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

For The

University of Colorado Denver | Anschutz Medical Campus / GFE

For The

Central Utility Plant (CUP) Capacity Expansion / PN 18-135884

October 16, 2018
REQUEST FOR PROPOSALS FOR AN INTEGRATED PROJECT DELIVERY METHOD UTILIZING CONSTRUCTION MANAGEMENT/GENERAL CONTRACTING (CM/GC) SERVICES

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REQUEST FOR PROPOSAL

Agency: University of Colorado Denver | Anschutz Medical Campus

Notice Type: Request for Proposal

Select the RFP Subtype: ☑ Construction Management/General Contractor (CM/GC)  ☐ Design/Build Services (D/B)

Fixed Limits of Construction - $25,226,687

Project No: 18-135884

Project Title: Central Utility Plant (CUP) Capacity Expansion

Project Description:

The University of Colorado, Anschutz Medical Campus (CU Anschutz) Central Utility Plant (CUP) Capacity Expansion project involves the design and installation of a new gas-fired boiler to replace existing boiler #5, expansion of the CUP’s chilled water capacity by installing a new chiller and cooling towers, along with upgrades to the CUP’s electrical, structural and security systems to support the new mechanical equipment.

Project Construction will be 14 months from start of demolition to new equipment operation.

Qualified Contractors may procure Submittal Documents from:

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

Minimum Requirements:

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

1. Provided Construction Management/General Contracting services within the last five (5) years for at least two (2) projects each in excess of $25,000,000 (hard costs), utilizing the expertise present in their Colorado Office; and

2. Demonstrated specific Construction Management/General Contracting experience in projects of similar scope and complexity; including having successfully engaged in infrastructure work, within operating facilities, of this scale and of similar programmatic usage.

3. Demonstrated bonding capability up to $30,000,000 for an individual project coincidentally with current and anticipated workloads; provide letter from surety that affirms this capacity.

Scope of Services:

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

Submission Details:

Submittal Deadline (Prequalification Step 1): November 19, 2018 at 10:00 a.m. (MST)

Submissions Accepted Via: ☐ Email ☐ Fax ☑ In Person ☑ Mail
Details: Ten (10) hard copies and one (1) electronic copy (This must a readable PDF, not a scanned PDF) of the submittal are due November 19, 2018 and shall be received no later than 10:00 a.m. (MST), at the following address:

Elaine Rydberg
Campus Services Building
Rm T36-310, Third Floor Reception Desk
1945 North Wheeling Street, MS F-418
Aurora, CO 80045

Comments: Late submittals will be rejected without consideration. The University of Colorado Denver | Anschutz Medical Campus and the State of Colorado assume no responsibility for costs related to the preparation of submittals. When noted that a completely executed form will be sent by certified mail to the Contractor, or any other means as agreed to, notice will be sent by electronic mail.

Point of Contact:

Name: Robert Holzwarth
Agency: University of Colorado Denver | Anschutz Medical Campus
Phone: 303-724-0749
Fax: 303-724-0931
Email: robert.holzwarth@ucdenver.edu

Meetings:

Mandatory Pre-Submittal Conference and Tour

Date and Time: October 29, 2018 at 10:00 a.m. (MDT)

Details: To ensure sufficient information is available to firms preparing submittals, a mandatory pre-submittal conference and tour has been scheduled. The intent of this conference is to tour the project site and to have University of Colorado Anschutz Medical Campus staff able to discuss the project. Firms preparing submittals for this project must attend and sign-in to register in order to have their submittals accepted. The pre-submittal conference and tour will be held at:

Campus Services Building – Conference Room T36-111
1945 Wheeling Street
Aurora, CO 80045
October 29, 2018, 10:00 a.m. (MDT)

Comments: Submittals received from those who have not attended the mandatory pre-submittal conference and tour will not be considered for the project. Questions will be collected until 11/5/18 at 10:00 a.m. (MDT) from those who attended mandatory pre-submittal conference and tour. Questions will be answered by 11/12/18 at 10:00 a.m. (MDT).

Specification Details/Attachments:

Attachments: Central Utility Plant (CUP) Capacity Expansion / PN 18-135884

Media of Publications:

Media of Publication(s):
http://www.ucdenver.edu/about/departments/FacilitiesManagement/FacilitiesProjects/RFP/Pages/RFP.aspx
www.Colorado.gov/vss

Publication Date 10/15/18
REQUEST FOR PROPOSALS FOR AN
INTEGRATED PROJECT DELIVERY METHOD UTILIZING
CONSTRUCTION MANAGEMENT/GENERAL CONTRACTING (CM/GC) SERVICES
University of Colorado Denver | Anschutz Medical Campus

I. GENERAL INFORMATION

A. INTRODUCTION/DESCRIPTION OF PROJECT

The University of Colorado Denver | Anschutz Medical Campus (CU Anschutz) seeks the services of a qualified Construction Manager/General Contractor (CM/GC) to construct an expansion of the Central Utility Plant (CUP) on the Anschutz Medical Campus to include a new gas-fired boiler to replace existing boiler #5, expand the CUP’s chilled water capacity by installing a new chiller, and upgrade the CUP’s electrical, security and structural systems to support the new equipment.

The steam and chilled water generation systems in the CUP serve the heating and cooling loads of the University, as well as those of the University of Colorado Hospital (UCH) and the Children’s Hospital Colorado (CHCO), a total of about 7 Million gross square feet.

CU Anschutz Medical Campus has grown dramatically over the past 15 years. By 2021, to accommodate a new CU Anschutz building, The Anschutz Health Sciences Building (AHSB), and shortly thereafter, an anticipated UCH Inpatient Tower 3 addition, the CUP facility must be improved to support additional heating, cooling and process loads.

The existing boiler side of the Central Utility Plant at CU Anschutz consists of six natural gas-fired (#2 Diesel back up fuel) boilers with a total production capacity of 360,000 pounds per hour (pph) with a maximum Fixed Firm Capacity (FFC) (holding the largest boiler in reserve) of 270,000 pph. Five of the boilers were part of the original construction of the facility in 2001 and the sixth was installed in 2012. Four of the original boilers are 60,000 pph; the 5th original boiler is rated at 30,000 pph; the newest boiler, #6, is rated at 90,000 pph. Summer minimum steam loads now exceed 40,000 pph and winter minimum electrical loads exceed 12 megawatts. The campus currently has maximum steam demand of about 250,000 pph, which is expected to grow to 287,000 pph by 2025. Given the planned future growth which makes plant steam capacity increases necessary, a planning study of all options to meet the growth in steam demand has been completed and the recommendation to meet this growing load is to replace existing boiler #5 with a new 109,000 pph unit. The new boiler will be designated #7.

Currently, the CUP’s nine chillers have a maximum generating capacity of 17,400 tons of chilled water. Two chillers are rated at 1,200 tons, two at 2,000 tons and five at 2,200 tons of cooling which results in a FFC of 15,200 tons of chilled water (holding the largest chiller in reserve). The addition of new buildings in 2021 both by CU Anschutz and UCH will increase chilled water demand to 16,300 tons. A new 2,200-ton chiller, to be labeled CH-1 will be installed in the northeast corner of the CUP’s chiller room. The resulting new FFC of 17,400 tons of chilled water provides additional capacity beyond the expected 16,300 tons of demand, once the AHSB and UCH projects are completed.

This project will also provide a new back-up generator, other system upgrades to improve reliability, plant efficiency and replace aging equipment. New electrical systems are included to support the proposed new mechanical equipment. The existing CUP building structure also requires upgrades to support the new mechanical and electrical equipment. This project
includes upgrading the CUP building structure, along with mechanical and electrical systems within to meet current codes, including requirements for Risk Category IV to serve critical needs. In addition, security improvements to the site area surrounding the CUP facility will be made to reduce potential threats from both pedestrians and vehicles. Some landscaping improvements to the site are also anticipated.

CU Anschutz anticipates using a Construction Manager/General Contractor (CM/GC) approach to project delivery. A Guaranteed Maximum Price (GMP) and an updated project duration schedule will be established by the Architect/Engineer and the Construction Manager/General Contractor in conjunction with CU Anschutz. The CM/GC will evaluate, among other things, availability of materials and labor, project schedule, project costs as they relate to the established budget, constructability, and will work closely with the Architect/Engineer and CU Anschutz throughout the planning, design and construction phases of the project. Lead time for the boiler, chiller, cooling towers, generator, transformer and switchgear requires an early order of the equipment prior to the start of construction. It is anticipated that this long-lead time equipment should be ordered on or about April 15, 2019 and that physical on-site construction is estimated to commence on or about August 1, 2019.

The project has a planned schedule (from design through new equipment being installed and operational) of approximately 24 months.

The CMGC Contract value will include the following fixed limits of construction (FLCC).

| FLCC for construction | $25,226,687 |
| Total FLCC            | $25,226,687 |

Your team should be able to demonstrate, at a minimum, a 5-year history of successfully managing and contracting for institutional power plants and utilities infrastructure work within operating facilities of this scale and of similar programmatic usage.

In additional, your team should be able to clearly demonstrate a history of working collaboratively with institutional owners, and their consultants, to provide timely and accurate cost-estimating and scheduling information from pre-construction through project completion.

The University of Colorado Anschutz Medical Campus (CU Anschutz) anticipates using a Construction Manager/General Contractor (CM/GC) approach to project delivery. A Guaranteed Maximum Price (GMP) and an updated project duration schedule will be established by the Architect/Engineer and the Construction Manager/General Contractor in conjunction with the University of Colorado Denver. The CM/GC will evaluate, among other things, availability of materials and labor, project schedule, project costs as they relate to the established budget, constructability, and will work closely with the Architect/Engineer and the University of Colorado Denver throughout the planning, design and construction phases of the project. For this project, there are four (4) expected bid packages, one bid package for long-lead equipment (i.e.: boiler, chiller, cooling towers, generator, transformer, switchgear), one bid package for structural steel and site/security work, one for chilled water and electrical systems, and a final one for steam systems. Construction is estimated to take 14 months, including demolition and removal of existing equipment.

The process to be used in the selection of the CM/GC is comprised of two steps. STEP I is the Submittal of Prequalification as described in Section II (D). STEP II is the Oral Interview/Cost Proposal as described in detail in Section III. A Jury Panel of individuals who will be involved in
the project and/or understand the required services associated with Construction Management/General Contracting will evaluate responses to this RFP for both STEPS. Upon completion of the evaluation of the Submittals of Prequalification, a limited number of firms will be invited to the oral interviews. Sealed fee proposals will be required only from those firms who are interviewed and are to be submitted as indicated in this RFP. Both qualifications and cost will be considered in the final ranking of firms with qualifications given 70% of the value of the weighted criteria and fees for the Cost/Proposal given 30%.

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

B. MINIMUM QUALIFICATIONS

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

1. Provided Construction Management/General Contracting services within the last five (5) years for at least two (2) projects each in excess of $25,000,000 (hard costs), utilizing the expertise present in their Colorado Office; and

2. Demonstrated specific Construction Management/General Contracting experience in projects of similar scope and complexity; including having successfully engaged in renovation work, within operating facilities, of this scale and of similar programmatic usage.

3. Demonstrated bonding capability up to $30,000,000 for an individual project coincidentally with current and anticipated workloads; provide letter from surety that affirms this capacity.

C. SCOPE OF SERVICES

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

II. PREQUALIFICATION SUBMITTALS (STEP I)

A. SCHEDULE

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

<table>
<thead>
<tr>
<th>Event</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advertisement</td>
<td>October 15, 2018</td>
</tr>
<tr>
<td>RFP Document Release</td>
<td>October 16, 2018</td>
</tr>
<tr>
<td>Mandatory Pre-submittal Conference and Tour</td>
<td>October 29, 2018</td>
</tr>
<tr>
<td></td>
<td>– 10:00 a.m. MDT</td>
</tr>
<tr>
<td>Event</td>
<td>Date &amp; Time</td>
</tr>
<tr>
<td>--------------------------------------------</td>
<td>------------------------------------</td>
</tr>
<tr>
<td>Date Email Questions Due</td>
<td>November 5, 2018– 10:00 a.m. MST</td>
</tr>
<tr>
<td>Date Email Answers Issued</td>
<td>November 12, 2018– 10:00 a.m. MST</td>
</tr>
<tr>
<td>Submittals Due (Prequalification: Step I)</td>
<td>November 19, 2018– 10:00 a.m. MST</td>
</tr>
<tr>
<td>Interview Short List Announced</td>
<td>November 26, 2018</td>
</tr>
<tr>
<td>Sealed Proposal Due (Evaluation and Award: Step II)</td>
<td>December 5, 2018</td>
</tr>
<tr>
<td>Oral Interviews</td>
<td>December 5, 2018</td>
</tr>
<tr>
<td>Selection Announced</td>
<td>Pending Leadership approval</td>
</tr>
<tr>
<td>Negotiation of CM/GC Contract</td>
<td>Pending Leadership approval</td>
</tr>
<tr>
<td>Contract Approval (projected)</td>
<td>Pending Leadership approval</td>
</tr>
<tr>
<td>Anticipated Design Start</td>
<td>November 1, 2018</td>
</tr>
<tr>
<td>Anticipated CM/GC Start</td>
<td>December 19, 2018</td>
</tr>
<tr>
<td>Anticipated Construction Start</td>
<td>August 2019</td>
</tr>
<tr>
<td>Anticipated Construction Finish</td>
<td>September 2020</td>
</tr>
</tbody>
</table>

2. Ten (10) hard copies and one (1) electronic copy (This must a readable PDF, not a scanned PDF) of the submittal are due November 19, 2018 and shall be received no later than 10:00 a.m. (MST), at the following address:

   Elaine Rydberg  
   Campus Services Building  
   Rm T36-310, Third Floor Reception Desk  
   1945 North Wheeling Street, MS F-418  
   Aurora, CO 80045

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

B. MANDATORY PRE-SUBMITTAL CONFERENCE

1. To ensure sufficient information is available to firms preparing submittals, a mandatory pre-submittal conference has been scheduled. The intent of this conference is to tour the site and to have University of Colorado Denver | Anschutz Medical Campus staff able to discuss the project. Firms preparing submittals must attend and sign-in in order to have their submittals accepted. The pre-submittal conference will be held at:
C. CLARIFICATIONS

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

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

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

2. Respondent initiated email requests for clarification will be received any time on, or before November 5, 2018 at 10:00 a.m. (MST). All State responses will be issued by email addenda on, or before November 12, 2018 at 10:00 a.m. (MST)

D. GENERAL INFORMATION

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

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

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

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

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

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

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

E. PREQUALIFICATION SUBMITTALS (STEP I)

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

a. Submit Ten (10) complete hard copies and one (1) complete electronic copy (This must a readable PDF, not a scanned PDF) of all material.

b. Submittals shall be formatted and tabbed in the exact form and numeric sequence of the Evaluation Form (1 through 5) in Appendix A. A two sided single page cover letter addressed to the University Project Manager, Robert Holzwarth outlining the firm(s) qualifications is required at the front of the submittal. (Not counting the cover letter and required Acknowledgement and Attestation form, the entire submittal is to be no more than 40 doubled sided 8 ½’ x 11” sized pages in portrait format, at least 10 font, and stapled, spiral or plastic bound. No loose leaf notebooks or hard bound submittals.)

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

d. Response to all items shall be complete.

e. All references shall be current and relevant.

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

III. ORAL INTERVIEWS/COST PROPOSALS (STEP II)

A. SHORT LIST

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

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

B. ORAL INTERVIEW

1. Mandatory oral interviews shall be conducted for the short listed firm(s) only. Interview times and location, will be arranged by the University of Colorado Denver | Anschutz Medical Campus and all short listed firms will be notified in advance. At the option of the State, a visit to the short listed firm(s) managing home office and/or representative field office may be required. (Note that the primary focus of the Oral Interview evaluation in addition to the Cost Proposal will be the proposed Project Management Team members’ capabilities).

C. COST PROPOSALS

1. Only those firms short listed for interview are required to submit their sealed proposals. (Only one copy is required on the scheduled submission date.) Cost Proposals will remain sealed until after the qualitative scoring and will then be opened. The Cost Proposal will then be considered (equivalent to 30 percent of the weighted criteria) in conjunction with the qualitative score from the response and interview (equivalent to 70 percent of the weighted criteria).
2. Cost Proposals shall be submitted on the form provided in Section VII, without modification. A Cost Proposal shall be accompanied with sufficient detail to clearly identify the fee for service and include a detailed schedule of estimated (not-to-exceed) reimbursable and non-reimbursable costs. Percentage of the cost of work is not an acceptable value. General Conditions for the Cost Proposal shall be based on 14 months of construction. The Cost Proposal should be prepared independently in accordance with the following:

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

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

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

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

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

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

D. METHOD OF SELECTION AND AWARD

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

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

IV. EVALUATION CRITERIA

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

1. QUALIFICATIONS OF THE FIRM(s)

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

2. QUALIFICATIONS OF THE MANAGEMENT TEAM MEMBERS

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

3. PROJECT MANAGEMENT APPROACH

□ Provide a strategic project approach summary: Include discussion of your firm’s approach in providing successful Construction Management/General Contracting services based on prior experience in cost, schedule and quality effectiveness. Include specific examples (1-2 page excerpts) of actual products (estimates, progress reports, schedules, constructability reviews, value engineering studies, forms, general conditions budgets, organizational structures, etc.).
□ Provide a description of construction work Project Management Team has capability to competitively bid and self-perform, including qualifications to do such. It is the perception of the University of Colorado Denver | Anschutz Medical Campus that subcontracting CM/GC construction work is in the State’s best interest in terms of price competition. The University of Colorado Denver | Anschutz Medical Campus may, at its discretion, limit the types and amount of work Project Management Team bids and self-performs.
□ Provide a description of how the project management team will approach creating the preconstruction estimate and the actual project estimate. Provide examples from prior projects indicating how similar these estimates were.
4. PRIOR PROJECT EXPERIENCE/SUCCESS

Select your three (3) most relevant projects and provide, at a minimum, the following:

☐ The project/contract name
☐ Description of services provided
☐ Overall construction cost of project, as applicable, including initial contract value and change orders including reasons for change orders
☐ Organizational structure of service delivery under the contract (include the owner’s organization as it interfaced with the respondent’s contract)
☐ Key assigned in-house staff (name and title)
☐ Subcontracts (service) used in the performance of the contract
☐ Schedule history
☐ Reference(s) for Owner and Architect as described in IV.E
☐ Continuing services, if any

a. Timeliness

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

b. Budget Considerations

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

1. Conceptual estimating
2. Value analysis
3. Alternate solutions
4. Scope reduction that maintains project function
5. Cost/benefit analysis
6. Use and management of allowances
7. Timely buyout
8. Managing contingency and allowances effectively to utilize all funding for the building with minimal savings at the end of construction

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

c. Quality

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

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

e. Project Acceptability

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

f. Compliance

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

5. MISCELLANEOUS CONSIDERATIONS

a. Claims/Litigation History of Firm

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

b. Knowledge of Denver area market and qualified subcontractors

c. Other

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

B. ORAL INTERVIEWS/COST PROPOSALS EVALUATION CRITERIA

(Note that the primary focus of the Oral Interview evaluation in addition to the Cost Proposal will be the proposed project management team members’ capabilities).

1. QUALIFICATIONS OF THE FIRM

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

2. QUALIFICATIONS OF THE MANAGEMENT TEAM MEMBERS

□ Bring the Project Manager, Superintendent, and Preconstruction Personnel for interview and present specific skills they bring to achieve this project.
□ Explain the prior experience with projects of similar scope and complexity and similar fast track project delivery methods of the superintendent and all other project management team members. Explain their roles and responsibilities and authority and why they are the right team members for this project.
□ Explain anticipated project management team staff current and projected workload.
□ Identify all current office locations and the resident expertise intended to be provided under this RFP. Identify the location of the staff for the performance of this contract,
their expertise, and generic equipment that will be located in Colorado and act in support of the anticipated contract.

3. PROJECT MANAGEMENT APPROACH

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

4. PRIOR PROJECT EXPERIENCE/SUCCESS

☐ The proposed team must include one to two projects that are similar and how they minimized site impact while maintaining the schedule.
☐ Explain the most relevant projects the superintendent and the team members have completed together and/or separately and what their role was. University of Colorado Denver | Anschutz Medical Campus may at its discretion contact references and/or conduct independent performance analysis on projects on which the team member has worked).
☐ Provide descriptions of other related experience of superintendent and other project management team members.

5. MISCELLANEOUS CONSIDERATIONS

a. Craft Labor Capabilities

Describe the availability of resources that will be utilized to successfully complete the project.

b. Other

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

V. CM/GC CONTRACT INFORMATION

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

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

C. Any approved reimbursable expenses made under the terms of the final agreement shall be a direct pass-on cost with no adjustment to the fee described therein.
D. Any and all products, systems, methods, and procedures developed, as a result of this agreement shall remain the exclusive property of the State.

VI. ACKNOWLEDGEMENT AND ATTESTATION FORM

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

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

VII. COST PROPOSAL FORM

A. Immediately following the Acknowledgement and Attestation Form is a Cost Proposal Form to be utilized to summarize the fee proposal for the services. Only those firms short-listed will be required to submit fee proposals as directed by the University of Colorado Denver | Anschutz Medical Campus.

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

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

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

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

F. Respondents should include a separate detailed not-to-exceed reimbursable estimate
ACKNOWLEDGEMENT AND ATTESTATION FORM
(Partnership Format)

Date: ______________________________

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

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

Subscribed on ______________________________ at ______________________________

Date City

___________________________, State of ______________________________

County State

1)___________________________________________

Partner Signature

Typed Name:_________________________

2)___________________________________________

Partner Signature

Typed Name:_________________________

Notary:_____________________________ Date

Commission Expires:_____________________________

Note: Add additional signature if there are more than two partners.
ACKNOWLEDGEMENT AND ATTESTATION FORM  
(Joint Venture Format)

Date: ______________________

Page 1 of 1

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

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

Subscribed on _______________________________ at ______________________,
Date      City

___________________________, State of _____________________________________.
County       State

1)_______________________  ______________________ _________________
Venture Partner   Binding Signature   Date

________________________
Typed Name: _____________________________

Type of Business
Title: _____________________________

Witness
Typed Name: _____________________________

Date

Typed Name: _____________________________

2)_______________________  ______________________ _________________
Venture Partner   Binding Signature   Date

________________________
Typed Name: _____________________________

Type of Business
Title: _____________________________

Witness
Typed Name: _____________________________

Date

Typed Name: _____________________________

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

Date: ______________________

Page 1 of 1

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

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

Subscribed on ______________________________ at _______________________.
Date      City

___________________________, State of _____________________________________.
County       State

___________________________________  ____________________________
Corporate Officer Signature    Date

___________________________________  ____________________________
Secretary       Date

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

(SEAL)
ACKNOWLEDGEMENT AND ATTESTATION FORM  
(Sole Proprietorship Format)

Date: ______________________

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

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

Subscribed on _______________________________ at ______________________, 
        Date                  City

___________________________, State of ___________________________________.
County                  State

Respondent ________________________________ Date

Typed Name: ________________________________

Notary: ________________________________ Date

Commission Expires: _____________________
COST PROPOSAL FORM
CONSTRUCTION MANAGER/GENERAL CONTRACTING (CM/GC) SERVICES

Date:____________________

Central Utility Plant (CUP) Capacity Expansion / PN 18-135884

1. CM/GC Preconstruction Fee $ ________________
2. CM/GC Construction Fee $ ________________
3. General Conditions On-Site CM/GC Staff $ ________________
4. Other Reimbursable General Conditions (NTE) $ ________________

Total CM/GC Fee $ ________________

Fees are to be calculated per Exhibit A (SC-6.4), CM/GC Designated Services and Method of Payment.

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

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

Acknowledge receipt of Addendum Nos. _______________

Anticipates Services outside the United States or Colorado [ ] Yes [ ] No
If the respondent anticipates services under the contract or any subcontracts will be performed outside the United States or Colorado, the respondent shall provide in a written statement which must include, but need not be limited to the type of services that will be performed at a location outside the United States or Colorado and the reason why it is necessary or advantageous to go outside the United States or Colorado to perform such services. (Does not apply to any project that receives federal moneys)

Will comply with 80% Colorado Labor [ ] Yes [ ] No
For State Public Works Project per C.R.S 8-17-10, Colorado labor shall be employed to perform at least 80% of the work. “Colorado Labor” means any person who is a resident of the state of Colorado at the time of the Public Works project. Respondents indicating that their bid proposal will not comply with the 80% Colorado Labor requirement are required to submit written justification along with the bid submission. A governmental body that allows a waiver shall post notice and justification for the waiver on its web site. (Does not apply to any project that receives federal moneys)

Bidder is a Service-Disabled Veteran Owned Small Business [ ] Yes [ ] No
A Service-Disabled Veteran Owned Small Business (SDVOSB) per C.R.S. 24-103-211, means a business that is incorporated or organized in Colorado or maintains a place of business or has an office in Colorado and is officially registered and verified by the Center for Veteran Enterprise within the U.S. Department of Veteran Affairs. Attach proof of certification along with the proposal submission.

Applicant or Corporate Officer Signature

Title
IPD CM/GC RFP
Rev/7/2015
Appendix A

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

Name of Firm:_________________________________________________________________
Name of Project: Central Utility Plant (CUP) Capacity Expansion / PN 18-135884
Evaluator No:_________________________ Date: ___________________

RFP REFERENCE
MINIMUM REQUIREMENTS          Y ____ N ____

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

Acknowledgement and Attestation included:          Y ____ N ____

SCORE

Weight² x Rating³ = Score

1. QUALIFICATIONS OF THE FIRM(s)¹

- Qualifications of the firm
  4 x _____ = _______
- Organizational structure/lines of authority
  3 x _____ = _______
- Subcontractor selection and management
  3 x _____ = _______
- Colorado workforce
  2 x _____ = _______
- Safety/employee support
  3 x _____ = _______

2. QUALIFICATIONS OF THE MANAGEMENT TEAM MEMBERS¹

- Qualifications and relevant experience of project manager
  4 x _____ = _______
- Qualifications and relevant experience of superintendent
  4 x _____ = _______
- Qualifications and relevant experience of in-house staff
  3 x _____ = _______
- Qualifications and relevant experience of preconstruction
  3 x _____ = _______
- Location/Access
  2 x _____ = _______

3. PROJECT MANAGEMENT APPROACH¹

- Approach to successful CM/GC Services
  a. Cost effectiveness
     4 x _____ = _______
  b. Schedule effectiveness
     4 x _____ = _______
  c. Quality effectiveness
     4 x _____ = _______
- Competitively Bid/Self Performed Work
  2 x _____ = _______
- Preconstruction and Actual Project Estimate
  3 x _____ = _______

IPD CM/GC RFP
Rev. 7/2015
4. PRIOR PROJECT EXPERIENCE/SUCCESS

☐ Project #1
  a. Timeliness
  b. Budget Considerations
  c. Quality
  d. Disruption
  e. Acceptability
  f. Compliance
  g. Hazmat Mgmt
  _____ x _____ = _______

☐ Project #2
  a. Timeliness
  b. Budget Considerations
  c. Quality
  d. Disruption
  e. Acceptability
  f. Compliance
  g. Hazmat Mgmt
  _____ x _____ = _______

☐ Project #3
  a. Timeliness
  b. Budget Considerations
  c. Quality
  d. Disruption
  e. Acceptability
  f. Compliance
  _____ x _____ = _______

☐ Related experience of the firm
  _____ x _____ = _______

5. MISCELLANEOUS

☐ Claims/litigation history
  _____ x _____ = _______

☐ Knowledge of Denver area market
  _____ x _____ = _______

☐ Other
  _____ x _____ = _______

TOTAL SCORE: ________________

NOTES:

1. Criteria: Agencies/Institutions are encouraged to include additional criteria that reflect unique characteristics of the project under each category to help determine the submitter’s overall qualifications.

2. Weights: Agency/Institutions to assign weights, using whole numbers, to all criteria on evaluation forms for inclusion into RFQ document and prior to evaluations.

3. Ratings: Evaluator to assess the strength of each firm’s qualifications and assign a numerical rating of 1 to 5 with 5 being the highest rating. (Use whole numbers)

4. Total Score: Includes the sum of all criteria. Note: a passing score (as a percentage of the total points available) is optional and should be assigned by the agency/institution prior to evaluation.
Appendix A1

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

Name of Firm: ____________________________________________________________
Name of Project: Central Utility Plant (CUP) Capacity Expansion / PN 18-135884
Evaluator No: ___________________________  Date: ____________________________

<table>
<thead>
<tr>
<th>SCORE</th>
<th>Weight</th>
<th>x</th>
<th>Rating</th>
<th>Total Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Score</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. QUALIFICATIONS OF THE TEAM</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. QUALIFICATIONS OF THE MANAGEMENT TEAM MEMBERS</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. PROJECT MANAGEMENT APPROACH</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. PRIOR PROJECT EXPERIENCE/SUCCESS</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. MISCELLANEOUS 1</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL SCORE:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

**QUALIFICATIONS 70%/FEE 30%**

<table>
<thead>
<tr>
<th>FIRM</th>
<th>QUALIFICATIONS¹</th>
<th>AVERAGE QUALS²</th>
<th>QUALS SCORE³</th>
<th>FEE SCORE⁴</th>
<th>QUALS &amp; FEE SCORE⁵</th>
<th>RANK⁶</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>EVAL #1</th>
<th>EVAL #2</th>
<th>EVAL #3</th>
<th>EVAL #4</th>
<th>EVAL #5</th>
<th>EVAL #6</th>
</tr>
</thead>
</table>

---

*IPD CM/GC RFP*
*Rev. 7/2015*
NOTES:

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

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

3. The highest score for qualifications on the evaluation form is to receive 70 points and the other team scores are to be determined as a percentage of the 70 points. To score each average qualification score, use the example formula.

   Assume the highest score is 700.

<table>
<thead>
<tr>
<th>FIRM</th>
<th>Qualification Score</th>
<th>Calculation</th>
<th>Points</th>
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<tbody>
<tr>
<td>B</td>
<td>700 x 70 points = 70 points</td>
<td>700</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>600 x 70 points = 60 points</td>
<td>700</td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>500 x 70 points = 50 points</td>
<td>700</td>
<td></td>
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4. Determine score for each firm’s sealed cost proposal with the lowest fee being equivalent to a score of 30 points. To score each fee, use the example formula.

   Assume the lowest fee was $100,000.

<table>
<thead>
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<th>FIRM</th>
<th>Fee</th>
<th>Calculation</th>
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<tr>
<td>A</td>
<td>$100,000</td>
<td>$100,000 x 30 points = 30 points</td>
<td>$100,000</td>
</tr>
<tr>
<td>B</td>
<td>$100,000</td>
<td>$100,000 x 30 points = 24 points</td>
<td>$125,000</td>
</tr>
<tr>
<td>C</td>
<td>$100,000</td>
<td>$100,000 x 30 points = 20 points</td>
<td>$150,000</td>
</tr>
</tbody>
</table>

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

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

**CONSTRUCTION MANAGER / GENERAL CONTRACTOR (CM/GC) AGREEMENT AND CM/GC CERTIFICATION (FORM SC-6.4)**
(Sample)

**AS REFERENCED:**
[https://drive.google.com/file/d/1RtowJ_Fk-FGwy_lWFQWb7wom6JA2JC/view](https://drive.google.com/file/d/1RtowJ_Fk-FGwy_lWFQWb7wom6JA2JC/view)

**CONSTRUCTION MANAGER/GENERAL CONTRACTOR (CM/GC) AGREEMENT SC-6.4**
**EXHIBIT A  DESIGNATED SERVICES AND METHOD OF PAYMENT MATRIX**
(INCLUDED)

**UNIVERSITY OF COLORADO DENVER CONSTRUCTION MANAGER/GENERAL CONTRACTOR AGREEMENT SUPPLEMENTARY GENERAL CONDITIONS AND EXHIBIT N TAX FORMS**
(INCLUDED)

**SERVICE-DISABLED VETERAN-OWNED SMALL BUSINESS AND MINORITY/WOMEN BUSINESS ENTERPRISE PARTICIPATION REPORT**
(INCLUDED)
CONSTRUCTION MANAGER/GENERAL CONTRACTOR AGREEMENT
CMGC STANDARD FORMAT
(STATE FORM SC-6.4)

EXHIBIT A

CMGC DESIGNATED SERVICES AND METHOD OF PAYMENT

Exhibit A
Designated Services and Method of Payment
Clarifications

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

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

## Construction Management Services

<table>
<thead>
<tr>
<th>Phase: Preconstruction</th>
<th>Required of CM/GC</th>
<th>Required of Arch</th>
<th>Required of Owner</th>
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<td>Architectural Selection</td>
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<td>Structural, Mechanical and Electrical (Consultant)</td>
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<td>Special Consultant Selection</td>
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<td>Surveyor Selection</td>
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<td>Site Selection Recommendations</td>
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<td>Review Design Concepts</td>
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<td>Develop Bid Packages/Sub-Contracting Strategy</td>
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<td>Site Use Recommendations</td>
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<td>Life Cycle Costing Analysis</td>
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<td>Informal and Formal Value Engineering</td>
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Responsibility: x = Total 1 = Primary 2 = Secondary
Designated Services and Method of Payment

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<tr>
<th>CONSTRUCTION MANAGEMENT SERVICES</th>
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<td></td>
<td>PRE-CONST SVCS FEE</td>
<td>CONST SVCS FEE</td>
<td>GEN CONDS.</td>
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<td>PHASE: PROJECT BUDGETING AND COST CONTROL</td>
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Responsibility: 

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- **2** = Secondary
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<td><strong>FILTER CHANGE (AS REQUIRED)</strong></td>
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<td><strong>TEMPORARY OFFICE HEATING (AS REQUIRED)</strong></td>
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<td><strong>TEMP WEATHER PROTECTION &amp; HEATING FOR SUBCONTRACTORS (AS REQ’D)</strong></td>
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Responsibility: x = Total 1 = Primary 2 = Secondary
## Designated Services and Method of Payment

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

Responsibility: x = Total 1 = Primary 2 = Secondary
## Designated Services and Method of Payment

<table>
<thead>
<tr>
<th>CONSTRUCTION MANAGEMENT SERVICES</th>
<th>REQUIRED OF CM/GC</th>
<th>REQUIRED OF ARCH</th>
<th>REQUIRED OF OWNER</th>
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<tbody>
<tr>
<td><strong>PHASE: QUALITY CONTROL</strong></td>
<td>PRE-CONST SVCS FEE</td>
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<td>GEN CONDS.</td>
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<tr>
<td>Field Inspector (as required)</td>
<td></td>
<td>x</td>
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<tr>
<td>Inspectors' Office (as required)</td>
<td>x</td>
<td></td>
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<tr>
<td>Inspectors' Transportation (as required)</td>
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<td></td>
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<tr>
<td>Inspectors' Equipment (as required)</td>
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<tr>
<td>Special Inspection Consultants</td>
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<tr>
<td>Special Testing Consultants</td>
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<td>Concrete Substructure-Observations</td>
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<tr>
<td>Concrete Testing</td>
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</tr>
<tr>
<td>Masonry Testing</td>
<td>x</td>
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</tr>
<tr>
<td>Compaction Testing</td>
<td>x</td>
<td></td>
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<tr>
<td>Welding Testing</td>
<td>x</td>
<td></td>
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<tr>
<td>Pier Inspection/Testing</td>
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<td>Soils Investigation</td>
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<td>Special Testing Services (except as noted)</td>
<td>x</td>
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<td>Project Photographs</td>
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<td>Warranty Inspections</td>
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<td>Air and Water Balancing</td>
<td>x</td>
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<td>Operator On-Site Training</td>
<td>x</td>
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<tr>
<td>Prepare Operation/Maintenance Manuals</td>
<td>2</td>
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</tbody>
</table>

**Responsibility:**
- x = Total
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### Designated Services and Method of Payment

<table>
<thead>
<tr>
<th>CONSTRUCTION MANAGEMENT SERVICES</th>
<th>REQUIRED OF CM/GC</th>
<th>REQUIRED OF ARCH</th>
<th>REQUIRED OF OWNER</th>
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<tbody>
<tr>
<td><strong>PHASE:</strong> PERMITS AND SPECIAL FEES</td>
<td>PRE-CONST SVCS FEE</td>
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<td>STORAGE YARD RENTAL</td>
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<td>PARKING LOT RENTALS AND SHUTTLE EXPENSES (AS REQUIRED)</td>
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<td>FIELD OFFICE STAFF PARKING FEES</td>
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<td>STREET/CURB PERMIT</td>
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<td>BUILDING PERMITS</td>
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<tr>
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<td>SEWER USE &amp; DRAINAGE PERMIT/DEV. FEE</td>
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<tr>
<td>GAS AND POWER SERVICE CHARGE (TEMPORARY)</td>
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<td>CHILLER WATER SERVICE CHARGE</td>
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Responsibility:
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## Designated Services and Method of Payment

<table>
<thead>
<tr>
<th>CONSTRUCTION MANAGEMENT SERVICES</th>
<th>REQUIRED OF CM/GC</th>
<th>REQUIRED OF ARCH</th>
<th>REQUIRED OF OWNER</th>
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<tr>
<td></td>
<td>PRE-CONST SVCS FEE</td>
<td>CONST SVCS FEE</td>
<td>GEN CONDS.</td>
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<tr>
<td><strong>PHASE: INSURANCE AND BONDS</strong></td>
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<td>BUILDERS RISK INSURANCE</td>
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<td>GENERAL LIABILITY, INCLUDING AUTOMOBILE</td>
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<td>PRODUCT LIABILITY</td>
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<td>EXCESS LIABILITY COVERAGE</td>
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<td>WORKERS COMPENSATION (FIELD OFFICE STAFF)</td>
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<td>FICA INSURANCE (FIELD OFFICE STAFF)</td>
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<td>FEDERAL UNEMPLOYMENT (FIELD OFFICE STAFF)</td>
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<td>STATE UNEMPLOYMENT (FIELD OFFICE STAFF)</td>
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<td>CONSTRUCTION MANAGER’S PAYMENT BOND</td>
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<td>CONSTRUCTION MANAGER’S PERFORMANCE BOND</td>
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<td>STATE/LOCAL BONDS</td>
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<tr>
<td>* SUBCONTRACTOR BONDS</td>
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* Responsibility: x = Total 1 = Primary 2 = Secondary

* ONLY AS MUTUALLY AGREED UPON BETWEEN THE PRINCIPAL REPRESENTATIVE AND THE CM.
# Designated Services and Method of Payment

<table>
<thead>
<tr>
<th>CONSTRUCTION MANAGEMENT SERVICES</th>
<th>REQUIRED OF CM/GC</th>
<th>REQUIRED OF ARCH</th>
<th>REQUIRED OF OWNER</th>
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<tr>
<td></td>
<td>PRE-CONST SVCS FEE</td>
<td>CONST SVCS FEE</td>
<td>GEN CONDS.</td>
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<td>PHASE: OTHER COSTS</td>
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<td>CONSTRUCTION EQUIPMENT</td>
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<tr>
<td>CONSTRUCTION SERVICES LABOR</td>
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<td>CONSTRUCTION MATERIALS</td>
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<tr>
<td>COST OF DESIGN AND ENGINEERING</td>
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<tr>
<td>A/E FAST TRACK COST EXTRAS</td>
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<td>PRELIMINARY SOILS INVESTIGATION</td>
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<td>TITLE/DEVELOPMENT COST</td>
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<td>BUILDING OPERATION AFTER MOVE-IN</td>
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<td>BUILDING MAINTENANCE AFTER MOVE-IN</td>
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<td>STATE REQUIRED INSPECTIONS</td>
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Responsibility:  
- **x** = Total  
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### Designated Services and Method of Payment

<table>
<thead>
<tr>
<th>PHASE: OFF-SITE SERVICES</th>
<th>REQUIRED OF CM/GC</th>
<th>REQUIRED OF ARCH</th>
<th>REQUIRED OF OWNER</th>
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<tr>
<td></td>
<td>PRE-CONST SVCS FEE</td>
<td>CONST SVCS FEE</td>
<td>GEN CONDS.</td>
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<tr>
<td>CORPORATE EXECUTIVES (AS REQUIRED)</td>
<td>X</td>
<td>X</td>
<td></td>
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<tr>
<td>PRINCIPAL IN CHARGE (AS REQUIRED)</td>
<td>X</td>
<td>X</td>
<td></td>
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<tr>
<td>PROJECT EXECUTIVE (AS REQUIRED)</td>
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<td></td>
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<td>LEGAL - BASIC SERVICES (AS REQUIRED)</td>
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<td>ACCOUNTING (AS REQUIRED)</td>
<td></td>
<td></td>
<td>X</td>
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<tr>
<td>PURCHASING (AS REQUIRED)</td>
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<tr>
<td>SAFETY OFFICER (AS REQUIRED)</td>
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<td>EEO OFFICER (AS REQUIRED)</td>
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<td>SECRETARIAL AND CLERK-TYPIST (AS REQUIRED)</td>
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<tr>
<td>BENEFITS AND VACATIONS FOR ABOVE</td>
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</tbody>
</table>

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

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

ARTICLE 11 INSURANCE - Replace Article 11 as follows:

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

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

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

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

1. **Commercial General Liability – ISO CG 0001 or equivalent. Coverage to include:**
   - Premises and Operations
   - Explosions, Collapse and Underground Hazards
   - Personal / Advertising Injury
   - Products / Completed Operations
   - Liability assumed under an Insured Contract (including defense costs assumed under contract)
   - Independent Contractors
• Additional Insured—Owners, Lessees or Contractors Endorsement, ISO Form 2010 (2004 Edition or equivalent)
• Additional Insured—Owners, Lessees or Contractors Endorsement (Completed Operations), ISO CG 2037 (7/2004 Edition or equivalent)
• The policy shall be endorsed to include the following additional insured language on the Additional Insured Endorsements specified above: “The Regents of the University of Colorado, a Body Corporate, named as an additional insured with respect to liability and defense of suits arising out of the activities performed by, or on behalf of the Contractor, including completed operations”.
• Commercial General Liability Completed Operations policies must be kept in effect for up to three (3) years after completion of the project. For buildings with a construction cost greater than $99 million, the Commercial General Liability Completed Operations policies must be kept in effect for up to eight (8) years after the completion of the project.
• An umbrella and/or excess liability policy may be used to meet the minimum liability requirements provided that the coverage is written on a “following form” basis.

<table>
<thead>
<tr>
<th>Liability Limits</th>
<th>General Aggregate</th>
<th>Products/Completed Operation Aggregate</th>
<th>Each Occurrence</th>
<th>Personal/Advertising Injury</th>
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</thead>
<tbody>
<tr>
<td>Primary General Liability</td>
<td>$2,000,000</td>
<td>$2,000,000</td>
<td>$1,000,000</td>
<td>$1,000,000</td>
</tr>
<tr>
<td>Umbrella or Excess Liability*</td>
<td>$5,000,000</td>
<td>$5,000,000</td>
<td>$5,000,000</td>
<td>$5,000,000</td>
</tr>
</tbody>
</table>

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

The following exclusionary endorsements are prohibited in the CGL policy:

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

2. **Automobile Liability**

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

**Minimum Limits:**

Bodily Injury/Property Damage (Each Accident) $ 1,000,000
3. **Workers Compensation**
   - Statutory Benefits (Coverage A)
   - Employers Liability (Coverage B)

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

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

**Minimum Limits:**

<table>
<thead>
<tr>
<th>Coverage A (Workers’ Compensation)</th>
<th>Statutory</th>
<th>Coverage B (Employers Liability)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Each accident</td>
<td>$100,000</td>
<td>Disease each employee</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Disease policy limit</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4. **Contractors Pollution Liability**

   - Coverage shall apply to sudden and gradual pollution conditions resulting from the escape of release of smoke, vapors, fumes, acids, alkalis, toxic chemicals, liquids, or gases, natural gas, waste materials, or other irritants, contaminants, or pollutants (including asbestos). Policy shall cover the Contractor’s completed operations.

   - If the coverage is written on a claims-made basis, the Contractor warrants that any retroactive date applicable to coverage under the policy precedes the effective date of this Contract; and that continuous coverage will be maintained or an extended discovery period will be exercised for a period of three (3) years beginning from the time that work under this contract is completed.

   - **The policy shall be endorsed to include the following as Additional Insureds:** The Regents of the University of Colorado, a Body Corporate, named as an additional insured with respect to liability and defense of suits arising out of the activities performed by, or on behalf of the Construction Manager, including completed operations.

   - Endorsements CA9948 and MCS-90 are required on the Automobile Liability Coverage if the Contractor is transporting any type of hazardous materials.

   - **Contractors Pollution Liability policies must be kept in effect for up to three (3) years after completion of the project.**

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

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

**Minimum Limits (Projects over $500,000):**

<table>
<thead>
<tr>
<th>Per Loss</th>
<th>$2,000,000</th>
</tr>
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<tr>
<td>Aggregate</td>
<td>$2,000,000</td>
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5. **Professional Liability (Errors and Omissions)**

   (*This Professional Liability requirement applies only to Design/Build Entity SC-8.0 and 9.0.*)
• The Contractor shall maintain Errors and Omissions Liability covering negligent acts, errors and/or omissions, including design errors of the Contractor for damage sustained by reason of or in the course of operations under this Contract. The policy/coverages shall be amended to include the following:

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

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

• Policy shall contain a waiver of subrogation against The Regents of the University of Colorado, a Body Corporate.

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

6. **Builder's Risk/ Installation Floater**

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

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

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

4. **Builders’ Risk Coverage** shall be on a **Special Covered Cause of Loss Form** and shall include theft, vandalism, malicious mischief, collapse, false-work, temporary buildings and debris removal including demolition, increased cost of construction, architect’s fees and expenses, flood (including water damage), earthquake, and if applicable, all below and above ground structures, piping, foundations including underground water and sewer mains, piling including the ground on which the structure rests and excavation, backfilling, filling, and grading. Equipment Breakdown Coverage (a.k.a. Boiler & Machinery) shall be included as required by the Contract Documents or by law, which shall specifically cover insured equipment during installation and testing (including hot testing, where applicable). Other coverages may be required if provided in contract documents.

5. The **Builders’ Risk** shall be written for 100% of the completed value (replacement cost basis) of the work being performed. The Builders’ Risk shall include the following provisions:
   a. **Replacement Cost Basis** - including modification of the valuation clause to cover all costs needed to repair the structure or work (including overhead and profits) and will pay based on the values figured at the time of rebuilding or repairing, not at the time of loss
   b. Modify or delete exclusion pertaining to damage to interior of building caused by perils insured against are covered; also provide coverage for water damage

*Note, if the addition, or renovation is to an existing building, The Principal Representative requires that the Contractor provide as an option to include the existing building into the Builders’ Risk Policy. The Principal Representative shall provide the replacement cost value of the existing building*

6. At the option of the Principal Representative, the Principal Representative may include Soft Costs (including Loss of Use)/Delay in Opening Endorsement under the builder’s risk policy. The Principal Representative agrees to provide the necessary exposure base information for quotation by the Builder’s Risk carrier. The Principal Representative agrees to pay the premium associated with the Soft Costs coverage, the Principal Representative decides to purchase this coverage.

7. The **Builders’ Risk Policy** shall specifically permit occupancy of the building during construction. Partial occupancy or use of the work shall not commence until the insurance company or companies providing insurance have consented to such partial occupancy or use. The Principal Representative and Contractor shall take reasonable steps to obtain consent of the insurance company or companies and delete any provisions with regard to restrictions within any Occupancy Clauses within the Builders’ Risk Policy. The Builders’ Risk Policy shall remain in force until acceptance of the project by the Principal Representative.

8. The deductible shall not exceed $50,000 and shall be the responsibility of the Contractor except for losses such as flood (not water damage), earthquake, windstorm, tsunami, volcano, etc. Losses in excess of $50,000 insured shall be adjusted in conjunction with the Principal Representative. Any insurance payments/proceeds shall be made payable to the Principal Representative subject to requirements of any applicable mortgagee clause. The Contractor shall pay subcontractors their just shares of insurance proceeds received by the Contractor, and by appropriate agreements, written where legally required for validity, shall require subcontractors to make payments to their sub-subcontractors in similar manner.
The Principal Representative shall have the authority to adjust and settle any losses in excess of $50,000 with insurers unless one of the parties in interest shall object in writing within five days after occurrence of loss to the Principal Representative exercise of this power. It is expressly agreed that nothing in this section shall be subject to arbitration and any references to arbitration are expressly deleted.

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

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

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

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

ADDITIONAL INSURANCE REQUIREMENTS

1. All insurers must be licensed or approved to do business within the State of Colorado, and unless otherwise specified, all policies must be written on a per occurrence basis.

2. Contractor’s insurance carrier should possess a minimum A.M. Best’s Insurance Guide rating of A- VI.

3. On insurance policies where the Principal Representative are named as additional insureds, the Principal Representative shall be additional insureds to the full limits of liability purchased by the Contractor even if those limits of liability are in excess of those required by this Contract.

4. Contractor shall furnish the Principal Representative with certificates of insurance (ACORD form or equivalent approved by the Principal Representative) as required by this Contract. The certificates for each insurance policy are to be signed by a person authorized by that insurer to bind coverage on its behalf.

All certificates and any required endorsements are to be received and approved by the Principal Representative before work commences. Each insurance policy required by this Contract must be in effect at or prior to commencement of work under this Contract and remain in effect for the duration of the project. Failure to maintain the insurance policies as required by this Contract or to provide evidence of renewal is a material breach of contract.

5. Upon request by the Principal Representative, Contractor must provide a copy of the actual insurance policy effecting coverage(s) required by the contract.

6. The Contractor’s insurance coverage shall be primary insurance and non-contributory with respect to all other available resources.
7. The Contractor shall advise the Principal Representative in the event any general aggregate 
or other aggregate limits are reduced below the required per occurrence limit. At their own 
expense, the Contractor will reinstate the aggregate limits to comply with the minimum 
requirements and shall furnish to the Principal Representative a new certificate of insurance 
showing such coverage is in force.

8. Provide a minimum of thirty (30) days advance written notice to the Principal Representative 
for cancellation, non-renewal, or material changes to policies required under the Contract 
(45 days for builders' risk coverage).

North Wheeling Street, Campus Mail stop F-418, Aurora, CO 80045.

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

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

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

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

(Revised 7-21-11)

ARTICLE 21. MISCELLANEOUS. PROVISIONS

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

21.22 STATEWIDE CONTRACT MANAGEMENT SYSTEM

Add the following:

21.24 UNIVERSITY OF COLORADO DENVER POLICY ON SEXUAL HARASSMENT

1) The Contractor shall vigorously pursue to the greatest extent possible, adherence to 
the University of Colorado Denver Policy on Sexual Harassment and also require all 
employees, and employees of all subcontractors of any kind, working on this project 
to adhere to this Policy.
2) Statement of Policy: It is the policy of the University of Colorado Denver to maintain the community as a place of work, study, and residence free of sexual harassment or exploitation of students, faculty, staff, and administrators. Sexual harassment is prohibited on campus and in university programs. The university is committed to taking appropriate action against any of its officials, employees or students who violate the policy prohibiting sexual harassment.

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

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

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

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

21.25 UNIVERSITY OF COLORADO DENVER POLICY ON SECURITY BADGING

1) All costs and time associated with obtaining a University security badge for Contractor employees working on campus shall be borne by the Contractor.
NEW AUTOMATED SERVICES FOR AND ABOUT BUSINESSES

The Colorado Department of Revenue Sales Tax Information System provides the following automated services:

* Colorado Sales Tax Rates – find specific city, county and special district rates.
* Verification of Sales Tax License Exemption Numbers – determine whether a Colorado sales tax license or exemption certificate is valid.
* Tax Rates by Account Number – find sales tax rates and locations for specific sales tax accounts.

These services make it possible for taxpayers to help themselves to information 24 hours a day – without requiring the assistance of a customer service representative. In this way, more complicated or confidential tax information inquiries can be reserved for speaking to a live agent.

Listen and look for these services on the department’s business tax information phone line at 303-238-FAST (3278) for specific account information, 303-238-SERV (7378) for general information or the DOR Web site at www.taxcolorado.com.

Web users can try the new system online at www.taxview.state.co.us We are interested in your comments about the system. You can send us an e-mail with your comments through our Department of Revenue Web site.
SALES TAX EXEMPTION CERTIFICATE
MULTI-JURISDICTION

Issued to (Seller):
Regents of University of Colorado

Address:
1800 Grant Street, Suite 600

City: Denver State: CO Zip Code: 80203

☐ WHOLESALE  ☐ RETAILER  ☐ MANUFACTURER  ☐ LESSOR (See details on reverse side)  ☐ CHARITABLE OR RELIGIOUS

☐ POLITICAL SUBDIVISION OR GOVERNMENTAL AGENCY  ☐ OTHER (Specify)

1) and is registered with the below listed states and cities within which your firm would deliver purchases to us which are for resale or lease by us in the normal course of our business which is __________________________________________ or

2) that such purchases are exempt from payment of sales or use tax in such states and cities because our buyer is: ☐ CHARITABLE OR RELIGIOUS

☐ POLITICAL SUBDIVISION OR GOVERNMENTAL AGENCY  ☐ OTHERWISE EXEMPT BY STATUTE (Specify)

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<th>City or State</th>
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<tr>
<td>City of Aurora</td>
<td>98-00799-0000</td>
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<tr>
<td>City of State</td>
<td>Colorado</td>
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</tbody>
</table>

If the list of states and cities is more than six (6), attach a list to this certificate.

I further certify that if any property so purchased tax free is used or consumed by the firm as to make it subject to a Sales or Use Tax we will pay the tax due direct to the proper taxing authority when state law so provides or inform the seller for added tax billing. This certificate shall be part of each order which we may hereafter give to you, unless otherwise specified, and shall be valid until cancelled by us in writing or revoked by the city or state.

General description of products to be purchased from the seller:

Under penalties of perjury, I swear or affirm that the information on this form is true and correct as to every material matter.

Authorized Signature (Owner, Partner or Corporate Officer):

Title: Associate Vice President and University Controller

Date: 7/25/008
March 12, 2001

Wayne F. Henderson
Vice Chancellor for Administration and Finance
University of Colorado Health Sciences Center
Fitzsimons, Building 500, Room C1003
P.O. Box 6508
Aurora, Colorado 80045-0508

RE: Letter of Commitment

Dear Mr. Henderson:

I am in receipt of your letter dated February 27, 2001, requesting that I issue a letter of commitment to the University of Colorado Health Sciences Center ("UCHSC") pursuant to City Code Section 130-63(c). It is my understanding that UCHSC is part and parcel of the University of Colorado, a public institution of higher education of the State of Colorado. § 23-20-101, et seq., C.R.S. You have asked for some assurance that UCHSC is exempt from the payment of City sales and use tax, as well as the employer portion of the City occupational privilege tax.

City Code Section 130-157(1) exempts all sales of tangible personal property and taxable services to the various political subdivisions of this state from imposition of City sales tax. Identical exemptions exist in both the City Use Tax ordinance (City Code § 130-198(5)) and the City Employer Occupational Privilege Tax ordinance (City Code § 130-405(1)). Accordingly, UCHSC falls squarely within each of these three exemptions.

It should be noted, however, that these exemptions do not extend to the collection of City tax. For instance, UCHSC must collect, report, and remit City sales tax on any retail sale of tangible personal property or taxable services it makes to a non-exempt third party. City Code § 130-160. Likewise, UCHSC
must also collect, report, and remit the employee portion of the City occupational privilege tax for each person it employs within the City for any period of time within a calendar month sufficient to receive no less than $250.00 as compensation for such employment. *City Code § 130-464.*

With respect to the deposit and ultimate payment of City use tax on construction materials, it is the longstanding policy of the City that the party who contracts for and directs and controls the construction of building improvements is liable for such tax. *See Fifteenth Street Investment Co. v. People,* 102 Colo. 571, 81 P.2d 764 (1938). Under the circumstances described in your request, it is UCHSC, and not its contractors, upon whom sole liability for the payment of City use tax would rest. Because UCHSC is an exempt entity, no use tax is due and owing on the purchase and subsequent use of construction materials for the development of UCHSC’s property at the Fitzsimons site.

With regard to your additional requests, the City has no objection if UCHSC’s contractors wish to use this letter to present to City building officials and third-party retailers as evidence of UCHSC’s tax exemption. As for any future revocation of this letter, unless the status of UCHSC as a political subdivision changes, the various City tax exemptions which UCHSC is entitled to claim cannot be lawfully repealed without the prior approval of the City’s voters. *See Colo. Const. Art. X, § 20(4)(a).* Therefore, the City believes UCHSC will be adequately informed in the event that the City decides to seek approval for any change in its tax laws that would impact UCHSC’s tax-exempt status.

Very truly yours,

[Signature]

John Gross
Director of Finance
November 5, 1999

University of Colorado Procurement Service Center
Fitzsimons Building 500 Rm. B4325
Mail Stop F 719
P.O. Box 6508
Aurora, CO 80045

Ladies/Gentlemen:

The University of Colorado Procurement Service Center is exempt from the Denver sales tax per Sec. 53-26 (1) of the City Retail Sales Tax Article:

Sec. 53-26(1) Exemptions.

There shall be exempt from taxation under the provisions of this Article the following:
(1) All sales to the United States Government, to the State, its departments and institutions and the political subdivisions thereof, only when purchased in their governmental capacities.

To qualify for the exemption, purchases must be billed direct to the organization, and payment made from funds of the organization.

The exemption does not extend to construction contractors who may perform contracts for you; they are the consumer of all property purchased and used in the performance or contracts for others. Nor does the exemption apply to purchases by employees or members for their own personal use.

You may reproduce this letter to furnish to suppliers as needed.

Sincerely,

Scott Sprague, Audit Manager
Tax Compliance/Audit Section
(303) 640-3484
Michael J. Barden  
University of Colorado at Denver and Health Sciences Center(UCDHSC)  
Building 500, Mail Stop F418  
P.O. Box 6508  
Aurora CO 80045  

April 7, 2006  

Dear Mr. Barden:  

This is in response to your letter of March 1, 2006, to Bruce Nelson of the Department of Revenue regarding sales tax exemption from county and special district sales taxes for UCDHSC construction projects at the Fitzsimons campus. Mr. Nelson has left the Department, so I am responding to your inquiry.  

In regards to Adams County sales and use tax, the sales tax is collected by the Department of Revenue, not the city of Aurora. Use tax on building materials is collected by the county when issuing building permits. Under 29-2-105(d), 39-26-708(1)(a) and 39-26-708(2)(a), C.R.S., UCDHSC and its contractors and sub-contractors are exempt from county sales and use tax on construction and building materials for State/UCDHSC owned real property.  

In regards to special district sales and use taxes, UCDHSC and its contractors and sub-contractors are exempt from sales and use tax pursuant to the exemptions granted in 39-26-708(1)(a) and 39-26-708(2)(a), C.R.S., for the Regional Transportation District under 32-9-119(2)(c)(ii), C.R.S., for the Scientific and Cultural District under 32-13-107(2), C.R.S, and for the Metropolitan Football Stadium District under 32-15-110(2)(a), C.R.S.  

Additionally, for construction projects in the City and County of Denver, UCDHSC and its contractors and sub-contractors are exempt from the aforementioned special district sales and use taxes, as well as state sales and use tax.  

Should you have additional questions regarding these matters, feel free to contact me.  

Respectfully,  

Steve Asbell  
Taxpayer Service Policy Group  
Colorado Dept of Revenue  
Ph:303.866.3889  email: sasbell@spike.dor.state.co.us
CONTRACTOR APPLICATION FOR EXEMPTION CERTIFICATE
Pursuant to Statute
Section 39-26.708(1)(a)(XIX)

The exemption certificate for which you are applying must be used only for the purpose of purchasing construction and building materials for the exempt project described below. This exemption does not include or apply to the purchase or rental of equipment, supplies, and materials which are purchased, rented, or consumed by the contractor and which do not become a part of the structure, highway, road, street, or other public works owned and used by the exempt organization.

Any unauthorized use of the exemption certificate will result in revocation of your exemption certificate and other penalties provided by law.

A separate certificate is required for each contract.

Subcontractors will not be issued Certificates of Exemption by the Department of Revenue. It is the responsibility of the prime contractor to issue certificates to each of the subcontractors. (See reverse side.)

SEND COMPLETED FORMS TO: COLORADO DEPARTMENT OF REVENUE, DENVER, CO 80261

FAILURE TO ACCURATELY COMPLETE ALL BOXES WILL CAUSE THE APPLICATION TO BE DENIED.

Contractor/Account No. (Leave blank if filing for the first time) 89 -
Period 0170-750 (999) $0.00

CONTRACTOR INFORMATION

Trade name/DBA: 
Owner, partner, or corporate name: 

Mailing address (City, State, Zip): Contact Person

E-Mail address: Federal Employer's Identification Number:

Fax number: ( ) Business telephone number: ( )

Colorado withholding tax account number: 

EXEMPTION INFORMATION

Copies of contract or agreement pages, identifying the contracting parties, bid amount, type of work, and signatures of contracting parties MUST be attached.

Name of exempt organization (as shown on contract): Exempt organization's number: 98 -

Address of exempt organization (City, State, Zip): 

Principal contact at exempt organization: Principal contact's telephone number:

Physical location of project site (give actual address when applicable and Cities and/or County (ies) where project is located)

Scheduled construction start date: Month Day Year Estimated completion date: Month Day Year

I declare under penalty of perjury in the second degree that the statements made in this application are true and complete to the best of my knowledge.

Signature of the business owner, partner or corporate officer: Title of corporate officer: Date:

DO NOT WRITE BELOW THIS LINE
Contractors who have completed this application in the past, please note the following changes in procedure:

The Department will no longer issue individual Certificates of exemption to subcontractors. Only prime contractors will receive a Contractor's Exemption Certificate on exempt projects.

Upon receipt of the Certificate, the prime contractor should make a copy for each subcontractor involved in the project and complete it by filling in the subcontractor's name and address and signing it.

The original Certificate should always be retained by the prime contractor. Copies of all Certificates that the prime contractor issued to subcontractors should be kept at the prime contractor's place of business for a minimum of three years and be available for inspection in the event of an audit.

Once an 89# has been assigned to you, please use the next five numbers following it for any applications submitted for future projects. This should be your permanent number. For instance, if you were assigned 89-12345-0001, every application submitted thereafter should contain 89-12345 on the application. The succeeding numbers will be issued by the Department of Revenue. **DO NOT** enter what you believe to be the next in sequence as this may delay processing of your application.
SERVICE-DISABLED VETERAN-OWNED SMALL BUSINESS AND MINORITY/WOMEN BUSINESS ENTERPRISE PARTICIPATION REPORT

Institution/Agency: University of Colorado Denver | Anschutz Medical Campus / GFE
Project No./Name: PN 18-135884 / Central Utility Plant (CUP) Capacity Expansion

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 service-disabled veteran-owned enterprise as defined in this report. 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: ________________________________
   Name (print)     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. It is also the intent of the State to address the goals of the HB14-1224 | CRS 24-103-211 of at least 3% of all contracts by dollar value to be awarded to SDVOSBs.

III. REQUIREMENTS

A. Service-Disabled Veteran-Enterprise (SDVE) means for the purpose of this report, a business who must be incorporated or organized in Colorado or they must maintain a place of business or have an office in Colorado and who are officially registered and verified as a SDVOSB by the Center for Veteran Enterprise within the U.S. Department of Veterans Affairs (www.vip.vetbiz.gov) per CRS 24-103-211

B. 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.

C. 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.

D. The University of Colorado Denver does not have a certification process for nor does it require MBE's and WBE's to be certified.
E. The percentages of service-disabled veteran, minority and women-owned business participation will be determined by dollar value of the work subcontracted to or joint ventured with service-disabled veteran, minority, and women-owned firms, as compared to the total dollar value of the bid amount for all work bid under this contract.

F. Prior to the award of this contract, the contractor will be required to provide to the Principal Representative a list of SDV/M/WBE enterprises, stipulating the dollar amount of each subcontract or supplier of materials on page 2 of this Service-Disabled Veteran, Minority and Women Business Enterprises Participation Report.

G. 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.

ARCHITECT/ENGINEER/CONSULTANT/CONTRACTOR:

SDVOE: Yes [ ] MBE: Yes [ ] WBE: Yes [ ]
No [ ] No [ ] No [ ]

Total Contract Amount: $ ___________

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<tr>
<th>Name and Address of SDV/M/WBE Subcontractors and/or Suppliers and/or Self-Performed Work by SDV/M/WBE Primes*</th>
<th>SDVE Contract Amounts</th>
<th>MBE Contract Amounts</th>
<th>WBE Contract Amounts</th>
<th>Type of Work</th>
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*Indicate ethnicity based on Paragraph III. A. above.

Total SDVE Contracts: $ ____________________
Total MBE Contracts: $ ____________________
Total WBE Contracts: $ ____________________
Total SDVE %: ____________________
Total MBE %: ____________________
Total WBE %: ____________________
Appendix C

CERTIFICATION AND AFFIDAVIT REGARDING Unauthorized Immigrants (Form UI-1)
A. CERTIFICATION STATEMENT CRS 8-17.5-101 & 102 (HB 06-1343, SB 08-193)

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

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

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

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

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

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

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

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

CERTIFIED and AGREED to this _____ day of __________, __20__.  

VENDOR:

__________________________
Vendor Full Legal Name

BY: ________________________  ________________________
Signature of Authorized Representative  Title

IPD CM/GC RFP
Appendix D

CENTRAL UTILITY PLANT (CUP) CAPACITY EXPANSION PROGRAM PLAN
Central Utility Plant (CUP) Capacity Expansion

PROGRAM PLAN

August 6, 2018
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APPENDICES

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I. EXECUTIVE SUMMARY

This program plan proposes to expand the steam and chilled water generation capacity at the University of Colorado Anschutz Medical Campus Central Utility Plant (CUP) by installing a new boiler in place of existing boiler B-5, expand the CUP’s chilled water capacity by installing a new chiller, and upgrade the CUP’s electrical, security and structural systems to support the new equipment.

The CUP generates steam and chilled water as a heating, cooling and process utility source for the University of Colorado Anschutz Medical Campus (CU Anschutz), University of Colorado Hospital (UCH) and Children’s Hospital Colorado (CHCO). The CUP is operated as a CU Anschutz auxiliary service that is funded through utility charges to the institutions supplied by its steam and chilled water. Natural gas and electricity are provided to the entire campus by Xcel Energy.

By 2021, to accommodate a new CU Anschutz building, the Colorado Center for Personalized Medicine and Behavioral Health (CCPM-BH) Building, and shortly thereafter an anticipated UCH expansion, the CUP must be improved to support additional heating, cooling and process loads. While the steam and chilled water needs of the CCPM-BH building can be met by the equipment within the CUP, the anticipated UCH expansion will require that additional generating capacity for these utilities be provided at the CUP.

The 2012 Anschutz Medical Campus Facilities Master Plan recommended that before any of the CUP’s boilers were replaced, or additional ones installed, to expand its steam generating capacity that CU Anschutz explore the feasibility of cogeneration of steam and electricity at the CUP.

In cogeneration, the heated waste gases from electricity generation, that would normally be considered a byproduct, are used to warm water and produce steam. Two utilities can be provided using less fuel resources than would be required to produce each separately.

The 2017 Central Utility Plant Cogeneration Study completed by CU Anschutz determined that the minimum steam load on the campus during summer months (to supply medical equipment and calibrate cooling in buildings) made cogeneration viable. However, many project uncertainties made it cost-prohibitive and a program plan was not submitted.

Before they are fully operational, the two new CU Anschutz and UCH projects will increase steam and chilled water demands beyond the capacity of the CUP’s current equipment, and the CUP’s capacity must be increased. Therefore, CU Anschutz has decided to pursue a boiler replacement and chiller installation as a more cost-effective means of meeting campus needs.

The total project cost is $[redacted] and will be funded through bonds and the debt will be repaid through CUP service revenue from steam and chilled water charges to the CUP’s customers. See the cost data at the end of the program plan for the cost breakdowns for this effort.

Design work for this project will commence in late fall 2018 after the project is approved by the Board of Regents and the Colorado General Assembly’s Capital Development Committee. The new boiler and chiller will be ordered in time to allow their installation in late-2020. This will allow the systems to be fully commissioned for commercial operation in the spring of 2021, prior to the completion of the two projects. This will allow the CUP to provide the required steam and chilled water services in advance of the new facilities.
II. Goals and Objectives

The framework for this program plan evolved from meetings among facilities personnel at the three Anschutz Medical Campus institutions, and from the findings of the 2017 Central Utility Plant Cogeneration Study. The 2012 Anschutz Medical Campus Facilities Master Plan indicated that planned campus growth over a ten-year period would eventually require CUP expansion to generate additional steam and chilled water to meet campus demands.

Expansion of the CUP’s steam and chilled water capacities is being pursued to ensure that the world-class, innovative medical research and patient care activities on the Anschutz Medical Campus are supported by reliable and consistent utility services.

III. Project Justification

A. Programmatic Background

The CUP is obligated to serve the heating, cooling, and process loads for CU Anschutz, UCH, and CHCO by the Amended and Restated Central Utility Plant Services Agreement of 2004. The CUP is operated as a CU Anschutz auxiliary service and is funded through utility charges to its steam and chilled water customers. It does not provide natural gas or electrical power to the institutions.

Two major projects on the Anschutz Medical Campus, the Colorado Center for Personalized Medicine and Behavioral Health (CCPM-BH) Building at CU Anschutz, and an anticipated UCH expansion, are proceeding to design and construction. The additional steam and chilled water demands of these projects will exceed the current generation capacities of these utilities at the CUP and require their expansion. The additional capacity must be provided before these two projects are completed to ensure that any new generating equipment can be adequately tested, commissioned, and fully functional to support the new facilities before they are occupied. At the same time, the CUP must be able to fully supply chilled water and steam to the new and existing buildings during this commissioning process.

B. Existing Conditions

B.1 CUP Facility

The 82,722 gross square foot (GSF) CUP is located at the intersection of 19th Avenue and Victor Streets. The CUP was initially designed, constructed, and owned by Sempra Energy Colorado. On November 1, 2010, CU Anschutz bought the CUP from Sempra Energy Colorado and took over its direct operations.

The CUP provides steam and chilled water to the Anschutz Medical Campus including CU Anschutz, CHCO, and UCH buildings. Both hospitals have backup electrical capability but do not have backup steam or chilled water systems.

The building is a steel frame structure with precast exterior wall panels and large storefront window systems. An elevator provides access to upper floors as well as maintenance access to roof mounted cooling towers. As of November 2012, the building has a Facilities Condition Index (FCI) of 86%. While the CUP has not been physically expanded since it was constructed, one additional boiler and multiple chillers have been installed within it.

The boilers that generate steam are located on the west side of the building, closest to Victor Street, while the chillers for chilled water production are located on its east side, closer to the Campus Services Building (CSB). There is space to install a new chiller within the CUP and on its roof to install new cooling towers. However, all boiler bays in the facility currently house steam generating equipment. If the CUP’s smaller boilers are replaced with larger ones, its steam generating capacity can be increased. Eventually, The CUP will need to be expanded to accommodate additional boilers to support full campus build-out.
B.1.1 Building Codes

The CUP was constructed as a Risk Category II facility based on the 1997 Uniform Building Code (UBC). The current and updated code requires that new facilities and modifications of existing facilities that provide essential services, to hospitals such as steam and chilled water, are designed and built to Risk Category IV.

The two most recent expansions of the CUP comply with mechanical and electrical system seismic bracing requirements for essential facilities. However, portions of the CUP’s pre-existing structural lateral and mechanical/electrical systems were not improved to the more stringent requirements of Risk Category IV. Thus to comply with these requirements, the building still needs seismic lateral bracing and diaphragm capacity, equipment rated for the seismic load, and bracing for its mechanical and electrical systems.
B.2 Site

The area south of the CUP contains the main campus switch gear in the automatic throw-over (ATO) switch facility and the CUP’s natural gas main entry (See Figures III-2 and III-3). It is not secured and allows free passage of pedestrians that increases the risk of vandalism to the CUP’s grounds and equipment. Overflow clients of a homeless shelter near the campus have also camped and slept in this area leading to maintenance problems. Due to an existing brick wall, safety patrols cannot view into the area from Victor Street to observe such trespassers. The wall is also not adequately secured into the ground and requires strengthening to secure the site.

Additional locations with security concerns, in priority order, are the exterior transformers and switch gear along the CUP’s east side (see Figure III-4) and the switch enclosures at 17th and Victor Streets. See Appendix B for additional information on how these security concerns were identified.

B.3 Utility Systems

B.3.1 Steam

Generation Capacity

The CUP’s initial generating capacity was 270,000 pounds per hour (pph), supplied from five boilers - four rated at 60,000 pph and one at 30,000 pph. A CUP expansion project in 2011 added a sixth 90,000 pph boiler. All produce steam at a pressure of 125 pounds per square inch gage (psig).

Currently, the peak campus steam load is 250,000 pph and the CUP’s maximum steam generating capacity is 360,000 pph with 270,000 pph of fixed firm capacity (FFC). FFC refers to the amount of steam that can be generated with the largest unit out of service.

All boiler burners draw combustion air from inside the building. Make-up air is supplied to the boiler room from five indoor air handling units mounted on the mezzanine, one roof-top air handling unit and/or through a partially open rollup door at the north end of the boiler room.

Distribution Network

Steam is distributed to the campus through buried steam piping connecting a series of vaults. The distribution system has capacity of approximately 400,000 pph. Figure III-6 on Page 5 shows that the network forms a rectangular loop beginning and ending at the CUP. It runs approximately along North Victor Street, East 17th Avenue, North Racine Street and East 19th Avenue. A branch runs east of Research 1 North and Research 1 South to connect the two major east/west runs. The piping along the entire loop consists of a 20-inch high-pressure steam main and an 8-inch low-pressure condensate pipe. Smaller pipes branch off the main pipes at the vaults to connect to buildings.

Condensate and Feedwater

As steam is utilized at campus buildings it cools and creates liquid condensate that is collected in the condensate pipe. This is ultimately returned to two condensate receivers in the CUP’s basement. From the receivers, four return pumps, each rated at 117,000 pph / 235 gallons per minute (gpm), for a total of 470,000 pph and 352,000 pph FFC, lift the condensate to three polishing units.

The polishers are ion exchange devices similar to water softeners that remove dissolved minerals and suspended matter from the condensate. Each is rated at 175,000 pph (350 gpm) and requires periodic regeneration of its exchange media. As a result, the system usually operates with two units active so the third can regenerate. However, during peak steam demand, all polishers must be in operation to avoid having some of the condensate flow bypass them.

The processed condensate is combined with treated water to provide the required amount of feedwater to the boilers. During normal operation, approximately 85% of steam distributed to campus will be collected and returned to the plant as condensate. The remaining 15% of feedwater is comprised of “make-up” water.

The feedwater is then supplied to three deaerators on the mezzanine level to preheat and remove dissolved gases from it before it enters the boilers. This reduces corrosion within the boilers and steam distribution system. Each deaerator is rated at 150,000 pph for a combined maximum capacity of 450,000 pph with 300,000 pph FFC. Each deaerator has two pumps that deliver the feedwater to the boilers.
Figure III-6: Anschutz Medical Campus Steam and Chilled Water Distribution Systems
Make-up Water Treatment

The make-up water is treated by three water softeners and three dealkalizers that all utilize ion exchange technology. The softeners reduce water hardness by removing dissolved minerals (primarily calcium). The dealkalizers then primarily remove carbonates, as well as other material, from the softened water to reduce its alkalinity.

Each softener can accommodate water flows between 80,000 pph (160 gpm) at 15 pounds per square inch (psi) up to 100,000 pph (200 gpm) at 25 psi. Each dealkalizer can accommodate 50,000 pph (100 gpm) at 10 psi to 100,000 pph (200 gpm) at 20 psi. The softeners maintain their performance throughout their rated flow range whereas the rated performance of the dealkalizers will diminish as the flow rate increases within the range.

Assuming that make-up water provides 15% of the CUP's 330,000 pph FFC for steam, under normal operating conditions the system will need to provide 50,000 pph (100 gpm) of make-up water. This requirement can be met with only one softener and one dealkalizer in use. The remaining units will be regenerating, in standby mode, or out-of-service.

Mechanical Single Points of Failure

A previous study of the campus steam network identified that the pumped condensate piping from the storage tanks to the deaerators and the make-up water piping were potential ‘single points of failure’. This means that if any of the pipes broke or failed it would cripple steam production at the CUP. This project will address and fix this problem.

B.3.2 Chilled Water
Generation Capacity

Currently, the CUP’s nine chillers have a maximum generating capacity of 17,400 tons of chilled water. Two chillers are rated at 1,200 tons, two at 2,000 tons and five at 2,200 tons of cooling which results in a FFC of 15,200 tons of chilled water. FFC refers to the amount of chilled water that can be generated with the largest unit out of service. The chillers utilize electricity to chill water.

Distribution Network

The chilled water distribution system follows the same route, and passes through the same vaults, as the steam piping network (see Figure III-6). Two chilled water distribution loops originate at the CUP and each is comprised of a 20-inch supply and a 20-inch return pipe. The inner loop supplies chilled water to the east side of campus and the outer loop supplies the west side. Near the CUP, all four pipes run side-by-side as they enter it. As with the steam distribution network, smaller pipes branch off the main to connect buildings to the system.

The chiller plant currently has two side-stream filtration units connected to the chilled water return lines, one for the eastern loop main piping and one for the western loop. Each unit is rated for 750 GPM and uses filters rated to remove particulates larger than 0.5 micron.

There are multiple chillers, cooling towers and pumps throughout this system to provide redundancies. Outside of an extended power outage, this allows vital research and patient care activities to continue without interruption on the Anschutz Medical Campus.

Waterside Economizer

During cold weather, a waterside economizer (WSE) allows the CUP’s cooling towers to produce chilled water using the air temperature as opposed to firing the chillers which saves electricity. A 600-ton heat exchanger (HX) separates the tower water from the chilled water. The WSE is configured (piped) in a manner that allows operation of either it or the chillers, but not both at the same time.

Currently, the campus has a consistent demand of 1,500 – 2,000 tons of cooling below about 32°F-wet bulb (WB) that climbs to about 3,000 tons as the temperature rises to about 45°F-WB. The WB temperature adjusts the standard dry bulb temperature to account for the cooling effects of humidity. It is used because the water temperature...
Figure III-8: Tons of Cooling Versus Wet Bulb Temperature

(December 2016 - January 2017)
produced by a cooling tower is directly proportional to the WB temperature. As the WSE is undersized for this cold-weather chilled water demand, during the winter months the CUP’s chillers must be operated to provide all chilled water.

Campus chilled water demands were determined using CU Anschutz Facilities Management hourly records of chilled water production at the CUP that were combined with concurrent wet bulb and dry bulb ambient temperature data for two winter months (see Figure III-7).

B.3.3 Supporting Utilities

Natural Gas and Fuel Oil

The primary fuel used to fire the boilers is natural gas. A 6-inch secondary-supply 150 psi gas line from Xcel Energy supplies natural gas to the CUP’s gas meter / regulator station on the south side of the facility. At that point, the gas pressure is reduced to 20 psi for use in the CUP’s boilers and enters an 8-inch gas pipe that routes through the building to the boilers. The gas pipe reduces to 6-inches after it connects to boiler B-3 and further reduces to 4-inches after it connects to B-5.

As a result, when gas pressure from Xcel is supplied at 20 psi, B-6 does not receive adequate pressure during cold weather (peak steam demand) to fire at 100% capacity.

The standby generator primarily uses fuel oil which is also a backup fuel for the boilers. Three 105,000 gallon above ground No. 2 fuel oil storage tanks store this fuel southeast of the CUP. These outdoor fuel tanks fill a 25,000 gallon indoor day-tank through gravity flow to provide a back-up fuel supply for the boilers and generator. Three fuel oil pumps rated at 32 gpm at 175 psi then deliver fuel oil from the day-tank to the boilers and the generator’s “belly tank”. The fuel oil back-pressure valve is set at 150psi.

A minimum of 100 psi compressed air or steam is required to atomize the fuel oil for combustion. The plant currently uses a 185 standard cubic feet per minute (scfm) at 125 psi duplex air compressor for this purpose. If natural gas is unavailable to fuel the boilers, a propane cylinder will provide pilot gas and the first boiler will be started using compressed air to atomize fuel oil. All subsequent boilers that are started will use steam to atomize fuel oil.

Electricity

Xcel Energy supplies dual feed electrical power from two substations to a switchgear building that is located south of the CUP. Even though many of the loads do not have ATO switches, the facility is referred to as the ATO building (R34). From the ATO, dual feed power (A and B) is distributed to the Anschutz Medical Campus. The CUP receives 13.8 kilovolt (kV) three phase power from the ATO in two sets (A & B) of electrical feeders at the 1,200 amp main switchgear on the building’s east side. Each feeder consists of two sets of 500 MCM cable and has a capacity of 18.8 megawatts (MWs) or 795 amps.

The current highest demand for power at the CUP main switchgear is 10.3MW/11.7 Mega Volt Amp (MVA)/491 amps (at 13.8kV). As required by the National Electric Code (NEC), peak demand is actually set at 125% of this figure, or 12.88MW. Thus there is approximately 6MW (30%) of spare capacity remaining in each of the existing feeders.

The CUP’s main switchgear powers eight transformers; two 5MVA / 13.8kV-4,160V pad mounted, two 5/6.25MVA (with fans) / 13.8kV-4,160V pad mounted, and four dry-type 13.8kV-480V ones on two double-ended unit substations. The two sets of pad-mounted transformers each feed a set of double-ended (A & B) 4,160 volt (V) chiller switchgear in the CUP’s second floor main electric room. The double-ended unit substations power the CUP’s remaining mechanical equipment and lighting and also provide general power.
The CUP’s main switchgear and feeders have capacity to support boiler and chiller expansions, but the 4,160V pad-mounted transformers, chiller switchgears, unit substations and downstream distribution equipment require improvements. Due to the limitations of the chiller switchgear, the most recent chiller, CH-5, is not connected to one side and does not have a redundant connection. Therefore, All the chillers cannot be concurrently powered as a true double-ended, redundant system.

Inside the CUP, the main electric room experiences periods of high temperature that could potentially damage the equipment within it. One 7,000 CFM air-handling unit (AHU) serves the room and is relatively small for the space and if it fails the room will quickly overheat. Currently, ventilation air is brought into the room through a 10” round duct connected to the inlet of the AHU.

**Standby Power**

A standby 1,000 kilowatt (kW), 914kW de-rated capacity at altitude, electrical generator in the CUP provides power to 480V equipment (primarily for the boilers) during a power outage to maintain steam production. The generator feeds Side B of a double-ended 1,200 amp, 480V standby switchboard via an automatic transfer switch (ATS).

Side A of the switchboard includes an ATS that is available to connect to a second 1000kW generator for redundancy of standby power. The current maximum demand on the standby switchboard is 550 amps. After adding the NEC required 25% to this figure, there are 512 amps of spare capacity at peak demand to support new boiler loads.

The chillers are not connected to the standby power system as they have a large power demand that cannot be reliably supplied by the generator during an extended power outage. However, the chilled water distribution system contains multiple redundant chillers, cooling towers and pumps and most campus buildings have emergency generators to power their building level pumps. This allows the chilled water system to continually supply critical loads during an interruption by using water already in the system until new chilled water can be produced once electric service is restored.

However, due to the limitations mentioned earlier, CH-5’s chilled water pump is currently connected to a motor control center (MCC). It is fed from the standby switchboard as a temporary measure and will be addressed by this project.
C. Future Utility Demands

Figure III-12 shows anticipated steam and chilled water load demands and CUP capacities for each service between 2015 and 2025 (projected after 2017). Expected loads are from the Central Utility Plant Growth Projection spreadsheet prepared by the CU Anschutz Department of Facilities Management. This includes the anticipated loads of all future projects on the Anschutz Medical Campus.

The upcoming CCPM-BH Building and anticipated UCH expansion projects are expected to increase the campus steam load by 37,000 pph to 287,000 pph, which exceeds the CUP’s current 270,000 pph FFC for steam. The two projects will also drive cooling demands over the current FFC in mid-2021.

D. Economic Impact

CU Anschutz is the only comprehensive academic health sciences center in Colorado, the largest academic health center in the Rocky Mountain region and one of the newest education, research and patient care facilities in the world. Home to almost 19,000 employees, more than 4,100 degree-seeking students and two nationally recognized hospitals, CU Anschutz trains the health sciences workforce of the future and fuels the state economy.

Over 500 million dollars of funded research occurs each year on the campus. CU Anschutz is estimated to have a state economic impact of $2.6 billion a year, on par with the Colorado ski industry.

In a typical year, there are more than 3,000 hours when the outside temperature is above 60°F and patient care areas must be cooled using chilled water from the CUP. A failure of the CUP’s chilled water system would result in the loss of environmental controls and could put patients and research at risk.
E. Consistency

E.1 Mission Consistency

The 2008-2020 Strategic Plan for the University of Colorado Denver (the plan covers both CU Denver and CU Anschutz) states that the campus:

is a diverse teaching and learning community that creates, discovers and applies knowledge to improve the health and well-being of Colorado and the world.

This project will provide necessary support and infrastructure to the CU Anschutz Medical Campus to facilitate teaching and learning while enhancing health and wellness.

E.2 Strategic Plan Consistency

This project clearly supports Strategic Goal 7.2 from the University of Colorado Denver Strategic Plan 2008-2020:

Invest in providing the infrastructure (services and facilities) necessary for a world class learning and discovery environment for the benefit of our students, faculty, staff and communities.

E.3 Facilities Master Plan Consistency

The 2012 Anschutz Medical Campus Facilities Master Plan included the CUP Boiler and Chiller Expansion project as one of seven proposed infrastructure efforts to support future campus growth. The effort was expressly linked to construction of an Interdisciplinary Building Phase I, which evolved into the CCPM-BH Building project.

E.4 Accreditation Compliance

The hospitals connected to the CUP are required by the Joint Commission on the Accreditation of Healthcare Organizations (JCAHO) to maintain redundant heating system capacity with emergency electrical power back up for the heating system. The CUP must therefore increase its steam generating capacity in step with increased loads with corresponding increases in emergency power to back up the steam generating equipment.

Once the CCPM-BH Building and anticipated UCH expansion are complete, the CUP must therefore be able to provide 287,000 pph, or greater, FFC of steam to meet campus needs.

E.5 Emissions Regulations Compliance

The CUP’s boilers create atmospheric emissions that fall under the jurisdiction of the federal Clean Air Act. The Front Range’s ambient air quality is classified as Moderate Non-Attainment for ozone and the public is in close proximity to the CUP’s emissions.

Before a new or replacement boiler is installed, CU Anschutz must submit an application for a Construction Permit to the Colorado Department of Public Health and Environment (CDPHE) Air Pollution Control Division for approval. The existing permit allows maximum annual gas consumption of 1,700 million standard cubic feet (MMSCF) which will be retained.

During an April 18, 2018 meeting with CDPHE, it was noted that the typical duration of its Minor Modification permit process is 6 months but can extend to well over a year if air dispersion modeling is required. It is likely that modeling will not be required, though it is up to CDPHE’s discretion. Refer to Appendix F for minutes of the CDPHE meeting.

During this review process, emitting equipment such as boilers can be purchased, but no construction can begin until CDPHE issues the permit.
IV. Proposed Project

A. Description

This program plan proposes to expand the steam capacity of the CU Anschutz CUP by installing a new boiler (B-7), in place of B-5, expand the chilled water capacity by installing a new chiller (CH-10), and upgrade the electrical system, fuel supply and external security to support the new equipment. The replacement boiler will include a burner that emits low levels of nitrogen oxides (NOx), with a typical emission rate of less than 32 lb / MMSCF.

Portions of the CUP’s structural framing system will be modified. Structural modifications to meet the building code requirements for vertical load carrying capacity are needed to accommodate the weight of the new equipment. A facility-wide upgrade of the building’s lateral system to meet Risk Category IV requirements will be completed.

B. Program Considerations

As the choice of a boiler, chiller and supporting systems will drive the improvements within the CUP, these components of the project will be described and discussed before the proposed facility improvements.

B.1 Utility Improvements

B.1.1 Steam

The CUP’s smallest 30,000 pph boiler will be replaced with a new 109,000 pph one to increase the CUP’s FFC for steam to 330,000 pph. This will accommodate the projected demand for 287,000 pph of steam once the CCPM-BH Building and anticipated UCH expansion are complete while still providing additional capacity for further growth.

The replacement boiler will connect to the existing 20" steam header in the CUP basement and connect to the existing 8" feedwater line on the first floor. The replacement boiler will also connect to the existing natural gas, fuel oil, condensate blowdown, steam test header, compressed air, and building control and monitoring systems at the CUP. A replacement flue stack through the CUP’s roof will also be required.

While an additional deaerator is not necessary to satisfy the steam loads of the CCPM-BH Building and anticipated UCH expansion projects, one will be needed to satisfy the campus’s projected steam loads in 2030. As a result, this project will install a fourth deaerator, and two associated feedwater pumps.

Figure IV-1: 30,000 pph Boiler 5 and 90,000 pph Boiler 6

Figure IV-2: Existing Deaerator

The stack economizer for B-4 has developed leaks and operates less efficiently as it has reached the end of its useful life. An identical unit will replace it so that heat from the boiler’s flue gases can be transferred to and heat B-4’s feedwater so the boiler can operate more efficiently.

A new 15,000 cfm air handling unit (similar to the five existing units, AHU-2-3 through 7) will be added on the mezzanine to supplement existing make-up air capacity. Figures IV-3 to IV-6 indicate where new equipment will be placed in the CUP.

Mechanical Single Points of Failure

To address identified mechanical points of failure, a second pipe will be installed parallel to both the existing condensate and make-up water pipes. Connections and valves will be provided between the two pipes in each system at several locations. This will allow sections of the old pipe to be isolated and bypassed, so repairs can be made or sections of pipe replaced, while keeping the overall pipe active.
Figure IV-3: Locations of WSE and CH-10 Pumps (Basement)
Figure IV-4: Locations of New Boiler and Chiller (1st Floor)
Figure IV-5: Locations of New Deaerator and Generator (2nd Floor)
Figure IV-6: Locations of New Cooling Towers (Roof)
B.1.2 Chilled Water

A new 2,200-ton chiller, to be labeled CH-10, will be installed in the northeast corner of the CUP’s chiller room. Chilled water FFC will increase from its current 15,200 tons to 17,400 tons which provides additional capacity beyond the expected 16,300 tons of FFC once the CCPM-BH Building and anticipated UCH expansion projects are complete. The chilled water and condenser water pumps associated with CH-10 will be installed below it in the basement pump room. CH-10 will be a high-efficiency, variable speed chiller mostly identical to CH-5, the CUP’s newest chiller. (See Figures IV-3 to IV-6 for the locations of the new chiller equipment).

The existing WSE heat exchanger will need be removed to accommodate the new chiller and the WSE’s associated pumps will also be removed from the basement to make room for CH-10’s new pumps. The new chiller will connect to the existing chilled water and tower water piping in the CUP basement.

Two new filtration units will be added, with each one rated for 1,250 gpm and use rated filters that remove the same particle size as the existing ones, 0.5 microns. Each unit will also be coupled with a dedicated pump. This will raise the total filtration rate up to 4,000 GPM. This is 11% of the new FFC chilled water flowrate of 34,800 GPM. The filter manufacturer recommends rates of 10-20%. However, as the proposed system uses very clean water, even lower rates would be acceptable.

Two new cooling towers (CT), CT-15 and CT-16, will be installed on the roof to provide heat rejection for the new chiller at the north end of the eastern row of towers. Heat rejection refers to the movement of heat from one area (indoors) to another (outdoors). The CUP’s water-cooled chillers transfer the heat removed from the chilled water inside the CUP into a separate condenser water loop that passes through the cooling towers outside the CUP. In the towers, the condenser water temperature is lowered through evaporative cooling as air passes over the loop before it is returned to the chillers to again transfer heat from water as it is chilled.

A third cooling tower, CT17, will be installed at the south end of the east bank of cooling towers to primarily serve the new WSE (described in the next section) and passively chill water without use of the chillers in colder months. This will reduce and/or eliminate the need to activate the chillers during these periods and reduce energy costs.

In addition, CT-17 will be utilized on hot / humid summer days, when the wet bulb temperature entering the towers rises above 65°F. During these periods, the supply water temperature from the cooling towers will creep upward and the chillers will utilize a greater amount of energy. CT-17 will provide additional cooling capacity.

Waterside Economizer

A WSE will be installed that is capable of chilling water to meet winter month campus demands. It will be initially sized for 4,000 tons of cooling, with the ability of reaching 6,000 tons in the future. There will be two pairs of HXs, with each pair sized for 2,000 tons and
room for plates to be added to reach 3,000 tons. Four HXs needed as the required cooling cannot be handled by two HXs.

The piping will be arranged on the chilled water side so the WSE pumps can pump directly to the campus when the system can make chilled water that is 45°F or lower. When the resultant water temperature is above 45°F, the pumps will serve to pre-cool the chilled water returned to the CUP before it enters the chillers. This will maximize the number of hours per year when the WSE will be beneficial.

During operation of the WSE, the five cooling towers in Bank C (southeast corner including CT-17) will be isolated from the others by closing the main isolation valves on the roof for the supply and return tower water piping for Bank C. An automatic actuator will be added to these two valves to simplify the closing process. These towers will lower the water temperature (as much as possible, but no lower than) to a minimum of 42°F. With heat exchangers selected at 3°F approach, 45°F chilled water can be produced with 42°F using tower water. Water from these towers will be directed down new pipes running directly from the roof to the WSE in the basement. The other cooling towers will be accessible to any chiller to produce warmer water that can be used for condenser cooling when a chiller is operated to supplement the WSE.

The WSE tower water pumps will be variable speed so they can be modulated as needed to produce enough cold water to meet the campus demand during winter months.

B.1.3 Supporting Utilities

Natural Gas and Fuel Oil

The replacement boiler will utilize natural gas provided through the CUP’s existing 150 psi Xcel Energy line. A segment of new gas pipe will be installed within the CUP to form a gas loop that will reduce the identified loss of gas pressure to the boilers in the existing system. Fuel oil piping will be connected to the burner at the new boiler.

Electrical

Two new switchgear sections will be installed in the 15kV enclosed outdoor switchgear substation east of the CUP. This enclosure/underground vault was built to accommodate this future equipment. Each switchgear section will provide dual feed (A & B) power to either two new pad-mounted liquid-filled transformers to power the chillers or a new switchboard #3 that will serve the boilers, cooling towers, pumps and other lower voltage CUP equipment.

The new transformers will be installed outside the CUP to its east. Safety sensors on them will be connected to the plant’s control system to warn of their impending failure or overtaxing of their capacity. Each transformer will connect to one side of the new chiller switchgear MV2, that will be installed in the CUP’s electric room and operate at 4,160 volts. The new chiller will be served by MV2 and a medium voltage (MV) variable frequency drive (VFD). CH-5 will be provided the redundant power connection that it currently lacks through MV2.

Switchboard #3 will also be installed in the main electric room. It will be double-ended with dry-type transformers on its outside sections with main breaker sections between. MV armored cable, similar to existing cables, will be routed from the switchgear substation’s basement in cable trays to the transformers that will reduce voltage from 13.8kV to 480Y/277V. The switchboard will support new motor MCCs to serve the boiler equipment, chilled water pumps, and other processes within the CUP.

Within the CUP, a new 14,000 cubic feet per minute (CFM) AHU will replace the existing one in the main electrical room and the ventilation duct connection will be reused. The new unit will have greater capacity and redundant fans; so that if one fails, or needs to be turned off for maintenance, the other can remain in operation. Each fan will include a VFD that can be adjusted so that one fan could provide 75% of total required cooling when the other is out of service to meet a large portion of cooling needs. In addition, each fan will be powered from a separate electrical circuit to provide further redundancy in ventilation.

Standby Power

CH-5’s chilled water pump will be removed from the MCC fed from the standby switchboard and connected to a new MCC fed from the new Switchboard #3.

The standby electrical system will be expanded by installing a second generator rated nominal 1,000 KW (914 KW derated capacity at altitude) in the existing generator room. This generator will serve Side A of the existing Standby Switchboard and will provide redundancy to the standby system that powers the team production equipment during any utility outage. A tie breaker is present that will allow either generator to assume all the loads on the switchboard.
B.2 Facility Improvements

As described in Section III.B.1.1, the CUP was built as a Risk Category II facility, although changes in the UBC would now require that it be built as a Risk Category IV (Essential) facility. The modifications required to upgrade the CUP can be broken into two categories, those required to support the gravity loads of the new equipment (based on current Building Codes) and those to meet the more stringent requirements for lateral load resisting systems for a Risk Category IV structure.

Gravity Load Improvements

Approximately 2 tons of miscellaneous steel framing is required in the CUP basement to support and brace new piping for new or relocated equipment.

The new B-7 weighs 180 kips (1 kip = 1,000 pounds). To support the increased weight of this boiler, steel tonnage of 1 ton will be used to reinforce three steel beams in this area. In addition, miscellaneous cast-in-place concrete for a housekeeping pad will be included.

The new chiller, CH-10, will be placed in the northeast corner of the building and is assumed to be approximately the same size as the existing chillers. The existing beams under this chiller will be reinforced with one ton of steel tonnage. In addition, a housekeeping pad of miscellaneous cast-in-place concrete for a housekeeping pad will be included.

B-7 has a larger flue opening and heavier economizer than the existing B-5 that requires modifications to the grated floor framing and adjacent girder. One ton of steel will be used to strengthen these areas. No additional strengthening of the composite steel floor will be required to support new switchgear equipment.

The larger flue will also require additional or modified framing at the roof opening. These improvements will use ½ ton of miscellaneous steel framing to brace the stack from the roof structure. Posts from the support framing of the three new cooling towers will penetrate through the existing roofing material to connect to the roof framing in eight locations. 2 tons of material will be used to strengthen these areas.

At the cooling tower platform elevation, 9 tons of steel will be required to frame the supports for the new towers and the generator radiator including posts, bracing, and connections. 680 square feet of pultruded fiberglass grating with grit top surface that matches the existing grating, plus 136 feet of 2-rail Occupational Safety and Health Administration (OSHA) approved handrail with ¼” toe kick, and two access stairs with grating treads will also be required.

11 additional roof penetrations will be needed to accommodate the piping supports to the existing tower headers. Although the exact weight of the remote radiator and fan required for the new generator have not been determined, it is assumed they will be heavier than other existing models. As a result, additional framing has been included as part of an overall allowance.

An additional ½ ton of miscellaneous steel will be required to vertically support the two new water lines that run from the basement to the roof’s cooling tower headers. A ½ ton of miscellaneous steel above the roof to support horizontal piping runs is also required. Temporary shoring may also be needed as the installation paths for the boiler and chiller have not been determined. Please see Appendix H for the detailed structural report.

Lateral System Recommendations

After analysis of the existing building documents and proposed expansion, the mass of the expanded CUP exceeds the mass of the baseline CUP by approximately 9%. This is below the 10% threshold in the International Existing Building Code (IEBC) that would necessitate a full building lateral analysis and upgrade. As part of a “reasonableness check”, an initial capacity check on the existing lateral bracing tube X-Braces and the member connections was completed. This preliminary analysis indicates the gross brace capacity exceeds both the original required capacity as well as that of the expanded CUP, provided it remains a Risk Category II facility.

The grated mezzanine floor at the second level does not appear to have a direct lateral load path connection to the building lateral system. An allowance of 10 tons of miscellaneous steel angles and hot-rolled steel shapes should be added to each grating floor bay below the grating and connect to the existing floor beams. Approximately 50 beam to column connections should also be upgraded. 50 exterior precast panel to structural frame connections should also be provided. A Risk Category IV analysis of the tunnels and campus wide distribution networks was not included in this Program Plan.
B.3 Site Security Improvements

This project will improve the security of the CUP site, specifically in regards to the natural gas main entry, the ATO and eight switch enclosures. The improvements are described below and shown on Figure V-2. No other site improvements will be made as the existing facility will not be expanded and the project’s scope is limited to the building’s interior.

Security improvements at the Campus Services Building, Building 610 (used for storage), and the tank farm are not included in this project, nor is access control at adjacent parking areas.

B.3.1 ATO and Gas Main Enclosure

An old framed brick veneer wall south of the CUP will be removed and a security fence installed around the ATO and the CUP’s main gas connection. The fence will provide increased visibility into the area while blocking general pedestrian access. CUP personnel will be able to enter the area through card-access-secured gates on the east and west. The fence will provide a higher level of physical barrier protection than the existing wall, which is mainly aesthetic. A padlocked vehicular service gate will be provided on the enclosure’s northeast side.

The existing grass pavers within the enclosure will be removed and replaced with a poured concrete access road. Overgrown junipers and sod will be removed and replaced with low-water landscaping. The irrigation system will be upgraded to reduce water use. A 360 degree camera and lighting will be installed to cover the south and east of the ATO to further enhance site security.

Although, not within the proposed enclosure, the narrow pedestrian walkway north of the CUP between Victor Street and the CUP’s service drive will be widened for service cart use. This will better facilitate movement around the CUP to improve the ability of personnel to support security and maintenance activities.

B.3.2 Secure Transformers

To protect the transformers to the east of the CUP, bollards will be installed next to the adjacent head-in parking spaces. These will be fixed and removable as required for electrical equipment working clearance. The hatches adjacent to transformers will be secured and additional lighting installed. New signage will be provided at the southeast and north entries to the enclosure.

B.3.3 Switch enclosures at 17th & Victor

The eight switch enclosures will be protected with a 3’ cabled vehicle barrier. In addition, adjacent sod will be removed and replaced with rock mulch while the irrigation system will be capped within the barrier to reduce water intrusion. These efforts will be coordinated with Xcel Energy to ensure that required clearance and access are provided.

C. Alternatives

C.1 Cogeneration

CU Anschutz completed a cogeneration study to determine whether cogeneration of steam and electricity at the CUP was feasible. In cogeneration, the heated waste gases from electricity generation, that are normally be considered a byproduct, are used to warm water and produce steam. Two utilities can be provided using less fuel resources than would be required to produce each separately.

The study did determine the minimum steam loads during the summer would allow cogeneration of electricity using a turbine. The waste gases from the turbine would be used to create steam. However, upon further study it was determined that the air quality permitting process and need for a new source of natural gas for the turbine made it difficult to complete the project by the it would be needed.

The uncertainties of providing gas also increased project costs. As a result, the rate increases for steam and chilled water to the CUP’s customers to fund the project would be significant and unacceptable to them. Therefore, due to time and cost constraints, cogeneration was not pursued.

C.2 Energy Conservation Measures

Past energy conservation projects have reduced demands for steam and chilled water on the Anschutz Medical Campus. The effects of past efforts are most clearly seen as a dip in steam and chilled water demands in 2016 on Figure III-12. During 2016, CU Anschutz completed an energy conservation project in one of its research buildings.

While such efforts can reduce overall steam and chilled water demands, it will be impossible to provide the amount of steam and chilled water required by the two new facility projects strictly through conservation. However, future energy conservation projects may be still pursued at the Anschutz Medical Campus to improve overall stewardship of resources.
Figure IV-8: CUP Site Security Improvements

Example of Security Fencing

Example of Cabled Barrier
V. IMPLEMENTATION

A. Budget

The project budget, see Figure V-1, was created by comparing opinions of probable cost from two sources and applying the university’s standard contingency and overhead numbers. Vermeulens prepared the construction cost estimate based on mechanical, electrical and plumbing information provided by RMH, BWG | Cannon based on the project scope, pricing information solicited from major equipment manufacturers and applying escalation for the anticipated completion date of the project.

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<tr>
<td>TOTAL PROGRAM BUDGET</td>
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Assumptions
Design start: Dec 2018  Construction start: by Aug 2019
Cost is based on a Program Plan study completed by CannonDesign / RMH Engineers

Figure V-1: Project Budget
**B. Funding Sources**

This project will be paid for from debt from bonds, and the debt service will be paid from CUP service revenue.

**C. Schedule/Phasing**

The driving factor for this project is the need for additional steam capacity and chilled water capacity once the CCPM-BH Building and the anticipated UCH expansion are operational. These buildings are scheduled to be completed in mid-2021. However, the equipment must be installed at least a year prior (mid-2020) to provide time to adequately test it, commission it and commence commercial operation. The equipment must also be operational during the separate commissioning processes for each facility.

The project will proceed in four phases.

*Phase 1: Equipment Selection/Schematic Design*

The boiler requires 10 months to a year between its purchase and shipment, and can be ordered before the CDPHE emissions permit is issued. The boiler and chiller will be selected early in the design process as they will much of the subsequent building, mechanical and electrical design decisions. Other equipment such as the deaerator, feedwater pumps, standby generator and electrical equipment may also be procured before design is complete if they have long enough lead times.

*Phase 2: Mechanical and Electrical System Decision*

During this phase, boiler and chiller system shop drawings will be reviewed.

*Phase 3: Installation and Construction*

The boiler and chiller units will be installed and the balance of the CUP’s mechanical and electrical systems improvements will be constructed. This phase cannot start until the CDPHE permit has been issued.

*Phase 4: Commissioning*

After all systems have been installed and all pre-functional tests are complete commissioning will occur. This process will test both the functionality and the performance of the boiler and chiller systems. This will uncover problem areas within the system controls and physical infrastructure to ensure units run consistently without faults when operation begins at the end of the commissioning phase.
D. Project Milestones

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<td>ANTICIPATED UCH EXPANSION</td>
<td>9/1/2021</td>
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E Operating Costs

Operating costs for the replacement boiler and new chiller will remain similar to the existing CUP operating costs, while increasing capacity and improving redundancy.
## APPENDIX A: Acronym List

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Definition</th>
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<tbody>
<tr>
<td>AHU</td>
<td>Air-handling Unit</td>
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<tr>
<td>AMP</td>
<td>Ampere</td>
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<td>ATO</td>
<td>Automatic Throw-over</td>
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<tr>
<td>B</td>
<td>Boiler</td>
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<tr>
<td>CCPM-BH</td>
<td>Colorado Center for Personalized Medicine and Behavioral Health</td>
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<tr>
<td>CDPHE</td>
<td>Colorado Department of Public Health and Environment</td>
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<tr>
<td>CFM</td>
<td>Cubic Feet per Minute</td>
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<tr>
<td>CH</td>
<td>Chiller</td>
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<tr>
<td>CHCO</td>
<td>Children's Hospital Colorado</td>
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<tr>
<td>CSB</td>
<td>Campus Services Building</td>
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<tr>
<td>CT</td>
<td>Cooling Tower</td>
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<td>CU</td>
<td>University of Colorado</td>
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<tr>
<td>CUP</td>
<td>Central Utility Plant</td>
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<tr>
<td>F</td>
<td>Fahrenheit</td>
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<tr>
<td>FD</td>
<td>Forced Draft</td>
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<tr>
<td>FCI</td>
<td>Facilities Condition Index</td>
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<tr>
<td>FFC</td>
<td>Fixed Firm Capacity</td>
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<tr>
<td>GPM</td>
<td>Gallons per Minute</td>
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<tr>
<td>GSF</td>
<td>Gross Square Feet</td>
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<td>HX</td>
<td>Heat Exchanger</td>
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<td>IEBC</td>
<td>International Existing Building Code</td>
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<td>Thousands of Pounds</td>
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<td>Kilovolt</td>
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<td>KW</td>
<td>Kilowatt</td>
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<td>MCC</td>
<td>Motor Control Center</td>
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<td>MCM</td>
<td>Thousand Circular Milis</td>
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<tr>
<td>MMSCF</td>
<td>Million Standard Cubic Feet</td>
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<td>MVA</td>
<td>Mega Volt Amp</td>
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<td>NOx</td>
<td>Nitrogen Oxides</td>
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<tr>
<td>PPH</td>
<td>Pounds per Hour</td>
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<td>PSI</td>
<td>Pounds per Square Inch</td>
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<td>University of Colorado Hospital</td>
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<td>V</td>
<td>Volt</td>
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<tr>
<td>VFD</td>
<td>Variable Frequency Drive</td>
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<td>WB</td>
<td>Wet Bulb</td>
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<tr>
<td>WSE</td>
<td>Waterside Economizer</td>
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</table>
Site Security Improvements

A. Scope of work:
(SR) Planned scope of work for site security is limited to the Central Utility Plant structure / surroundings, gas main entry and main electrical switch gear (ATO). Scope will also include the eight switch enclosures along Victor Street north of 17th Place.

The Central Utility Plant planned scope for site security does not include the Campus Services Building, Building 610 (used for storage), the tank farm or access control for adjacent parking areas.

B. Level of Threat anticipated:
1. Vehicular: An accidental incident is more likely to occur than use of a vehicle as a weapon. Protect equipment / structures in proximity to parking, public streets and service drives.
2. Pedestrian: Current issues involve mostly trespass by homeless shelter overflow. Limiting pedestrian access through site, especially around ATO would be a security benefit.
3. Aerial: CUP is not considered a likely target for an aerial attack. CU has banned drones on the Anschutz Campus.
4. Blast: CUP is not considered a likely target for a blast attack.

C. Assets / Priorities:
1. CUP building, south side
   Gas Main Entry

2. Main Switch Gear (ATO)

3. CUP building, east side
   Transformers and switchgear

4. Switch Enclosures at 17th & Victor
5. Lower priority: CUP building, protect west glazing

D. Enclose ATO and Gas Main (Priorities 1 and 2)
Enclose ATO and Gas Main / close pedestrian access along south side of building.
Note: South entry to the building will no longer be accessible to the public.

1. Demo existing framed brick veneer wall (poor condition) to improve visibility south and west of the ATO.
2. Remove junipers from south side of building and re-landscape.
3. Upgrade irrigation around ATO and remove and replace sod with low-water alternative.
4. Install security fence (ATFP, similar to VA) to enclose the ATO from the SW corner of the tank farm to the existing wall location, continuing to the south side of the CUP. (Integrate cable for vehicle barrier adjacent to street / parking.)
5. Provide a man gate with card reader at the west end of the existing walkway.
6. Install security fence from the SE corner of the CUP to the NW corner of the tank farm.
7. Provide a man gate with card reader and a locking vehicle service gate.
8. Remove grass pavers. Recompact for 6” reinforced concrete access.
9. Provide an additional camera on the south tank to view the area south of the ATO.
Note: RB requested two additional lights to the east and south
10. Provide additional lighting along west side of the tank farm and the north side of building 610. Note: RB recommended a night lighting study.
11. Retain picnic table and shelter within fenced ATO enclosure.
12. Remove and replace existing pedestrian walk between service drive north of CUP and back of sidewalk at Victor with wider sidewalk suitable for service cart use.

E. Protect transformers and switchgear (Priority 3)
East wall of CUP building

1. Install bollards adjacent to head-in parking; fixed and removable as required for electrical equipment working clearance.
2. Secure two hatches at adjacent to transformers.
3. Provide additional lighting along east side of CUP.
4. Provide new signage at both southeast and north entries.

F. Protect eight switch enclosures at 17th & Victor (Priority 4)
1. Enclose eight switches with 3’ cabled vehicle barrier. Coordinate required clearance and access with Xcel Energy.
2. Remove sod and cap irrigation inside barrier. Replace with rock mulch.

G. Lower Priority: Protection of six windows at west face of CUP building along Victor (Priority 5)
Note: Work at this location will need to be coordinated with S A Miro’s flood mediation project at the main utility vault in Victor Street.

Option G1: Continue brick faced, reinforced concrete planter wall to the north and south, along west wall of CUP.
Option G2: Install a low cabled vehicle barrier fence at back of walk adjacent to Victor Street, return 10’ toward building at NW and SW corner.

H. Not in Central Utility Plant site scope: Protect of tank farm containment wall at end of service drives:
   1. Provide bollards (two removable) adjacent to the east wall of the tank farm at the end of the service drive from Wheeling.
   2. Provide bollards adjacent to the north wall of the tank farm.
   3. Provide two additional cameras on the south tank to view the parking areas to the east and south.

I. Not in Central Utility Plant site scope: Add lighting at Campus Services Building: Two dark areas were mentioned at the NW and SE corners of the Campus Services Building.

Prepared by,
Laurie Jessen, BWG | CD
Issued 5/2/2018; revised 5/9/2018

Attachment:
cc: Attendees
    Mike Barden, CU Anschutz
    Pontus Ugander, M/M
Security Fence at VA, 17th Place at Fitzsimons Pkwy

Low Vehicle Barrier
Existing Planter wall at west side Central Utility Plant
A meeting was held on April 18, 2018 between the Colorado Department of Public Health and Environment (CDPHE), RMH, POWER Engineers, and the University of Colorado Denver / Anschutz Medical Campus (CUP) staff to discuss the air permitting process for the upcoming CUP boiler addition project. Below are the air permitting meeting minutes for this discussion, including commentary on the impact of these discussions, and an air permitting action item list. There are also minutes from project-related discussions earlier in the day at the CUP and at lunch.

**MEETING WITH CDPHE**

1. Introductions. Attending where: Scott Roen, Dean Marsh, and Robert Holzwarth from CUP, Steven Babler and Brian Petermann from POWER, Dan Gable from RMH, and Chip Hancock and Sunday Fadeyi from CDPHE.

2. A brief summary of the project was given to CDPHE stating that this project had the potential to decrease annual emissions. The reason for this decrease in annual emissions is that after the addition of Boiler 7 the CUP will still be limited to 1,700 MMSCF of natural gas on an annual basis and Boiler 7 will have a lower NOx emissions rate than Boiler 5. CDPHE challenged this statement as they believe that the NOx emissions for Boiler 5, and the other CUP boilers for that matter, were permitted incorrectly using a NOx emission rate of 100 lb/MMSCF. For boilers with low NOx burners (LNB) and flue-gas recirculation (FGR) (which is the case for all the existing CUP boilers) the typical NOx emission rate used is 32 lb/MMSCF. (This is a standard emission factor found in EPA’s AP-42 handbook of emission factors, and is recognized by the CDPHE as valid for gas fired boilers with LNB and FGR.) POWER agrees with CDPHE that the CUP Boilers should be using a NOx emission factor of 32 lb/MMSCF to calculate emissions.
3. The CUP boilers are limited to 1,700 MMSCF of natural gas and if the NOx emission factor is 32 lb/MMSCF then the CUP boilers’ NOx potential-to-emit is 27.2 tons of NOx. Currently the CUP boilers using the 100 lb/MMSCF have a NOx potential-to-emit of 85 tons. By repermitting the boilers at the lower NOx emission rate the CUP can easily become a synthetic minor source.

4. A main point of the meeting was going to be a discussion on changing the Boiler 6 emission factor to a lower emission factor to allow the CUP to become a minor source. Because the CDPHE were well prepared for the meeting and quickly realized that the CUP had been using high NOx emission factors this changed the agenda that POWER had created for the meeting. CDPHE’s allowing the use of the lower NOx emission factor for all the boilers at the CUP is very beneficial and is a much better outcome than just adjusting the Boiler 6 emission factor. This will allow the CUP to maintain their current boiler flexibility and will not place any additional operation restrictions on the boilers.

5. The use of the lower NOx emission rate will require the CUP to repermit the facility. Air Pollution Emission Notices (APENs) will need to be submitted for Boilers 1-4, Boiler 6 and 7, and the new emergency engine. CDPHE requested that sources covered by the same New Source Performance Standard (NSPS) regulation be grouped, which defines the above groupings. The CDPHE can then further group these APENs and the existing engine APENs into a common permit. This will be beneficial for the CUP as it will move all the individual campus permits into one document. CDPHE said there is no problem having a single natural gas use limit for the facility even though there are multiple APEN.

6. Because it will become a minor source (under 100 tpy), the CUP will no longer need a Title V permit once this project is complete. The CDPHE was not acting on the Title V application submitted by the CUP.

7. The CDPHE stated that to become a minor source they recommend the potential-to-emit of the CUP be limited under 90 tons to allow margin for insignificant sources. If the potential-to-emit was over 90 tons the insignificant source emissions would need to be calculated to see if they pushed the facility over the 100 ton threshold.

8. Reasonably Available Control Technology (RACT) was also discussed. The CUP is in a nonattainment area for ozone that has RACT requirements. CDPHE will require a RACT analysis for any emission sources greater than 5 tons of NOx or VOC. A RACT analysis looks at available air pollution controls for the air emission source and determines based on availability, technology feasibility, environmental considerations, and costs which control technology should be installed. CDPHE did caution that recent RACT for emergency engines had been in some cases determined to be the use of a Tier IV engine. The EPA has emission standards for engines that are met by the engine manufacturer. Emergency engines typically only meet Tier II requirements while non-emergency engines are subject to the stricter Tier IV requirements. This issue will need to be examined in the permitting and preliminary design process regarding availability, cost, and need for a Tier 4 engine instead of Tier 2. CDPHE did not see any issue with LNB and FGR being considered RACT for Boiler 7.

9. Potential air dispersion modeling requirements for the project were discussed. The CDPHE would like to avoid requiring modeling for this project but it will need to be justified. CDPHE said the typical trigger for modeling needs is 40 tpy (which Boiler 7 and the engine will be under), but since their understanding is that this facility hasn’t been
modeled before then they need to consider this a possibility in their permit application review for this project. CDPHE said that since the new engine is for emergency use, that would tend to lessen the need for modeling for that source. The CDPHE can provide a modeling applicability determination prior to the application if it is requested. The CDPHE asked if the CUP had conducted any AERMOD modeling as they could not find any records of modeling in the CDPHE files. Scott Roen stated that he believed that they had conducted some AERMOD modeling and that the files might be in the CUP’s Title V file. CDPHE stated that the results of the previous modeling might be ratioed by the change in emissions caused by the project to determine if there is a need for modeling. Steve Babler mentioned that the previous modeling was probably done using the 100 lb/MMSCF NOx emission rate and that it would also need to be ratioed to the 32 lb/MMSCF NOx emission rate. If this is the case, a significant decrease in the modeled impact could be claimed which would improve CDPHE’s likelihood of not requiring modeling for this project. [**ACTION ITEM** – Scott Roen will send Steve Babler the previous modeling results. Steve Babler will then use the data to determine how the project will impact these results and prepare a write-up to be submitted to CDPHE so that they can provide a modeling applicability determination to decide whether modeling will be required for this project.]

10. The current CUP operations and maintenance (O&M) plan requires the Boiler 6 predictive emissions monitoring system (PEMS) to undergo relative accuracy audits (RAAs) three quarters per year and annual relative accuracy testing audits (RATAs) for the other quarter. The O&M plan allows these requirements to be conducted less frequently if the CUP demonstrates that their PEMS has been performing accurately. The CUP would like to relax these requirements. The CDPHE stated that they should go through Shannon McMillan of the compliance and enforcement division to update the O&M plan and relax the requirements. This could either be done now or when the O&M plan is updated with the Boiler 7 requirements. CDPHE stated that the new PEMS for the Boiler 7 addition would probably need the quarterly RAAs at least in the beginning to establish a successful track record of performance.

11. The CDPHE stated that the timeline for issuing the construction permit depended mainly on whether air dispersion modeling would be required. If modeling is not required, it could take as little as two months up to six months. If modeling is required, then it could take up to 12 months.

12. CDPHE said that Sunday Fadeyi is the contact to be used for questions and requests related to the permitting applications for this project.

**GENERAL**

Other discussions were conducted before the CDPHE meeting at lunch and at the CUP. Below are the important notes from these discussions.

1. Boiler 6 has recently had a tube rupture in a series of four tubes located at the back wall of the boiler. The CUP is currently looking into the cause of this boiler issue. Boiler 6 is currently not in operation. This issue has reinforced the need to maintain operational flexibility in the permitting process so that the CUP has the ability to continuously meet full steam demands while dealing with unforeseen issues with any of the boilers.
2. The CUP designed and created their own PEMS for Boiler 6 during its construction process. They had to design the PEMS since the PEMS requirements were not known to the CUP until late in the Boiler 6 construction process. Brian Petermann is experienced with various PEMS and stated that there are software vendors that can utilize standard software packages to create a PEMS for Boiler 7. The software would also continuously monitor data validity, create status reports, and reports required for submissions. This system could also be retrofitted on Boiler 6 and could include all sources in the emissions tracking and reporting system. Scott Roen and Dean Marsh were very receptive to this topic to ensure they have a consistent, reliable system to track emissions and applicable data. [ACTION ITEM – Brian Petermann will follow up with Scott Roen and Dean Marsh on the possibility of assisting CUP with acquiring applicable PEMS and emissions tracking software.]

3. Robert Holzwarth and POWER discussed the overall permitting schedule. It was explained that the permit application date is dependent on many factors including boiler design (size and heat input), air dispersion modeling requirements, and CDPHE requests. Based on the CDPHE meeting there is a clearer path forward, but as noted above there is some paperwork, administrative, and sequencing requirements associated with the need for several APENs as well as a grouping of all the sources into a whole permit. Mr. Holzwarth’s main concern was how the procurement process for the new boiler would be impacted by the permitting process/schedule and avoidance of any changes to Boiler 7 caused by the permitting process. At the quickest the permit application will need a couple of months to be prepared (depending on the boiler sizing/commitment schedule) and the CDPHE will need about 6 months to issue the permit.

**Action Item List**

1. Scott Roen will send any available air dispersion modeling information to Steven Babler.
2. Possibility of an additional trip by Steven Babler to meet with Scott to review modeling files and past APEN files to gather data needed for the applications.
3. Steven Babler will prepare a write-up for the CDPHE to determine if air dispersion modeling will be required.
4. Brian Petermann will follow-up with CUP staff on PEMS software options.

Steven Babler
Air Quality Engineer
GENERAL BUILDING DESCRIPTION

The Original Central Utility Plant (CUP) was designed in the year 2000 with “For Construction” foundation construction documents issued in October of 2000. The building consists of a basement level, a first floor with composite steel framing, a second floor with a combination of steel grating and composite steel framing, and a roof level with steel roof decking supported on non-composite steel framing. There have been several equipment upgrades to the CUP over time prior to the upgrades presently under consideration.

The components and characteristics of the levels are as follows:

- **Basement level**: The basement consists of a cast-in-place concrete slab on grade with raised concrete equipment pads for the various equipment. The equipment in the basement consists primarily of pumps, expansion tanks, piping for the condenser water, chilled water supply and return, steam and condensate piping. There are localized steel beam piping supports and hangers. The basement walls are cast in place. The basement also serves as the access point for the underground steam and chilled water service to the various campus buildings.

- **First floor**: The first floor consists of 4 ½” normal weight concrete on 2” composite steel deck. The deck and slab are supported on steel beams and girders and made composite with the structural steel with headed anchor studs welded through the steel decking. The equipment supported on the first floor consists of boilers on the west side and chillers on the east side. A larger boiler and an additional chiller are part of the proposed CUP expansion. There are existing CMU partition walls at various locations on the first floor extending to the second floor, separating different operational areas.

- **Second Floor**: The second floor is more complex. The western portion consists of approximately 5,700 square feet of 1 ¼” steel bar grating supported on steel beams and girders. The grating portion of the floor supports the boiler economizers, the boiler flue penetrations, air handlers and related piping. The deaerators that serve the boilers are located in the southwest corner of the grating floor. The eastern portion of the second floor consists of 4 ½” of normal weight concrete on 2” composite steel deck on steel beams, similar to the first floor. The composite steel portion of the floor supports electrical switchgear and related conduit and control panels. The existing standby generator is located in the northeast corner of this area. There is an open area of approximately 5,730 square feet from the first floor to below the roof between the steel grating floor area and the composite floor area. There is an additional opening in the southeast corner of the composite floor of approximately 1,800 square feet. Similar to the first floor there are masonry partitions separating operating areas that extend to the roof.

- **Roof Level**: The roof level consists of steel roof deck supported by non-composite steel beams and girders. The roof level supports the cooling tower support and access platforms, an air handler, the standby generator cooling system and the boiler flue stacks.
Building Codes and Materials Properties:
According to the original drawings, the governing building codes and standards were used:
- Denver Building Code, 1999 edition
- ACI Concrete Code, ACI 318-95
- AISC Manual of Steel Construction, 9th edition
The following materials properties were listed for the original design
- All concrete except for precast panel elements are $f'c = 4000$ PSI
- Precast wall panels are $f'c = 5000$ PSI
- All reinforcing bars are ASTM A615 with $f_y = 60$ KSI
- Welded wire fabric is ASTM A185.
- Prestressing Strands are ASTM A416 with ultimate strength = 270 KSI.
- Structural Steel W shapes are ASTM A995 with $f_y = 50$ KSI.
- All other structural steel shapes are ASTM A36 with $f_y = 36$ KSI
- Steel Pipe columns are ASTM A53 Grade B with $f_y = 33$ KSI
- Tube columns are ASTM A500 Grade B with $f_y = 42$ KSI
- Structural high strength bolts used in connections are ASTM A325 tensioned “snug tight”.
- Masonry is generally listed as “non-load bearing”. The f’m listed is 1500 PSI.
For the proposed CUP capacity expansion project the following building codes are considered
- International Building Code (IBC) 2015
- International Existing Building Code (IEBC) 2015
- Associated referenced materials codes referenced in the IBC and IEBC

Existing Framing and Estimated Upgrades for Gravity Loads:
First floor:
- Boiler #5 located between grids B and C and between grids 1 and 2 is the smallest of the boilers currently installed in the building. A new Boiler weighing 180 kips is proposed as part of the upgrades. This particular boiler position has three W21x44 composite beam supporting the floor. Reinforce two of three W21x44 beams with WT4x24 welded to the bottom of the beam. Steel tonnage = 1 ton including allowance for strengthened connection plus approximately 26’ of ¼” weld per beam.
- A new chiller unit is under consideration in the chiller area between roughly grid 4 to 6 and between grids A to D.5. At the present time the physical space available for the chiller versus the space required is under study. For the purposes of this narrative we have assumed the chiller is approximately the same plan size as the existing chillers but weighs 95 kips. Based on this assumption, the existing W24x55 beams under the chiller are adequate but the W33x118 girder on grid 4 between grids A and B.1 requires reinforcing of a WT 5x30 welded to the bottom of the girder. Steel tonnage = ½ ton including a connection allowance plus 26’ of ¼” weld to the girder.
- For both the new boiler and the new chiller the path for installation has not been determined. Temporary shoring may be required.

Second floor:
On the grating floor area, the increased size of Boiler #5 is anticipated to require a larger flue opening and a heavier economizer and larger opening. Assume one ton of steel for modified floor framing and plus another ½ ton of WT 4x24 material and 26” of ¾” weld to strengthen the W18x40 girder and connections on grid B between grids 1 to 2.

On the composite steel floor framing side on additional switchgear segment of 27.5 kips and an additional generator of up to 38.5 kips are anticipated. This is the heaviest option of the three generators considered. Neither piece of equipment requires floor strengthening.

Roof and cooling tower supports:

- The increased flue size for the new Boiler #5 will require added or modified framing at the opening. We estimate ½ ton of miscellaneous added steel framing including davits to anchor guy wires for the new larger stack.

- A total of three new cooling towers are planned, similar to the Marley units of the east side of the roof. Two units are planned to the north of existing cooling tower 14 and one unit to the south of cooling tower 9. Posts down from the cooling tower support framing will penetrate the roofing material to the roof framing in eight locations. The steel tonnage for these have been included in the platform tonnage estimate. At two locations an WT5x30 will be added to an existing W24x55 and a W24x62. At a third location a WT4x24 will be added to an existing W21x44. We estimate 2 tons of material and 78 feet of ¾” weld will be required including an allowance for connection modifications.

- We anticipate an additional heavier remote radiator and fan will be required for the new generator. At this time, we do not have a potential weight for the unit so we don’t have any potential roof strengthening information available.

- At the cooling tower platform elevation we anticipate 8 tons of steel will be required to frame the supports for the new towers including posts, bracing, and connections. We estimate 680 square feet of pultruded fiberglass grating with grit top surface to match the existing grating plus 136 feet of 2-rail OSHA handrail with ¾” toe kick and two access stairs with grating treads.

Existing Building Lateral System Evaluation:

The original Structural and Mechanical drawings in particular show a summary of the loads used in the design as well as equipment layouts and weight allowances used to design the building. The following general dead load and live load allowances are listed on the original drawings:

- Roof Live Load 30 PSF
- Roof Dead Load 64 PSF
- First Floor Live Load 250 PSF
- First Floor Dead Load 147 PSF
- 2nd Floor Live Load 200 PSF
- 2nd Floor Boiler Access Floor Live Load 40 PSF
- 2nd Floor Boiler Access Floor Dead Load 15 PSF

Specific equipment loads are listed throughout the existing drawings and are considered for lateral load purposes on a case by case basis. Loads for seismic purposes were evaluated in two different ways for this
narrative. The first way was to tabulate the loads shown on the original drawings as per-floor totals including the structure, equipment weights, exterior wall panels and internal non-load bearing CMU walls as shown on the architectural drawings. The objective was to determine the seismic mass of the building including the mechanical equipment based on the original drawings compared to the present building and equipment including the current proposed upgrades to determine if the increase in building mass is within 10% of the original mass. If the demand on the existing lateral system is less than 10% greater than the original demand, then an analysis and upgrade of the existing lateral system is not required.

When we consider the baseline mass from the original structural drawings we have included the mass of the existing structure including the floor and roof framing, the mass of the exterior precast walls, and the mass of the masonry partition walls assuming they are made from lightweight block and grouted at 48” on center which is a very common masonry assembly in this area. We included all equipment weight or allowance for future equipment weight as noted on the original structural drawings. The dead load allowance for the roof was used as described in the general notes although it appears to be higher than we would anticipate, perhaps to account for suspended equipment. The live load allowance at the second floor (we assume the concrete floor area) is higher than we would anticipate. There is a possibility a portion of that live load was included in the seismic mass although we did not consider it. The second-floor boiler access floor (grating) live load allowance was listed as 40 PSF which we believe is reasonable as a maintenance load and would not contribute to the seismic mass allowance. The first-floor live load is also greater than we anticipate but since the first floor is at grade we did not consider the first floor to contribute to the mass for seismic purposes. The design seismic base shear value was not included in the original construction documents, so we could not directly compare the new calculated values to the value on the existing drawings.

For the seismic mass for the proposed CUP expansion we have used the same mass of structure, exterior precast and masonry partition walls as for the baseline building since there have been minimal modifications to the structure that would measurably affect the building mass. We have used the operating weights of the current equipment plus the operating weights of the proposed new equipment when calculating the new mass of the building in the fully expanded condition. As with the baseline mass we have not included any of the live load allowances including allowances over 125 PSF.

Our conclusion is the mass of the expanded CUP exceeds the mass of the baseline CUP by approximately 9% which is below the 10% threshold for full building lateral analysis and upgrade per the IEBC. As part of a “reasonableness check”, we have done an initial capacity check on the existing lateral bracing tube X-Braces and the member connections. Our preliminary analysis shows the gross brace capacity exceeds both the original required brace capacity as well as the expanded CUP brace capacity provided the CUP remains a design category II facility.

As an alternate check on the existing versus the expanded capacity we evaluated the building based on the existing mass of the structure, cladding and masonry partitions plus an allowance of a portion of the design live loads and dead loads shown on the drawings. For example, the roof dead load stated on the existing drawings is 64 PSF while the structure is on the order of 37 PSF. The excess dead load was added to the seismic mass and applied uniformly. A similar approach was used for the 2nd floor grating and composite
May 9, 2018

cementer floors. The equipment was not applied directly but was estimated as a uniform load applied uniformly across the floor plate. In some cases, a small portion of the uniform live load allowance was included to be certain we accounted adequately for the new equipment weights. The result of this average load approach was similar to the specific equipment approach with the net increase of seismic mass of 8%.

Further study has been suggested to evaluate upgrading the existing lateral system to meet category IV seismic requirements. An estimate of the required materials and construction required will be addressed in a future addendum to this narrative.

We have included separately our floor plans as 11x17 preliminary drawings with equipment locations and estimated gravity structure reinforcing for reference.
GENERAL BUILDING DESCRIPTION

The general background and general building description is contained in the schematic building upgrade narrative dated May 9, 2018. Also contained in the May 9, 2018 narrative is a brief discussion of upgrades to the gravity load resisting systems required for proposed new and possibly heavier equipment. Below is analysis of the existing building from a seismic perspective if the building remains a Risk Category II building, or if it is upgraded to a Risk Category IV building.

A restatement of the original building codes and materials used in design as well as the current codes used for evaluation:

Building Codes and Materials Properties:

According to the original drawings, the governing building codes and standards were used:

- Denver Building Code, 1999 edition
- ACI Concrete Code, ACI 318-95
- AISC Manual of Steel Construction, 9th edition

The following materials properties were listed for the original design:

- All concrete except for precast panel elements are f’c = 4000 PSI
- Precast wall panels are f’c = 5000 PSI
- All reinforcing bars are ASTM A615 with f_y = 60 KSI
- Welded wire fabric is ASTM A185.
- Prestressing Strands are ASTM A416 with ultimate strength = 270 KSI.
- Structural Steel W shapes are ASTM A995 with F_y = 50 KSI.
- All other structural steel shapes are ASTM A36 with F_y = 36 KSI
- Steel Pipe columns are ASTM A53 Grade B with F_y = 33 KSI
- Tube columns are ASTM A500 Grade B with f_y = 42 KSI
- Structural high strength bolts used in connections are ASTM A325 tensioned “snug tight”.
- Masonry is generally listed as “non-load bearing”. The f’m listed is 1500 PSI.

For the proposed CUP capacity expansion project the following building codes are considered:

- International Building Code (IBC) 2015
- International Existing Building Code (IEBC) 2015
- Associated referenced materials codes referenced in the IBC and IEBC

General Observations and Recommendations Regardless of Seismic Risk Category:

- Our initial analysis of the existing building with the proposed added equipment for the final build-out shows that the building seismic load demand will increase approximately 9% above the baseline
loading derived from the existing structural and mechanical drawings. This is within the 10% lateral load demand increase without building upgrades allowed in the 2015 IEBC. If the building remains a risk category II building, only minor repair and possible correction of existing conditions will be required. The final acceptance of this methodology will ultimately depend on the University’s code reviewer.

- During our initial walk-through and condition review of the existing building we noted conditions where column anchor bolts were missing nuts. Our review was not detailed or exhaustive. During the design phase of the upgrades a more detailed review of the individual conditions should be performed, and deficient conditions noted for correction. We recommend an allowance for $5000 to repair anchor bolts.

**Recommendations if the Building Must be Upgraded to Risk Category IV Performance Levels:**

- During our walk-through we noted the grating mezzanine floor at the second level does not appear to have a direct lateral load path connection to the building lateral system. We have evaluated the existing columns to have capacity to carry this load to the roof and first floor diaphragms if the building is a Risk Category II building, but this method will not be sufficient for the seismic force demand for a Risk Category IV building. We recommend an allowance for 10 tons of miscellaneous steel angles and hot-rolled steel shapes arranged in an X pattern and along the edges in each bay to be installed under the existing grating floor and connected to the steel floor support beams. Note that due to access from the first floor and existing equipment utilities under the grating, access will be difficult.

- We estimate approximately 50 beam to column connections must be upgraded. We also estimate that we will be required to add 50 exterior precast panel to structural frame connections.

- The original seismic design “R factor” for the building under the UBC was approximately 4.7. A seismic upgrade of the existing system under the current IBC would require an R factor of approximately 3.0. This factor is an adjustment for the ductility of a structural system under seismic loads. The lower the R value the more brittle the lateral system is and the higher the required design forces for the lateral system. The goal is to have a ductile lateral system that can absorb energy before yielding and eventually failing.

- In order to carry the higher seismic force demand for a Risk Category IV building the existing lateral load resisting system must be upgraded or supplemented. One method is to replace the relatively brittle elements that are sized to remain below yield under seismic loads with more ductile elements that are able to yield without failure while absorbing energy. In this case, replacing the existing diagonal tube braces with a more ductile element like a buckling restrained brace or a similar element is a possible upgrade option. The purpose of the more ductile elements is to increase the energy dissipation capability of the brace and thereby reduce the lateral load demand on the entire system. These elements are proprietary and are selected based on length and required load carrying capability. With these types of elements, the R value is approximately 7 to 8, resulting in design lateral loads below the original building design. We believe this upgrade could be accomplished by removing the existing tube braces one at a time and replacing them with a buckling restrained brace. Since most of the braces are not covered up and are fairly accessible the disruption caused by replacing the braces could be minimized. We estimate a total of 24 members with 100 kips of capacity each,
approximately 37’ long and four members 26’ long with 100 kips of capacity will be required. An allowance should be included to address connection modifications at the braces.

- An ALTERNATE to upgrading the seismic force resisting elements as noted above if the overall ductility of the existing building is not increased is to add additional lateral load resisting bays to each of the four sides of the building as well as additional roof diaphragm bracing and upgraded connections between the precast panels and the structure. We estimate adding the additional braced bays (total of four). We estimate approximately 100 beam to column connections must be upgraded. The added roof diaphragm bracing, diaphragm chord and drag member reinforcing will be on the order of 30 tons of steel. We also estimate that we will be required to add 100 exterior precast panel to structural frame connections to resist the higher seismic design forces.
DAVIT, BELOW DECK.

DAVITS WITH (4) W12x19 BRACE MEMBERS AT EACH ENLARGED BOILER EXHAUST STACK. ADD (4) NEW 18'-4" WATER LINES.

ADD FRAMING UNDER NEW COOLING TOWERS 15, 16, AND 17 MATCH EXISTING. APPROX 9 TONS TOTAL.

INCLUDED IN FRAMING.

POST HAS 2 KICKERS. TONNAGE INCLUDED IN FRAMING.

(3) NEW POSTS DOWN TO ROOF, EA POST HAS 2 KICKERS.

(5) NEW POSTS DOWN TO ROOF, END.

ADD WELDED SHEAR TAB EA.

ADD WT5x30 TO BOTTOM OF BEAM, FULL LENGTH OF BEAM.

ADD WT4x24 TO BOTTOM OF BEAM, FULL LENGTH OF BEAM.

ROOF PLAN

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