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IMPLEMENTATION 7





7.1 PROJECT COSTS

To develop an implementation plan, the project team prepared an order-of-magnitude cost estimate for each recommended capital project. The 2017 Facilities Master Plan cost estimates were prepared with the guidance of the university's Director of Facilities Projects to ensure each was consistent with the university's project estimating criteria and methodology.

The Project Implementation Phasing and Costs table (Figure 7-1) lists the estimated costs for each specific project and each project bundle. When aggregated by phase, this plan estimates the following five-year sums:

- PHASE I (0-5 Years): \$379,995,571
- PHASE II (6-10 Years): \$470,207,683

These numbers do not include costs related to services provided by AHEC or the City of Denver including roadway improvements and utility infrastructure.

COST METHODOLOGY

The method used to estimate project costs includes the following five broad categories:

1. **CONSTRUCTION COSTS:** Costs related to the actual construction of the building – interior and exterior. Estimated construction costs use per square foot costs of similar recently completed projects.
2. **SOFT COSTS:** Costs related to design and other professional fees, and permitting costs. Soft costs are typically equivalent to 30 percent of construction costs.
3. **SITE INFRASTRUCTURE:** Costs related to preparing the site for construction, as well as connecting the building utilities to the surrounding utility infrastructure. Site Infrastructure costs are typically equivalent to five percent of construction costs.
4. **CONTINGENCY:** All projects undertaken by CU Denver include contingency at five percent for new construction and ten percent for renovation projects. The **TOTAL COST** for each project resulted from a contingency applied to the total costs of categories 1-3 above; construction costs, soft costs, and site infrastructure.
5. **INFLATION:** Total Project Costs for each project was inflated to the projected year of construction, using an estimated five percent per year rate of inflation.

DESCRIPTION	ESTIMATED GSF	ANTICIPATED PROJECT START YEAR	ESTIMATED COSTS ¹	
			PHASE I (YEARS 0-5)	PHASE II (YEARS 6-10)
New Facilities				
A1 Engineering and Physical Sciences Building Renovation	98,368	2018-2019	\$66,621,963	
A2 Business School Phase II	12,531	2019-2020	\$9,166,314	
A3 First-Year Residence Hall with Dining	146,064	2020-2021	\$76,593,908	
A4 Nexus Building Mixed Use Residential ²	183,032	2020-2021	\$105,351,611	
A5 Instructional Lab Wing	37,600	2020-2021	\$24,433,661	
A6 Engineering & Physical Sciences Building Phase II	136,463	2023-2024		\$115,126,953
A7 CU Denver Building Annex Tower	121,000	2024-2025		\$142,528,841
A8 Science Building Addition	148,436	2026-2027		\$142,159,891
Total New Facilities			\$282,167,457	\$399,815,686
Renovations of Existing Spaces				
B1 Tivoli Student Union Building ³	15,184	2019-2020	\$3,728,915	
B2 CU Denver Building Renovation	131,249	2020-2021	\$51,376,935	
B3 Lawrence Street Center – EPS Building Backfill (Reno I)	12,220	2024-2025		\$5,851,652
B4 Lawrence Street Center – Science Building Addition Backfill (Reno II)	11,986	2027-2028		\$5,739,446
B5 Student Commons – Science Building Addition Backfill	36,126	2027-2028		\$15,136,921
B6 Tivoli Student Union Building II ³	8,000	2027-2028		\$2,499,008
Total Renovations of Existing Spaces			\$55,105,850	\$29,227,028
Other				
C1 Additional Facility Operating Expenses ⁴			\$32,104,397	\$36,614,970
C2 Facility Deferred Maintenance (Lawrence Street Center and CU Denver Building)			\$6,067,867	
C3 Campus Village Apartments Deferred Maintenance			\$4,550,000	\$4,550,000
Total Other			\$42,722,264	\$41,164,970
Grand Total			\$379,995,571	\$470,207,683

1 Project costs are escalated to the anticipated project start year.

2 Does not include any costs related to land acquisition.

3 Does not include lease costs.

4 Calculated at a rate of \$21/GSF of new construction.

Figure 7-1: Project Implementation Phasing and Costs (June 2017)

7.2 RECOMMENDATIONS

In addition to the projects proposed in this master plan, the following recommendations will support the plan's overall vision and goals.

WORKPLACE GUIDELINES

NATIONAL PERSPECTIVE

National and international trends have seen reductions in office space per person. The Global Association for Corporate Real Estate has reported a 25 percent reduction in office space from 2010 to 2013. A workspace allocation and space benchmark study published by the General Services Administration (GSA) of the federal government noted that organizations were allocating an average of 190 Usable Square Feet (USF) per workplace, whereas a new GSA headquarters facility was averaging approximately 80 USF. Implementation of alternative workplace strategies, such as telecommuting and office “hoteling” achieve some of these reductions.

In the traditional office approach, private offices include dedicated meeting or visitor space and material storage. Alternatively, an activity based workplace approach aggregates meeting and storage need together in a shared fashion with a variety of space types, such as conference rooms, huddle rooms, and informal gathering space with amenities such as soft furniture and appliances. Consequently,

the transition from a fully-enclosed private office to a more open and shared work space result in reductions in total space per employee. Furthermore, providing more shared spaces for formal and informal interaction encourages collaboration and communication.

CU DENVER

Office space represents the largest share of the CU Denver space inventory. The average office is 133 ASF, or ten percent greater than a typical academic office of 120 ASF. Where the university has purchased and occupied older, corporate office buildings or residential structures, office sizes are larger than typical. Whereas new buildings such as Student Commons average 131 ASF per office, older spaces such as those in the Ninth Street Historic Park average 143 ASF, the CU Denver Building averages 156 ASF, and Lawrence Street Center averages 141 ASF per office. Lawrence Street Center also has a great deal of internal circulation space which contributes to this inefficiency.

Two sets of workplace criteria when used in calculating future office space needs—the 2007 Space Policy for CU Denver and the more efficient guidelines recently adopted at CU Anschutz. The projected office needs assume that existing office configurations will remain in place.

However, if the university adopted workplace guidelines similar to CU Anschutz and applied them to new construction and renovated all old workspaces, CU Denver's total office space 10-year need could be reduced by over 52,000 ASF. The CU Anschutz workplace criteria were applied to all master plan recommended new construction and renovation projects, while all existing workspace calculations retained their current size and type.

RECOMMENDATION

The office need of 29,823 ASF (Figure 5-13, Page 65) for CU Denver over the 10-year planning period is based on the following:

- CU Denver adopts new workplace guidelines similar to those of CU Anschutz;
- CU Denver applies the new guidelines to all of the projects recommended in this master plan – new construction and renovations; and,
- CU Denver retrofits all remaining office space (that which is not part of one of the Facilities Master Plan renovation projects) consistent with the new guidelines.

If CU Denver continues to follow its current practices of assigning office space, the 10-year office need will increase to approximately 82,000 ASF, which is largely unattainable

given the past and current scarcity of capital construction funding.

CU Denver should conduct a follow-up study to determine the efficacy of adopting new workplace guidelines. The study could draw on the experience of CU Anschutz while achieving campus-specific guidelines.

The renovated 13th floor of the Lawrence Street Center for the Office of Information Technology and the newly constructed office areas of the Student Commons Building could serve as excellent case studies for this follow-up effort.

MONDAY THROUGH FRIDAY CLASSROOM SCHEDULING

Classroom space will be critical to accommodating enrollment growth. As previously noted, the average weekly room hours (WRH) for all classrooms is 31, which is above the CDHE guideline of 30 WRH. However, a national survey of best practices recommends a target of 35 WRH.

Roughly thirty percent of all weekly student credit hour production occurs after 3 p.m., and most classes are scheduled Monday through Thursday. This pattern leaves approximately 90 percent of classrooms empty on Fridays (Figure 7-2).

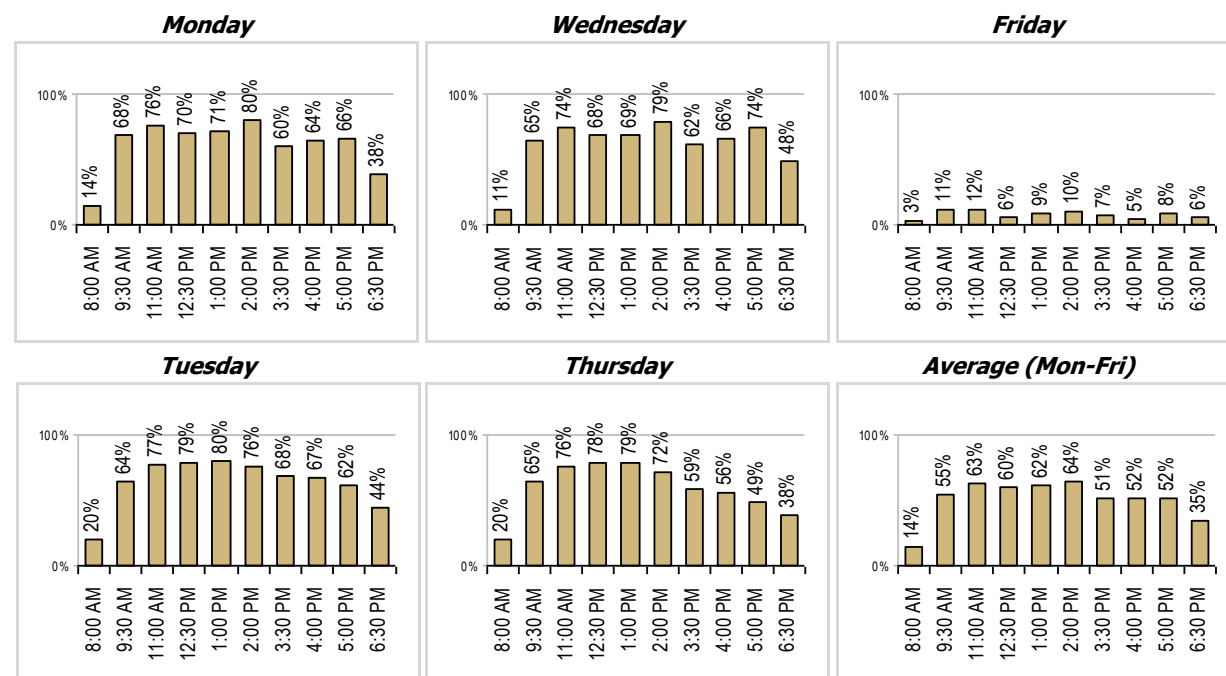
RECOMMENDATION

The university should study the feasibility and effectiveness of Monday through Friday scheduling practices to raise weekly room hour use and optimize the use of the instructional space assets.

Since the campus is mostly vacant Friday, Saturday and Sunday, a five-day schedule would also benefit student life by creating a more vibrant and active campus all week.

Lastly, increased student engagement with the campus correlates with improved student retention and success.

Percent of Classrooms In Use



Total classrooms = 117

Figure 7-2: Classroom Use by Day and Time (Fall 2015)

DEPARTMENT VS. CENTRAL CLASSROOM SCHEDULING

The university uses approximately one-third of its classrooms for less than 30 WRH (ranging in value from 0 to 29.6 WRH). Over half of these rooms are departmentally-controlled. As Figure 7-3 demonstrates, the cluster of dark lines to the left represents a disproportionate number of departmental classrooms.

On the whole, utilization of centrally-scheduled classrooms is higher than departmentally-scheduled classrooms. There are, however, examples where the decentralized scheduling model works very well. Some of CU Denver’s highest classroom utilization rates are in the Business School, where the school is granted first rights to schedule classrooms before they are turned over for centralized scheduling.

RECOMMENDATION

The university should examine various models of classroom scheduling—centralized, decentralized and hybrid—to determine which model would be most effective for both Proprietary and General Assignment Priority Scheduled classrooms. Certain factors should be considered, including the classroom location and whether other academic programs could

potentially benefit from the space. For example, many underperforming classrooms are in the Lawrence Street Center, CU Denver Building and King Center—buildings that may be less accessible to certain schools or colleges.

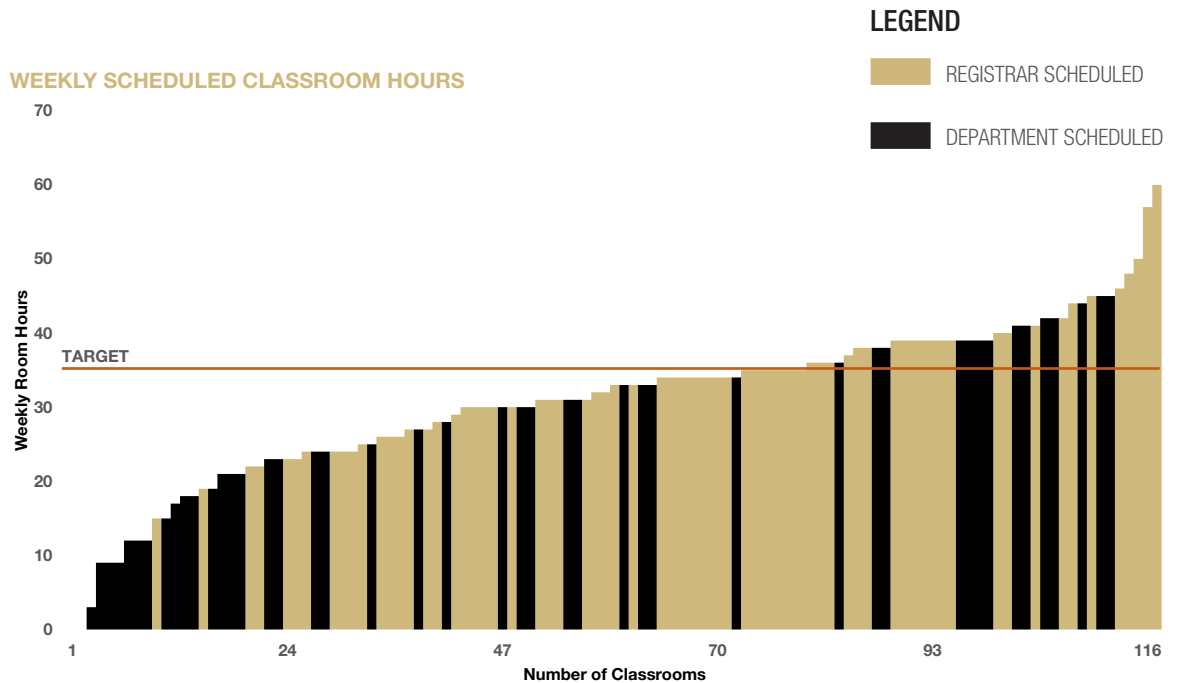


Figure 7-3: Utilization of Registrar and Departmentally Scheduled Classrooms

CLASSROOM MIX

As described in the Student Station Occupancy analysis (Section 5.0 Analysis, page 61), some classrooms are only half occupied when scheduled. While this offers potential capacity for enrollment growth, this is also a lost opportunity.

RECOMMENDATION

CU Denver should examine how classroom sizes relate to individual course enrollments to improve occupancy. Improvements can take numerous forms, some of which include:

- Review of the course scheduling process to see if there are ways to align course size and room capacities better;
- Consider re-purposing classroom or other space to create classrooms with capacities that better fit common course enrollment observed at CU Denver; and,
- Consider moving to course enrollments that better fit the current stock of classrooms available to CU Denver.

SPACE MANAGEMENT INVENTORY SYSTEM

CU Denver currently relies on space management information and building floor plans from two sources, AHEC and the university. In the case of the former, the university has no control over the structure or updating of data, and in the latter, the system is designed for purposes other than space planning and management. The current situation poses a challenge for the Office of Institutional Planning when responding to requests for information from architects and other consultants, CU Denver staff and faculty, and the CU System or governmental agencies. It also hampers efforts to effectively manage the space assets of the university and provide conceptual design services.

RECOMMENDATION

CU Denver should quickly implement the recently purchased Computer-Aided Facilities Management (CAFM) software to improve space tracking and streamline information requests. It will also provide a means to track progress on goals that center around the addition of specific types of space, such as student activity space.

SPACE STANDARDS

The implementation of the CAFM system will provide CU Denver the opportunity to adopt space standards simultaneously. Space standards assign a square footage amount or range to various space types that are commonly seen in a university setting- office space, classrooms, conference space, teaching laboratories, etc. They ensure that space is assigned equitably across the university and that space is being used efficiently.

They also provide guidance to planners and architects when establishing the overall space need of a project or designing the project.

RECOMMENDATION

CU Denver should work to develop and adopt space standards that align with the strategic priorities of the university.

OPEN SPACE STUDIES

Of the many open spaces discussed in this plan, two have the potential to significantly enhance the campus experience for CU Denver students, staff and faculty and merit further study. The open spaces are the Creekfront Park area between the CU Denver Building and Cherry Creek (identified on page 99 as area #1), and the lawn in front of the North Classroom Building along Speer Boulevard (one portion of project #6 on page 99).

RECOMMENDATION

CU Denver should conduct a study of both open spaces to ascertain how they might be enhanced or reprogrammed to improve the user experience and meet other university goals. In the case of Creekfront Park, this must be in collaboration with the City of Denver Parks and Recreation Department.

SPEER BOULEVARD CROSSING

As mentioned in Section 6.1 (page 89) at-grade roadway improvements for the Speer Boulevard/Larimer Street intersection will be considered for funding by Denver voters in the fall of 2017 as part of the General Obligation Bond. These roadway improvements, if approved, represent an opportunity for CU Denver because of the linkage and physical proximity between this critical intersection and a number of other initiatives mentioned in this plan. These include the development of the Nexus site, re-visioning of the open spaces behind the CU Denver Building and between the North Classroom Building and Speer Boulevard, and re-development of the CU Denver Building annex site.

RECOMMENDATION

CU Denver should make sure it has representation on the project committee if/when the roadway improvements are funded. CU Denver should also consider assembling some of its key civic partners before the roadway improvements commence to discuss how these efforts could be coordinated.



SUPPORT FUNCTIONS – SPACE NEEDS

As part of the Facilities Master Plan process, interviews were conducted with representatives of departments which provide support to the overall university in the areas of facilities operations and maintenance, information technology and environmental health and safety. The interviews revealed the following space needs:

- The **Office of Information Technology (OIT) data center** that currently serves CU Denver is located in the North Classroom Building on its second floor. The data center is land-locked – there is no opportunity to expand it into surrounding spaces. Based on discussions with the OIT, a new data center of 2,000 square feet, and projected to cost approximately \$15 million, has been identified as a future need. This need currently has neither a projected start date nor specific location, but would most likely need to be included as part of a larger project.
- The **Facilities Management** Department at CU Denver is responsible for performing building operations and maintenance of the four properties owned by CU Denver: the Business School, the CU Denver Building, the Lawrence Street Center and Student Commons. The Wellness Center will open in early 2018, adding a fifth property.

Currently, the facilities group performs these duties with a minimum of dedicated space for personnel and storage and no large industrial shop spaces. The department often finds it necessary to bring personnel back and forth from CU Anschutz and/or utilize shop space at CU Anschutz for maintenance of CU Denver Campus buildings. The interviews with Facilities Management revealed that on or before completion of the next CU Denver-owned facility (after the Wellness Center), the department will require approximately 20,000 GSF of space to adequately support all of the CU Denver assets. This space should be proximate to the CU Denver owned properties to minimize distances that must be traveled.

- **Environmental Health and Safety (EHS)** presently occupies one office in the North Classroom Building and has use of several storage lockers behind the AHEC Facilities Services Building near the corner of 7th Street and Lawrence Way. As CU Denver research and instructional laboratory space increases, the EH&S staff will need additional office space to accommodate a total of 3 additional FTE (360 ASF), a dedicated hazardous waste room (500 ASF) and a Biosafety room for waste and autoclave activities (400 ASF). The total square footage need for EH&S is 1,260 ASF.

RECOMMENDATION

CU Denver should continue to explore opportunities to provide space to these departments, either as part of a project that has already been contemplated, as part of a new project, or by acquiring and renovating existing space.

ADVANCEMENT OUTREACH

The current trajectory of state funding for capital projects suggests that some or all of the projects proposed in this master plan will require some donor funding to be realized. As such, the CU Denver Office of Advancement (Advancement) will be a critical partner in the execution of this master plan.

Advancement creates a unique fundraising plan and recognition recommendations for each capital project as the site, occupants, goals and vision of each project are different. They then work in partnership with the CU Foundation to create a gift agreement for each gift that is pledged on a capital project. If the gift involves the naming of a building, the agreement must follow the Board of Regents policy on building naming.

The Facilities Master Plan itself can be a very useful tool to inform a donor about the aspirations of the university and how that donor can play a crucial role in making them a reality.

RECOMMENDATION

CU Denver should review and amend as needed its capital project design process to ensure that the Advancement is involved as early as possible. Doing so allows Advancement to be part of discussions about site, vision, goals and other elements of a project that make it compelling for a potential donor. Going forward, program plans that are written for capital projects should include

a recognition plan, which among other things could highlight opportunities for donor involvement and identify areas of the building for donor recognition.

CAMPUS SUSTAINABILITY MASTER PLAN

Issues and discussions relating to sustainability were woven through the master planning process but were not addressed in a comprehensive and holistic manner.

RECOMMENDATION

The university should conduct a separate, extended and comprehensive effort to examine options, set goals and develop holistic campus strategies. A future sustainability master plan could address the following topics:

- The risks and potential impacts of climate change on the university;
- Water issues relating both to use within buildings and to landscape irrigation, particularly in Colorado's semi-arid climate;
- An overall storm water retention and treatment strategy;
- Strategies and opportunities to incorporate sources of renewable energy. Potential benchmarks for incrementally reducing energy use could be evaluated for adoption at CU Denver;

- Expansion of the solid waste reduction and recycling program; and,
- Encouraging the use of a broad range of transportation modes including light rail.

CU Denver's core mission includes research and teaching, so the arenas of innovation and public education around sustainability in an urban context are a natural fit for CU Denver.