

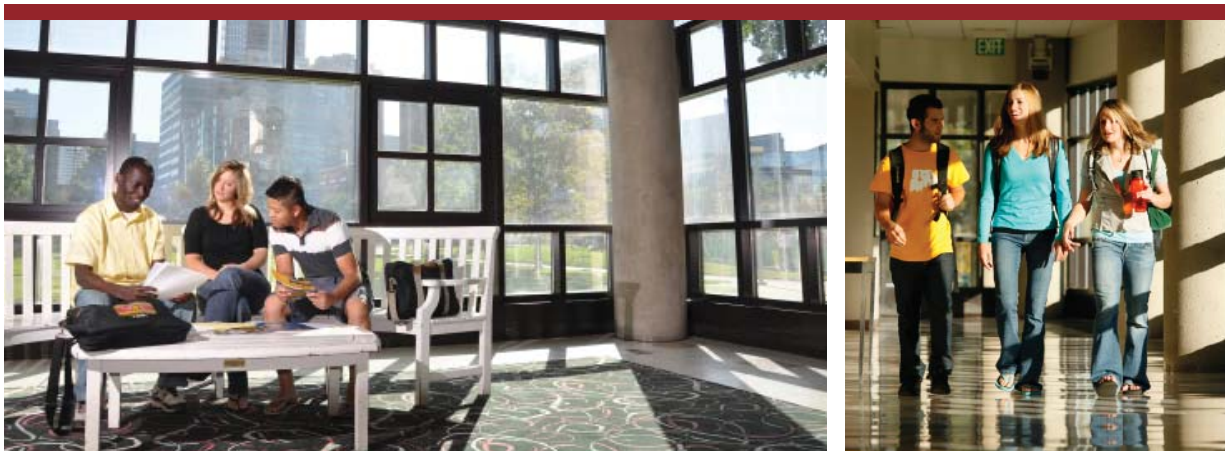


University of Colorado  
Denver

# North Classroom Building Renovation

PROGRAM PLAN *AMENDMENT* | MAY 16, 2014

University of Colorado Denver  
Office of Institutional Planning





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## I. Executive Summary

The original North Classroom Building Renovation program plan described a \$10,928,636, cash funded project that included three elements: the renovation of 34 general assignment classrooms, the renovation of the main atrium of the building, and the renovation of departmental space for the College of Liberal Arts and Sciences (CLAS). That program plan was approved by the Board of Regents on September 5, 2013 and by the Auraria Board of Directors on September 25, 2013. After approval, it was submitted as a Fiscal Year 2014-15 cash funded project.

As a companion project, the University of Colorado Denver (CU Denver) submitted a Fiscal Year 2014-15 request for a \$7,846,650, state funded Capital Renewal project to address the numerous and extensive deficiencies in the building systems and common areas of the North Classroom. Following submission of the Capital Renewal project, further study revealed some additional deficiencies in the building.

This amended program plan adds the Capital Renewal project elements and some additional building system improvements to the projects described in the original North Classroom Building Renovation program plan to create one, consolidated North Classroom Building Renovation project. This consolidated project includes a cash funded portion and a state funded portion. The \$11,325,741 cash funded portion will include the three elements described in the original North Classroom Building Renovation Program Plan. The \$20,552,020 state funded portion will include the improvements to the building systems and common areas. The total project cost is \$31,877,761.

This program plan amendment focuses primarily on those elements that represent an addition to the

original program plan, namely the improvements to the building systems and common areas.

A few scattered renovations are covered as part of the building of Academic 1 at Speer and Larimer. The Backfill Project focuses on renovating areas vacated by moves into Academic 1. These renovations are not part of this project plan, but affect this project. However, these renovations do not address the majority of the classrooms or the common areas.

The North Classroom building is 27 years old, and is one of the most heavily populated and visited buildings on the Auraria Campus. This combination of age and use has led to the significant deterioration of the systems, interior and exterior of the building. This deterioration greatly affects the functionality and efficiency of the building and continues to require expensive, patchwork fixes in lieu of systemic, long term improvements.

The addition of building system and common area improvements to the North Classroom Renovation project will result in a building that is much more energy efficient and less costly to maintain. As well as increasing the cost efficiency for maintaining this building, these changes will provide a healthier and more functional environment for those using this facility.



## II. Introduction and Background

### *a. Institutional Background*

*No Change*

### *b. Program*

#### *i. Program Narratives*

The original program plan elements are reviewed briefly below, followed by a more extensive overview of the elements of the project that are unique to this program plan amendment. Additionally, the entire project program (original and amended) is illustrated on the following page.

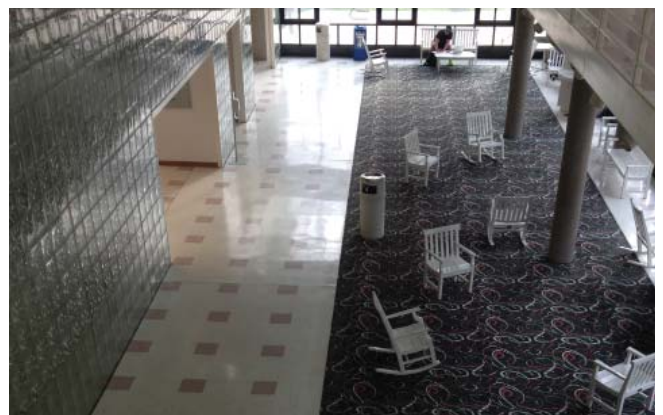
#### *Original Program Plan*

##### *Atrium Renovation*

The renovation of the main atrium of the North Classroom, which totals 14,656 square feet, includes adding power near seating for charging devices, printing stations for students, kitchenette areas where students can heat up food, improving the way-finding (including electronic signage), and new paint. One change from the original program plan in this section is the removal of two items; new carpet and new furnishings. Since the writing of the original program plan, The Student Fee Review Committee voted to purchase new carpet and new furnishings for the atrium. The relationship of this and other North Classroom projects to the North Classroom Building Renovation is explained in more detail in *Section III. f. Relation to the Master Plan and Other Projects* (page 16).

##### *General Assignment Classroom Renovation*

This includes updates to 34 of the general assignment classrooms in the building. It excludes the new classrooms that were created as part of



the Auraria Science Building project. There are five elements that will be addressed in all of the classrooms:

1. Technology Upgrades
2. New Furnishings
3. ADA Compliance Issues
4. Lighting Upgrades
5. Aesthetic Improvements - Paint, Flooring, etc.


In addition, the following will be considered in classrooms based on feasibility, pedagogy, and their effect on the overall classroom capacity of the university:


1. Introducing natural light into the classroom.
2. Moving the teaching wall location to improve sight lines.
3. Providing new furniture combinations to provide additional work space for students and improve classroom flexibility.
4. Altering room layouts to help improve pedagogy.
5. Decreasing classroom density to improve the learning environment and provide more comfort to the students.

*CLAS Renovations*

Includes updates to interior spaces in the building that have not been renovated since the building opened in 1987. This includes space for Physics, Psychology, and Geography and Environmental Sciences.

**Original and Amended Program Plan Legend**

 Original Program Plan- Classroom, Atrium (does not include student funded improvements), CLAS Renovations

 Amended Program Plan Additions- Common Area Improvements and Building Systems (not shown)

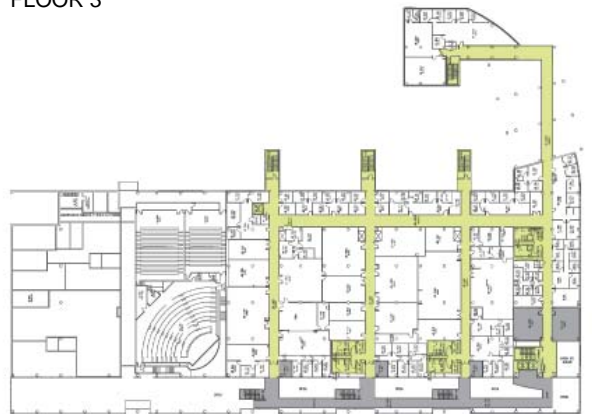


FLOOR 4

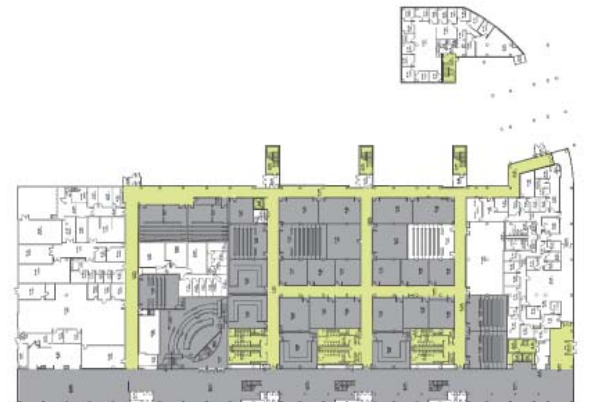
FLOOR 5



FLOOR 3



FLOOR 2



FLOOR 1



*Amended Program Plan Additions*

The amended program plan additions are divided into the following two categories:

*Building System Improvements*

The following system improvements are included in the North Classroom Building Renovation. More information on each is provided in *Section III.C Space Program and Project Area Diagrams* (page 10).

- Roof Replacement
- Heating, Ventilation and Air Conditioning (HVAC)
- Electrical-Panel, Transformer
- Plumbing
- Fire and Life Safety - Fire Pump and Emergency Generator
- Lighting
- Exterior - Windows, Sealant

*Common Area Improvements*

Common Area Improvements will occur in the areas listed below. More information on each is provided in *Section III.C Space Program and Project Area Diagrams* (page 10).

- Corridors (Excluding atrium)
- Restrooms
- Stairwells
- Elevators

**ii. Existing Space Summary**

Below is the summary of existing space for the program elements that are being added to the project as part of this program plan amendment.

*Building Systems Improvements*

The building systems serve the entirety of the building. As such, no square footage is being provided for these.

*Common Area Improvements*

The total existing square footage for the common areas is 52,944 square feet. That square footage is further broken down by category below.

Corridors (Excluding atrium) - 38,465 square feet

Restrooms - 8,547 square feet

Stairwells - 4,832 square feet

Elevators - 1,100 square feet



Failing window seal.

*c. Relation to Academic or Institutional Strategic Plans*

The addition of building systems and common area improvements to the North Classroom Renovation project only reinforces CU Denver's commitment to the strategic goals outlined in the original program plan.

Goal 2.1 Deliver superior educational programs on multiple campuses and academic centers across the state, nation, and around the world.

Objective 2.1.1 Build and sustain superior education facilities and infrastructure.

Improving the building systems and common areas of the North Classroom speaks directly to the objective of sustaining superior education facilities.

Goal 7.2 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.

Objective 7.2.2 Implement the University of Colorado Denver facilities capital plan to provide cost-effective, adaptable, maintainable, sustainable, and accessible facilities.

The university maintains a ten year capital list that is well vetted with campus leadership. This project is included on that list. The building systems and common areas improvements outlined in this amendment will make North Classroom a much more cost-effective facility and a much more efficient user of resources.

### III. Project Description

#### *a. North Classroom Building*

##### *i. General Information*

The North Classroom building opened in 1987, and was designed and built to replace the Tramway Building at 14th Avenue and Arapahoe Street as the main base of operations for the University of Colorado Denver. The Tramway Building was known then as East Classroom.

The North Classroom building was designed by Hoover Berg Desmond, most notably by chief designer and renowned Denver architect, George Hoover. The cost of the project was \$28 million.

The juncture of the Speer Boulevard façade and the Larimer Street façade, which includes the building's signature glass block and a large clock face, has long served as a beacon for those shopping, working and playing downtown as well as the many cars that pass by on Speer Boulevard.

The building totals 257,500 gross square feet, and rises to its maximum height of five stories along the Speer Boulevard elevation.

North Classroom is the third largest building on the Auraria Campus, behind the Tivoli Student Union (291,635 sf) and the Auraria Science Building (285,821 GSF).

##### *ii. Existing Condition*

The condition of the North Classroom Building was ascertained through the following sources:

1. A Facilities Condition Index (FCI) conducted by the Auraria Higher Education Center in 2013. This report is available as Appendix A. The 2013 FCI report served as the basis for the Capital Renewal request submitted in 2013 by the University of Colorado Denver, which is included as Appendix B.
2. A Summary report from an energy assessment conducted by Xcel Energy in March of 2012. This is included as Appendix C.

3. Meetings held between CU Denver Facilities Operations staff and Auraria Higher Education Center (AHEC) Facilities Operations staff in 2013 and 2014.
4. Walkthroughs of the building conducted by CU Denver staff in 2013.

Collectively, these sources revealed the following about the building systems:

- **Roof** - The roof of North Classroom was one of the top Auraria Higher Education Center controlled maintenance priorities before being shifted into the Capital Renewal request submitted by CU Denver in 2013. There is evidence of leaking in exterior offices in the building, despite many attempts at short term remedies. There is also evidence of water damage on the underside of some of the



North Classroom Facade - Speer Boulevard.

exterior soffits. The 2013 FCI reported that the roof drain is now problematic as well. The roof is 23 years old. It is one of the areas of greatest concern.

- **HVAC** - The building is conditioned by a combination of ten air handling units (AHUs), six make-up air units (MAUs), one rooftop unit (RTU) and variable air volume (VAV) boxes with perimeter reheat. The AHUs are VAV, Trane units with hot and chilled water coils. The seven largest AHUs offer three stages of cooling through the use of air-side economizers, evaporative coolers and chilled water cooling. The RTU was recently added and provides heating and cooling to a computer lab and small data center. The chilled water for the HVAC system is provided by one 500 ton water-cooled, Trane centrifugal chiller. Heating is provided by the Denver district steam network. The air handling units are nearing the end of their useful life, as would be expected with a nearly 30 year old building. Of the six make up air units, three are consistently failing. In addition, a second chiller is recommended to provided redundancy to the building. The building controls are pneumatic Johnson Controls, and should match with more modern Siemens controls used on other CU Denver Buildings. Also noted were the following
  - The fan power box coils are restricted.
  - Three out of the six makeup air units (MAU) are consistently failing
  - All of the A/C split system and stand-alone evaporative coolers need upgrading
  - The temperature control compressor should be rebuilt or replaced
  - Heating and cooling pumps should be replaced with pumps that accommodate Variable Frequency Drives (VFDs)
- **Electrical** - There are two transformers in the North Classroom, both of which are very old. The electrical system in the North Classroom is a redundant system. When building operations staff have to switch to one transformer, or feed, the transformer that is designed to carry the full load in that scenario is under-sized and close to being overloaded.
- **Plumbing** - Denver's district steam provides heating to the hot water heater, which is a 1,500

gallon tank. The tank is oversized for the current occupants of the building. The tank primarily provides hot water to the restroom areas, which could be better served by local, tankless hot water heaters. There are five duplex pump systems that receive ground water from the underground collection system. All five pump systems are in need of replacement. The drinking fountain condensers through the building are in need of replacement. The domestic water pre heat tube bundle and heater tube bundle are nearing the end of their useful life. The use of double walled tube bundles is recommended due to the use of hazardous glycol for cooling. The domestic hot water recirculation line is also showing signs of wear, and several leaks have been reported in the building over the last five years.

- **Fire/Life Safety**- The biggest life safety issue in the building is the rooftop emergency generator. It is currently under-sized and services only the elevators, egress lighting and fire alarm. It is a very old unit, and has begun to fail. The potential failure of the emergency generator is a an urgent issue. The fire alarm system was upgraded several years ago with money left over from the Auraria Science Building Project. However, it is possible that inadequate water pressure in the building would require the addition of a fire pump. When the building was originally constructed, all of the fire sprinklers were set up to drain into sump pumps that were then pumped into the storm drain. This is a code violation, as sprinkler discharge should be piped into the sanitary system versus the storm water system.



Original North Classroom bathroom fixtures.

- **Lighting** - The indoor lighting for North Classroom is provided by 32-watt, T8, compact fluorescent (CFLs) and induction luminaires. Most lighting circuits are controlled by manual switches, which often results in lights being left on.
- **Exterior Envelope** - There is evidence throughout the exterior of the building of failing window seals, cracking columns and heaving concrete. Joint sealant has become cracked and/or eroded, both along the perimeter at grade and within vertical control joints. In addition, some or all of the exterior doors do not meet the current five pound pull limit stipulated by ADA.
- **Interior Wall and Partition System** - Walkthroughs of the building with code inspectors have revealed that the fire rating ability of some of the interior walls has been compromised by penetrations.
- **Common Areas** - In general, the common areas of the building have received little or no updating since the building was opened. This is true of most stairwells, corridors and restrooms. While elevator controls have been updated, the finishes in the elevator cabs have not.

The sources listed above, most notable the energy assessment report, revealed the following about the general efficiency of the North Classroom.

- **General Efficiency** - In the Xcel Energy report, an Energy Use Index (EUI) was used to compare North Classroom to similar buildings.

North Classroom used 113 kBtu per square foot per year during the year studied. The national average for higher education buildings is 108 kBtu per square foot per year, which placed North Classroom in the 51st percentile for buildings that participated in the Commercial Building Energy Consumption Survey (CBECS). Essentially, this means that North Classroom uses more energy per square foot than 51% of similar buildings in the survey. The Xcel report determined that the total annual cost of electricity and heating for the North Classroom is \$568,887.

A summary of Operations and Maintenance (O&M) funds spent on each Auraria building compiled by AHEC revealed the O&M cost for North Classroom to be \$1.58/sf for fiscal year 2013-14. At this amount, North Classroom was the fourth most expensive building on the campus, behind the Plaza Building, the P.E. Events Center and the Arts Building. It should be noted that the P.E. Events Center has a pool, which inflates its O & M number significantly.

### *b. Project Assumptions*

The project assumptions below were listed in the original program plan. Updates are provided for each, as well as their relationship to the amended program plan project additions.

*CU Denver will trade space they currently occupy on the Auraria Campus with Metropolitan State University of Denver (MSUD) for their classrooms in North Classroom.*



North Classroom corridor - no updates since 1987.



Exterior cracking around door.

- The classroom trades have not occurred yet, but discussions are underway. This item is related to the CLAS renovation described in the original program plan and does not affect the amended program plan additions.

*The Physics programs of MSUD and CU Denver will split apart and CU Denver will trade MSUD for both the shared spaces and the dedicated MSUD Physics spaces.*

- This scenario is predicated on MSUD funding and constructing their new Aerospace Engineering Sciences Building. MSUD is still seeking state funding for a portion of the project, and the soonest the building could be completed is the spring of 2017. This item is related to the CLAS renovation described in the original program plan and does not affect the amended program plan additions.

*That the university receives some matching student funding for the atrium renovation.*

- CU Denver students did commit \$437,000 to purchase new furniture and carpet for the North Classroom atrium. The project kicked off in April of 2014, and is expected to be complete in late fall/winter of 2014. This item is related to the atrium renovation described in the original program plan and does not affect the amended program plan additions.

*That the 1000 corridor in the North Classroom atrium will be renovated as part of the Academic Building 1 backfill project.*

- The 1000 corridor is, in fact, part of the AB1 backfill project. The project is in the design development phase. This area is not part of the North Classroom Building Renovation project.

### *c. Space Program and Project Diagrams*

An updated space program chart is included below. Of the two elements added to the project and described in this program plan amendment, only the Common Area Improvements represent an addition to the square footage of the project. A description of the specific building systems improvements and common area improvements are listed below.

#### *i. Building System Improvements*

##### *Roof Replacement*

The roof will be replaced. The total square footage of the roof is 97,466.

##### *Heating, Ventilation and Air Conditioning (HVAC)*

A second chiller will be purchased and installed to provided redundancy to the system. All seven air handling units, and three make up air units, will be replaced with new units. The Johnson Controls Building Automation System (BAS) will be replaced with a Siemens system. In addition, the fan power box coils will be replaced, and the A/C split system and evaporative coolers will be upgraded. The temperature control compressors will be rebuilt, and heating and cooling pumps will be replaced with units that accommodate VFDs. The Liebert unit will also be factory inspected.

##### *Electrical*

The two existing building transformers will be replaced with new units, and sized adequately to be able to handle the switching required in this redundant system. At the same time, the panels in the building will be upgraded. The project also includes performing an IR scan in the main electrical room, and torquing all connections to manufacturers specifications.

University of Colorado Denver North Classroom Renovation Amended Space Program	
<b>Original Program Plan</b>	<b>Area</b>
CLAS Renovations	16723
General Assignment Classrooms	31082
Atrium	14656
<b>Amended Program Plan Additions</b>	<b>Area</b>
Common Area Improvements	52944
Building Systems Improvements	0
<b>TOTAL</b>	<b>115405</b>

*Plumbing*

The existing hot water heater will be decommissioned and replaced with an appropriately sized unit or local, tankless water heaters to serve the restroom and kitchen areas. The five storm water ejector pumps will be replaced, as will the condensers in the water fountains. The hot water needs of the building will be assessed to determine if repair or replacement of the pre heat tube bundle and domestic water heater tube bundle are necessary.

*Fire/Life Safety*

The emergency generator will be replaced. The project has also budgeted for a fire pump, in the event that existing water pressure is determined to be insufficient. The fire sprinkler system will be

re-routed to drain into the sanitary sewer system as stipulated by code.

*Lighting*

Lighting improvements, as they relate to the building system improvements, will consist primarily of control changes that will reduce the number of manually operated switches. This will be coordinated with any lighting upgrades being done as part of some of the interior renovations and classrooms renovations.

*Exterior*

Areas where joint sealant has become cracked or eroded, both along the perimeter at grade and vertical control joints, will be re-sealed. Where required, doors will be replaced to meet ADA standards. Windows where the seals have failed will be replaced or, if possible, repaired.



Existing North Classroom roof.



Exterior doors that require ADA upgrades.



Failing exterior sealant.



Warped window film.

**ii. Common Area Improvements**

The common area improvements are outlined below, and shown graphically on pages 12-14. All of these items were included in the original Capital Renewal request under the heading of *Division 09 - Finishes*.

**Corridors**

All of the corridor areas shown on the graphic will receive new paint, base and ceiling tile. These items will be coordinated with any lighting improvements that will be taking place as part of the building system improvements. Most of the corridor areas are terrazzo flooring, and will remain and be re-finished. Any corridors areas that contain other types of flooring (carpet, tile) will be replaced with new materials. The corridor area is a total of 38,465 square feet.

**Elevators**

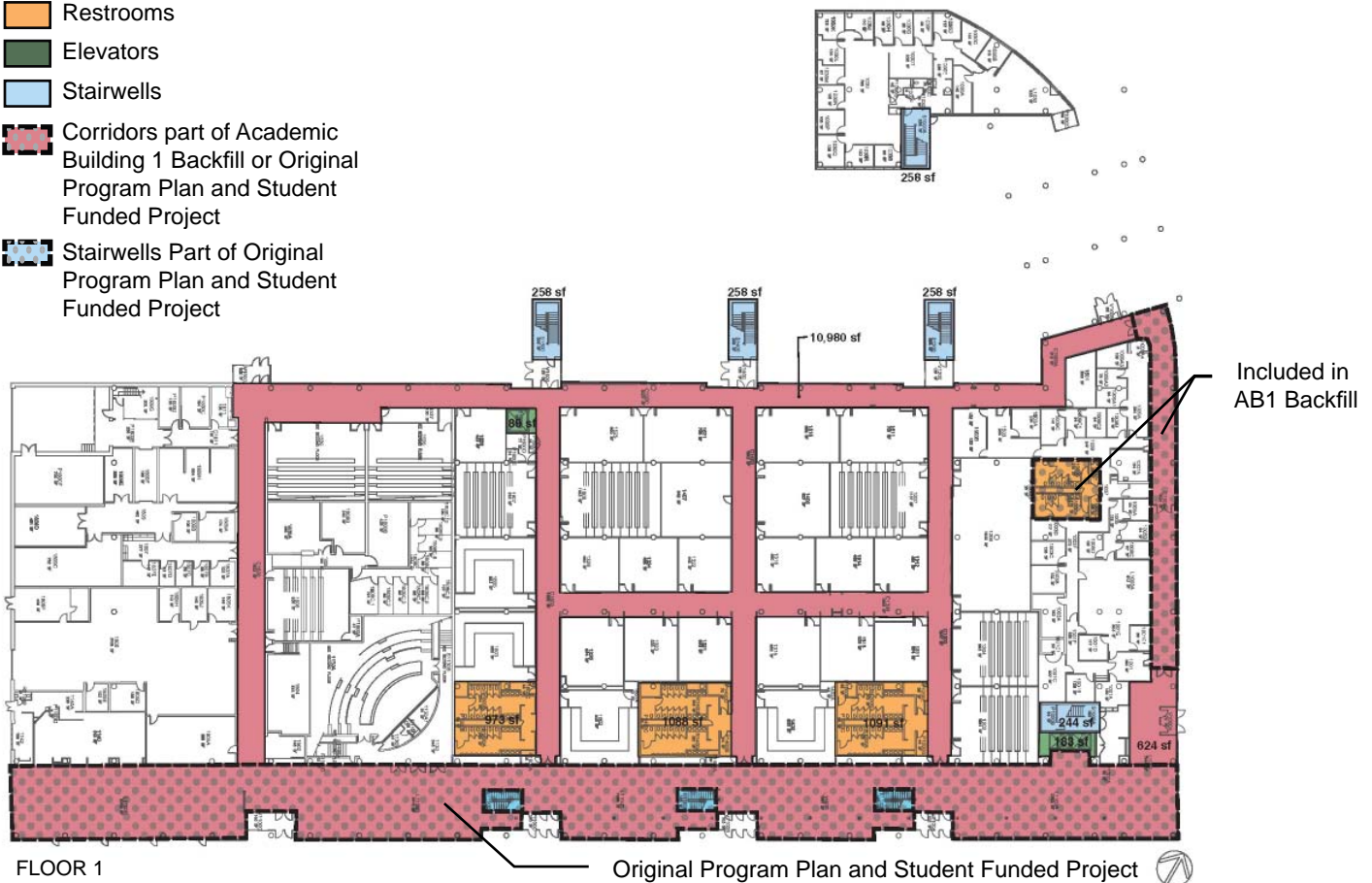
The North Classroom elevator controls have been upgraded, so the focus will be on upgrading the elevator cabs. This will involve some combination of flooring and wall finishes and panels. There are a total of three elevators in North Classroom - two passenger and one freight.

**Stairwells**

There are eight stairwells in the North Classroom. However, three of them lie in the atrium area, and will be covered in the atrium renovation that was part of the original North Classroom Renovation program plan. This amended program plan adds improvements to the remaining five stairwells. Of these five, two of them serve all floors of the building. The remaining three, which lie in external, non-conditioned towers, terminate on the third floor. The stairwell improvements will be primarily paint (on handrails and vertical and horizontal walls), ceiling tiles (where applicable) and re-finishing or finishing stair treads.

**Amended Program Plan Improvements Legend**

- Corridors
- Restrooms
- Elevators
- Stairwells
- Corridors part of Academic Building 1 Backfill or Original Program Plan and Student Funded Project
- Stairwells Part of Original Program Plan and Student Funded Project

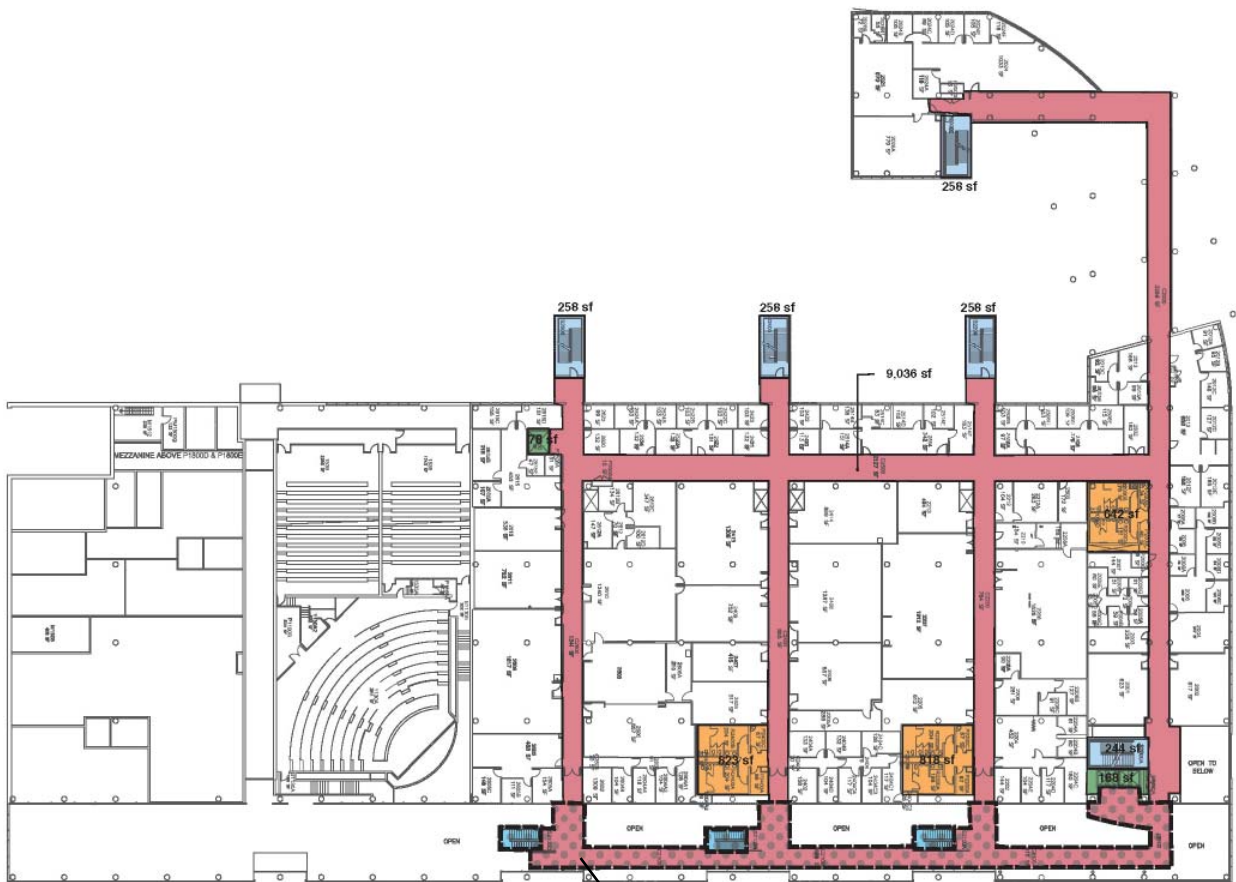






FLOOR 3

Original Program Plan and Student Funded Project



FLOOR 2

Original Program Plan and Student Funded Project

**Restrooms**

Of the 12 restrooms in North Classroom, 11 will be renovated as part of the common area improvements. The remaining restroom is being renovated as part of Academic Building 1 backfill. The restroom improvements will include new partitions, paint, flooring, fixtures, counters and dispensers.

**iii. Other**

*High Performance Building Program*

The renovations described in the original program plan and this program plan amendment are expected to exceed 25% of the replacement value of the North Classroom. As such, the project will fall under the guidelines of the State of Colorado’s High Performance Building Program.

*Public Art*

Since a portion of this project is funded with state capital construction funding, 1% of the construction costs of that portion have been allocated for public art in the building.

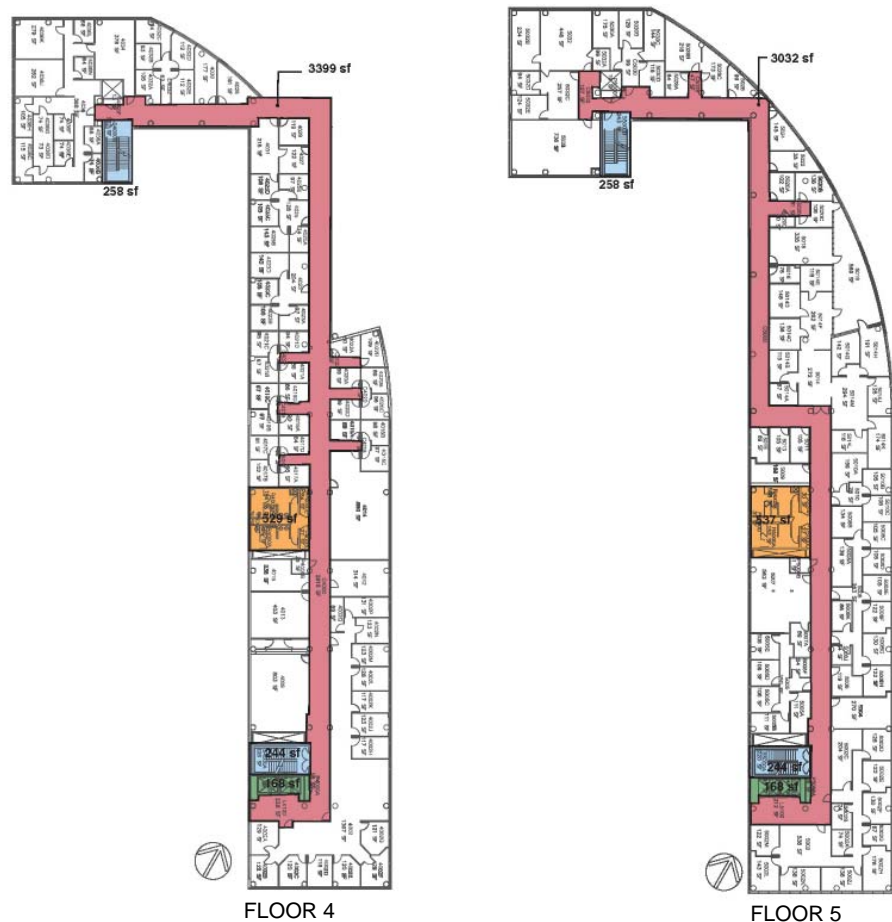
*d. Project Cost Estimate*

A detailed project estimate for the amended North Classroom Building Renovation project is provided on the following page. The total project estimate is \$31,877,671, an increase over the original program plan estimate of \$10,928,636. This is due to the addition of the building system improvements and common area improvements that were previously part of the 2013 North Classroom Capital Renewal request, and items that were discovered after the Capital Renewal was submitted. The original North Classroom Renovation Program Plan estimate is provided in Appendix D. The 2013 North Classroom

**Amended Program Plan Improvements**

**Legend**

- Corridors
- Restrooms
- Elevators
- Stairwells



CC-C: CAPITAL CONSTRUCTION REQUEST FOR FY 2014-15															
Agency or Institution:		University of Colorado Denver			Signature Department or Institution Approval:		Date								
Project Title:		North Classroom Building Renovation			Signature C CHE Approval:		Date								
Project Year(s):		FY 2015-16			Signature OSPB Approval:		Date								
Agency or Institution Priority Number:		1			Name and e-mail address of preparer: Mark Berthold mark.berthold@ucdenver.edu										
Revision? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>		Total Project Costs		Total Prior Year Appropriations		Current Request FY 2015-16		Year 2 Request		Year 3 Request		Year 4 Request		Year 5 Request	
If yes, last submission date:															
<b>A. Land Acquisition</b>															
(1)	Land /Building Acquisition	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-
<b>B. Professional Services</b>															
(1)	Master Plan/PP	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-
(2)	Site Surveys, Investigations, Reports	\$	157,500	\$	-	\$	157,500	\$	-	\$	-	\$	-	\$	-
(3)	Architectural/Engineering/ Basic Services	\$	3,047,985			\$	3,047,985	\$	-	\$	-	\$	-	\$	-
(4)	Code Review/Inspection	\$	159,600			\$	159,600	\$	-	\$	-	\$	-	\$	-
(5)	Construction Management	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-
(6)	Advertisements	\$	4,200	\$	-	\$	4,200	\$	-	\$	-	\$	-	\$	-
(7a)	Inflation for Professional Services	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-
(7b)	Inflation Percentage Applied				0.00%		5.00%		0.00%		0.00%		0.00%		0.00%
(8)	Other (Commissioning)	\$	157,500	\$	-	\$	157,500	\$	-	\$	-	\$	-	\$	-
(9)	Total Professional Services	\$	3,526,785	\$	-	\$	3,526,785	\$	-	\$	-	\$	-	\$	-
<b>C. Construction or Improvement</b>															
(1)	Infrastructure	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-
	(a) Service/Utilities	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-
	(b) Site Improvements			\$	-			\$	-	\$	-	\$	-	\$	-
(2)	Structure/Systems/ Components														
	(a) New (GSF):	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-
	New \$ /GSF														
	(b) Renovate 115,405 GSF:	\$	21,315,470			\$	21,315,470	\$	-	\$	-	\$	-	\$	-
	Renovate \$ 97 / GSF														
(3)	Other (Security)			\$	-			\$	-	\$	-	\$	-	\$	-
(4)	High Performance Certification Program	\$	659,241	\$	-	\$	659,241	\$	-	\$	-	\$	-	\$	-
(5a)	Inflation for Construction	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-
(5b)	Inflation Percentage Applied				0.00%		5.00%		0.00%		0.00%		0.00%		0.00%
(6)	Total Construction Costs	\$	21,974,711	\$	-	\$	21,974,711	\$	-	\$	-	\$	-	\$	-
<b>D. Equipment and Furnishings</b>															
(1)	Equipment	\$	934,000	\$	-	\$	934,000	\$	-	\$	-	\$	-	\$	-
(2)	Furnishings	\$	1,482,566	\$	-	\$	1,482,566	\$	-	\$	-	\$	-	\$	-
(3)	Communications	\$	845,500	\$	-	\$	845,500	\$	-	\$	-	\$	-	\$	-
(4a)	Inflation on Equipment and Furnishings	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-
(4b)	Inflation Percentage Applied				0.00%		5.00%		0.00%		0.00%		0.00%		0.00%
(5)	Total Equipment and Furnishings Cost	\$	3,262,066	\$	-	\$	3,262,066	\$	-	\$	-	\$	-	\$	-
<b>E. Miscellaneous</b>															
(1)	Art in Public Places=1% of State Total Construction Costs (see SB 10-94)	\$	156,137	\$	-	\$	156,137	\$	-	\$	-	\$	-	\$	-
(2)	Annual Payment for Certificates of Participation	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-
(3)	Relocation Costs	\$	171,544	\$	-	\$	171,544	\$	-	\$	-	\$	-	\$	-
(4)	Other Costs [TAP fees]	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-
(5)	Other Costs [specify]	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-
(6)	Other Costs [specify]	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-
(7)	Other Costs [specify]	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-
(8)	Total Misc. Costs	\$	327,681	\$	-	\$	327,681	\$	-	\$	-	\$	-	\$	-
<b>F.</b>	<b>Total Project Costs</b>	\$	29,091,243	\$	-	\$	29,091,243	\$	-	\$	-	\$	-	\$	-
<b>G. Project Contingency</b>															
(1)	5% for New	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-
(2)	10% for Renovation	\$	2,786,518	\$	-	\$	2,786,518	\$	-	\$	-	\$	-	\$	-
(3)	Total Contingency	\$	2,786,518	\$	-	\$	2,786,518	\$	-	\$	-	\$	-	\$	-
<b>H.</b>	<b>Total Budget Request [F+G(3)]</b>	\$	31,877,761	\$	-	\$	31,877,761	\$	-	\$	-	\$	-	\$	-
<b>I. Source of Funds</b>															
	CCF	\$	20,552,020	\$	-	\$	20,552,020	\$	-	\$	-	\$	-	\$	-
	CF	\$	11,325,741	\$	-	\$	11,325,741	\$	-	\$	-	\$	-	\$	-
	RF	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-
	FF	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-	\$	-

Capital Renewal Request is included in Appendix B.

Of the amended North Classroom Renovation project estimate, \$11,325,741 is cash funded and \$20,552,020 is state funded. The source for the cash funds will be a mixture of debt and cash reserves.

**e. Project Schedule**

The project schedule has been amended from the original program plan, so that all elements of the project will follow the same schedule. The overall schedule, from design to furniture install, encompasses approximately 3 years. The schedule is broken down in phases below.

Design	10 Months
Bidding/Contracting	2 Months
Construction	24 Months
Furniture Install	1 Month

**f. Relation to Master Plan and Other Projects**

**Relation to Master Plan**

No Change

**Relation to Other Projects**

There are several projects either underway or in the planning phase in the North Classroom. Each of these is a separate stand-alone project with a distinct funding source. There have been changes to several of the North Classroom projects since the original program plan was written in 2013. Updates are provided below, and an updated graphic is shown at right.

**Academic Building 1 Backfill**




The new, 156,400 gross square foot Academic Building 1 will open in August of 2014. The "backfill" projects, or renovations to spaces that are being vacated by departments moving into the new building, are approaching the design development phase. All backfill projects will be complete by the summer of 2015. The backfill area shown in the original program plan for North Classroom is unchanged.

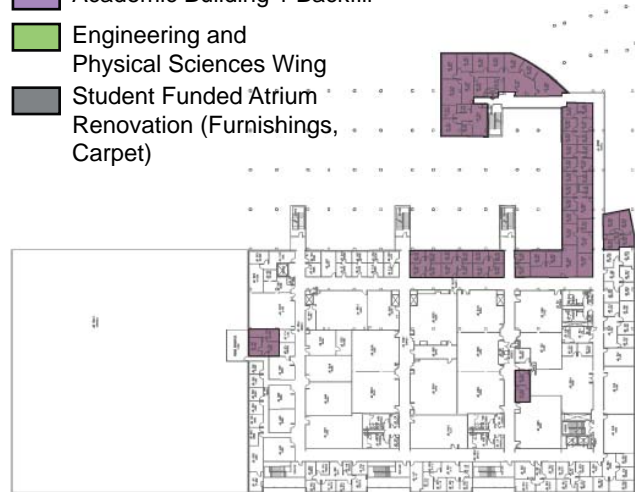
**North Classroom Capital Renewal**

The amended North Classroom Renovation project has absorbed all elements of the Capital Renewal

**Other Projects in North Classroom**

**Legend**

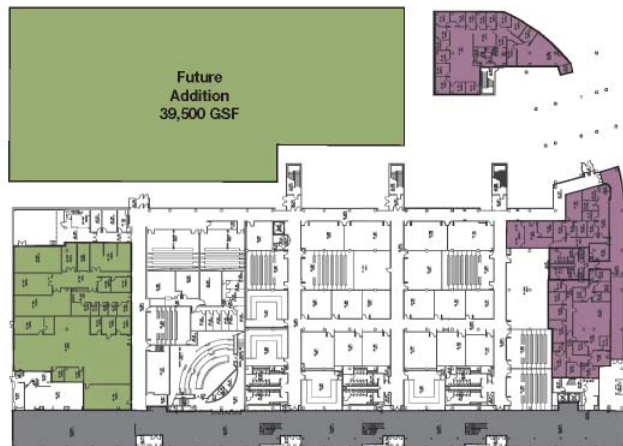
-  Academic Building 1 Backfill
-  Engineering and Physical Sciences Wing
-  Student Funded Atrium Renovation (Furnishings, Carpet)



FLOOR 3



FLOOR 2



FLOOR 1

Project submitted by CU Denver in 2013. Therefore, the North Classroom Capital Renewal project will be withdrawn and is not shown on the graphic.

Engineering & Physical Sciences Building | Renovation

The Engineering & Physical Sciences Building | Renovation remains in the 10 year capital plan for CU Denver. The Engineering & Physical Sciences Building | Renovation project has two components: a new, 60,000 gsf building for the College of Engineering and Applied Sciences (CEAS) adjacent to North Classroom and renovations to 39,500 gsf of space being vacated by CEAS in North Classroom. Total project budget is \$38, 316,444. CU Denver plans to seek capital construction funding of approximately \$19,158,222 million for FY 2016-2017 for the project, and would provide cash funding for the remainder.

Student Funded Atrium Renovation

In 2014, the Student Fee Reserve Committee approved the use of \$437,000 to make improvements to the North Classroom atrium. These funds will be used to replace all of the furniture and carpet in the atrium. The remaining atrium improvements are still part of this project, and remain as described in the original program plan.

*g. Project Alternatives*

Two project alternatives were outlined in the original program plan. These alternatives as they relate to the program elements added in this amendment are explored below.

**No Project**

Not doing the project at all would have the following consequences:

- **Building Systems Improvements:**  
The building systems would continue to deteriorate, resulting in additional operating inefficiencies and loss of function and comfort. It would also continue a pattern of expensive temporary fixes. It is very likely that the condition of the building has turned away interested students and faculty, and continuing to use the deteriorating building is likely to result in lower enrollments since this building is so heavily used by all types of CU Denver students.



Engineering & Physical Sciences Building | Renovation - massing study.



North Classroom Atrium - new furnishings.

- **Common Area Improvements:**  
The North Classroom is a nearly 30 year old building, much of which has seen no improvements over its entire history. If the project does not move forward, the common areas will continue to worsen.

***Modified Scope***

The Modified Scope scenario described in the original program plan contemplated that one of the main initiatives that comprise this project (Atrium, Classrooms, CLAS Space, Building Systems, Common Areas) might be pulled out of the project. The University believes that much efficiency in cost and schedule can be realized by funding and commencing with all of the initiatives simultaneously. It would also ensure a consistent project team and approach for all of the initiatives. Given the age and needs of the building, it would also be difficult to prioritize one initiative over another.

## IV. Appendices

### A. 2013 North Classroom Facilities Condition Index

FACILITIES AUDIT PROGRAM										
Building Summary										
Building Name:	NORTH	Bldg ID No.:	NC							
Construction Date:	1988	Gross Square Feet:	254,587	No. of Stories:	5					
Date of Audit:	2007	Building Use:	Classroom/Office/Labs							
Replacement Cost:	\$52,954,096	(Year 2001)		\$ 54,761,228						
Category of System	2007 Total Rating	2007 Component Deficiency	2007 Renewal Cost	2013 Total Rating	2013 Component Deficiency	2013 Renewal Cost				
B.01	Foundation and Substructure System	0.085	0.0033	\$174,749	0.0901	0.003498	\$ 191,555	Additional deterioration over time.		
B.02	Structural System	0.015	0.0022	\$116,499	0.0159	0.002332	\$ 127,703	Additional deterioration over time.		
B.03	Exterior Wall System	0.2	0.0126	\$667,222	0.19	0.01197	\$ 655,492	Addressed 38 windows and Exterior Doors		
B.04	Roof System	0.52	0.01144	\$605,795	0.728	0.016016	\$ 877,056	Additional deterioration + Roof Drain system is now becoming an issue.		
B.05	Interior Wall and Partition System	0.33	0.02673	\$1,415,463	0.3861	0.0312741	\$ 1,712,608	Still have the same issues and with additional use these have been compounded.		
B.06	Ceiling System	0.075	0.0024	\$127,090	0.05625	0.0018	\$ 98,570	Have addressed the major ceiling issues in the 2007 Audit.		
B.07	Floor Covering System	0.4	0.014	\$741,357	0.4	0.014	\$ 766,657	Have addressed carpeting issues in high traffic areas, but remainder of building has aged more.		
B.08	Specialties	0.505	0.009595	\$508,095	0.5555	0.0105545	\$ 577,977	Continued wear and tear since 2007.		
B.09	Heating, Ventilating, and Air Conditioning Systems	0.06	0.01068	\$565,550	0.1008	0.0247968	\$ 1,357,903	HVAC is still a big concern.		
B.10	Plumbing System	0.1	0.0178	\$942,583	0.11	0.01958	\$ 1,072,225	Hot water heater should be replaced with one that is sized correctly for building. DI Faucets no longer an issue. Sump pumps and Drinking Fountains, and Urinals still need to be replaced		
B.11	Electrical System	0.065	0.006565	\$347,644	0.10855	0.01096355	\$ 600,377	Building Transformers are undersized to allow loads to be shifted from Feeder A to B.		
B.12	Conveying Systems	0.365	0.00438	\$231,939	0.05475	0.000657	\$ 35,978	Elevators have been addressed with Controlled Maintenance project and Freight elevator issues have been addressed.		
B.13	Other Systems	0.5	0.0045	\$238,293	0.25	0.00225	\$ 123,213	Majority of Telecom issues addressed with Science Building Backfill Work.		
B.14	Overall Safety Standards	0.36	0.00612	\$324,079	0.17	0.00289	\$ 158,260	Fire alarm system replaced in 2011, Need to address MIC Issue.		
SUBTOTAL			0.13231	\$ 7,006,356		0.15258195	\$ 8,355,575			
Contingency and AE		0.21	0.0277851	\$ 194,672		0.03204221	\$ 267,731			
Component Deficiency Total:			0.1600951			0.18462416				
Total Project Cost:				\$7,201,029			\$8,623,306			
(1.00 – Component Deficiency Total) x 100 = FCI				83.99	(Facilities Condition Index)*		81.54			
* derived by (contingency & A/E) x (subtotal of component deficiencies) x (bldg replacement cost) or by (contingency & A/E) x (subtotal of renewal costs)										





B. 2013 Capital Renewal Request

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A. AGENCY BASIC DATA:

<input type="checkbox"/>	<b>Controlled Maintenance Request</b>	<input checked="" type="checkbox"/>	<b>Capital Renewal Building/Infrastructure Request</b>
		<input checked="" type="checkbox"/>	<b>HPCP required in Capital Renewal Request (Y/N)</b> (on CC-A specify HPCP compliance)
1) Agency	University of Colorado Denver		
2) Department	Higher Education		
3) Agency ID No.	001-15	Project M #	New request
4) Agency Priority #	1		
5) Project Title	North Classroom Capital Renewal		

B. FACILITY PROFILE

1) Facility Type	<input type="checkbox"/> Site (Utilities underground) <input type="checkbox"/> or Site (Improvements above ground) <input checked="" type="checkbox"/> or Building Name (s) North Classroom <input type="checkbox"/> Risk Mgmt. Bldg(s) ID#		
2) Facility Location	Auraria Higher Education Center		
3) Facility Area/Age	GSF 259,211	ASF 154,668	Date Built 1988
4) Facility Functional Use/Occupancy	Classrooms/Academic Offices/Labs/Instructional Space		
5) Facility Construction (Type)	Cast-in-Place Concrete Frame with exterior brick veneer and metal studs, Building Type II-A with automatic sprinkler system.		
6) Facility Physical Condition and Facility Condition Index (FCI) Number	Actual FCI = 84* AHEC Targeted FCI = 85* AHEC Date of Last Audit 2007 Structurally sound but with basic building systems have deteriorated and are in need of repair/upgrade for code compliance. System upgrades are needed especially the roof but also for air handling systems, electrical systems, exterior window glazing and seals, common areas, restrooms, lighting systems. The 25 year-old building has been well maintained but many systems and finishes have exceeded their useful life. Note the last FCI Audit was completed in 2007, and the building has deteriorated rapidly over the past 6 years due to heavy use and environmental conditions. Based upon recent observations and visual inspection of the building by the campus Architect and the Facilities Projects group, the current FCI is estimated to be substantially lower.		
7) Facility - Intensity of Use, Time(s) of Operation: (Hours/Day, Days/Month, Months/Year)	7 a.m. – 10:00 p.m.; 6 days a week, 12 months a year, serving 2,550 students/hr at full capacity.		
8) Facility - Current Replacement Value \$	54,761,228		
9) Master Plan Status - Check one or more of the following:	a) <input type="checkbox"/> Facility 'useful' life is less than five (5) years. b) <input checked="" type="checkbox"/> Facility 'useful' life is more than five (5) years. c) <input type="checkbox"/> Master Plan is obsolete; Last Date Approved (by OSPB/CDHE) d) <input type="checkbox"/> Major facility changes, renovations, or program revisions are ongoing or anticipated in the next five years, (If yes, please explain below if these facility renovations or program revisions may have an impact on this CM request.)		
10) Facility Audit Survey:	a) Facility Audit Survey concluded and submitted to SBP - Date b) Status of the Infrastructure Assessment. % Completed c) Facility Audit Survey Cycle n/a (last audit conducted in 2007)		
11) List all the controlled maintenance, capital construction, and emergency projects completed within			

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the last five years or ongoing projects that can be associated with either this CM building or infrastructure request.

Project No.	Project Title	Completion date or status
M06032	Life Safety Mechanical and Electrical Repairs, Ph 1 of 1 (Campus)	Completed 2007
M07045	Campus Elevator Repairs, Ph 1 of 1 (2 passenger elevators)	Completed 2009
	Science Building Backfill (Upgrade of NC Freight Elevator and NC Fire Alarm System )	Completed 2011 and 2012

**C. INTEGRATED PROGRAM PLAN DATA**

**NOTE:** For a Capital Renewal Building/Infrastructure Request, refer to the instructions for the additional information required to support the request.

1) Narrative Description of CM Problem (Initial problem and solution by phase):

A) It is anticipated that within the next Fiscal Year that the responsibility of operating and maintaining the North Classroom Building on the Auraria campus will be transferred from the Auraria Higher Education Center (AHEC) to the University of Colorado Denver. The 2007 facility audit for this building demonstrated deficiencies in all major building systems. The deferred maintenance items related to major building systems have reached a critical juncture. These items include the roof, building electrical, the HVAC system and building envelope.

- The roof is 25 years old and failing.
- On a recent walk-thru it was observed that filters in the 25-year old AHUs are clogged with dirt and some filters are missing. The unit serving the 5 story portion cannot maintain static pressure and has difficulty in maintaining temperature in summer and winter. Pneumatic controls are beginning to fail and will require replacing since they can no longer be repaired. Failure of any of the mechanical systems will severely impact the ability to support the classroom functions of this building.
- Interior lighting is poor and highly inefficient. Suspended and hard lid ceilings sagging and separating in several areas of the public corridors.
- Other than the toilet fixtures having been replaced with 1.6 gpm fixtures in 2003 the restrooms have not been updated to since first built. Some partitions are rusting and the epoxy floors are worn.

This capital renewal project will address the operational issues that impact the full use/functionality of this facility. The Capital Renewal Request does not exceed 25% of the value of the building but appropriate strategies will be used as applicable.

B) See breakdown under Item #5 – Detailed Cost Estimate

C) See attached floor and roof plans indicating extent of general interior upgrades to public areas, roof area and location of mechanical penthouses.

D) See attached Facilities Audit performed by AHEC in 2007

E) See attached list of University of Colorado Denver capital construction priorities - FY 2015 Prioritized State Capital Construction Budget Request and FY 2015 - FY 2019 Five-Year Capital Construction Plan submitted to the Board of Regents

F) By using a CM/GC approach for this project we will be able to confirm our cost estimates and effectively manage the design and construction process. A second component of this project is a Cash Funded project scope to address programmatic and functionality of the building for its users. If this Capital Renewal is funded, the Cash Funded construction portion of the project would be done simultaneously with the Capital Renewal to gain economy of scale in the construction and to help

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minimize the amount of disruption time to the building occupants.

2) Total Project Cost Estimate (From Cost Breakdown) \$ **\$7,846,650**

3) Consequences (cost effects, program impacts, facility impacts, etc.) of not funding and justifying this specific project request:

The current and future delivery of academic programs will be severely affected if this project is not funded. This is the most heavily utilized building on the Auraria campus. Many core undergraduate courses are offered in this building. If not funded, the number of maintenance calls will increase, causing additional operating expense. The building systems will deteriorate even further and the student experience in the building will worsen. The number of leaks on the roof will increase, requiring costly patches that are only short term fixes. Due to the increasing deterioration of the HVAC system and the porous building envelope, the operational efficiency of the building will continue to decrease.

4) **Mandatory** - Include Facility Audit documentation from most recent audit. Include site maps for any infrastructure project request.

5) **Optional** - Include photographs and any other supporting documents.

6) Explanation of how this project will improve the building(s) facility condition index or improve a specific infrastructure system.

All recommended work when completed will improve the FCI number for this building. While updating the various building systems will extend the life of this building for use by University of Colorado Denver, one of the additional benefits of this Capital Renewal Project will be the replacement equipment building systems will operate at increased efficiency rates compared to the original building systems that were installed in 1988.

*Note: This is a companion project to the cash funded project that will be submitted to the Legislative Capital Development Committee this fall on the Two-year List of Cash Needs. Upon the completion of the university-funded Academic Building 1, this project will renovate spaces vacated by programs relocating to the new building and ease overcrowding in undergraduate programs relocating to from other Auraria buildings. This Capital Renewal project and the Cash Funded project are planned to be constructed together to achieve construction cost savings and minimize disruption in this heavily utilized building.*

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**D. DETAILED COST ESTIMATE** (detail by phase, one page per phase, include all phases)

1) Approved By Todd Akey 2) Phase? Phase 1 of 1  
 3) Method and Date of Estimate "means" square foot and historical campus project data

4) Professional Services

Site Surveys, Investigations, and Reports:	\$17,000
Arch/Eng/Basic Services:	\$747,800
Code Review/Inspection:	\$15,000
Other (Explain): Advertising	\$2,000
<b>Total of Professional Services:</b>	<b>\$\$781,800</b>

5) Construction Improvement (by Construction Specification Institute (CSI) Division format)

WORK ITEM (Labor/Material/Equipment)	UNIT <u>sf, cf, lf, etc.</u>	UNIT COST	EXTENDED COST
Infrastructure			
a) Utility Services:			0
b) Site Improvements:			0
Structure/Systems/Components			
Div. 07 - Roof Replacement (97,466 sf)	sf	\$12.54	1,222,000
Div. 07 - Exterior Sealants (4,278 lf based on building perimeter at grade and vertical control joints)	lf	\$3.51	15,000
Div. 08 - Exterior Glazing/Doors based on 20% of existing	lf	\$19.47	400,000
Div. 09 – Finishes (paint , flooring, ceiling replacement/repairs - 60,723 sf of public areas including stairwells, restrooms, corridors – excludes atrium space)	sf	\$33.37	2,040,212
Div. 23 – AHUs, Controls, Repair and Cleaning of Air Distribution System (based on 259,211 gsf)	sf	\$4.44	1,151,442
Div. 26 – Interior Lighting/transformer/panel upgrades (based on 259,211 gsf)	sf	\$2.31	600,000
Div. 27 – Communications (based on 60,723 sf public areas excludes atrium space)	sf	\$0.96	58,000
Other(explain):			
<b>Contractor's General Conditions:</b>	% of Constr	10%	629,080
<b>Contractor's Overhead &amp; Profit:</b>	% of Constr	3%	188,724
<b>Total of Construction Improvement Costs:</b>			<b>\$6,290,795</b>

5a) Total square feet/lineal feet of Construction Improvement area:	259,211 gsf
5b) Overall cost per square foot/lineal foot of construction Improvement:	\$24.27/gsf

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6) Miscellaneous (explain)

Relocation/staging coordination(based on 60,723 sf of public areas)	sf	\$1.00	\$60,723
Total of Miscellaneous Costs:			\$60,723

7) Project Contingency

Contingency (10% CM) (Percentage of total of professional services, construction improvements, and miscellaneous costs.)	\$713,332
--------------------------------------------------------------------------------------------------------------------------	-----------

8) Total Cost of the Project (single phase) or Total for this specific Phase of all professional services (4), construction improvements(5), miscellaneous costs(6), and project contingency(7)

\$7,846,650

Note: Agency formatted cost estimates may accompany this page.

**E. PROPOSED PHASING**

**PRIOR PHASING<sup>1</sup>**

Proj. M#	Fiscal Year	Phase or Phases of Work	Dollar Amount (Actual Appropriation)
	FY 2010/2011		
	FY 2011/2012		
	FY 2012/2013		
	FY 2013/2014		
(Subtotal)			\$

**CURRENT PHASE<sup>2</sup> REQUESTED**

Proj. M#	Fiscal Year	Phase of Work	Dollar Amount (Per Detailed Budget)
	FY 2014/2015	Phase 1 of 1	\$7,846,650

**FUTURE PHASING<sup>2</sup>**

Proj. M#	Fiscal Year	Phase or Phases of Work	Dollar Amount (Per Detailed Budget)
	FY 2015/2016		
	FY 2016/2017		
	FY 2017/2018		
	FY 2018/2019		
(Subtotal)			\$

**TOTAL PROJECT DOLLAR AMOUNT** \$ 7,846,650  
(All Prior, Future Phases subtotals and Current Dollar amount)

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- <sup>1</sup> List all previous phases with actual appropriation by year (include federal funding). Note if different from requested amount.  
<sup>2</sup> List all current and anticipated future phases with estimated costs as listed in the detailed cost estimate subtotal blank 8.

**F. PROPOSED PROJECT IMPLEMENTATION SCHEDULE (PLAN):**

PHASE	FROM	TO
1. Pre-Design (Insert Dates)	July 2014	September 2014
2. Design (Insert Dates)	October 2014	March 2015
3. Construction (Insert Dates)	April 2015	April 2016
4. Project Close-out/Final Completion	April 2016	June 2016

- NOTE: This Capital Renewal project and the Cash Funded project are planned to be constructed together to achieve construction cost savings and minimize disruption in this heavily utilized building.*

## C. North Classroom Energy Assessment

## CUSTOMER SUMMARY PAGE



Customer Name:	<u>Auraria Higher Education Center – North Classroom</u>	Account Number(s):	<u>53-2135181-5</u>
Service Address:	<u>900 Auraria Parkway Denver, CO 80204</u>		
Additional Service Address:	<u></u>	Additional Service Address:	<u></u>
Customer Contact:	<u>Jeff Stamper</u>	Site Contact:	<u>Jon Bortles</u>
Phone:	<u>303.556.2750</u>	Phone:	<u>303.556.3297</u>

Xcel Energy Rep:	<u>Melanie Gavin</u>	Energy Auditor:	<u>Steven Nelson</u>
Phone:	<u>303.294.2359</u>	Company:	<u>Nexant, Inc.</u>
Fax:	<u></u>	Phone:	<u>303.998.2582</u>

Building Type:	<u>University</u>	Peak Demand:	<u>1,166</u>
Electric Service Provided by:	<u>Xcel Energy</u>	Gas Service Provided by:	<u>Xcel Energy</u>
Date of Site Visit:	<u>3/30/12</u>	Square Footage:	<u>259,211</u>

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Xcel Energy and the energy assessor do not guarantee that any specific level of energy or costs savings will result from implementing any energy conservation measures described in this Assessment. Xcel Energy and the energy assessor shall not, under any circumstances, be liable to the customer in the event that potential energy savings are not achieved.

Xcel Energy advises that customers check with their Xcel Energy Account Manager to determine the estimated value of their rebate (if any) and to verify that the equipment qualifies for Xcel Energy programs prior to implementation of any conservation measure. Some measures identified in this report may qualify for an Xcel Energy Custom Efficiency rebate. Custom Efficiency projects require pre-approval prior to purchase and installation. The customer is responsible for submitting project information to their Xcel Energy Account Manager to obtain pre-approval for Custom Efficiency projects and to determine the eligible custom rebate amount.

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Glossary

## Executive Summary

Auraria Higher Education Center (AHEC) requested that Xcel Energy perform an energy assessment to identify energy-related opportunities that show potential for improvement and investment options. This is the first step toward developing a long-term energy plan for Auraria Higher Education Center. Steven Nelson and Jim Zarske with Nexant, Inc. visited the customer's business site on 3/30/12 and met with Jon Bortles, Pete Candelaria and Mike Snead. Table 1 below describes recommended energy conservation opportunities (ECOs), for which costs, savings, rebates, and paybacks are calculated. This report also describes strategic opportunities, which are additional energy-saving projects that require further study before implementation.

**Table 1: Summary of Energy Conservation Opportunities**

Energy Conservation Opportunity	Estimated Demand Savings (kW)	Estimated Energy Savings (kWh)	Estimated Steam Savings (MLbs)	Estimated Annual Cost Savings (\$)	Estimated Capital Cost (\$)	Simple Payback (Years)	Estimated Xcel Energy Incentives (\$)
Payback less than 2 years (low/no cost opportunities)							
1 HWP Summer Shutdown	19.4	57,200	0	\$3,187	\$0	0.0	\$0
2 AHU Scheduling	0.0	40,643	790	\$15,144	\$200	0.0	\$0
Retrofit opportunities payback 2 – 10+ years							
3 Tankless Water Heater	0	0	1,228	\$21,578	\$10,067	0.5	0
4 Lighting Controls – Occupancy and Daylight	0	144,973	-117	\$2,466	\$27,889	6.9	\$10,950
5 Vending Misers	0	1,200	0	\$37	\$300	8.0	\$0
<b>Total</b>	<b>19.4</b>	<b>244,016</b>	<b>1,901</b>	<b>\$42,411</b>	<b>\$38,456</b>	<b>0.6</b>	<b>\$10,950</b>

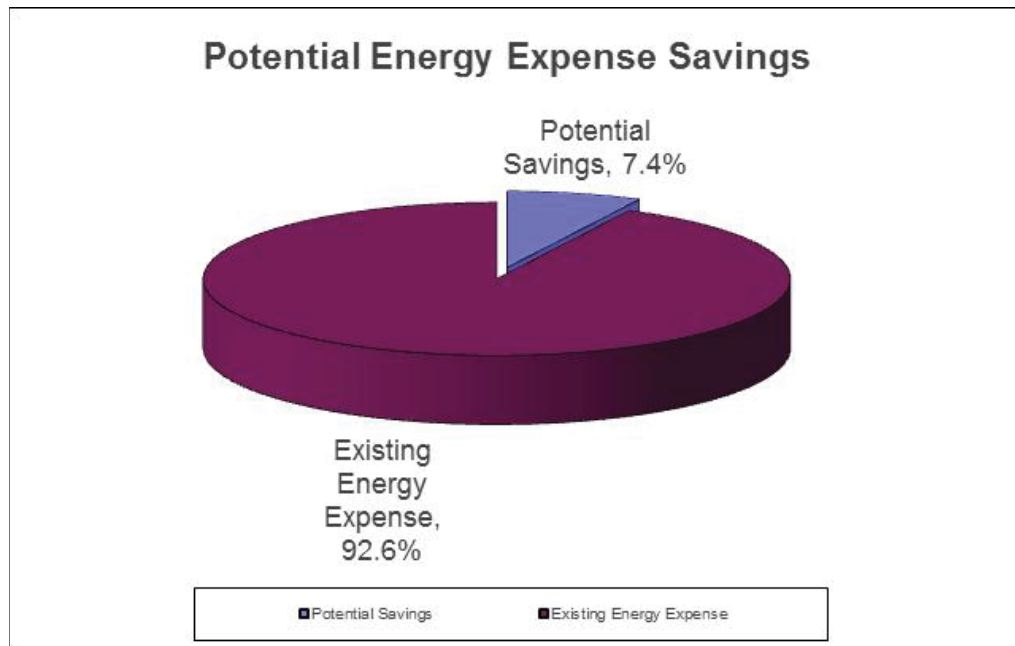
## Strategic Opportunities Summary

Strategic opportunities are measures that are recommended, but could not be fully evaluated for this report. Further study is recommended before implementing these measures:

- Install Flat Plate Heat Exchanger
- Add Split System to 5<sup>th</sup> Floor Server Room
- Retro-commission the HVAC System
- Computer Energy Conservation
- Zone Occupancy Sensors on Terminal Units
- Familiarization with Rebate Programs

## Potential Energy Expense Savings

The following chart shows the potential percentage of this facility's annual energy expense that could be saved by implementing all of the Energy Conservation Opportunities recommended in this report. There was no steam billing data provided; therefore the steam portion of the building's energy use was estimated.



## Suggested Follow-up Action

1. Your Xcel Energy account representative, Melanie Gavin, will answer any questions regarding this Energy Assessment.
2. Steven Nelson at Nexant, Inc. will answer any questions regarding this Energy Assessment.

If you have any questions or need additional information, please do not hesitate to call.

Sincerely,  
Steven Nelson  
Engineer, Demand Management  
Nexant, Inc.  
303.998.2582  
1401 Walnut St., Suite 400  
Boulder, CO 80302

## Facility and Operations Description

The North Classroom is a 259,211 square foot, five-story building located on the Auraria Higher Education Campus in Denver, CO. The building currently has the following different space types: classrooms, computer labs, offices and two small data centers. The general hours of occupancy for the building are 6:30 am – 11:00 pm Monday through Friday, and 7 am – 8 pm on Saturday and Sunday. Faculty can, however, access the building outside of these operating hours.

The indoor lighting for the facility is comprised of 32-watt T8, compact fluorescent lamps (CFLs) and induction luminaires. The lighting in each room is controlled by manual switches and the corridor lighting is generally lit 24 hours per day, 7 days per week (24/7). A portion of the lighting in the atrium is connected to a photocell but was illuminated during the time of the walk-through while there was ample natural light in the space. The lighting in each room is controlled by manual switches and the corridor lighting is generally lit 24/7.

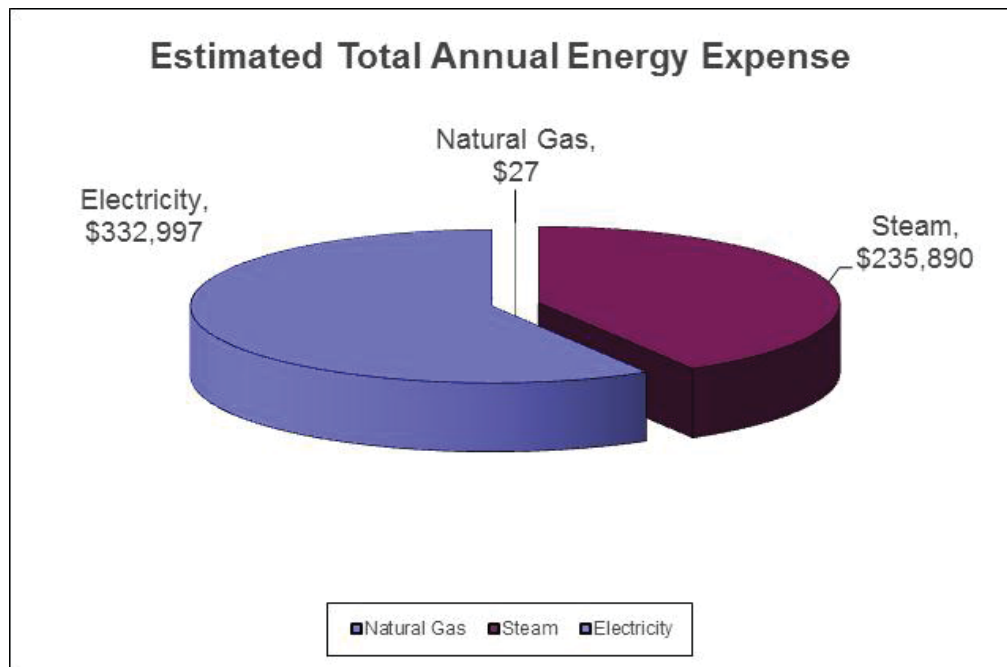
The building is conditioned with a combination of ten air handling units (AHUs), two make-up air units (MAUs), one rooftop unit (RTU) and variable air volume (VAV) boxes with perimeter reheat. The AHUs are VAV, Trane units with hot and chilled water coils. The seven largest AHUs offer three stages of cooling through the use of air-side economizers, evaporative coolers and chilled water cooling. The RTU was recently added and provides heating and cooling to a computer lab and small data center. The chilled water for the HVAC system is provided by one 500 ton water-cooled, Trane centrifugal chiller. Denver's district steam system provides heating to the units and the domestic hot water system through the use of two steam-to-water heat exchangers. A 1,500 gallon domestic hot water tank is maintained at 140°F for use throughout the building. Hot and chilled water is pumped through the building using constant volume primary pumps.

The HVAC equipment is controlled using a Johnson Controls Inc. building automation system (BAS). This control system, along with other capabilities, has the ability to schedule the mechanical equipment, set thermostat temperatures and monitor system performances. The AHUs are staged on every 10 minutes starting at 5 am and are shut down at 10 pm, 7 days per week.

In walking through the facility, it was noted that several (capital) energy-savings measures have already been implemented in the North Classroom building such as efficient lighting and the utilization of the BAS to conserve energy. The majority of the cost-effective savings that are still available will be realized through the installation of tankless or on demand hot water heaters closer to the faucets that require hot water, lighting controls and retro-commissioning.

## Energy Profile

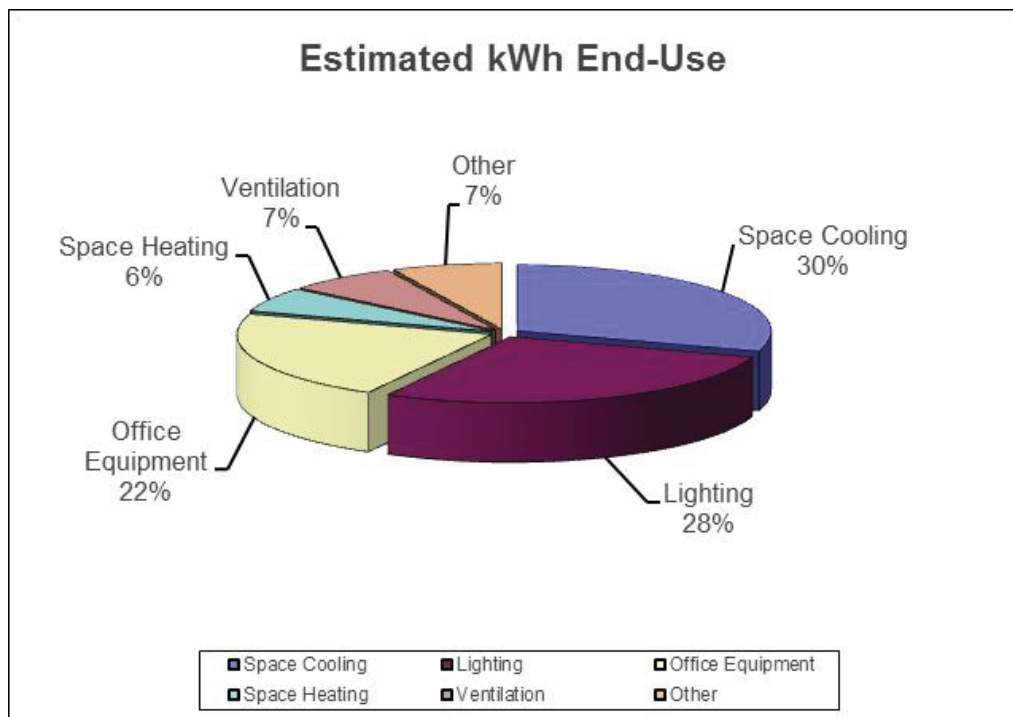
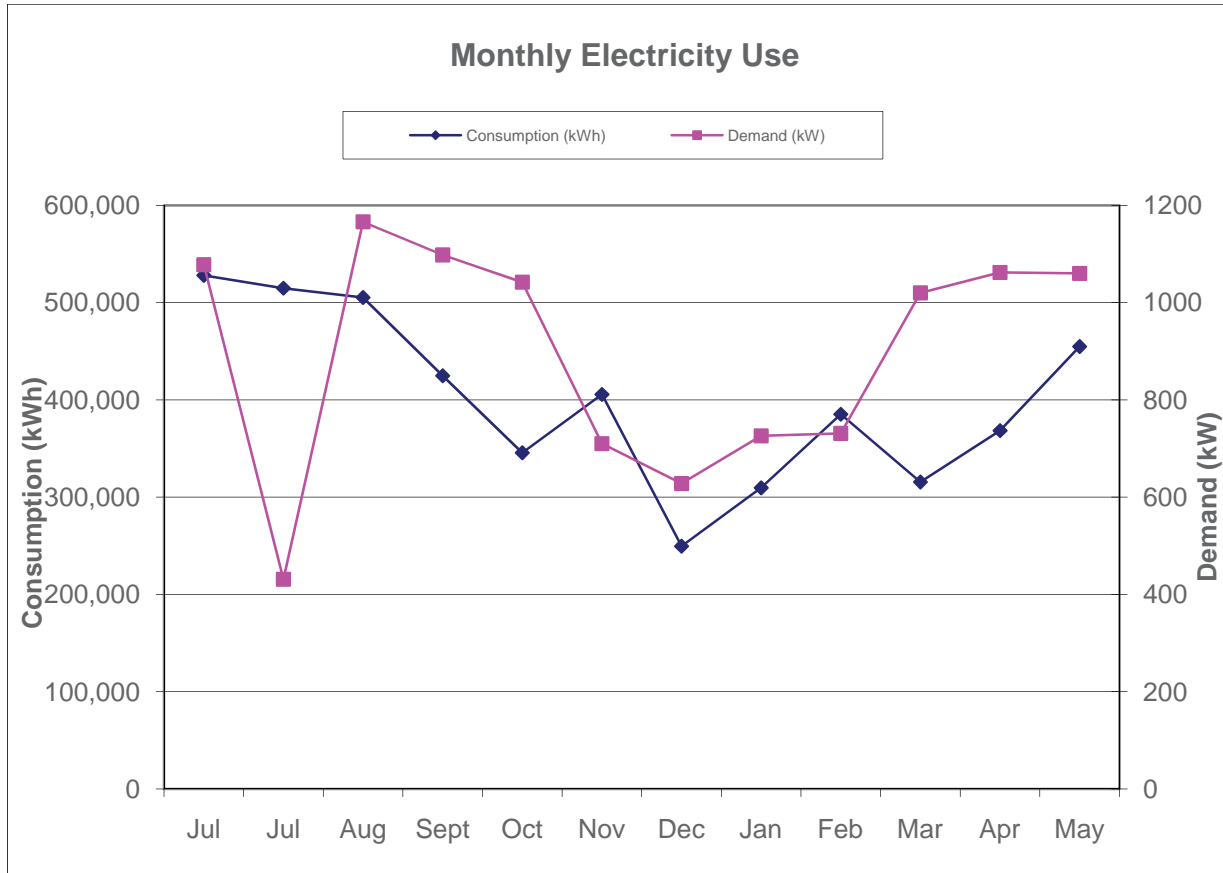
The following charts identify your electricity, natural gas and steam usage. Due to exact steam billing data not being provided, the steam portion of the analysis was estimated based off the sub-metered data and Xcel Energy's basic district steam rate structure.



One Year of Electricity Consumption – July 2010 - May 2011

Month	Days	Actual Demand	Billed Demand	Energy	Total Cost	Blended Cost/kWh	Load Factor
		kW	kW	kWh	\$	\$	%
Jul	28	1,078	1,078	528,000	\$35,941	\$0.07	72.9%
Jul	31	431	431	514,800	\$23,882	\$0.05	160.5%
Aug	30	1,166	1,166	505,200	\$36,811	\$0.07	60.2%
Sept	30	1,098	1,098	424,800	\$31,334	\$0.07	53.7%
Oct	31	1,042	1,042	345,600	\$27,945	\$0.08	44.6%
Nov	30	710	710	405,600	\$24,338	\$0.06	79.3%
Dec	31	628	628	249,600	\$18,128	\$0.07	53.4%
Jan	29	726	726	309,600	\$21,613	\$0.07	61.3%
Feb	30	731	731	385,200	\$24,049	\$0.06	73.2%
Mar	31	1,020	1,020	315,600	\$26,648	\$0.08	41.6%
Apr	30	1,062	1,062	368,400	\$28,984	\$0.08	48.2%
May	31	1,060	1,060	454,800	\$33,324	\$0.07	57.7%
<b>Total</b>	<b>362</b>			<b>4,807,200</b>	<b>\$332,997</b>		
<b>Avg.</b>	<b>30</b>	<b>896</b>	<b>896</b>	<b>400,600</b>	<b>\$27,750</b>	<b>\$0.07</b>	<b>67.2%</b>

This building's electric and gas meters serve seven buildings and use sub-meters to determine each building's usage. This data is not as accurate as a primary meter and there were several instances where data was missing and estimates had to be made. There was no cost provided, so the cost was estimated using the building's rate structure. All electrical, gas and steam usage data is estimated based off Xcel Energy's rate structures.

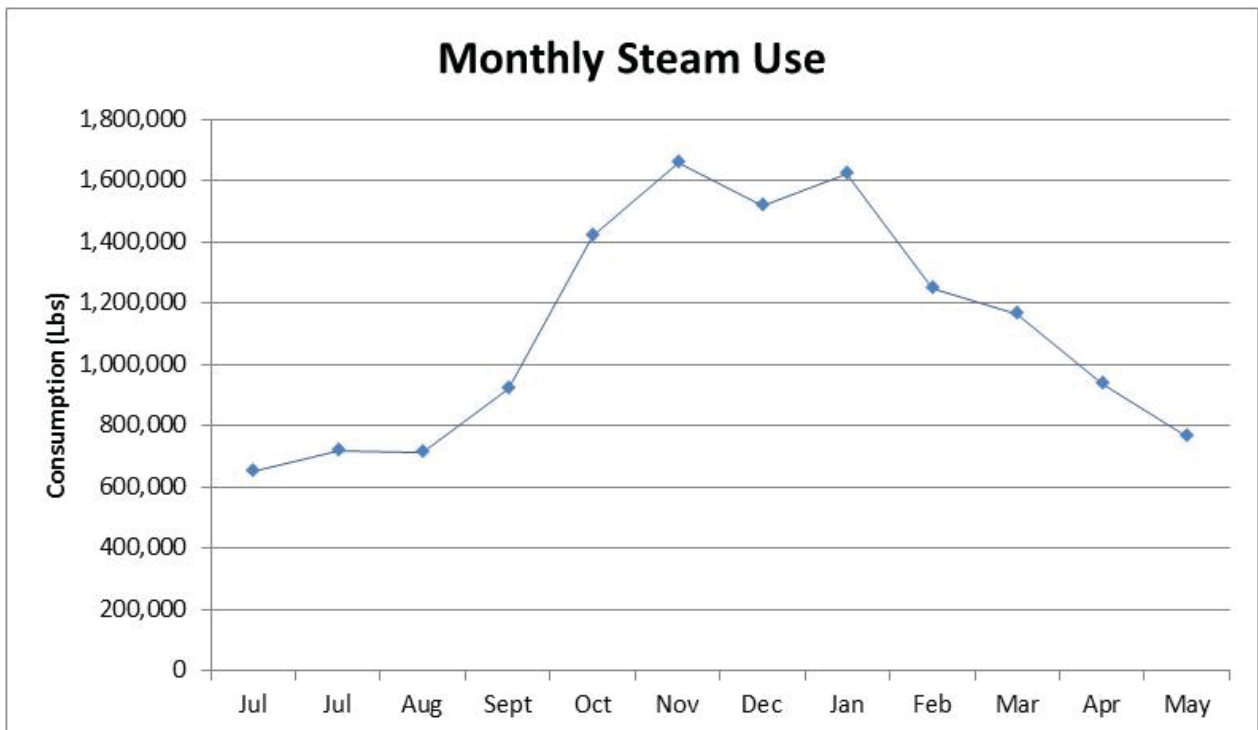


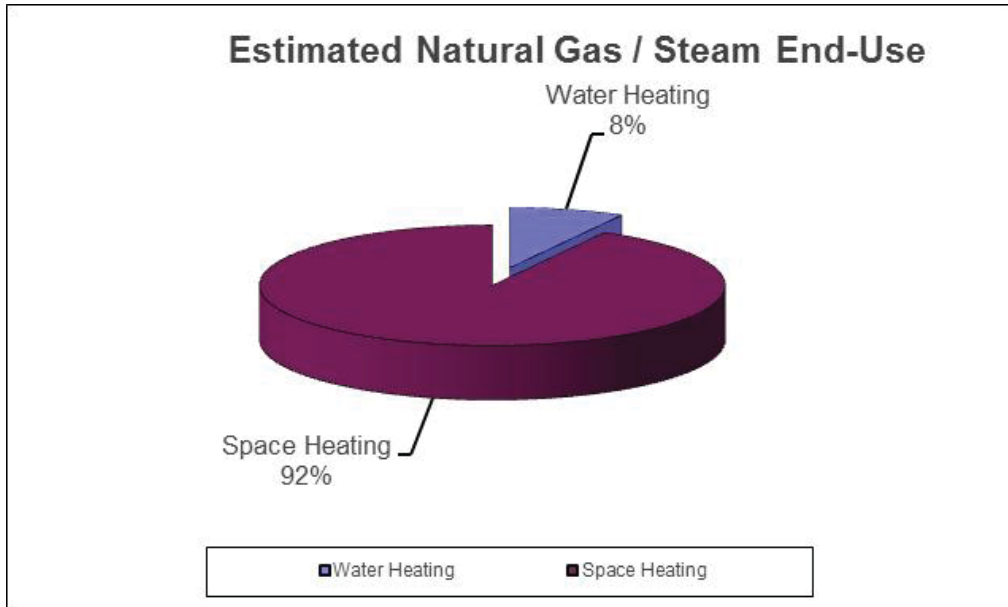
This chart is an estimate based upon data taken from the facility on the day of the audit, the utility bills and typical energy consumption of similar facilities.

Included with the energy usage data supplied by the sub-meters was a small amount of natural gas usage (about 40 therms per year of usage). While the HVAC equipment receives heating from steam, it is possible that there is a small kitchen or appliance that uses gas in the building.

One Year of Steam Consumption - July 2010 - May 2011

Month	Days	Total Energy	Total Cost
		lbs Steam	\$
Jul	28	651,960	\$11,582
Jul	31	718,800	\$12,756
Aug	30	715,640	\$12,700
Sept	30	921,640	\$16,319
Oct	31	1,421,020	\$25,090
Nov	30	1,660,160	\$29,291
Dec	31	1,516,980	\$26,776
Jan	29	1,619,540	\$28,577
Feb	30	1,250,380	\$22,093
Mar	31	1,165,680	\$20,605
Apr	30	934,080	\$16,537
May	31	764,880	\$13,565
<b>Total</b>	<b>362</b>	<b>13,340,760</b>	<b>\$235,890</b>
Avg.	30	1,111,730	\$19,658





This chart is an estimate based upon data taken from the facility on the day of the audit, the utility bills and typical energy consumption of similar facilities (CBECS 2003).

## Benchmarking Results

For comparison between the North Classroom and other similar buildings, an Energy Use Index (EUI) was calculated. This facility used 113 kBtu per square foot per year, based upon the past year of utility data. The national average EUI for College/University buildings is 108 kBtu per square foot per year, from the 2003 Commercial Building Energy Consumption Survey (CBECS). This facility's EUI is above the 51<sup>st</sup> percentile for facilities similar to it. This means that it consumes more energy per square foot than 51% of the facilities of this building type that participated in the survey for CBECS.



## Energy Conservation Opportunity Analysis

Table 2 below describes recommended energy conservation opportunities (ECOs), for which costs, savings, rebates, and paybacks are calculated.

**Table 2: Summary of Energy Conservation Opportunities**

Energy Conservation Opportunity	Estimated Demand Savings (kW)	Estimated Energy Savings (kWh)	Estimated Steam Savings (MLbs)	Estimated Annual Cost Savings (\$)	Estimated Capital Cost (\$)	Simple Payback (Years)	Estimated Xcel Energy Incentives (\$)
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### Opportunity 1 – Hot Water Pump Summer Shutdown

There are di-electric unions located throughout the heating hot water piping loops in the North Classroom building. These unions currently do not have proper fitting and will leak if the water in the pipes is lower than 140°F. This results in the two 15 HP hot water pumps having to circulate hot water throughout the building year-round, even during the cooling season. Building management has planned to replace all the di-electric unions with proper fitting units by June 15, 2012. Once these unions are replaced, it is recommended that the hot water pumps be shut down during the cooling season.

The summary of the costs, savings, and paybacks for this ECO are given in Table 2. The assumptions that were included in this analysis are listed below:

- Cooling season ranges from June through September
- 80% average load factor

### Opportunity 2 – AHU Scheduling

The current HVAC schedule for the ten AHUs and two MAUs at the North Classroom on average is from 5:30 am – 10:00 pm, 7 days per week. Regular occupancy hours for the facility are Monday through Friday from 6:30 am – 11:00 pm and from 7:00 am – 8:00 pm on the weekends. Reducing the daily HVAC schedule for the RTUs by half an hour in the morning and 2 hours in the evening to 6:00 am – 8:00 pm during the weekends would result in significant energy savings. This schedule could be easily programmed using the existing BAS. For work that may be done after hours it is recommended to install override timers for each zone that will automatically revert back to unoccupied mode after a set amount of time (e.g., 1 or 2 hours). It is critical if override timers are installed that they are mounted in a central location that building occupants have access to and the occupants are educated on their location and purpose. This will ensure that only the spaces being used will receive heating or cooling and only the AHUs required will turn on.

The summary of the costs, savings, and paybacks for this ECO are given in Table 2. The following assumptions were considered in this analysis:

- 0.55 kW/ton used as average chiller efficiency
- 1 CFM / sq. ft. based on design cooling load
- Cost of override timers not included with cost estimate
- Cost of programming BAS: \$200 (2 hours at \$100/hour)

Opportunity 3 – Install Tankless Water Heaters

During the walk-through, a 1,500 gallon water holding tank was observed. This water is heated by a steam-to-water heat exchanger along with condensate from the heating hot water system. The water from this tank supplies hot water to sinks throughout the building. For the current usage of primarily sink hot water (i.e., no showers/locker rooms), this tank is oversized and uses large amounts of energy maintaining its holding temperature. It is recommended that aerators be installed on all restroom sinks that reduce the water flow to 0.5 gallons-per-minute (GPM) and that instantaneous tankless water heaters replace the existing domestic hot water system. Installation of the natural gas tankless water heaters will decrease the amount of steam usage by the facility because it will not continuously use steam to heat the water on standby.

The summary of the costs, savings, rebates, and paybacks for this ECO are given in Table 2. The savings are associated with the installation of natural gas tankless water heaters. The costs do not include the installation of a flue or natural gas line for each heater. However, electric, tankless water heaters could also be installed if natural gas water heaters are cost prohibitive. The following assumptions were considered in this analysis:

- Costs
  - \$430/ heater
  - 30% labor charge

Opportunity 4 – Lighting Controls

It was observed during the walk-through that nearly all lighting circuits in the individual rooms are controlled by manual switches. It is recommended that switch mounted occupancy sensors be installed in areas where employees or students may forget to turn off lights such as offices, conference rooms and break-rooms and ceiling mounted occupancy sensors be installed in the restrooms. Occupancy sensors automatically turn on lights when occupancy is detected and shut them off after a pre-programmed period of inactivity. Most occupancy sensors use one of two technologies, ultrasonic or infrared. Infrared sensors detect emitted heat sources and ultrasonic sensors read sound patterns of a room and react to changes in the returned signal. Infrared sensors are recommended for the offices, conference rooms, and break-rooms where switches have ‘line-of-sight’ visibility to occupants. In rooms where occupants may be obscured from the occupancy sensor, such as restrooms, dual technology sensors are recommended. Dual technology sensors rely on both infrared and ultrasonic sensors to determine space occupancy.

Table 3 below shows the spaces in the building where occupancy sensors are recommended and the values used in the energy savings calculations. The quantity of rooms and fixtures per room were estimated based off floor plans of the facility.

**Table 3: Scope of Occupancy Sensor Controls ECO**

Qty	Location Type	Controlled Fixtures	Type of Sensor	Fixtures per Room
353	Private Room/Office	2-lamp, 4-foot, 32-Watt T8	Wall-Mounted	2
28	Restroom	2-lamp, 4-foot, 32-Watt T8	Ceiling-Mounted	2

The North Classroom building has several large windows along the perimeter of the building. On clear days, these windows would provide enough natural light that the lamps in those areas would not have to be turned on. These luminaires could be controlled to turn on only when the lighting level is below a certain point through the use of photocells. The portions of the building that were identified as good locations for active daylighting controls were the first floor atrium and the fourth and fifth floor corridors. In speaking with building management, the first floor atrium already has daylight control capabilities, but during the time of the walk-through, the lights were on while there was plenty of natural light coming through the large windows.

Xcel Energy offers a prescriptive rebate of \$30 per wall-mounted occupancy sensor or photocell and \$50 for each ceiling-mounted occupancy sensor.

Table 4 shows the spaces in the building where daylight control sensors are recommended and the values used in the energy savings calculations. The quantity of fixtures in the corridors was estimated based off floor plans of the facility.

**Table 4: Scope of Daylight Controls ECO**

Location Type	Controlled Fixtures	Type of Sensor (Qty)	Number of Fixtures
Atrium	104-Watt Induction	Photocell (2)	29
Atrium	52-Watt Induction	Photocell (2)	73
Atrium	82-Watt Induction	Photocell (2)	158
Atrium	208-Watt Induction	Photocell(2)	21
Corridors	18-Watt CFL	Photocell (4)	132

The summary of the costs, savings, rebates, and paybacks for this ECO are given in Table 2. Please note that the estimated costs and rebates include the installation of photocells in the atrium, which may not be required if the lighting already has sensors. If no installation is required, the payback will become shorter. The other assumptions that were included in this analysis are listed below:

- 30% reduction in annual operating hours for occupancy sensors
- 25% reduction in annual operating hours for daylight controls
- Interactive heating and cooling gas and electricity savings were included
- Annual baseline operating hours
  - Private rooms, offices and restrooms: 5,616 hours
  - Corridors/Atrium: 8,760 hours

#### Opportunity 5 – Vending Misers

Vending machines are typically operational for 24 hours a day, regardless of the presence of any nearby occupants. Vending machine controllers act like occupancy sensors which cycle off the vending machine when the nearby space is unoccupied. Energy savings are seen from shutting off lights and reduced usage of the compressor. Vending machine controls cycle the compressor on periodically, even in the absence of employees, to ensure that the beverages remain cool.

The summary of the costs, savings, rebates, and paybacks for this ECO are given in Table 2. The exact number of vending machines in the building was not determined during the walk-through, so the values reflect the savings associated with controlling one beverage machine and one snack machine. The assumptions that were included in this analysis are listed below:

- High traffic area
- 900 kWh/year savings for beverage
- 300 kWh/year savings for Snack
- Cost includes 3 hours of labor per unit

### **Strategic Opportunity Analysis**

In addition to the Energy Conservation Opportunities described and evaluated in the previous section, there were also other energy related measures that were identified during our audit. These energy measures were not fully evaluated as Energy Conservation Opportunities for one of several reasons: 1) they are outside the scope of a walk-through analysis, 2) there was not enough information to estimate or evaluate the recommendations 3) the measures may not be desirable presently, but should be considered in the future, 4) the measures are already completely or partially being done and should continue as regular practice. These recommended measures should be considered as part of the facility's future energy efficiency plan.

#### Opportunity 6 – Install Flat Plate Heat Exchanger

It is recommended that the option of water-side economizing be explored in the North Classroom. This efficiency option takes full advantage of the cooling tower, when the outside air wetbulb temperature is suitable, by foregoing additional use of the chiller and directly circulating water cooled by the cooling tower. The energy savings are realized due to reducing the chiller's run-time. In order to utilize water-side economizing at the North Classroom, a flat plate heat exchanger would need to be installed, connecting the chilled water and condenser water loops to bypass the chiller. Diverting valves would also have to be installed allowing the chiller to be bypassed. The flat plate heat exchanger would operate during periods where the outside wet bulb temperature is low enough that the cooling tower can supply sufficiently cool water to the building's cooling system. Along with appropriate valves, the flat plate heat exchanger should be piped in series with the chilled water return to allow the chilled water return to be pre-cooled when the chiller is on and the wetbulb temperature is low. Using the water-side economizer in conjunction with the direct evaporative cooling already present in the building would extend the use of the direct evaporative coolers (i.e., indirect/direct evaporative cooling), further reducing chiller run time. Through proper use of water-side and air-side economizing, along with the evaporative coolers, the chiller run-time could be drastically reduced at the North Classroom.

#### Opportunity 7 – Add Split System to 5<sup>th</sup> Floor Server Room

RTU-1 is a 20 ton unit with direct expansion (DX) cooling and a hot water heating coil that was recently added to supply conditioned air to the 5<sup>th</sup> floor computer lab and a small server room. Due to the heating load produced by the server room, this RTU has to be running 24/7 to keep the room cool. There could be significant energy savings realized by adding a small split system unit to provide the cooling for the server room only. This split system unit would be more appropriately sized to reject the heat in the server room and would allow the RTU to be scheduled off during unoccupied hours.

#### Opportunity 8 – Retro-commission the HVAC System

Retro-commissioning is an economical way to “tune-up” your HVAC and lighting controls systems, both by making easy on-site adjustments of the current equipment and possibly suggesting other larger capital improvements that will help save energy.

The HVAC systems at the North Classroom facility consist of ten AHUs, two MAUs and one RTU, served by a chiller located within the facility and Denver's district steam system. Retro-commissioning of a complicated HVAC facility like this is highly recommended to validate the intended operation of each aspect of the system. Retro-commissioning would involve some or all of the following items:

- 1) The HVAC system is air and water balanced,
- 2) A discharge air temperature reset is being utilized,
- 3) Lower the domestic hot water temperature,
- 4) Static pressure reset on the VAV AHUs
- 5) Enabling a hot water water reset,
- 6) Chiller plant optimization,
- 7) Equipment schedules are appropriate,

**An unbalanced system** will provide either too much or too little air to the areas served by the airside and waterside systems. This can be the result of incorrect static pressure set-points, frozen dampers, inoperable actuators/controls, damaged ductwork, blocked ductwork, space uses or loads change over time, and/or inoperable valves. It usually results in over/under heating and cooling and unnecessary energy use. It is recommended to set the building static pressure as close to 1.0 in. w.g. as possible. The static pressure readings of several of the AHUs (101C and 101D) were significantly greater than 1.0 in. w.g. It is recommended that these set points be reduced to values closer to 1.0 in. w.g. or see Static Pressure Reset discussion below.

**The discharge air temperature (DAT)** setting influences the operation of the airside economizer and comfort of the building in general. Currently this is set near 55°F which is the typical set point to which most HVAC systems are designed around. There can be energy savings realized, however, by resetting this temperature with relation to the return air temperature. As the seasons change and the outside air temperature drops in the fall, winter and spring, the DAT can be reset to a higher temperature. This can be done by resetting the DAT based off of return air temperature (RAT). When the RAT is 75°F set the DAT to 55°F and when the RAT is 70°F reset the DAT to 65°F, all values in between are scaled linearly.

**The domestic hot water** is currently set to be heated to 140°F. If the tankless water heater recommendation described above is not implemented, this temperature can be decreased. When a domestic hot water heater is only supplying water to sinks, with no commercial kitchens, it is recommended that the hot water temperature at the sink be set to around 120°F. Retro-commissioning would determine the optimal temperature to heat the water in the holding tank in order to supply the sinks with 120°F water.

Implementing a **static pressure reset** strategy for the VAV AHUs, would minimize the amount of flow necessary to each zone and save fan energy. This would involve the use of a dynamic trim and respond strategy implemented using the BAS to reset the static pressure delivered to each zone based off temperature need.

**The heating hot water set point** is currently set to 160°F. This set point is a reasonable supply temperature and should be maintained whenever the outside air temperature is below 20°F. However, this set point should be linearly adjusted or reset from 160°F to 120°F whenever the outside air temperature is between 20°F and 50°F. The boiler should also be turned off completely when the outside air temperature is above 65°F or 60°F, if possible.

The **chiller plant** should be optimized. There is currently a condenser water reset programmed into the cooling tower sequence based off the outside air wetbulb temperature. Ensuring this reset is working properly and optimizing its schedule would result in the coldest condenser water temperature entering the chiller, therefore minimizing its energy use. The chiller plant is currently enabled at an outside air temperature of 50°F. This lockout could be raised to a temperature close to 60°F, enabling the chiller to be used less frequently.

**Equipment operation** should be limited to only when it is needed. Some equipment, like exhaust fans, run all night and on the weekends which may be unnecessary. Limiting the operation during unoccupied hours will save unnecessary energy consumption. Checking to make sure that the settings for unoccupied times are correct will limit the HVAC system to running only when needed. The schedules of the VAV fan-powered boxes, AHUs, MAUs and the RTU should also be optimized. AHUs 1, 2 and 3 were observed running at nearly 100% supply fan speed during the walk-through when the outside air temperature was in the 70s (i.e., mild conditions). According to the BAS these units were supposed to be in economizer mode. These units may have been running due to the static pressure setpoint being too high or other issues with the terminal unit dampers. Proper operating and scheduling of the equipment modes would also be included in a retro-commissioning study.

Retro-commissioning the HVAC system may qualify for a rebate from Xcel Energy's Recommissioning Program. Xcel provides a rebate for up to 75% of the cost of a recommissioning study, up to \$25,000, for buildings greater than 50,000 SF. They also provide energy incentives to offset the implementation costs, once the measures are implemented and verified.

#### Opportunity 9 – Computer Energy Conservation

The North Classroom contains several computer labs that do not shut down during periods of no occupancy, which was observed during the walk-through. Computers are large energy users in buildings today. There are many things that can be done to reduce the energy consumption of computers during the day. Enabling the “Turn Off Monitor”, “Sleep” and “Hibernate” functions during the day and shutting down the computer at night are simple ways to reduce computer energy consumption. A screen saver does not save energy because the monitor is still operating.

If it is difficult to utilize these computer settings throughout the building, there are also network software programs that can monitor and control the energy usage of all networked computers. These programs typically have a low cost and a short payback. Implementing the network software may be eligible for an Xcel rebate through the Custom Efficiency Program.

Another energy saving measure is to replace cathode ray tube (CRT) monitors with liquid crystal display (LCD) monitors. CRT monitors use anywhere from 100-120 watts while LCD monitors use 30-45 watts.

#### Opportunity 10 – Zone Occupancy Sensors on Terminal Units

Due to the large size of the North Classroom Building, there are many terminal units located throughout the facility. These units are controlled by the temperature set points that each zone is calling for, regardless of occupancy. Individual terminal units could be disabled through the use of occupancy sensors that could also be integrated into the lighting system. It is recommended that during periods of no occupancy detected by the occupancy sensor, the terminal unit disables and allows the actual temperature to set back 4-5°F. This would yield energy savings while not adversely affecting occupant comfort.

#### Opportunity 11 – Familiarization with Rebate Programs

It is recommended that staff at AHEC familiarize themselves with all of the rebate programs available to them through Xcel Energy. These rebate programs are designed to reduce the capital cost required to install high-efficiency equipment, reduce paybacks, and make energy-efficiency a more attractive proposition. Additionally, changes in market forces cause rebate programs to constantly shift their requirements and incentive levels. It is recommended that AHEC keep up to date with current program offerings so that economic and purchasing decisions can be made in an educated manner. More information about programs offered by Xcel Energy can be found on their website at:

[www.xcelenergy.com](http://www.xcelenergy.com)

## Payment Options

In addition to the energy conservation measures we recommend in this energy assessment, Xcel Energy offers cash rebates and a variety of payment and billing programs to better manage your cash flow.

*BillWise* from Xcel Energy<sup>SM</sup> programs include payment options like:

- Auto Pay – a simple and convenient way to have monthly energy payment automatically withdrawn from a bank account on the day it is due.
- EFT (Electronic Funds Transfer) – allows simplification of the bill paying process and improving cash management by directly transferring money from your account to Xcel Energy.
- Pay By Phone – allows quick and secure transfer of energy payment from a bank account directly to Xcel Energy, right over the phone, at no cost.
- Credit/Debit Cards Payments – allows payment of energy bill online or by phone using a credit or debit card for a small fee.

The Billing options include – EDI (Electronic Data Interchange) which allows receipt of your energy bill electronically the day after the billing cycle is complete. More information on all these programs can be obtained by discussing eligibility requirements with your Xcel Energy representative. You also can call the Business Solution Center at 1-800-481-4700 or visit us at [xcelenergy.com](http://xcelenergy.com) for more information about qualifying for cash rebates, discount rates or billing/payment options.

## Glossary

The following definitions will help you understand the information and how it relates to your energy bills.

Actual Demand is the highest average 15 minutes of demand over a billing period.

Billed Demand is the actual demand plus the adjusted demand for power factor correction.

A CCF is 100 cubic feet of natural gas. A therm is a unit of energy equivalent to 100,000 BTU. For the purposes of measuring energy use, a therm and a CCF of natural gas are equivalent.

Load Factor is a measure of efficiency. Load factor is the ratio of average load in kilowatt supplied during a designated period to the peak load occurring that period.

$$\text{Load Factor} = \frac{\text{kWh supplied in a period}}{\text{Peak kW in a period} \times \text{Hours in a Period}}$$

An Energy Conservation Opportunity is an energy saving measure that was evaluated with estimated costs, savings, rebates, and simple payback.

Strategic Opportunities are recommended measures that were not fully evaluated for this report.

D. Original Program Plan Estimate

CC-C: CAPITAL CONSTRUCTION REQUEST FOR FY 2014-15								
Agency or Institution:		University of Colorado Denver		Signature Department or Institution Approval:		Date		
Project Title:		North Classroom Building Renovation		Signature CCHE Approval:		Date		
Project Year(s):		FY 2014-15		Signature OSPB Approval:		Date		
Agency or Institution Priority Number:		2		Name and e-mail address of preparer:		Mark Berthold mark.berthold@ucdenver.edu		
Revision? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	If yes, last submission date:	Total Project Costs	Total Prior Year Appropriations	Current Request FY 2014-15	Year 2 Request	Year 3 Request	Year 4 Request	Year 5 Request
<b>A. Land Acquisition</b>								
(1)	Land/Building Acquisition	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
<b>B. Professional Services</b>								
(1)	Master Plan/PP	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
(2)	Site Surveys, Investigations, Reports	\$ 25,000	\$ -	\$ 25,000	\$ -	\$ -	\$ -	\$ -
(3)	Architectural/Engineering/ Basic Services	\$ 1,043,009	\$ -	\$ 1,043,009	\$ -	\$ -	\$ -	\$ -
(4)	Code Review/Inspection	\$ 25,000	\$ -	\$ 25,000	\$ -	\$ -	\$ -	\$ -
(5)	Construction Management	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
(6)	Advertisements	\$ 2,000	\$ -	\$ 2,000	\$ -	\$ -	\$ -	\$ -
(7a)	Inflation for Professional Services	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
(7b)	Inflation Percentage Applied		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
(8)	Other (LEED Consultant)	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
(9)	Total Professional Services	\$ 1,095,009	\$ -	\$ 1,095,009	\$ -	\$ -	\$ -	\$ -
<b>C. Construction or Improvement</b>								
(1)	Infrastructure	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	(a) Service/Utilities	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	(b) Site Improvements	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
(2)	Structure/Systems/ Components	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	(a) New (GSF):	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	New \$ /GSF							
	(b) Renovate 58,250 GSF:	\$ 5,668,740	\$ -	\$ 5,668,740	\$ -	\$ -	\$ -	\$ -
	Renovate \$ 97 / GSF							
(3)	Other (Security)	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
(4)	High Performance Certification Program	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
(5a)	Inflation for Construction	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
(5b)	Inflation Percentage Applied		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
(6)	Total Construction Costs	\$ 5,668,740	\$ -	\$ 5,668,740	\$ -	\$ -	\$ -	\$ -
<b>D. Equipment and Furnishings</b>								
(1)	Equipment	\$ 890,000	\$ -	\$ 890,000	\$ -	\$ -	\$ -	\$ -
(2)	Furnishings	\$ 1,346,000	\$ -	\$ 1,346,000	\$ -	\$ -	\$ -	\$ -
(3)	Communications	\$ 787,000	\$ -	\$ 787,000	\$ -	\$ -	\$ -	\$ -
(4a)	Inflation on Equipment and Furnishings	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
(4b)	Inflation Percentage Applied		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
(5)	Total Equipment and Furnishings Cost	\$ 3,023,000	\$ -	\$ 3,023,000	\$ -	\$ -	\$ -	\$ -
<b>E. Miscellaneous</b>								
(1)	Art in Public Places=1% of State Total Construction Costs (see SB 10-94)	\$ 35,000	\$ -	\$ 35,000	\$ -	\$ -	\$ -	\$ -
(2)	Annual Payment for Certificates of Participation	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
(3)	Relocation Costs	\$ 113,375	\$ -	\$ 113,375	\$ -	\$ -	\$ -	\$ -
(4)	Other Costs [TAP fees]	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
(5)	Other Costs [specify]	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
(6)	Other Costs [specify]	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
(7)	Other Costs [specify]	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
(8)	Total Misc. Costs	\$ 148,375	\$ -	\$ 148,375	\$ -	\$ -	\$ -	\$ -
<b>F.</b>	<b>Total Project Costs</b>	\$ 9,935,124	\$ -	\$ 9,935,124	\$ -	\$ -	\$ -	\$ -
<b>G. Project Contingency</b>								
(1)	5% for New	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
(2)	10% for Renovation	\$ 993,512	\$ -	\$ 993,512	\$ -	\$ -	\$ -	\$ -
(3)	Total Contingency	\$ 993,512	\$ -	\$ 993,512	\$ -	\$ -	\$ -	\$ -
<b>H.</b>	<b>Total Budget Request [F+G(3)]</b>	\$ 10,928,636	\$ -	\$ 10,928,636	\$ -	\$ -	\$ -	\$ -
<b>I. Source of Funds</b>								
	CCF	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	CF	\$ 10,928,636	\$ -	\$ 10,928,636	\$ -	\$ -	\$ -	\$ -
	RF	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	FF	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -