Conduit ends shall be fitted with bushings – bushings shall be threaded and have a nylon insulated throat.
   c. RNC fittings shall be of same material and manufacturer as the conduit, shall be UL listed and conform to UL 514. Cement shall be as recommended by manufacturer.
2. Expansion fittings shall be provided across structural joints, shall be of a design to compensate for expansion and contraction, shall be sealed to prevent entrance of water and moisture, and shall safely deflect and expand up to twice the distance of the structural movement. Expansion fittings shall be approved for grounding duty.

2.3 JUNCTION BOXES

A. Junction boxes shall be provided to serve as a transition point between pathways/raceways. Junction boxes shall be galvanized stamped steel, deep drawn one piece (without welds or tab connections), with knockouts for conduit entrances, meeting NEMA OS 1.

B. Junction boxes in walls:
1. Unless otherwise shown on the Drawings, junction boxes shall be minimum 4-inch by 4-inch by 2-1/8 inch deep with extension ring, single gang mud ring, and
knockouts pre-manufactured to support the conduit size serving the junction box (i.e. field modifications of the junction boxes to support the conduit sizes specified are not acceptable). Combined depth of junction box and extension ring shall be a minimum 3-1/2 inches.

2.4 DEVICE BOXES

A. General: Unless otherwise shown on the Drawings or specified herein, device boxes shall:
   1. Be galvanized stamped steel, deep drawn one piece (without welds or tab connections), with knockouts for conduit entrances, meeting NEMA OS 1, and equipped with extension rings to suit construction and application.
   2. Have knockouts pre-manufactured to support the conduit size serving the outlet box (i.e. field modifications of the outlet box to support the conduit sizes specified are not acceptable).

B. Device Box Types:
   1. Outlets: Outlet boxes shall be provided to house communications outlets/connectors:
      a. Shall be a minimum 4-inch by 4-inch by 2-1/8 inch deep capable of accepting a 1-1/4 inch conduit
      b. Shall be equipped with a 1 inch extension ring and a single-gang mud ring unless otherwise noted on the Drawings or specified as follows:
      c. Combined depth of device box and extension ring shall be a minimum of 3-1/2 inches.
      d. Outlet boxes in modular furniture locations shall be deep device boxes.

2.5 PULL BOXES

A. Pull Boxes shall be code gauge sheet metal/fabricated steel continuously welded at seams and painted after fabrication. Boxes shall be complete with covers, trim, etc.

B. Minimum pull boxes sizes shall be as follows:

<table>
<thead>
<tr>
<th>CONDUIT</th>
<th>PULL BOX SIZE</th>
<th>FOR EACH ADDITIONAL CONDUIT INCREASE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Width</td>
<td>Length</td>
<td>Depth</td>
</tr>
<tr>
<td>1&quot;</td>
<td>4&quot;</td>
<td>16&quot;</td>
</tr>
<tr>
<td>1-¼&quot;</td>
<td>6&quot;</td>
<td>20&quot;</td>
</tr>
<tr>
<td>1-½&quot;</td>
<td>8&quot;</td>
<td>27&quot;</td>
</tr>
<tr>
<td>2&quot;</td>
<td>8&quot;</td>
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<tr>
<td>2-1/2&quot;</td>
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<tr>
<td>3&quot;</td>
<td>12&quot;</td>
<td>48&quot;</td>
</tr>
<tr>
<td>3-1/2&quot;</td>
<td>12&quot;</td>
<td>54&quot;</td>
</tr>
<tr>
<td>4&quot;</td>
<td>15&quot;</td>
<td>60&quot;</td>
</tr>
</tbody>
</table>

C. Pull Boxes for conduits sized larger than shown in the table above shall be provided as shown on the Drawings.

2.6 POKE-THROUGHS
A. Poke through devices shall provide the interface for power, communication and/or audio/visual cabling in an above grade floor and the workstation location where power, communication and/or audio/visual outlets are required. Poke-through assembly shall be flush style, shall exceed UL scrub water exclusion requirements for tile and carpet floors, and shall be complete with brackets and hardware to support installation as shown on Drawings.

B. Poke-throughs may be combined for use by both power and communications where shown on the Drawings. When combined, provided metal dividers separating power from communications and provide separate conduits for power and communications.

2.7 WALL BOXES

A. Wall boxes shall provide the interface for power, communication and/or audio/visual cabling within walls. Wall boxes shall be flush style and shall be complete with covers, brackets and hardware to support installation as shown on Drawings.
1. Wall boxes may be combined for use by both power and communications where shown on the Drawings. When combined, provided metal dividers separating power from communications and provide separate conduits for power and communications.
2. Wall boxes shall be complete with brackets, cover plates, and/or other means to support power, communications, and/or audio-visual type connectors shown on the Drawings or called for in the Specifications.

PART 3 - EXECUTION

3.1 CONDUIT

A. General:
1. Run conduit in the most direct route possible, parallel and perpendicular to building lines.
2. Route conduits as close to structure as possible.
3. Do not route conduit through areas in which flammable material may be stored, or over or adjacent to boilers, incinerators, hot water lines, or steam lines.
4. Conceal all conduit unless indicated otherwise, within finished walls, ceilings, and floors.
5. Keep conduits at least 6-inches away from parallel runs of flues and steam or hot water pipes.
6. Install conduits level and square and at proper elevations.
7. For conduit runs exceeding more than 100 feet in length, provide pull boxes (see Part 3 – Execution, Pull Boxes herein) so that no conduit segment between end points/pull boxes exceeds 100 feet.
8. For conduit runs which require more than two 90 degree bends, install pull boxes (see Part 3 – Execution, Pull Boxes herein) so that no conduit segment between end points/pull boxes contains more than two 90 degree bends.
9. Ream all conduits to eliminate sharp edges. Conduits shall be reamed after threads are cut.
10. Joints shall be cut square and shall butt solidly into couplings.
11. Terminate all metal conduits with metallic threaded insulated throat bushings, PVC conduit with PVC bushings.
12. Metallic conduits entering communication rooms shall be equipped with grounding lugs.
13. Prevent foreign matter from entering conduits by using temporary closure protection. After cable installation, cap each unused conduit with a mechanical-type seal (tape is not acceptable).

14. Conduits shall be installed in such a manner as to keep exposed threads to an absolute minimum and in no case shall more than three threads be left exposed.

15. Install expansion fittings where conduit crosses an expansion join in structure or is in an environment where temperature changes combined with conduit run length may produce expansion or contraction stress. Provide a flexible bonding jumper at least three times the nominal width of the joint.

16. Terminate conduits that protrude through a floor 1 to 3 inches above the surface of the floor.

17. Conduits shall be cleaned and dried prior to the installation of cables.

18. Route conduit through roof openings for piping and ductwork wherever possible. Where not possible, provide and route through roof jack with pitch pocket for waterproofing. Empty conduits passing through roof penetrations shall be capped and sealed weather tight.

19. Conduits passing through exterior walls and floors below grade shall be made watertight with duct plugs. Pipe sleeves and wall collars shall extend all around the conduit or entrance seals and be specifically manufactured for that purpose.

20. When using RNC, transition to RMC for all bends, stub-ups, and penetrations through foundation walls.

B. Conduit Schedule:
1. Buried or below grade level slab: RNC
2. Embedded in concrete slab: RNC
3. Through foundation walls: RMC
4. Corrosive/Hazardous Areas: RMC
5. Exposed or subject to mechanical injury: RMC
6. All other areas (unless otherwise noted): EMT

C. Minimum Conduit Sizing, where not shown on the Drawings:
1. Outlet Boxes: 1 inch.
2. Junction Boxes in walls: 1 inch
3. Floor boxes: Provide per the Drawings. Where not shown, coordinate with the other Trades who will make use of the floor box and provide per their requirements. Conduits shall be provided per the manufacturer’s requirements and recommendations for the specified floor box.
4. Poke-throughs: The size of the conduit feeding the poke-through shall be the same size as the conduit stub of the poke-through.

D. Conduit bends:
1. A conduit bend shall not exceed 90 degrees and shall not be constructed in such a way as to reduce the effective diameter of the conduit.
2. Conduit bends shall be sweeping, shall conform to TIA/EIA 569 bend radius requirements, and shall be a minimum of no less than 10 times the internal diameter of the conduit.
3. For conduits larger than 1-1/4 inch, bends shall be factory-manufactured. Bending conduit larger than this in the field using manual or mechanical methods is not acceptable. 1 inch and 1-1/4 inch bends shall be made in an approved bending machine or shall be factory-manufactured.
4. The contractor shall test each conduit with a mandrel to prove compliance with TIA/EIA and cable manufacturer bend radius requirements throughout the conduit run and shall provide evidence of such testing immediately upon request of the Engineer.
5. The sum total of conduit bends for a conduit segment between end points/pull boxes shall not exceed 180 degrees, except one additional bend of up to 90
degrees is acceptable if the bend is located within 12 inches of the cable feed end.

6. 90 degree condulets (LB’s) are not acceptable.

E. Conduit/duct runs under slab: Coordinate with other trades (electrical, plumbing, etc.) prior to trenching and installation. Communications conduit/duct runs under slab shall not share a trench with conduit/duct runs from other trades.

F. Conduits embedded in slab: Not acceptable unless otherwise shown on the Drawings.

G. Pull Strings:
   1. Equip all conduits over 3 feet long with plastic or nylon pull strings with printed footage indicators and a minimum test rating of 200 pounds. Extend pull string a minimum of 3 feet from each end. Pull strings shall be secured to avoid losing the pull string within the conduit by either securing tying the end of each string in place, or by tying the end of each string to a washer with a diameter larger than the conduit diameter.
   2. Label each pull string in a clear manner by designating, at each end of the pull string, the location of the far end of the pull string (i.e. room name, communications closet name, pull box identifier, cable tray, station identifier, etc.) Indicate pull string length on the label.

H. Bushings: The Contractor is solely responsible for ensuring that bushings (insulated throat for metallic conduit, PVC for PVC conduit) are installed at conduit end(s) prior to cable installation. Where cable is installed prior to the installation of bushings, the Contractor shall remove the cable, install the bushing, and re-install the cable at no additional cost to the Owner.

I. Labels: Label each conduit end in a clear manner by designating, at each end of the conduit, the location of the far end of the conduit (i.e. room name, communications closet name, pull box identifier, cable tray, station identifier, etc.). Indicate conduit length on the label.

3.2 INNERDUCTS (SUBDUCTS)

A. Innerduct installation shall strictly comply with manufacturer’s recommendations.

3.3 JUNCTION AND DEVICE BOXES

A. General:
   1. Unless otherwise indicated, boxes shall be recessed. Set boxes plumb, level, square and flush with wall. Do not exceed more than 1/16 inch tolerance for each condition. Recess outside edge and trim plates from finished surface in accordance with NEC.
   2. Boxes shall be supported independently of the conduit system. Supports shall be noncombustible and corrosion resistant. Suspended boxes shall be supported with threaded rod hangers and galvanized steel clamps, or trapeze hangers such as Unistrut.
   3. Box locations may be adjusted by the Engineer by up to 10 feet from the location shown on the Drawings at no additional cost to the Owner.
   4. Install additional straps or cross-bracing to ensure a rigid installation in a steel stud system.
   5. Boxes on opposite sides of fire rated walls and partitions shall be separated by a horizontal distance of at least 24 inches.
6. Unused knockouts in boxes shall be left sealed.
7. For acoustical purposes, boxes on opposite sides of a wall shall not be located back-to-back.
8. For boxes to be installed in brick, masonry or concrete, offsets shall be provided to provide for proper adjustment to finished surfaces. Exposed mortar is not acceptable around device plates.
9. In the event of discrepancies between box locations shown on the Communications drawings and any other drawings in the Construction Documents, the Contractor shall notify the Engineer and await the Engineer’s direction prior to installation.

B. Device Box Types
1. Outlets:
   a. Unless specifically noted otherwise on the Drawings, outlet boxes shall be dedicated to communications, and shall not be shared with power.
   b. The use of dividers to divide a single box into “separate” sections for communications and power (or another function) is not acceptable.
   c. Outlet boxes shall be located within 3 feet of an electrical power receptacle. Where conditions are such that this is not possible, promptly notify the Engineer and await the Engineer’s direction prior to rough-in of the box.

3.4 PULL BOXES

A. Install pull boxes in an exposed location, readily accessible both at time of construction and after building occupation. Pull boxes shall not be installed in interstitial or otherwise non-accessible building spaces.

B. If mounting a pull box on ceiling structure above ceiling grid, do not mount higher than 4 feet above grid (mount on wall instead).

C. Install pull boxes such that conduit enters and exits only from opposite ends of the box (i.e. only two sides of a box may be used for conduit entry and those two sides must be opposite one another).

D. Do not install conduits into pullboxes in such a manner as to obstruct the installation of future feeder conduits into or out of the pullbox.

E. A pull box shall not be substituted for a 90 degree bend.

F. Do not exceed one pull box per total conduit run between outlet box and termination point in a communications closet, unless otherwise shown on the Drawings. Where field conditions necessitate the use of additional pull boxes notify the Engineer and await the Engineer’s direction prior to procurement and installation.

G. Pull boxes shall be rigidly mounted. Unused knockouts shall be plugged with suitable blanking devices.

H. Labels: Label each pullbox with a unique identifier. Identifiers shall be of the form “RN-YY” where “RN” is the room name of the room closest to (or containing) the pull box, and “YY” is the sequential number of the pull box for each “RN”. For example: The second pull box in the vicinity of room “201” would have the label “201-02”.

3.5 POKE-THROUGHS
A. Poke-throughs shall be installed per manufacturer’s requirements and recommendations.

3.6 WALL BOXES

A. Set boxes plumb, level, square and flush with floor. Do not exceed more than 1/16 inch tolerance for each condition. Recess outside edge and trim plates from finished surface in accordance with NEC.

B. Boxes shall be supported independently of the conduit system. Supports shall be noncombustible and corrosion resistant. Suspended boxes shall be supported with threaded rod hangers and galvanized steel clamps, or trapeze hangers such as Unistrut.

C. Box locations may be adjusted by the Engineer by up to 10 feet from the location shown on the Drawings at no additional cost to the Owner.

D. Install additional straps or cross-bracing to ensure a rigid installation in a steel stud system.

E. Boxes on opposite sides of fire rated walls and partitions shall be separated by a horizontal distance of at least 24 inches.

F. Unused knockouts in boxes shall be left sealed.

G. For acoustical purposes, boxes on opposite sides of a wall shall not be located back-to-back.

H. For boxes to be installed in brick, masonry or concrete, offsets shall be provided to provide for proper adjustment to finished surfaces. Exposed mortar is not acceptable around device plates.

I. In the event of discrepancies between box locations shown on the Communications drawings and any other drawings in the Construction Documents, the Contractor shall notify the Engineer and await the Engineer’s direction prior to installation.

J. Covers shall be installed per manufacturer’s recommendations.

K. For wall boxes with combined power and communications circuits, install metal dividers for separation of circuits and provide separate conduits for power and communications.

END OF SECTION
PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes general cabling requirements for the Communications Cabling System.

1.2 RELATED SECTIONS

A. Division 27 Specification Section Common Work - Sleeves, Penetrations and Firestopping. Provide sleeves, penetrations, and firestopping as required to support the work of this Section.

B. Division 27 Specification Section Common Work – Hangers and Supports. Provide hangers and supports as required to support the work of this Section.

1.3 SUBMITTALS

A. Provide the following per the criteria set forth in Submittals in Division 27 Specification Section Basic Communications Requirements:
   1. Product Data
   2. Shop Drawings:
      a. Cable Routing: Provide a cable routing plan if communications cable routing has not been shown on the Drawings, or if the Contractor is proposing a deviation from that shown.
         1) If a routing plan is not required, submit written documentation stating that the routing will be provided as shown on the Drawings, that the Contractor has reviewed the routing shown on the Drawings with the other applicable trades and that all have agreed that it does not create conflicts between the trades, and the routing meets applicable codes, regulations and standards.
         2) If a routing plan is required, submit complete floor plans or detail drawings showing the proposed routing, raceway sizes and locations, and cabling in a manner equal to that of the Drawings. Ensure that any routing changes are coordinated with comparable changes to the raceway routing. Specifically note each location where the proposed routing is different from the Drawings. Where deviations are proposed, submit written documentation detailing the reason for each. Each deviation must be approved in writing by the Engineer prior to proceeding with installation.
      b. Termination Block Wall Field Terminations and Elevations: Provide termination block wall field termination diagrams and elevation drawings where such diagrams and elevations have not been shown on the Drawings, or if the Contractor is proposing a deviation from that shown.
         1) Where changes to the wall field termination diagrams and elevation drawings are proposed, submit wall field termination diagrams and elevation drawings in a manner equal to that of the Drawings. Specifically note areas where deviations are proposed, and submit written documentation detailing the reason for each. Each deviation
must be approved in writing by the Engineer prior to proceeding with installation.

3. Samples:
   a. Provide one full size installation sample/mock-up for each of the following components. All samples are to be fully labeled per the Specifications and shall be complete with all associated components necessary to make a complete mock-up. Samples will be used to set the standard for the quality of work required of the Contractor throughout the project. Installation work not meeting the sampled standard will be rejected and shall be replaced by the Contractor at no additional cost to the Owner.

   1) Horizontal cable(s): Provide a mock-up of each type of outlet configuration shown on the Drawings. The samples shall be complete with the outlet box, 36 inch length(s) of horizontal cable(s), strain relief, faceplate, connector(s), and other incidental components as required for a complete outlet. Label each outlet per the Specifications. The cable shall show all cable markings.

4. Other:
   a. Owner Specific: Submit other information as required by Owner Specific Governing Requirements in Specification Section Basic Communications Requirements.

PART 2 - MATERIALS

2.1 GENERAL

A. Manufacturer: Structured cabling system components shall be sourced by a single Manufacturer or formally partnered Manufacturers (collectively referred to as the "Manufacturer"). Products shall not be intermixed between different manufacturers unless the Manufacturer of the chosen communications cabling system has listed (in writing) another manufacturer’s component as an “approved alternative product” (or equivalent wording) and will warrant the “approved alternative product” as part of the Manufacturer’s extended Warranty, or if the product has been specifically called out as a special requirement in the Specifications. Additionally, for a given Manufacturer, all products shall be part of a single product line and the product line shall be specifically engineered “end-to-end” (e.g. the system and all of its components shall have been engineered to function together as a single, continuous transmission path). The structured cabling system shall be:
   1. Hubbell – Mission Critical

B. Plenum Rating:
   1. Cable shall be plenum (CMP, OFNP) rated if installed in a plenum environment, non-plenum rated (CM/CMR, OFNR) otherwise, or per local Governing Requirements or code as required.
   2. The Contractor is solely responsible for determining the plenum rating of the environment in which cable is to be installed, and for doing so prior to procurement and installation of the cable. Non-plenum cable installed in an environment determined to be plenum rated shall be removed and replaced by the Contractor at no additional cost to the Owner.
   3. All cabling shall bear plenum or non-plenum markings for the environment in which they are installed.

2.2 PERFORMANCE
A. Protocols/Services:
   1. At a minimum, the communications cabling system shall support data network protocols/services at rates up to 1 Gbps for transmission on copper, and 10 Gbps for transmission on fiber. It shall support Ethernet, ATM and other network protocols. The communications cabling system shall additionally support RS-232 and other dedicated point-to-point protocols.
   2. The communications cabling system shall support PBX telephone services. It shall support analog, digital, and ISDN services, and shall be compatible with direct trunk lines (POTS).

B. Category Rating: Copper components (cable, connectors, etc.) shall meet or exceed the TIA/EIA transmission requirements for the Category for which they are rated.
   1. Horizontal Cable shall be rated:
      a. Category 5e (350 Mhz):
         1) Voice and Data
   2. Backbone Cable shall be rated Category 3 or higher.

C. Performance Rating: All components (copper and fiber) shall meet or exceed TIA/EIA transmission requirements for their component type.

PART 3 - EXECUTION

3.1 GENERAL

A. Work shall comply with the Governing Requirements as defined in Division 27 Specification Section Basic Communications Requirements. Governing Requirements of particular relevance to this Section include, but are not limited to:
   1. TIA/EIA - 568: Commercial Building Telecommunications Cabling Standard
   2. TIA/EIA 569: Commercial Building Standard for Telecommunication Pathways and Spaces
   3. ANSI/EIA 310-D: Cabinets, Racks, Panels and Associated Equipment
   4. TIA/EIA 606: The Administration Standard for the Telecommunications Infrastructure of Commercial Buildings
   5. ANSI J-STD-607: Commercial Building Grounding and Bonding Requirements for Telecommunications
   6. IEEE 802.3 (series): Local Area Network Ethernet Standards
   8. BICSI: Telecommunications Distribution Methods Manual
   10. National Electric Code (NFPA 70)

B. Owner required Governing Requirements of particular relevance to this Section include, but are not limited to:
   1. University of Colorado at Boulder:
      a. UCB Division 27 Telecommunications Standards
      b. UCB Construction Drawings As-built Requirements
      c. UCB Cable Footage and Count Information
      d. UCB Construction Inspection Report
      e. UCB Approved Rack Details
      f. UCB ITS Telecom CAD Standards Guidelines
      g. UCB Labeling and Testing Document
      h. UCB Jack Numbering Document (T-5)
      i. UCB Wireless Ceiling and Wall Security Box Instructions
      j. UCB Typical Telecommunications Conduit Layouts Drawing
3.2 GENERAL INSTALLATION

A. Maintain separation from other conductors (power, fire alarm, etc.) per NEC requirements and TIA/EIA standards.

B. The bending radius and pull strength requirements of all cable as detailed in the Governing Requirements and Manufacturers recommendations shall be strictly observed during handling and installation.

C. Pull cables simultaneously where more than one cable is being installed in the same raceway.

D. Use pulling compound or lubricant where necessary. Use compounds that will not damage conductor or insulation.

E. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips that will not damage cable or raceway.

F. Cable jackets shall not be twisted during installation. Cables showing evidence of twisting shall be replaced at no additional cost to the Owner, regardless of the outcome of cable testing.

G. Cable shall be installed in a continuous (non-spliced) manner unless otherwise indicated on the Drawings. Where splicing may be required in areas not shown on the Drawings due to Cable Spool length limitations or otherwise, the Contractor shall obtain the approval of the Engineer prior to procurement and installation.

H. Provide strain relief to ensure durable connections at all cable termination locations.

I. Pathway/Raceway Validation: The Contractor is responsible for validating pathway/raceway sizing against the amount of cable it is to support for compliance with NEC and TIA/EIA 569 cable capacity standards. The Contractor shall notify the Engineer of all raceways the Contractor determines to be insufficient in size and shall await the Engineer’s direction prior to procurement and installation.

J. Copper Cables:
   1. Backbone Cable: All pairs shall be terminated. Unless otherwise noted on the Drawings, the installation of un-terminated cable pairs is not acceptable. For shielded cable, bond both ends of the metallic shield (or metallic strength member) to the nearest TGB.
   2. Horizontal Cable: Thoroughly clean and remove foreign material from outlet boxes prior to installation of cable.

K. Coaxial Cable:
   1. Extreme care shall be taken not to kink coaxial cables during installation. Cable ends shall be protected prior to termination.

L. Provide Sleeves and Penetrations as necessary where cable must pass through building barriers such as walls, floors or foundations. Firestop all through and membrane penetrations of fire-rated barriers. Sleeves, Penetrations and Firestopping shall be per the requirements of Division 27 Specification Section Common Work - Sleeves Penetrations and Firestopping.

3.3 CABLE INSTALLED IN RACEWAY
A. In Conduit or Ducts:
1. Fill ratios shall not exceed NEC requirements.
2. Cable shall not be pulled into conduit/ducts until the conduit/duct ends have been prepared for cable installation (i.e. ducts cleaned and swabbed, reamed to eliminate sharp edges, bushings installed (insulated throat for metallic conduits, PVC for PVC conduits), etc.). Cables pulled into conduit/ducts prior to conduit/duct end preparation shall be removed and replaced (after the conduit/duct ends are prepared) at no additional cost to the Owner.
3. Backbone (riser) cables shall not share conduits/ducts with horizontal cables.
4. Reinstate pull-wires in conduits and ducts after use to facilitate future addition of cables.

B. In Cable Tray:
1. Cable shall not be attached to the cable tray (i.e. cable shall be left “loose”).
2. Cable shall be laid in tray in such a way as to present a neat and professional appearance. However, cable shall not be combed (for performance reasons).
3. For cable tray serving both backbone (riser) and horizontal cabling, install cable in cable tray in such a manner that backbone cabling does not overlap with horizontal cabling – reserve approximately 25 percent of the space in the tray for backbone cabling and the remaining 75 percent for horizontal cabling.
4. Where cables in cable trays are required to maintain specific distances between each other they shall be firmly secured to maintain this distance at fire rated penetrations.

3.4 CABLE NOT INSTALLED IN RACEWAY (E.G. “EXPOSED”):

A. Cables shall be installed in raceway unless specifically specified by Engineer or Owner.

B. Staples are not acceptable.

C. Where expressly allowed, cables exiting floor or wall penetrations and running exposed into furniture or casework shall be bundled and wrapped in spiral wrap or split-loom tubing for protection.

D. Route cable to comply with the Governing Requirements standards and rules for avoiding potential EMI sources of interference and as follows:
1. Provide clearances of:
   a. 18 inches from light fixtures
   b. 12 inches from electrical power distribution (including conduits and cables)
   c. 4 feet from motors and transformers
2. Cable pathway shall cross perpendicular to potential EMI sources of interference.

3.5 CABLE IN COMMUNICATIONS ROOMS AND SPACES

A. Cable on backboards:
1. Lay and dress all cables to allow other cables to enter raceway (conduit or otherwise) without difficulty at a later time by maintaining a working distance from these openings.
2. Cable shall be routed as close as possible to the ceiling, floor, sides, or corners to insure that adequate wall or backboard space is available for current and future equipment and for cable terminations.
3. Lay cables via the shortest route directly to the nearest edge of the backboard from mounted equipment or blocks. Secure all similarly routed and similar cables together and attach to D-rings vertically or horizontally, then route over a path
that will offer minimum obstruction to future installations of equipment, backboards or other cables.

B. Cable Bundles:
1. Cables shall be bundled by application (horizontal or backbone) and by cable type (Cat 3, Cat 5E, Cat 5, Cat 6, MM Fiber, SM Fiber, etc.). Cable applications and types shall not be intermixed within a bundle.
2. Cable bundles shall be combed to present a neat and professional appearance. For performance reasons, combing shall occur from the cable end to a maximum of 35 feet back (or per the Manufacturer’s recommendations, whichever is more stringent). For the portion of a cable bundle within the communications room exceeding this requirement (if any), the exterior cables in the cable bundle shall be combed straight. Interior cables shall not be combed (i.e. they shall be left “mixed”).

C. Cable in ladder rack on walls: Place larger cable bundles against wall, smaller cable bundles to the inside.

D. Cable straps: Install cable straps to secure cable bundles to cable runway and other supporting equipment. The use of plastic tie wraps for this purpose is not acceptable.

3.6 CABLE SLACK

A. Cable slack at the work area outlet: Provide 1 foot of slack. Slack shall be stored in a serpentine loop manner, not in the form of a circular “loop” (for performance reasons).

B. In cases of extreme congestion, notify the Engineer and await the Engineer’s direction prior to installation.

END OF SECTION
SECTION 271500 - COMMUNICATIONS - HORIZONTAL CABLE

PART 1 - GENERAL

1.1 SUMMARY
A. This Section includes specific requirements for horizontal cable within the Communications Cabling System. General requirements for horizontal cable are covered in Division 27 Specification Section Communications - General Requirements.

1.2 RELATED SECTIONS
A. The requirements of Division 27 Specification Section Communications - General Requirements shall serve as the basis for the requirements of this Section, and are incorporated by reference into this Section.

1.3 SUBMITTALS
A. Comply with the Submittal portion of Division 27 Specification Section Basic Communications Requirements. Provide submittal information for the following:
   1. Product Data

PART 2 - MATERIALS

2.1 GENERAL
A. Manufacturer: Unless otherwise indicated, equipment and materials in this Section shall be of the same manufacturer as that specified under Division 27 Specification Section Communications - General Requirements.

B. Part Numbers: Refer to the equipment schedule at the end of this Section for specific part numbers. If no part number is provided, then any part meeting the requirements and manufacturers specified is acceptable.

2.2 COPPER
A. Horizontal Cable: Cable shall be 4 pair UTP, solid copper conductors insulated with color coded PVC.
   1. Color shall be:
      a. Voice and Data: Category 5e – Blue
      b. Value Port and POS: Category 5e – Orange

2.3 COAXIAL CATV
A. Coaxial horizontal cable shall be 75 ohm Series 6, 18 AWG solid conductor, low loss, quad shield with 90% braid.
PART 3 - EXECUTION

3.1 GENERAL

A. Refer to UCB Jack Numbering Document for further information.

3.2 CONSTRUCTION WASTE MANAGEMENT

A. Construction waste shall be managed in accordance with provisions of Specification Section 017419 Construction Waste Management and Disposal. Documentation shall be submitted to satisfy the requirements of that Section.
### EQUIPMENT SCHEDULE - HC

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<td>HORIZONTAL COPPER CABLE (CAT5E)</td>
<td>Mohawk M575xx</td>
<td></td>
<td>Plenum: Conflitscope 2270V</td>
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<tr>
<td>HC200</td>
<td>HORIZONTAL COAX RG-6 CABLE (CATV)</td>
<td>See Special Rqmt</td>
<td>Mohawk M575xx</td>
<td>Non-Plenum: Times Fiber 2360V</td>
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</tbody>
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END OF SECTION
SECTION 271543 - COMMUNICATIONS - FACEPLATES AND CONNECTORS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes requirements for faceplates and connectors within the Communications Cabling System. General requirements for faceplates and connectors are covered in Division 27 Specification Section Communications - General Requirements.

1.2 RELATED SECTIONS

A. The requirements of Division 27 Specification Section Communications - General Requirements shall serve as the basis for the requirements of this Section, and are incorporated by reference into this Section.

1.3 SUBMITTALS

A. Comply with the Submittal portion of Division 27 Specification Section Basic Communications Requirements. Provide submittal information for the following:
   1. Product Data

PART 2 - MATERIALS

2.1 GENERAL

A. Manufacturer: Unless otherwise indicated, equipment in this Section shall be of the same Manufacturer as that specified under Division 27 Specification Section Communications - General Requirements.

B. Part Numbers: Refer to the equipment schedule at the end of this Section for specific part numbers. If no part number is provided, then any part meeting the requirements and manufacturers specified is acceptable.

2.2 FACEPLATES

A. General: Provide faceplates for outlets in the locations and gang counts as shown on the Drawings or as specified below. Faceplates shall be complete with blank inserts/fillers for covering unused connector openings. Faceplates and fittings shall be dimensionally suitable for securely mounting connectors, providing a snug and sure fit – loose connectors are not acceptable. Faceplates shall be complete with port identification labels, and shall be provided with appropriate adapters, fittings and adapters as required.

B. Color: The color of non-stainless steel faceplates shall be electric ivory unless specified below.
C. Faceplates/Fittings:
1. For wall-mount telephone locations:
   a. Faceplates shall be brushed stainless steel with stainless steel mounting lugs suitable for mounting wall-mount telephones. Faceplates shall be dimensionally suitable for securely mounting 8-position/8-conductor IDC (RJ45 style) connectors.
2. For specialized mounting requirements (including but not limited to furniture, furniture “pop-ups” and enclosures, floor-boxes, poke-throughs, surface mounted raceway, etc.):
   a. Provide faceplates and fittings as required to support the specialized mounting. Faceplates and fittings shall be manufactured specifically for the equipment that they are to be mounted into (“general purpose” faceplates field modified for the specialized use are not acceptable unless specifically noted otherwise on the Drawings). Faceplates and fittings shall be approved by both the equipment manufacturer and the communications cabling system manufacturer, and shall be coordinated and verified compatible by the Contractor, equipment manufacturer and cabling system manufacturer prior to procurement and delivery. The provision of the correct faceplates and fittings for use in specialized mounting requirements is the sole responsibility of the Contractor.
3. For walls and other non-specialized locations:
   a. Faceplates shall be plastic and capable of flush-mounting connectors.
   b. Standard single gang faceplates shall have six jack openings.
4. For additions/renovations, coordinate specific requirements with UCB ITS.

D. Wall Cutout Faceplate Mounting Brackets: Provide brackets for mounting faceplates over wall cutouts (i.e. flush-mount faceplates with no in-wall outlet box) as required.

E. Provide blank faceplates, matching those faceplates in use, for all unused communications backboxes.

2.3 CONNECTORS
A. General: Connectors shall meet or exceed the TIA/EIA standards and as called for in the Governing Requirements.

B. Horizontal:
1. Copper: Copper connectors shall be 8-position/8-conductor, insulation displacement connector (IDC), non-keyed, and shall accept modular 8-position/8-conductor plugs. Connectors shall have a universally color-coded wiring pattern for both T568A and T568B. Copper connectors Category rating shall be the same as that specified below. Fully populate all patch panels. Provide 25 additional connectors as spares to Owner.
   a. Voice and Data: Category 5e – Gray
   b. Value Port: Category 5e – Orange
   c. Coordinate with UCB ITS to verify connector color prior to placing order.

PART 3 - EXECUTION

3.1 FACEPLATES
A. Install all faceplates level and perpendicular to the floor. If long side of existing outlet box is mounted horizontal, then rotate faceplate counter-clockwise.

3.2 CONNECTORS

A. Horizontal:
1. Copper: Terminate connectors using the T568B wiring pattern at both ends of the cable.
2. Coaxial CATV: Connectorize coaxial cable strictly according to Manufacturers instructions using manufacturer specified tools.
# EQUIPMENT SCHEDULE - FC

<table>
<thead>
<tr>
<th>ID</th>
<th>DESCRIPTION</th>
<th>Manufacturer/Part Number</th>
<th>Hub/Mohawk</th>
<th>Special Rqmt</th>
</tr>
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<tbody>
<tr>
<td>FC010</td>
<td>WALL MOUNT TELEPHONE FACEPLATE</td>
<td>P630S81QJ8</td>
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<tr>
<td>FC020</td>
<td>SPECIALIZED FACEPLATE/MOUNTING</td>
<td>See Special Rqmt</td>
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<td>As required; coordinate with UCB and Eqpt mfrs</td>
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<td>FC050</td>
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<td>IFP16E1</td>
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<td>FC100</td>
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<td>COAXIAL RG-6 CONNECTOR (CATV)</td>
<td>See Special Rqmt</td>
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<td>T&amp;B Snap-N-Seal or Stirling SPL</td>
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END OF SECTION
SECTION 271619 - COMMUNICATIONS - PATCH CORDS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes specific requirements for communications patch cords within the Communications Cabling System. General requirements for patch cords are covered in Division 27 Specification Section Communications - General Requirements.

1.2 RELATED SECTIONS

A. The requirements of Division 27 Specification Section Communications - General Requirements shall serve as the basis for the requirements of this Section, and are incorporated by reference into this Section.

1.3 SUBMITTALS

A. Comply with the Submittal portion of Division 27 Specification Section Basic Communications Requirements. Provide submittal information for the following:
   1. Product Data

PART 2 - MATERIALS

2.1 GENERAL

A. Manufacturer: Unless otherwise indicated, equipment and materials in this Section shall be of the same manufacturer as that specified under Division 27 Specification Section Communications - General Requirements.

B. Part Numbers: Refer to the equipment schedule at the end of this Section for specific part numbers. If no part number is provided, then any part meeting the requirements and manufacturers specified is acceptable.

2.2 COPPER PATCH CABLES

A. Provide copper patch cables for modular copper cross-connects. Patch cables shall be pre-manufactured (factory-terminated), stranded UTP, with 8-pin modular plugs (Ultim8 or RJ45).
   1. Refer to UCB Telecommunications Standards: (http://www.colorado.edu/facilitiesmanagement/pdc/construction/standards/documents/Division27CommunicationsSpecifications.pdf) for additional patch cord requirements.
   2. Copper patch cables Category rating shall be the same as that specified under Division 27 Specification Section Communications - General Requirements.
      a. For ER/TR’s:
1) Patch cables shall be 4-pair with RJ45 plugs on one end and Ultim8 plugs on the other end.
2) Provide one (1) patch cord for each new horizontal cable. Coordinate type, color and exact length (15-foot maximum) with Owner prior to ordering patch cords.

b. For Work Area Outlets (Workstation):
   1) Patch cables shall be 4-pair with bootless modular plugs.
   2) Data Port: Provide one (1) Category 5e desktop patch cord for each cable in the second through sixth position on the faceplate. Coordinate color and exact length (15-foot maximum) with Owner prior to ordering patch cords.

2.3 FIBER PATCH CABLES

   A. Fiber patch cables will be provided by Owner.

PART 3 - EXECUTION

3.1 GENERAL

   A. Provide 4-pair modular patch cords for ER/TR and Work Area Outlets to Owner 3 weeks prior to final acceptance.

   B. Coordinate termination plan with Owner prior to ordering patch cords. The Contractor shall submit the pair count with the jack number for as-built documentation at three weeks and at one week prior to occupancy or as specified by Owner.
### EQUIPMENT SCHEDULE - PC

<table>
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<tr>
<th>ID</th>
<th>DESCRIPTION</th>
<th>Manufacturer/Part Number</th>
<th>ADC (KRONE)</th>
<th>Hub/Mohawk</th>
<th>Special Rqmt</th>
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</thead>
<tbody>
<tr>
<td>PC010</td>
<td>COPPER PATCH CORD, NO BOOT (CAT5E)</td>
<td>See Hub/Mohawk</td>
<td>PC5Exyy</td>
<td>Hub/Mohawk</td>
<td>Replace 'x' with color description and 'yy' with length</td>
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<tr>
<td>PC200</td>
<td>COPPER PATCH CORD FOR KRONE ULTIM8 BLOCKS</td>
<td>FNETByzexxx</td>
<td>ADC</td>
<td></td>
<td>Replace 'x' with length, 'y' with Pin configuration and 'zz' with color</td>
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</table>

END OF SECTION
PART 1 - GENERAL

1.1 SUMMARY
A. This Section includes requirements for testing and identification/administration of the Communications Cabling System.

1.2 UCB REQUIREMENTS AND STANDARDS
A. The Contractor shall comply with the following UCB requirements and standards:
1. UCB Telecommunications Standards, Section 271700 – Testing, Identification and Administration.
B. In the event of conflict/disagreement between UCB Telecommunications Standards and this Specification Section, the more stringent condition shall prevail.

1.3 SUBMITTALS
A. Comply with the Submittal portions of Division 27 Specification Sections Basic Communications Requirements and Communications - General Requirements. Provide submittal information for the following submittal sections below:
   a. Provide a list of proposed test equipment for use in verifying the installation of the communications cabling system.
   1) Provide for each testing device:
      a) Manufacturer and product number.
      b) Manufacturer documentation showing date and outcome of last re-calibration. Testing device shall have been re-calibrated within the manufacturer’s recommended recalibration period.
      c) Manufacturer documentation showing software revision. Software revision shall be most current revision available for the device and shall be based upon the most current TIA/EIA testing guidelines.
      d) Patch cords and other specialized components.
2. Identification and Administration (see Part 2 – Materials: Identification and Administration herein):
   a. Provide a list of proposed hand-carried or computer software based identification/label makers, and a list of proposed materials for identifiers/labels.
   b. Provide actual samples of labels to be created for each system component to be labeled.
   c. Complete and submit the UCB-provided T5 template spreadsheet designating all outlet and jack numbering.
      1) Spreadsheet shall be complete prior to installation.
      2) Update UCB-provided T5 template spreadsheet designating all outlet and jack numbering and submit to UCB three weeks prior to
move-in date. The revised T5 submittal shall incorporate any changes from the original project design.

PART 2 - MATERIALS

2.1 TESTING

A. General
1. Testing of the systems shall be in accordance with the manufacturer’s recommendations and with the Governing Requirements.
2. Test reports shall be complete and in accordance with the appropriate Governing Requirements.
3. Where testing discloses deficiencies in the work, the Contractor shall rework, repair, or replace equipment and systems found deficient. The Contractor shall continue remedial measures and retesting until satisfactory results are obtained. Remedial measures and retesting shall be at no additional cost to UCB.
4. Testing of product or equipment prior to installation shall include performance testing to establish the applicability of equipment for its intended purpose. The Contractor shall:
   a. Establish the required test procedures from required Governing Requirements and manufacturer’s recommendations.
   b. Provide necessary test equipment, power, and consumables to perform the test.
   c. Notify the Engineer of test schedule(s) at least one week in advance.
   d. Perform test.
   e. Provide test result documentation to the Engineer.
5. Final testing and start-up of product, equipment, and systems shall include establishing proper capacity, operation, maintenance, and compliance with Governing Requirements. The Contractor shall:
   a. Provide the services of manufacturer’s representatives for systems to be tested and started up.
   b. Establish the required test procedures from required Governing Requirements and manufacturer’s recommendations.
   c. Provide necessary test equipment, power, and consumables to perform the test.
   d. Notify the Engineer of test schedule(s) at least one week in advance.
   e. Perform tests and start-up functions.
   f. Provide documentation of test results and fully operational systems to the Engineer.
6. Test records shall be provided on a form approved by the Engineer.

B. Systems Specific: Test shall be performed for each of the following systems as follows:
1. Communications Cabling System
   a. Test records:
      1) Each cable in the system shall be tested. Test result forms shall include the cable identifier, tests performed, outcome of tests and indication of errors found, cable length, retest results, and name and signature of technician completing the tests. Test result forms shall be provided to UCB and Engineer for review and acceptance.
      2) Test records for each cable within the system shall be printed directly from the tester and shall be submitted in paper form (in a binder) and on compact disc to UCB and Engineer for review. Handwritten test results will not be accepted.
b. Testing Devices: Testing devices shall be capable of storing and printing test records for each cable within the system.
1) For copper cables:
   a) Testing device shall meet the following requirements for a level 3 ANSI/TIA/EIA-568-B.2 Annex B and Annex testing instrument:
      i. Be re-calibrated within the calibration period recommended by the manufacturer, with the most current software revision based upon the most current TIA/EIA testing guidelines.
      ii. Physical interface shall be modular RJ-45 and a serial port with DB-9 connector.
      iii. Store test results including date stamp of tests and UCB jack designator for each tested link.
      iv. Print test results in report form when connected to a PC.
      vi. Measure NEXT for all pair combinations and attenuation on all pairs from 1.0 to 350 MHz.

2.2 IDENTIFICATION AND ADMINISTRATION

A. Identifiers (labels) shall be as recommended in TIA/EIA 606-A, unless noted otherwise herein.

B. Identifiers (labels) shall be as determined by and coordinated with UCB.

C. Labels shall be permanent (i.e. not subject to fading or erasure) and permanently affixed. Handwritten labels are not acceptable.

D. For identification of materials and equipment interior to the facility:
   1. Faceplate labels: Labels shall be created with a hand-carried label maker (Dymo Electronic Labelmaker 5000 or equivalent) or an equivalent computer/software-based label making system.
   2. Termination sheets and labels for copper and fiber terminations and enclosures: to be provided by UCB ITS and installed by the Contractor. Replacement sheets and labels will be provided to the Contractor at an additional cost.
   3. Cable Marking: Label shall be a vinyl substrate with a while printing area and a clear “tail” that self laminates the printed area when wrapped around the cable. If cable jacket is white, provide cable label with printing area that is any other color than white (preferably orange or yellow), so that the labels are easily distinguishable.
   4. Pre-printed labels shall meet legibility, defacement, exposure and adhesion requirements of UL 969.
   5. Hand written labels shall not be acceptable.

E. For identification of materials and equipment in the outside plant:
   1. Labels shall be waterproof (even when submerged) and engraved on hard plastic markers. Lettering shall be black, markers shall be white.

PART 3 - EXECUTION
3.1 GENERAL

A. Work shall comply with the references and standards listed in Specification Section – Communications - General Requirements.

1. Testing:
   a. TIA/EIA - 568 Commercial Building Telecommunications Cabling Standard
   b. IEEE 802.3 (series): Local Area Network Ethernet Standard, including the IEEE 802.3z Gigabit Ethernet Standard

2. Identification and Administration:
   a. TIA/EIA 606-A: The Administration Standard for the Telecommunications Infrastructure of Commercial Buildings
   b. UCB Telecommunications Standards - Jack Numbering Document (http://decker.colorado.edu/standards)
   c. UCB Telecommunications Standards - Construction Drawings As-built Rules (http://decker.colorado.edu/standards)

3.2 TESTING

A. General

1. Test devices shall be in calibration throughout the testing period. Tests performed on equipment without up to date calibration shall be rejected and shall be repeated at no additional cost to UCB.

2. The Contractor shall notify the Engineer and UCB 7 days in advance of each type of test to be conducted. UCB or Engineer may, at their discretion, witness all testing.
   a. UCB and Engineer shall be invited to attend and inspect the first instance of each type of test to be conducted. Tests conducted prior to first inspection shall be at the sole risk of the Contractor, and as such are subject to rejection. Such tests will be repeated at no additional cost to UCB.

B. Systems Specific Testing:

1. Communications Cabling System
   a. All interior (inside plant) and exterior (outside plant) fiber cables shall be tested on the reel upon delivery to the job site prior to installation.
      1) Test results shall be permanently affixed to the reel and a copy given to UCB and Engineer for review prior to installation.
      2) Testing shall demonstrate compliance with the factory test results as shipped with the reel. Cables that fail to pass shall not be installed, and the Contractor shall replace the cable at no additional cost to UCB. Repair of damaged cable is not acceptable.
   b. The contractor shall perform pre-testing of the installed telecommunications systems to determine compliance and notify UCB ITS personnel when the system is ready for final inspection and testing. UCB shall be obligated to schedule final inspection and testing within five (5) business days of notification by the contractor. Final testing shall be scheduled and conducted in the presence of the UCB ITS representative.
   c. Test sheets for communication jacks will not be supplied to the Contractor by UCB ITS. The Contractor shall comply with the most current Hubbell Mission Critical Warranty documentation and procedure. All documentation including, but not limited to the “Structural Cabling System Registration Request Form”, “testing disk”, “Horizontal Schematic”, and “Backbone Schematic” shall be completed in full and shall include the installer’s full name, company name, telephone number, date completed, and UCB jack outlet with faceplate port numbers (e.g. 202-1A-1C). All
documentation shall be provided to both Hubbell and the University of Colorado ITS for warranty. The testing disk to UCB ITS shall be converted to a text format. Unless specified otherwise, submit testing results in as-built submittals of this information no later than 4 weeks following project completion. This project may be subject to submittal on a monthly basis as determined by UCB ITS.

d. Test the communications cabling system for compliance to the Governing Requirements and all applicable standards as follows:

1) Visually inspect all labels at the outlet locations (faceplates/ports), patch panels/ports, and on each end of each cable to ensure that all cables and equipment are correctly identified.

2) Copper Cable:
   a) For Horizontal Distribution: Test each copper horizontal cable, all pairs. To the extent possible, tests shall be performed with building electrical systems fully powered on (i.e. Lights, HVAC, etc.).
      i. Test each end-to-end Permanent Link (the entire link from the connector at the outlet to the connector or termination in the telecommunications closet) utilizing sweep tests, for Wire map (continuity), length, propagation delay/delay skew, attenuation (insertion loss), return loss, near-end cross talk (NEXT) loss, Equal Level Far-End Crosstalk (ELFEXT), attenuation-to-crosstalk ratio (ACR), power sum NEXT (PSNEXT) and power sum ELFEXT (PSELFEXT). Each cable shall be tested in both directions.
         (a) Measure NEXT for all cable pair combinations and attenuation on all pairs from 1.0 to 350 MHz.
      ii. Test results shall demonstrate compliance with:
         (a) The criteria specified in TIA/EIA 568 for Category 5e and 6 cables
         (b) The criteria specified in TIA/EIA TSB 95, and TIA/EIA 568-A-5
         (c) The criteria specified in IEEE 802.3z (1000Base-X Gigabit Ethernet)
   b) For Backbone Distribution (inside and outside plant): Test each cable, all pairs, for length, shorts, opens, continuity, polarity reversals, transposition (wire map), and the presence of AC voltage.
      i. Test entire channel, from termination block to termination block.
      ii. Test results shall demonstrate compliance with:
         (a) The criteria specified in TIA/EIA 568 for Category 3 cables

e. In addition to the above, tests performed shall be both those recommended and mandated by the communications cabling system Manufacturer.

f. Cables and equipment that do not pass shall be identified to the Engineer. The source of the non-compliance shall be determined, corrected or replaced, and re-tested at no additional cost to UCB. Provide new test results to the Engineer in the same manner as above.

1) In addition to the above, if it is determined that a cable is at fault, the contractor shall remove the damaged cable and replace it with a new cable. Cable “repairs” are not acceptable. The procedure for removing the cable shall be as follows:
a) Prior to removal of the damaged cable and re-pull of the new cable:
  i. Any cables which are in the same conduit, duct or innerduct as the damaged cable shall be tested, regardless of whether or not they are new cables installed as part of this project or existing cables installed prior to this project.
  ii. If the damaged cable is a backbone or outside plant cable:
      (a) UCB and Engineer shall be informed of the schedule for the removal and re-pull.
      (b) The new cable shall be tested on the reel prior to installation.
  iii. All test results shall be provided to the Engineer for approval.

b) The damaged cable shall be removed and the new cable shall be pulled in.

c) After the removal of the damaged cable and re-pull of the new cable:
  i. The new cable shall be tested.
  ii. Any cables which are in the same conduit, duct or innerduct as the damaged cable shall be tested, regardless of whether or not they are new cables installed as part of this project or existing cables installed prior to this project.
  iii. All test results shall be provided to the Engineer for approval.

d) Existing cables which are in the same conduit, duct or innerduct as the damaged cable, and which are damaged by the extraction and re-pull process, shall be removed and replaced at no additional cost to UCB.
  i. Existing damaged cables that are replaced shall be subject to the testing procedures of this section in its entirety.

2) The contractor shall perform pre-testing of the installed telecommunications systems to determine compliance and notify UCB ITS personnel when the system is ready for final inspection and testing. UCB shall be obligated to schedule final inspection and testing within five (5) business days of notification by the contractor. Final testing shall be scheduled and conducted in the presence of the UCB ITS representative.

3.3 IDENTIFICATION AND ADMINISTRATION

A. General
1. The UCB standard outlet numbering plan to be used for labeling faceplates, 66-blocks, patch panels, and fiber terminations shall be as described in UCB document Labeling and Testing.
2. The Contractor is solely responsible for the completeness, accuracy, and placement of identifiers (labels). Incorrectly identified components are the sole responsibility of the Contractor.
   a. Identification and labeling for all copper and fiber optic cable terminations shall be coordinated with UCB ITS staff.
b. Where questions arise regarding the correct identifier for a given component, the Contractor shall notify UCB ITS and Engineer and await direction prior to proceeding.

3. The Contractor shall install identifiers where indicated and at locations for best viewing convenience without interfering with the operation and maintenance of equipment.

4. The Contractor shall coordinate names, abbreviations, colors, and other designations with the corresponding designations indicated in the Construction Documents and as required by UCB, codes and standards.

5. The Contractor shall use consistent identifiers throughout the Project.

6. The Contractor shall clean surfaces of dust, loose material, and oily films before applying self-adhesive identifiers.

7. All copper and fiber optic cables shall be neatly and permanently labeled with the cable number at both ends.

8. Two weeks prior to a particular component or group of components being labeled, the Contractor shall review the proposed identification scheme, label(s), and procedure for affixing label(s) with UCB and Engineer. Contractor shall not proceed with labeling until UCB and Engineer have approved the proposed identification scheme, label(s), and procedure for affixing label(s).

9. The Contractor shall physically verify that the component to be identified matches the label to be affixed, prior to affixing the label.

B. The telecommunications rooms and spaces shall be labeled and 3 weeks prior to testing, including the outlet numbers on the patch panels as soon as the racks are installed) to allow pre-inspections.

C. UCB Jack Numbering Spreadsheet

1. Contractor shall complete UCB-provided T-5 template for Jack Numbering within 2 weeks of award. Additional T-5 lists shall be submitted to UCB for more than 5 additions or 5 deletions throughout the Project.

2. Contractor shall submit an updated UCB T-5 template three weeks prior to scheduled move-in date. The revised T-5 submittal shall incorporate any changes from the original project design.

3. Contractor shall submit an updated UCB T-5 template one week prior to occupancy, or as agreed on per the project schedule with UCB ITS. The T-5 template shall be provided in hard copy and electronic copy.

4. Contractor shall post an Owner-approved final copy of UCB T-5 template in each applicable Telecommunications Room prior to occupancy.

END OF SECTION
SECTION 271730 - COMMUNICATIONS - DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes demolition of existing or abandoned communications related cabling, materials, hardware, and equipment.

1.2 SUBMITTALS

A. Not required for this Section

1.3 DEFINITIONS

A. Probable Abandoned Cable: Installed communications cable that is not terminated at both ends at a connector or other equipment and has not been identified for future use with a tag/label.

B. Abandoned Cable: Probable Abandoned Cable which has been verified by the Contractor to have no future use.

PART 2 - MATERIALS

2.1 THIS SECTION NOT USED

PART 3 - EXECUTION

3.1 ABANDONED CABLE

A. The Contractor shall identify and verify all Probable Abandoned Cable.
   1. A Probable Abandoned Cable which is verified as having no future use shall be designated an Abandoned Cable.

B. The Contractor shall remove all Abandoned Cable
   1. Non-Abandoned Cables inadvertently damaged or removed by Contractor shall be repaired or replaced by the Contractor at no additional cost to the Owner.

3.2 ABANDONED MATERIALS, HARDWARE AND EQUIPMENT

A. The Contractor shall identify and verify all Abandoned Materials, Hardware and Equipment and receive direction from the owner as to what to do with the Abandoned Materials, Hardware and Equipment.

END OF SECTION