

**COVER PAGE**  
**University of Colorado System**

**FY 2016-17 CAPITAL CONSTRUCTION REQUESTS (LISTED IN OSPB PRIORITY ORDER)**

**NOT RECOMMENDED FOR FUNDING BY OSPB:**

- Interdisciplinary Building and Data Center (CU-Denver Anschutz) *(previously requested)*
- Aerospace Engineering Sciences Building (CU-Boulder) *(previously requested)*
- Engineering and Physical Sciences Building (CU-Denver) *(previously requested)*
- Engineering and Applied Science (EAS) Renovation (UCCS) *(new)*

**TOTAL: FY 2016-17 CAPITAL CONSTRUCTION STATE-FUNDED REQUEST AMOUNT = \$80,269,026**

**FY 2016-17 CONTROLLED MAINTENANCE REQUESTS (12)**

**RECOMMENDED FOR FUNDING BY OSPB:**

**LEVEL I:**

- Renovate Fire Sprinklers and HVAC System, SLHS, Ph 2 of 2 (CU-Boulder) (\$793,198)

**NOT RECOMMENDED FOR FUNDING BY OSPB:**

**LEVEL I:**

- Campus Fire Sprinkler Upgrades, Ph 3 of 5 (CU-Boulder) (\$754,965)
- Fire Detection System Replacement, 400 Building Series, Ph 1 of 1 (CU-Denver) (\$742,193)
- Mitigation/Control of Flood Water, Campus, Ph 2 of 2 (CU-Boulder) (\$677,019)

**LEVEL II:**

- Replace RTUs and Roof, Section C, University Hall, Ph 1 of 4 (UCCS) (\$912,378)
- Fire Sprinkler and HVAC Renovation, Education Building, Ph 1 of 3 (CU-Boulder) (\$1,277,234)
- Replace Electrical Switchgear, Building 500, Ph 1 of 3 (CU-Denver) (\$690,989)
- Exterior Concrete Repairs, Engineering Center, Ph 1 of 1 (CU-Boulder) (\$619,330)
- Building 500 Elevator Code Deficiencies and Repairs, Ph 2 of 3 (CU-Denver) (\$379,059)
- Upgrades to HVAC, VAV Distribution and Zone Control, Building 500, Ph 1 of 5 (CU-Denver) (\$766,892)

**LEVEL III:**

- HVAC Upgrades and IAQ Improvements, Electrical Engineering Center, Ph 1 of 4 (CU-Boulder) (\$1,448,121)
- Roadway Repair and Curb, Gutter, Drain Replacement, Mt. Lion Way, Ph 1 of 1 (UCCS) (\$235,205)
- Upgrade Electrical Cable and Switches, 400 Building Series, Ph 1 of 1 (CU-Denver) (\$456,306)

## **COVER PAGE (Cont.)**

### **University of Colorado System**

#### ***HISTORY OF STATE FUNDING***

- **\$103.8 million** has been appropriated on behalf of capital projects at the campuses since FY 2011-12. This represents **11.8 percent** of total amount appropriated on behalf of all capital construction and controlled maintenance projects during this period.
  
- **\$27.2 million** was appropriated in **FY 2015-16**.

#### ***INVENTORY OF GENERAL FUND SUPPORTED FACILITIES***

- The General Fund supported inventory of system facilities totals **10,384,810 GSF**. This total represents **22.4 percent** of the entire General Fund supported inventory of state buildings.

#### ***RECENT CDC VISITS***

- CU-Denver, Anschutz Medical Campus (October 2015 and August 2014)
- CU-Boulder (August 2015 and October 2013)
- Visual and Performing Arts Complex, UCCS (June 2015)
- UCCS (July 2013)
- CU-Denver, Auraria Campus (May 2013)

# Fiscal Year 2016-17 Capital Construction Request

## University of Colorado Denver Interdisciplinary Building and Data Center

### PROGRAM PLAN STATUS

2015-014

Approved Program Plan?

Yes

Date Approved:

October 29, 2015

### PRIORITY NUMBERS

| <u>Prioritized By</u> | <u>Priority</u> |                              |
|-----------------------|-----------------|------------------------------|
| DeptInst              | NP of 2         | CU System priority 1 of 4.   |
| CCHE                  | 7 of 31         |                              |
| OSPB                  | 16 of 46        | Not recommended for funding. |

### PRIOR APPROPRIATION AND REQUEST INFORMATION

| <u>Fund Source</u> | <u>Prior Approp.</u> | <u>FY 2016-17</u>   | <u>FY 2017-18</u>   | <u>Future Requests</u> | <u>Total Cost</u>    |
|--------------------|----------------------|---------------------|---------------------|------------------------|----------------------|
| CCF                | \$0                  | \$22,768,290        | \$22,767,418        | \$0                    | \$45,535,708         |
| CF                 | \$0                  | \$30,823,115        | \$43,579,287        | \$0                    | \$74,402,402         |
| <b>Total</b>       | <b>\$0</b>           | <b>\$53,591,405</b> | <b>\$66,346,705</b> | <b>\$0</b>             | <b>\$119,938,110</b> |

### ITEMIZED COST INFORMATION

| <u>Cost Item</u>      | <u>Prior Approp.</u> | <u>FY 2016-17</u>   | <u>FY 2017-18</u>   | <u>Future Requests</u> | <u>Total Cost</u>    |
|-----------------------|----------------------|---------------------|---------------------|------------------------|----------------------|
| Land Acquisition      | \$0                  | \$0                 | \$0                 | \$0                    | \$0                  |
| Professional Services | \$0                  | \$5,624,741         | \$5,667,817         | \$0                    | \$11,292,558         |
| Construction          | \$0                  | \$44,223,773        | \$42,091,146        | \$0                    | \$86,314,919         |
| Equipment             | \$0                  | \$0                 | \$14,587,023        | \$0                    | \$14,587,023         |
| Miscellaneous         | \$0                  | \$1,169,860         | \$821,309           | \$0                    | \$1,991,169          |
| Contingency           | \$0                  | \$2,573,031         | \$3,179,410         | \$0                    | \$5,752,441          |
| Software Acquisition  | \$0                  | \$0                 | \$0                 | \$0                    | \$0                  |
| <b>Total</b>          | <b>\$0</b>           | <b>\$53,591,405</b> | <b>\$66,346,705</b> | <b>\$0</b>             | <b>\$119,938,110</b> |

### PROJECT STATUS

This is the third request for funding. The university requested funding for the project in FY 2014-15 and FY 2015-16.

### PROJECT DESCRIPTION / SCOPE OF WORK

The University of Colorado Denver (UCD), Anschutz Medical Campus is requesting a combination of state funds and cash funds spending authority to construct a new, eight-story, 220,000-GSF Interdisciplinary Building. The project is a joint effort between CU Denver and its affiliated hospitals. The project will provide offices for clinical faculty associated with UCD's affiliated hospitals. The university expects that the hospitals will contribute to the project through capital contributions or through payments for leased space. However, the cash funds do not rely upon these possible contributions. The Interdisciplinary Building will house the following functions:

- a new tier 3 data center (5,450 ASF);
- the Center for Biomedical Informatics and Personalized Medicine (BIPM) (61,178 GSF on three floors);
- the Simulation Center (26,096 GSF on two floors);
- 80 clinical faculty offices and 28 workstations for support staff (24,488 GSF on two floors);

# Fiscal Year 2016-17 Capital Construction Request

## University of Colorado Denver *Interdisciplinary Building and Data Center*

- 24 offices and 13 workstations for the Continuing Medical Education, Graduate Medical Education, and Professional Risk Management units (10,538 GSF); and
- auxiliary functions (e.g., a 120-seat active-learning classroom, a café, health science exhibit space, study rooms, event space, and two rooftop terraces).

The new data center will enable the university to provide reliable, available, and maintainable computing services to over 22,000 faculty, staff, and students. According to the university, data centers typically quantify their operations using a tier system of 1 through 4 as defined by the American National Institute of Standards and the Telecommunications Infrastructure Standards. Tier 1 is the most basic type of server room and tier 4 is the most complex, mission-critical server system; tier 3 is selected by most modern data centers.

The new Center for BIPM will help the university develop the next generation of groundbreaking therapies and interventions, according to UCD. The Center for BIPM will be the university's home for medical informaticists who work with patient records; bioinformaticists who work with DNA sequence data; computational biologists who develop analytic algorithms; "omic" biologists who acquire huge datasets of biologic activity (e.g., gene expression, protein abundance, or metabolic activity); and other medical professionals focused on the application and implementation of personalized medicine. The Center for BIPM will also complement existing expertise from the School of Public Health and the Departments of Pediatrics, Genetics, and Pharmacology. The Center for BIPM's units include: Administrative Core, Personalized Medicine Division, Enterprise Data Warehouse Project/Information Commons, DNA Bank, Molecular Diagnostics Clinical and Laboratory Units, Computational Biology Core, and Biostatics and Informatics.

The Simulation Center will allow the university to simulate real-world clinical settings that support the health sciences curriculum and continued professional development. UCD says simulation is a critical curriculum tool that is increasingly used by academic health sciences centers nationwide. The new center will expose students to simulated patients so they can acquire necessary clinical, communication, and teamwork skills without risking patient lives. The Simulation Center will include 20 exam rooms, separate student/patient orientation rooms, offices, conference space, a control room, six high-fidelity simulation labs that replicate hospital operating rooms and intensive care units, and six debriefing rooms.

**Cost assumption.** The cost assumption was determined through the program planning process. The cost per GSF is \$545. The project cost accounts for future inflation. The project meets the Art in Public Places and High Performance Certification Program requirements.

### PROJECT JUSTIFICATION

Since 2011, when the last new facility was constructed on the Anschutz Medical Campus, UCD says it has experienced continued significant growth in student enrollment, faculty, and staff. Additionally, rapid changes to health care and health sciences education and research have led to the creation of new programs, centers, and institutes. This has led to an increasing space deficit, especially for specialized space, such as the Center for BIPM, the Simulation Center, and the Data Center. The 2012 Anschutz Medical Campus Facilities Master Plan documents the 658,164-GSF space deficiency that exists for the campus.

The seven primary units within BIPM are housed in various facilities across campus, leading to the displacement of faculty, staff, and students. UCD says the space limitations of these programs have a negative impact on cross disciplinary engagement, collaboration, and discovery. The BIPM programs do not have space on campus to grow and there is no existing space to accommodate all of the programs' necessary components, including complex hardware used for analyzing data.

The university says the existing simulation facilities, including CAPE and the WELLS Center, are outdated, are overused, and have no capacity for expansion. Student simulation assessments typically run from early morning to midnight each day. Furthermore, the labs do not replicate the size and configuration of the operating rooms and emergency rooms found in today's hospitals. UCD also says that the number and size of the existing patient practice rooms are inadequate to accommodate student assessments. According to UCD, the new Simulation Center will accommodate growth, improve operational efficiencies, maximize functional adjacent space, and allow the university to repurpose the existing simulation space.

# Fiscal Year 2016-17 Capital Construction Request

## University of Colorado Denver

### *Interdisciplinary Building and Data Center*

Occupying only 500 ASF and nearly 20 years old, the university says the existing data center in Building 500 is too small for its mission and is obsolete, and these constraints do not allow for future expansion. The existing server room is energy inefficient and unreliable, and does not provide for the computing needs of over 22,000 faculty, staff, and students. The university says that data access, storage, and delivery are critical to modern academics, research, and clinical care. UCD further notes that the data center's current location was initially a temporary solution given the facility's outdated infrastructure and limited space.

The university has identified a shortage of offices to accommodate clinical faculty members, and the project will provide 80 private offices and 28 workstations, as well as team rooms, conference rooms, and office service spaces, for clinical faculty and staff. According to the university, the relocation of the Continuing Medical Education, Graduate Medical Education, and Professional Risk Management units to the new building will complement the other building occupants, combine curriculum with practitioner education, and provide a place where students, faculty, clinicians, researchers, and practitioners can interact.

**Project alternatives.** The university considered constructing multiple smaller dedicated buildings for each need, but it was determined that combining programs with interdisciplinary functions would be more beneficial, allowing for a more appropriately-sized building, generating economies of scale, and creating an infill project at a central campus location. The university also considered leasing equivalent space off campus. The university says that the total life cycle cost of constructing the new building, over a 20 year period, is \$52.7 million cheaper than leasing equivalent space that meets programmatic needs.

## PROGRAM INFORMATION

In 2004, the University of Colorado at Denver officially joined with the University of Colorado Health Sciences Center to create a new university. Initially called the University of Colorado at Denver and Health Sciences Center, it was renamed the University of Colorado Denver in late 2007. The University of Colorado Denver Anschutz Medical Campus (AMC) is a 217-acre campus located on the former Fitzsimons Army Medical Center in northwest Aurora. The University of Colorado Denver occupies about 3.0 million GSF of the AMC, which is devoted to research, education, clinical activities, a library, and administrative space. The University of Colorado Hospital occupies the remaining 1.8 million GSF of the AMC.

Bioinformatics is the interdisciplinary study and pursuit of the use of data, information, and knowledge for scientific inquiry, problem solving, decision making, and communication. The proposed Center for BIPM will work at the intersection of information science, computer science, social science, behavioral science, and health care projects, such as deciphering the human genome. The university notes that the center is a campus-wide initiative that will have far-reaching connections to most of the clinical, research, and academic work conducted at the campus. At its full development, the center's work is expected to involve a significant portion of the School of Medicine's research and clinical faculty and students, as well as faculty and students in the School of Pharmacy and Colorado School of Public Health.

## PROJECT SCHEDULE

|              | Start Date   | Completion Date |
|--------------|--------------|-----------------|
| Design       | July 2016    | December 2016   |
| Construction | January 2017 | March 2018      |
| Equipment    | April 2018   | June 2019       |
| Occupancy    |              | July 2019       |

# Fiscal Year 2016-17 Capital Construction Request

## University of Colorado Denver *Interdisciplinary Building and Data Center*

### HIGH PERFORMANCE CERTIFICATION PROGRAM

UCD is dedicating \$2,589,447 of the project's total construction cost of \$86,314,919, or 3.0 percent, to meeting the requirements of LEED certification. The university plans to build the facility to the LEED gold standard, the second highest of four possible certification levels.

### SOURCE OF CASH FUNDS

The source of cash funds for the project is private donations that will be raised by the university and existing capital building reserve funds. The university says no significant private funds have been received for the project to date, but the campus has assessed its cash status and says it can make the necessary cash match for the project if approved and backfill those moneys with future donations.

### OPERATING BUDGET

Operating expenses are paid from institutional sources. The college anticipates an increase in operating costs. Based on the university's standard cost for building services of \$21 per ASF and an assumed ASF/GSF ratio of 65 percent, the estimated increase to annual operating costs is \$3.0 million.

### STAFF QUESTIONS AND ISSUES

1. Did the university consider building multiple smaller dedicated buildings for each need outlined in the submittal document? If so, what is the cost comparison between this and the proposal?

*The development of multiple, smaller buildings would disperse critical units that need to function as interdisciplinary teams. This is contrary to the institution's goal to facilitate cross-disciplinary collaboration.*

*Multiple buildings would reduce efficiencies and increase design, infrastructure and construction cost that can be achieved in one consolidated facility. In addition, the smaller buildings would be inconsistent with the CU Board of Regents and CDHE approved 2012 Campus Master Plan goal to increase core campus density and maximize dwindling land resources by building large, multi-functional facilities.*

*The single building meets the requirements of the new Center for Biomedical Informatics and Personalized Medicine (BIPM) and includes over seven inter-related departments with critical adjacency and co-location needs to maximize collaboration, discovery, and efficiency. BIPM also requires easy access to units and services that are located nearby in Research 2S (wet labs), UCH (clinical patients), and the Academic Office Building (SOM departments/faculty).*

*In addition, the proposed core campus building location adjacent to UCH is ideal for the much needed new Simulation Hub that will provide a state-of-the-art simulation center to serve health sciences student curriculum requirements and professional practitioners (CU clinical faculty) continuing education and certifications needs. Over the past ten years, high-fidelity simulation has advanced and become an integral and essential part of health science curriculum.*

*Clinical Faculty – as in the Academic Office 1 Building – need immediate access to UCH, as well as the core campus.*

# Fiscal Year 2016-17 Capital Construction Request

## University of Colorado at Boulder

*Aerospace Engineering Sciences Building*

### PROGRAM PLAN STATUS

2010-031

Approved Program Plan?  Yes  No

Date Approved:

### PRIORITY NUMBERS

| Prioritized By | Priority |                            |
|----------------|----------|----------------------------|
| DeptInst       | 1 of 1   | CU System priority 2 of 4. |
| CCHE           | 8 of 31  |                            |
| OSPB           | 17 of 46 |                            |

### PRIOR APPROPRIATION AND REQUEST INFORMATION

| <u>Fund Source</u> | <u>Prior Approp.</u> | <u>FY 2016-17</u>  | <u>FY 2017-18</u>   | <u>Future Requests</u> | <u>Total Cost</u>   |
|--------------------|----------------------|--------------------|---------------------|------------------------|---------------------|
| CCF                | \$0                  | \$4,834,369        | \$23,456,347        | \$0                    | \$28,290,716        |
| CF                 | \$0                  | \$668,931          | \$51,440,353        | \$0                    | \$52,109,284        |
| <b>Total</b>       | <b>\$0</b>           | <b>\$5,503,300</b> | <b>\$74,896,700</b> | <b>\$0</b>             | <b>\$80,400,000</b> |

### ITEMIZED COST INFORMATION

| <u>Cost Item</u>      | <u>Prior Approp.</u> | <u>FY 2016-17</u>  | <u>FY 2017-18</u>   | <u>Future Requests</u> | <u>Total Cost</u>   |
|-----------------------|----------------------|--------------------|---------------------|------------------------|---------------------|
| Land Acquisition      | \$0                  | \$0                | \$0                 | \$0                    | \$0                 |
| Professional Services | \$0                  | \$5,503,300        | \$3,394,790         | \$0                    | \$8,898,090         |
| Construction          | \$0                  | \$0                | \$63,069,150        | \$0                    | \$63,069,150        |
| Equipment             | \$0                  | \$0                | \$4,124,500         | \$0                    | \$4,124,500         |
| Miscellaneous         | \$0                  | \$0                | \$503,672           | \$0                    | \$503,672           |
| Contingency           | \$0                  | \$0                | \$3,804,588         | \$0                    | \$3,804,588         |
| Software Acquisition  | \$0                  | \$0                | \$0                 | \$0                    | \$0                 |
| <b>Total</b>          | <b>\$0</b>           | <b>\$5,503,300</b> | <b>\$74,896,700</b> | <b>\$0</b>             | <b>\$80,400,000</b> |

### PROJECT STATUS

The university has requested funding on behalf of this project each year since FY 2010-11.

### PROJECT DESCRIPTION / SCOPE OF WORK

The University of Colorado at Boulder (CU Boulder) is requesting a combination of state funds and cash funds spending authority for the first phase of a two-phase project to construct a four-story, 138,500-GSF Aerospace Engineering Sciences building on the university's east, or research, campus to house the Aerospace Engineering Sciences Department. The university says the objective is to ensure the placement of CU Boulder among its peer institutions as the premier institute for space system engineering and application, and to provide an environment for meeting the growing demands of state and national space enterprises. This year's request for Phase I designs the project. Phase II constructs and equips the facility. The university says the new facility will feature the following elements:

- a building layout that balances proximity of office space to research laboratories, while fostering creative interactions and collaborations among faculty and students;

# Fiscal Year 2016-17 Capital Construction Request

## University of Colorado at Boulder

### *Aerospace Engineering Sciences Building*

- an enclosed rooftop for testing unmanned aircraft and ground robots;
- laboratories for designing, constructing, and testing small satellites, instruments, and human space flight experiments;
- offices and laboratories that support International Traffic in Arms Regulations-controlled projects;
- specialized test facilities, including thermal-vacuum, vibration, and anechoic chamber testing facilities, and rooftop locations for light detection and ranging instruments and GPS antennas;
- research-quality machine and welding, electronics, and composite manufacturing shops for in-house fabrication of research components;
- highly specialized, discipline-specific “clean rooms” for assembly and testing of space hardware systems that include a mobile filtering system for erecting over experiments in progress to increase cleanliness; and
- expanded distance learning capabilities to accommodate working professionals seeking continued education.

**Cost assumption.** The cost assumption was determined through the program planning process. The cost per GSF is \$580. The project cost accounts for future inflation. The project meets the Art in Public Places and High Performance Certification Program requirements.

## PROJECT JUSTIFICATION

According to CU Boulder, the facility that currently hosts the Department of Aerospace Engineering Sciences is inadequate for accommodating the program. Further, lack of space in the facility is limiting the program's growth at a time when its students are in high demand from Colorado's growing aerospace industry.

The university says the expansion of highly technical facilities and equipment is essential for meeting the workforce needs of the state's aerospace sector. The Department of Aerospace Engineering Sciences' current facility, the Engineering Center, has a facilities condition index (FCI) rating of 53. FCI is a ratio of facility deficiencies to current replacement value, and the target FCI for state buildings recommended by the Office of the State Architect is 85 on a scale of 100. The university says research to be conducted in the new building requires specialized facilities with specific air handling, temperature, humidity control, and electrical requirements that cannot be accommodated within existing facilities without increased costs and displacement of current research and academic activities. The university also notes that the existing Engineering Center was designed before personal computers and high-performance computing facilities were the norm in engineering research and education; the proposed building will include space for high-performance computers requiring power and cooling resources that the university says cannot be provided in the existing facility.

CU Boulder says Colorado boasts the nation's third largest aerospace economy and highest private aerospace employment concentration, with over 25,000 employees working for about 400 aerospace companies; these workers earn an average salary of \$127,380, for a total private-sector payroll of \$3.2 billion. An additional 170,000 Coloradans work in aerospace-related industries. The industry relies on a steady flow of highly skilled and educated new hires, creating a high demand for Department of Aerospace Engineering Sciences graduates. The department's fall 2013 enrollment was 685, but CU Boulder says enrollment has been limited by a lack of space. The department's enrollment is expected to grow to 778 students by 2019. Space vacated by the department will be dedicated to remaining departments within the College of Engineering and Applied Science, which is projected to grow by 43.5 percent by 2019.

According to the university, the new facility will host collaborations among engineering and science faculty and students, federal laboratory researchers, and local industry to develop commercial applications for aerospace technologies. Further, the project aligns with state economic and educational goals, since aerospace is listed as a key industry by the Office of Economic Development and International Trade, and the Colorado Commission on Higher Education Master Plan lists the support of science, technology, engineering, and mathematics (STEM)-related disciplines as essential to the economic vitality of the state.

**Project alternatives.** The university considered renovating existing space to host the Department of Aerospace Engineering Sciences, but the university determined this is not a viable alternative considering enrollment demand. Additionally, CU Boulder says there is no space available for lease or purchase in the state that is suitable for supporting the department's educational mission. The university says that delay in constructing a new building is compromising the quality and effectiveness of the program and that it risks the loss of world-class faculty and

# Fiscal Year 2016-17 Capital Construction Request

## University of Colorado at Boulder

### *Aerospace Engineering Sciences Building*

students.

#### PROGRAM INFORMATION

The Department of Aerospace Engineering Sciences focuses its integrated teaching, and receives research awards, in five primary disciplines:

- Bioastronautics;
- Fluid and Structural Mechanics;
- Unmanned Aircraft Systems;
- Satellite Systems and Aerodynamics; and
- Remote Sensing and Aerospace Sciences.

Research expenditures and awards have ranged from \$10 million to \$21 million annually over the past five years, reflecting a level of funding per faculty member that places the program near the top nationally. CU Boulder says research funding success in the department is broad-based, with the top three sources accounting for 75 percent of the awards: NASA, the National Science Foundation, and private industry.

**Complementary programs.** CU Boulder explains that this request to construct a new Aerospace Engineering Science Building and the recently funded construction of an Aerospace Engineering Sciences Building for Metropolitan State University of Denver on the Auraria Higher Education Center campus are complementary efforts. Both projects provide opportunities for students entering the workforce in new fields.

#### PROJECT SCHEDULE

|              | Start Date    | Completion Date |
|--------------|---------------|-----------------|
| Design       | June 2016     | August 2017     |
| Construction | August 2017   | December 2018   |
| Equipment    | December 2018 | January 2019    |
| Occupancy    | January 2019  | January 2019    |

#### HIGH PERFORMANCE CERTIFICATION PROGRAM

CU Boulder is dedicating \$606,625 of the project's total construction cost of \$63,069,150, or about 1.0 percent, to meeting the requirements of LEED certification. The university plans to build the facility to the LEED gold standard, the second highest of four possible certification levels.

#### SOURCE OF CASH FUNDS

The source of cash funds for the project is bonds to be repaid from campus indirect cost revenues generated from federal grants. The term of the bonds will likely be 25 years, with an estimated 5.5 percent interest rate, and an average annual payment of about \$3.9 million. The university expects to issue bonds for the project in FY 2016-17, if state funding is appropriated on behalf of the project.

#### OPERATING BUDGET

Operating expenses are paid from institutional sources. The project is expected to result in increased operating costs of \$10.65 per square foot or about \$1.5 million per year.

# Fiscal Year 2016-17 Capital Construction Request

University of Colorado at Boulder

*Aerospace Engineering Sciences Building*

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## STAFF QUESTIONS AND ISSUES

None.

# Fiscal Year 2016-17 Capital Construction Request

## University of Colorado at Colorado Springs

*Engineering and Applied Science (EAS) Renovation*

### PROGRAM PLAN STATUS

2015-062

Approved Program Plan?  Date Approved:

### PRIORITY NUMBERS

| Prioritized By | Priority |                              |
|----------------|----------|------------------------------|
| DeptInst       | 1 of 1   | CU System priority 3 of 4.   |
| CCHE           | 27 of 31 |                              |
| OSPB           | 39 of 46 | Not recommended for funding. |

### PRIOR APPROPRIATION AND REQUEST INFORMATION

| Fund Source  | Prior Approp. | FY 2016-17         | FY 2017-18   | Future Requests | Total Cost   |
|--------------|---------------|--------------------|--------------|-----------------|--------------|
| CCF          | \$0           | \$7,551,960        | \$22,827,394 | \$0             | \$30,379,354 |
| <b>Total</b> | \$0           | <b>\$7,551,960</b> | \$22,827,394 | \$0             | \$30,379,354 |

### ITEMIZED COST INFORMATION

| Cost Item             | Prior Approp. | FY 2016-17         | FY 2017-18   | Future Requests | Total Cost   |
|-----------------------|---------------|--------------------|--------------|-----------------|--------------|
| Land Acquisition      | \$0           | \$0                | \$0          | \$0             | \$0          |
| Professional Services | \$0           | \$573,682          | \$1,855,900  | \$0             | \$2,429,582  |
| Construction          | \$0           | \$5,181,442        | \$16,953,394 | \$0             | \$22,134,836 |
| Equipment             | \$0           | \$947,086          | \$1,598,300  | \$0             | \$2,545,386  |
| Miscellaneous         | \$0           | \$163,208          | \$344,582    | \$0             | \$507,790    |
| Contingency           | \$0           | \$686,542          | \$2,075,218  | \$0             | \$2,761,760  |
| Software Acquisition  | \$0           | \$0                | \$0          | \$0             | \$0          |
| <b>Total</b>          | \$0           | <b>\$7,551,960</b> | \$22,827,394 | \$0             | \$30,379,354 |

### PROJECT STATUS

This is the first request for funding. The project was previously listed on a five-year projection of need.

### PROJECT DESCRIPTION / SCOPE OF WORK

The University of Colorado at Colorado Springs (UCCS) is requesting state funds for the first phase of a two-phase project to renovate the 74,022-GSF Engineering and Applied Sciences (EAS) Building to address building deficiencies and to improve classroom and research areas. This year's request for Phase I makes improvements in the 20,000-GSF research and office wing of the building to improve energy efficiency, reallocate space to support additional research functions, and update finishes in existing research and teaching spaces. Phase II will renovate the remainder of the building.

Specifically, Phase I of the project improves the energy efficiency of the research and office wing by replacing the chillers and cooling towers, installing a better-insulated roof, and extending the existing direct digital control system to improve heating and cooling. It also replaces worn finishes in public spaces and offices and reconfigures the clean room to support nanotechnology research. Phase II of the project addresses concerns with ADA accessibility in some public spaces, replaces the railings in the atrium to reduce the risk of falls, and replaces worn finishes in the remainder of the building.

# Fiscal Year 2016-17 Capital Construction Request

## University of Colorado at Colorado Springs

### *Engineering and Applied Science (EAS) Renovation*

**Cost assumption.** The cost assumption was determined through the program planning process. The cost per GSF is \$410. The project cost accounts for future inflation. The project meets the Art in Public Places and High Performance Certification Program requirements.

#### PROJECT JUSTIFICATION

UCCS says that enrollment in engineering programs housed in the EAS Building doubled between the fall of 2007 and the fall of 2014. It attributes this growth to a new degree program: a Bachelor of Innovation, along with other efforts to recruit and retain students and faculty. UCCS explains that the type of research conducted in the EAS Building has changed significantly in the last 30 years and that many of the research spaces, particularly the clean room and associated support spaces, are inadequate for the type of research now underway. The university contends that improved research spaces and building finishes will support growing enrollment in engineering programs and aid in the recruitment and retention of highly qualified faculty and students. It will also increase the opportunities for external grant funding for research conducted in the building. The newly renovated research and office wing will allow for the expansion of programs such as battery control research, propulsion research, and research related to cyber security.

According to UCCS, the EAS Building has received minimal improvements since it was originally constructed and it has the highest energy utilization index of all buildings on campus. The project will update the building to meet current code and replace inefficient heating and cooling equipment to improve energy efficiency.

#### PROGRAM INFORMATION

The EAS Building houses two of the three academic departments in the College of EAS: Computer Science and Electrical and Computer Engineering. A third department, Mechanical and Aerospace Engineering, is located in a different building. The EAS Building also houses the Department of Mathematics. The east wing of the EAS Building has two large research laboratories, including a microelectronics lab and an electromagnetic lab.

#### PROJECT SCHEDULE

|              | Start Date | Completion Date |
|--------------|------------|-----------------|
| Design       | July 2016  | May 2018        |
| Construction | June 2017  | August 2019     |
| Equipment    |            | August 2019     |
| Occupancy    |            | September 2019  |

#### HIGH PERFORMANCE CERTIFICATION PROGRAM

The university plans to renovate the building to meet LEED standards.

#### SOURCE OF CASH FUNDS

This project is not funded from cash sources.

#### OPERATING BUDGET

Operating expenses are paid from institutional sources. UCCS anticipates the project will result in a 10 to 15 percent reduction, or a savings of about \$25,000, in building energy costs.

# Fiscal Year 2016-17 Capital Construction Request

## University of Colorado at Colorado Springs

*Engineering and Applied Science (EAS) Renovation*

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### STAFF QUESTIONS AND ISSUES

1. The FCI score (58) seems particularly low for a building of this age. Please provide additional explanation for the FCI score.

*While the FCI would be low for a 30 year old office and classroom building it is not for an intensely used research building supporting research in engineering and science that has seen substantial changes in their research areas over the past 30 years.*

*A number of essential systems in the building have reached or are beyond their life expectancy. While the structure, floors, walls, windows, and doors are adequate, the roof is a number of years past replacement and the skylight has leaked causing damage. Heating and cooling equipment are 30 years old, have had numerous failures, including several extensive building floods in the past several years, and are very inefficient. Electrical systems can no longer support the intensive research in engineering and physics and the system may not be able to meet the demands of future research initiatives.*

*A substantial amount of square footage is dedicated to the 30 year clean room. This room was designed to support micro-technology research while research being conducted today requires support for nanotechnology. The heating and cooling equipment that supports the clean room is well past its useful life and jeopardizes the research being conducted there today. The design of the systems and the layout of the clean room is also very energy intensive making the Engineering Building (EAS) the highest energy use building, on a per square foot basis, on campus.*

*Classrooms are outdated and no longer support the pedagogical needs of today's engineering and science and need to be brought up to expected standards for STEM teaching.*

# Fiscal Year 2016-17 Capital Construction Request

## University of Colorado Denver *Engineering and Physical Sciences Building*

### PROGRAM PLAN STATUS

2015-061

Approved Program Plan?  Yes  Date Approved:

### PRIORITY NUMBERS

| Prioritized By | Priority |                              |
|----------------|----------|------------------------------|
| DeptInst       | NP of 2  | CU System priority 4 of 4.   |
| CCHE           | 26 of 31 |                              |
| OSPB           | 38 of 46 | Not recommended for funding. |

### PRIOR APPROPRIATION AND REQUEST INFORMATION

| <u>Fund Source</u> | <u>Prior Approp.</u> | <u>FY 2016-17</u>   | <u>FY 2017-18</u> | <u>Future Requests</u> | <u>Total Cost</u>   |
|--------------------|----------------------|---------------------|-------------------|------------------------|---------------------|
| CCF                | \$0                  | \$45,114,407        | \$0               | \$0                    | \$45,114,407        |
| CF                 | \$0                  | \$15,000,000        | \$0               | \$0                    | \$15,000,000        |
| <b>Total</b>       | <b>\$0</b>           | <b>\$60,114,407</b> | <b>\$0</b>        | <b>\$0</b>             | <b>\$60,114,407</b> |

### ITEMIZED COST INFORMATION

| <u>Cost Item</u>      | <u>Prior Approp.</u> | <u>FY 2016-17</u>   | <u>FY 2017-18</u> | <u>Future Requests</u> | <u>Total Cost</u>   |
|-----------------------|----------------------|---------------------|-------------------|------------------------|---------------------|
| Land Acquisition      | \$0                  | \$0                 | \$0               | \$0                    | \$0                 |
| Professional Services | \$0                  | \$8,419,578         | \$0               | \$0                    | \$8,419,578         |
| Construction          | \$0                  | \$40,175,201        | \$0               | \$0                    | \$40,175,201        |
| Equipment             | \$0                  | \$7,033,727         | \$0               | \$0                    | \$7,033,727         |
| Miscellaneous         | \$0                  | \$1,193,433         | \$0               | \$0                    | \$1,193,433         |
| Contingency           | \$0                  | \$3,292,468         | \$0               | \$0                    | \$3,292,468         |
| Software Acquisition  | \$0                  | \$0                 | \$0               | \$0                    | \$0                 |
| <b>Total</b>          | <b>\$0</b>           | <b>\$60,114,407</b> | <b>\$0</b>        | <b>\$0</b>             | <b>\$60,114,407</b> |

### PROJECT STATUS

This is a new, never-before-requested project.

### PROJECT DESCRIPTION / SCOPE OF WORK

The University of Colorado Denver (UCD) is requesting a combination of state funds and cash funds spending authority to construct a 60,000-GSF, three-story academic building adjacent to the North Classroom Building and to renovate 38,368-GSF in the North Classroom Building. UCD says the project will allow for growth and consolidation of the College of Engineering and Applied Sciences (CEAS) in a new, state-of-the-art facility.

The new Engineering and Physical Sciences Building will physically connect to the north side of the North Classroom Building. The new building will include instructional labs, high-bay labs for the testing of large-scale projects, computer labs, research labs, academic offices, and support space for CEAS. The space currently used by CEAS in the North Classroom Building will be vacated and renovated for use by the College of Liberal Arts and Sciences (CLAS). Several CLAS departments, such as Philosophy, Sociology, and Economics, are located in disparate areas of the Auraria campus. Relocating these departments to the North Classroom Building will consolidate faculty and

# Fiscal Year 2016-17 Capital Construction Request

## University of Colorado Denver

### *Engineering and Physical Sciences Building*

students within UCD's neighborhood on the Auraria campus. CEAS will also relocate some functions that are currently housed in the Boulder Creek and Administration Buildings. The new building will relocate space for the following departments and functions:

- Civil Engineering (8,355 ASF);
- Electrical Engineering (7,448 ASF);
- Mechanical Engineering (6,575 ASF);
- CEAS Dean's Office (1,977 ASF);
- CEAS Sustainability (413 ASF);
- Bioengineering (480 ASF); and
- shop space (2,097 ASF).

Approximately 80 percent of the assignable area within the new building will be used for instructional purposes, such as classrooms and labs, while the remaining 20 percent will be used for academic support and service functions.

**Cost assumption.** The cost assumption was determined through the program planning process. The cost per GSF is \$611. The project cost does not account for future inflation. The project meets the Art in Public Places and High Performance Certification Program requirements.

## PROJECT JUSTIFICATION

According to UCD, the project satisfies three areas of immediate need for the university: new instructional space for CEAS, additional space for CLAS departments, and the consolidation of satellite locations for both colleges into the UCD neighborhood on the Auraria campus. The new proposed engineering lab space would be difficult to accommodate in existing facilities due to size, access, power, and data requirements. The university says the new lab space will vastly improve the current CEAS labs, some of which have had no improvements in the last 20 years. UCD says that the engineering college has seen significant enrollment growth in recent years, and that its decentralized space across campus makes collaboration among students and faculty very challenging.

The current Facility Condition Index (FCI) for the North Classroom Building is 0.79. However, in spite of a relatively favorable FCI score, the university says that several of the classroom and research labs are in poor condition and do not meet modern teaching and research needs. Issues with the labs include deficient HVAC systems, outdated audio/visual equipment, poor visibility for students, and dated furnishings. Additionally, many of the lab spaces were not originally built as labs and do not effectively advance engineering instruction or investigation. Additionally, numerous code issues exist in the building related to fire safety, emergency lighting, the building's generator, and compliance with the Americans with Disabilities Act (ADA).

While the condition of the current CEAS labs in the North Classroom Building is a concern, UCD says the primary concern of CEAS is the significant lack of space needed to support current programs and to accommodate future growth. CEAS has had a 25 percent increase in enrollment over the last five years and has reached maximum facility capacity. The deficiency of research space has made the recruitment and retention of faculty and graduate students difficult. The college has also been unable to fully support opportunities for undergraduate research. If this growth rate continues, the college will have a space deficit of 23,500 ASF by 2023.

The university also says the project aligns with the Colorado Commission on Higher Education (CCHE) Master Plan's goals to increase attainment of high-quality post-secondary degrees across academic disciplines and to support Science, Technology, Engineering, and Math (STEM) disciplines. Increasing the number of STEM degrees is essential to the economic vitality of the state, and the project supports key industries identified by the Governor's Office of Economic Development and International Trade (OEDIT). These industries include bioscience, electronics, energy, infrastructure engineering, transportation and logistics, and technology and information. According to UCD, all of these industries rely on engineers and scientists from the university, as well as the research performed by them. Graduates of engineering and other STEM disciplines are in high demand throughout Colorado and the nation, and the university says the construction of this project will allow it to attract more high quality students.

**Project alternatives.** UCD says the demand for additional labs and support spaces can only be met through new construction or the lease of comparable space off-campus. According to the university, leasing off-campus space

# Fiscal Year 2016-17 Capital Construction Request

## University of Colorado Denver

*Engineering and Physical Sciences Building*

would be more costly. When modeled over a 25-year timeframe, the university estimates the total life-cycle costs of leased space to be \$6 million more than the construction of a new facility. Furthermore, it is unrealistic to find leasable space with the specialized needs of engineering research labs within close proximity to campus, according to UCD.

### PROGRAM INFORMATION

CEAS at UCD offers undergraduate and graduate programs in bioengineering, civil engineering, electrical engineering, mechanical engineering, and computer science and engineering. In fall 2013, CEAS had a full-time enrollment of 725 undergraduates and 423 graduate students. Graduate programs include a master of science, master of engineering, and doctor of philosophy. CEAS also offers professional training and continuing education classes on engineering topics.

AHEC is comprised of three separate higher education institutions, the Community College of Denver, Metropolitan State University of Denver, and UCD, all of which share classroom space, parking, and general services on the campus. AHEC manages campus facilities and non-academic functions, including the library, the child care center, classroom and event scheduling, and campus police and security.

### PROJECT SCHEDULE

|              | Start Date | Completion Date |
|--------------|------------|-----------------|
| Design       | July 2017  | June 2018       |
| Construction | July 2018  | June 2019       |
| Equipment    | July 2019  | August 2019     |
| Occupancy    |            | September 2019  |

### HIGH PERFORMANCE CERTIFICATION PROGRAM

The university is dedicating \$300,000 of the project's total construction costs of \$40,175,201, or 0.7 percent, to meeting the requirements of LEED certification. The university plans to build the facility to the LEED gold standard, the second highest of four possible certification levels.

### SOURCE OF CASH FUNDS

The source of cash funds is capital reserves and donations. The university indicates that the project may be financed through a future bond issuance. The interest rate and term will be determined by market conditions at the time of issuance.

### OPERATING BUDGET

Operating expenses are paid from institutional sources. The college anticipates an increase in operating costs. Based on the university's standard cost for building services of \$21 per ASF and an assumed ASF/GSF ratio of 65 percent, the estimated increase to annual operating costs is \$819,000.

### STAFF QUESTIONS AND ISSUES

All responses to staff questions and issues were incorporated into the project write-up.

**University of Colorado System  
Five-Year Projection of Need  
FY 2016-17 through FY 2020-21**

| <b>University of Colorado at Boulder</b>                     |                    |                    |                      |                   |                   |                   |                      |
|--|--------------------|--------------------|----------------------|-------------------|-------------------|-------------------|----------------------|
| <b>Project Title</b>   | <b>Fund Source</b> | <b>FY 2016-17</b>  | <b>FY 2017-18</b>    | <b>FY 2018-19</b> | <b>FY 2019-20</b> | <b>FY 2020-21</b> | <b>Totals</b>        |
| <i>Current Year Request(s)</i>                               |                    |                    |                      |                   |                   |                   |                      |
| Aerospace Engineering Sciences Building                      | CCF                | \$4,834,369        | \$23,456,347         | \$0               | \$0               | \$0               | \$28,290,716         |
|  | CF                 | 668,931            | 51,440,353           | 0                 | 0                 | 0                 | \$52,109,284         |
| <i>Out Year Request(s)</i>                                   |                    |                    |                      |                   |                   |                   |                      |
| Guggenheim Hall (Capital Renewal Project)                    | CCF                | 0                  | 6,705,960            | 0                 | 0                 | 0                 | \$6,705,960          |
|  | CF                 | 0                  | 0                    | 0                 | 0                 | 0                 | \$0                  |
| Hellems Arts and Sciences Building (Capital Renewal Project) | CCF                | 0                  | 28,541,982           | 0                 | 0                 | 0                 | \$28,541,982         |
|  | CF                 | 0                  | 0                    | 0                 | 0                 | 0                 | \$0                  |
| Henderson Building (Capital Renewal Project)                 | CCF                | 0                  | 8,572,400            | 0                 | 0                 | 0                 | \$8,572,400          |
|  | CF                 | 0                  | 0                    | 0                 | 0                 | 0                 | \$0                  |
| <i>Total: State Funds</i>                                    |                    | 4,834,369          | 67,276,689           | 0                 | 0                 | 0                 | \$72,111,058         |
| <b>Grand Total</b>   |                    | <b>\$5,503,300</b> | <b>\$118,717,042</b> | <b>\$0</b>        | <b>\$0</b>        | <b>\$0</b>        | <b>\$124,220,342</b> |

| <b>University of Colorado at Colorado Springs</b> |                    |                    |                     |                   |                   |                   |                     |
|---|--------------------|--------------------|---------------------|-------------------|-------------------|-------------------|---------------------|
| <b>Project Title</b>                              | <b>Fund Source</b> | <b>FY 2016-17</b>  | <b>FY 2017-18</b>   | <b>FY 2018-19</b> | <b>FY 2019-20</b> | <b>FY 2020-21</b> | <b>Totals</b>       |
| <i>Current Year Request(s)</i>                    |                    |                    |                     |                   |                   |                   |                     |
| Engineering and Applied Science (EAS) Renovation  | CCF                | \$7,551,960        | \$22,827,394        | \$0               | \$0               | \$0               | \$30,379,354        |
|   | CF                 | 0                  | 0                   | 0                 | 0                 | 0                 | \$0                 |
| <i>Total: State Funds</i>                         |                    | 7,551,960          | 22,827,394          | 0                 | 0                 | 0                 | \$30,379,354        |
| <b>Grand Total</b>                                |                    | <b>\$7,551,960</b> | <b>\$22,827,394</b> | <b>\$0</b>        | <b>\$0</b>        | <b>\$0</b>        | <b>\$30,379,354</b> |

**University of Colorado System (Cont.)  
Five-Year Projection of Need  
FY 2016-17 through FY 2020-21**

| <b>University of Colorado Denver</b>                         |                    |                      |                     |                     |                     |                   |                      |
|--|--------------------|----------------------|---------------------|---------------------|---------------------|-------------------|----------------------|
| <b>Project Title</b>   | <b>Fund Source</b> | <b>FY 2016-17</b>    | <b>FY 2017-18</b>   | <b>FY 2018-19</b>   | <b>FY 2019-20</b>   | <b>FY 2020-21</b> | <b>Totals</b>        |
| <i>Current Year Request(s)</i>                               |                    |                      |                     |                     |                     |                   |                      |
| Interdisciplinary Building and Data Center                   | CCF                | \$22,800,000         | \$22,797,598        | \$0                 | \$0                 | \$0               | \$45,597,598         |
|  | CF                 | 30,823,115           | 43,579,287          | 0                   | 0                   | 0                 | \$74,402,402         |
| Engineering and Physical Sciences Building                   | CCF                | 45,114,407           | 0                   | 0                   | 0                   | 0                 | \$45,114,407         |
|  | CF                 | 15,000,000           | 0                   | 0                   | 0                   | 0                 | \$15,000,000         |
| <i>Out Year Request(s)</i>                                   |                    |                      |                     |                     |                     |                   |                      |
| CU Denver Building (CAP)                                     | CCF                | 0                    | 0                   | 0                   | 22,618,946          | 0                 | \$22,618,946         |
|  | CF                 | 0                    | 0                   | 0                   | 22,618,945          | 0                 | \$22,618,945         |
| Health Science Library and Education Buildings<br>Renovation | CCF                | 0                    | 0                   | 0                   | 9,829,066           | 0                 | \$9,829,066          |
|  | CF                 | 0                    | 0                   | 0                   | 3,276,355           | 0                 | \$3,276,355          |
| Pre-Health Instructional Lab Wing                            | CCF                | 0                    | 0                   | 10,796,773          | 0                   | 0                 | \$10,796,773         |
|  | CF                 | 0                    | 0                   | 10,796,772          | 0                   | 0                 | \$10,796,772         |
| <i>Total: State Funds</i>                                    |                    | 67,914,407           | 22,797,598          | 10,796,773          | 32,448,012          | 0                 | \$133,956,790        |
| <b>Grand Total</b>   |                    | <b>\$113,737,522</b> | <b>\$66,376,885</b> | <b>\$21,593,545</b> | <b>\$58,343,312</b> | <b>\$0</b>        | <b>\$260,051,264</b> |