CAPITOL COMPLEX MASTERPLAN | DENVER, COLORADO

04

Facility Assessments

4.1 - Methodology

The facility assessments provide Findings & Recommendations (F&R) for the Capitol Complex Buildings and Camp George West site. The reports include a description and evaluation of the existing conditions, recommendations, and cost estimates for the recommended work from the following focus areas: architecture, structural, civil, mechanical/electrical/plumbing, voice and data/security and historical. The project team reviewed existing building documentation, drawings, and audit reports provided by the State, and conducted site visits to identify and document the observable existing conditions of the buildings and Camp George West site and the code and life safety issues.

The buildings were in fair to poor condition. The following table identifies the buildings with the greatest deficiencies as well as the top five major deficiencies within each building managed by Capitol Complex Facilities. The FCI (Facilities Condition Index), as audited by the state, is also shown for reference. The FCI is a numerical representation of the condition of a facility on a scale of 1 to 100, with 1 being the lowest. The date of the most recent FCI audit is indicated.

This chapter includes abridged facility assessments. Complete assessments are included as Appendix 4 - Comprehensive Facility Assessments.

Definitions

1. Life Safety (LS)
2. Loss of Use/Reliability (LOU)
3. Finishes (F)
4. Fair – usable but in serious need of repair
5. Poor – urgent need of repair, or life safety and/or loss of use/reliability issues could result

4.2 - Facility Assessment & Priorities Summary

CAPITOL COMPLEX PRIORITY	LOCATION	GENERAL BUILDING CONDITION	FACILITIES CONDITION INDEX (FCI)	BUILDING PRIORITY ITEMS
1	**Capitol Annex Building** (1375 Sherman, Denver)	Poor	36.35 (10/2009)	**1. Total gut and renovation back to core shell** (LS, LOU, F) 2. Asbestos abatement (LS, LOU) 3. Replace all electrical (LS, LOU) 4. Convert steam heat to hot water (LOU) 5. Replace all plumbing piping (LS, LOU)
2	**Centennial Building** (1313 Sherman, Denver)	Poor	53.14 (2/2011)	**1. Total gut and renovation back to core shell** (LS, LOU, F) 2. Replace fire alarm (LS) 3. Replace all HVAC, add stair pressurization (LS, LOU) 4. Replace roof (LOU) 5. Replace all plumbing piping (LS, LOU)
3	**1570 Grant Building** (1570 Grant, Denver)	Fair	60.07 (9/2010)	**1. Modernize elevators (LS)** 2. Replace windows (LOU) 3. Modify fire sprinkler system (LS) 4. Replace HVAC (LOU) 5. Replace AHU system in basement (LOU)
4	**North Campus West Bldg.** (1001 E. 62nd, Denver)	Poor	39.78 (8/2012)	**1. Demolish the building structure and rebuild to suit.** OR, if the building cannot be demolished: **1. Fix/correct fuel testing room code issues (LS)** **2. Fix/correct printer room code issues (LS)** 3. Replace fire alarm/install fire sprinkler system (LS) 4. Replace roof and add fall protection (LS, LOU) 5. Replace HVAC (LOU)
5	**1881 Pierce Building** (1881 Pierce, Lakewood)	Fair	61.51 (12/2010)	**1. Modify fire sprinkler system to floor 1 (LS)** 2. ADA upgrades (LS) 3. Repair/replace site paving (LS, LOU) 4. Asbestos assessment and abatement (LOU) 5. Replace HVAC system (LOU)

State Office Building (201 E. Colfax, Denver)	Fair	69.02 (9/2007)	1. Replace fire sprinkler piping (LS) 2. Provide fall protection at roof (LS) 3. Replace north chiller (LOU) 4. Replace windows (LOU) 5. Replace/repair exterior sealant & grout (LOU)
Legislative Services Building (200 E. 14th, Denver)	Fair	54.12 (5/2012)	1. Add panic devices on alley gates to allow exit to public way (LS) 2. Upgrade fire alarm (LS) 3. FL 3 Hearing Rm: need fire rated wall & change door swing (LS) 4. Replace windows & exterior doors (LOU) 5. Replace electric panel boards, past useful life (LOU)
Human Services Building (1575 Sherman, Denver)	Fair	60.27 (1/2013)	1. Replace engine generator (LS) 2. Replace electrical panels & receptacles (LS, LOU) 3. Accessibility upgrades (LS) 4. Replace roof (LOU) 5. Light fixture & control upgrade (LOU)
State Services Building (1525 Sherman, Denver)	Fair	69.77 (10/2012)	1. Replace fire alarm (LS) 2. Replace engine generator (LS) 3. Insulate exterior walls (LOU) 4. Replace roof (LOU) 5. Repair/replace exterior sealant (LOU)
Power Plant Building (1341 Sherman, Denver)	Fair	60.98 (4/2012)	1. Install a full fire alarm & detection system through out (LS) 2. Install fall protection (LS) 3. Replace all panel boards & receptacles over 25 years old (LS, LOU) 4. Repair exterior walls & window leaks (LOU) 5. Replace lighting (LOU)
Dale Tooley Building (690 Kipling, Lakewood)	Fair	64.71 (3/2010)	1. Replace fire alarm (LS) 2. Modernize elevator (LS) 3. Total redo of data center UPS (LOU) 4. Add electrical capacity (LOU) 5. Replace windows (LOU)
700 Kipling Building (700 Kipling, Lakewood)	Fair	69.92 (6/2010)	1. Upgrade fire alarm (LS) 2. Elevator modernization (LS) 3. Replace roof (LOU) 4. HVAC upgrade (LOU) 5. Repair exterior wall & window leaks (LOU)
State Capitol (200 E. Colfax, Denver)	Fair	44.47 (10/2009)	1. Replace roof (LOU) 2. Repair short tunnel roof/structural (LS) 3. Windows & façade restoration/repair (LOU) 4. Plumbing system repair/replacement (LOU) 5. Site repair: sidewalk, paving & drainage (LS, LOU)
North Campus North Bldg. (6321 N. Downing, Denver)	Poor	48.74 (8/2012)	1. Demolish the original building structure and rebuild to suit. <u>OR, if the building cannot be demolished:</u> 1. Add fire sprinkler system (LS) 2. Replace fire alarm (LS) 3. Replace roof and add fall protection (LS, LOU) 4. Upgrade lights (LOU) 5. Replace original building skin, doors, and windows (LOU)
North Campus East Bldg. (6221 N. Downing, Denver)	Poor	53.57 (8/2012)	1. Demolish the building structure and rebuild to suit. <u>OR, if the building cannot be demolished:</u> 1. Replace roof and add fall protection (LS, LOU) 2. Replace windows (LOU) 3. Add lighting controls (LOU) 4. Repair/replace sealant (LOU) 5. Repair/replace asphalt (LS, LOU)
Executive Residence (400 E. 8th, Denver)	Fair Fair	51.65 (12/2011) 69.13 (Carriage House 3/2012)	1. Replace electric panel boards & wiring past useful life (LS, LOU) 2. Rebuild brick wall adjacent to visitor center (LS) 3. Repair drainage problems (LOU) 4. Re-tuck point stone and brick (F) 5. Replace roof (LOU)
G. J. State Services Building (222 S. 6th, Grand Junction)	Fair	57.32 (4/2011)	1. Repair/replace parking lots/sidewalks (LS, LOU) 2. Replace roof (LS, LOU) 3. Replace condensing unit (LOU) 4. Upgrade lighting/add more controls (LOU) 5. Replace waterproof membrane at berm/building (LOU)
Camp George West Site (15000 S. Golden, Pleasant View)	Poor	None	1. Assessment of underground utilities (LOU) 2. Add additional site lighting (LS) 3. Repair/replace broken & cracked concrete on site (LS, LOU) 4. Drainage improvements (LOU) 5. Repair/replace site asphalt (LS, LOU)

4.3 - Facility Overviews

4.3.1 CAPITOL ANNEX BUILDING

1375 SHERMAN STREET (DENVER)

Building Area: 114,228 GSF

Constructed: 1937

Remodeled: N/A

Acquired: N/A

Agency Tenants:

- Department of Revenue

FCI: 36.35/100.00, 10/2009

Cost to Remodel:

- If all recommendations in the facility assessment are implemented as a single project, including the top five priorities, the cost estimate is: $22,321,671.
- If all recommendations in the facility assessment are implemented system by system as multiple projects, including the top five priorities (systems), the cost estimate is: $22,688,430.

Five Major Deficiencies:

1. Total gut and renovation of the building back to the core shell, with the exception of the historically-protected areas outlined in the facility assessment, including, but not limited to, the replacement of all windows and converting steam heat to hot water. This would provide an effective approach for abating all asbestos, replacing all of the aged electrical systems, replacing all of the old plumbing piping, and providing a more efficient layout. These recommendations encompass life safety, loss of use/reliability, finishes, and overall energy efficiency issues. Cost Estimate: $22,321,671.
2. Asbestos abatement. This recommendation encompasses life safety and loss of use/reliability issues. Cost estimate: $710,767.
3. Replace all electrical. This recommendation encompasses life safety and loss of use/reliability issues and is due to electrical code issues including an inadequate service load capacity. Cost estimate: $3,202,081
4. Convert steam heat to hot water. This recommendation encompasses loss of use/reliability and overall energy efficiency issues and is due to the inability to maintain a consistent comfortable working temperature within the building. Cost estimate: $5,434,187.
5. Replace all plumbing piping. This recommendation encompasses life safety and loss of use/reliability issues and is due to plumbing code issues as well as ongoing maintenance efforts. Cost estimate: $2,899,510.

NOTE: All of the above costs are in 2014 dollars and should be escalated to the year construction will occur.

4.3.2 CENTENNIAL BUILDING

1313 SHERMAN STREET (DENVER)

Building Area: 207,091 GSF

Constructed: 1976

Remodeled: N/A

Acquired: N/A

Agency Tenants:

- Department of Local Affairs
- Department of Natural Resources
- Department of Personnel & Administration (Archives)

FCI: 53.14/100.00, 2/2011

Cost to Remodel:

- If all recommendations in the facility assessment are implemented as a single project, including the top 5 priorities, the cost estimate is: $34,212,015.
- If all recommendations in the facility assessment are implemented system by system as multiple projects, including the top five priorities (systems), the cost estimate is: $34,482,015.

Five Major Deficiencies:

1. Total gut and renovation back to core shell, including, but not limited to, replacing the roof, replacing the windows, replacing the aged fire alarm system and HVAC systems, adding stair pressurization for life safety, installing energy saving lighting, adding insulation to the exterior walls, and providing a more efficient layout. These recommendations encompass life safety, loss of use/reliability, finishes, and overall energy efficiency issues. Cost estimate: $34,212,015.
2. Replace fire alarm. This recommendation encompasses life safety issues and is due to fire protection code issues and the age of the system. Cost estimate: $291,541.
3. Replace all HVAC, add stair pressurization. This recommendation encompasses life safety issues and overall energy efficiency issues and is due to the age of the HVAC systems and to fire protection code issues. Cost estimate: $9,839,947.
4. Replace roof. This recommendation encompasses loss of use/reliability issues and is due to the age of the roof. Cost estimate: $301,539.
5. Replace all plumbing piping. This recommendation encompasses life safety and loss of use/reliability issues. Cost estimate: $2,722,582.

NOTE: All of the above costs are in 2014 dollars and should be escalated to the year construction will occur.

4.3.3 1570 GRANT BUILDING

1570 GRANT STREET (DENVER)

Building Area: 47,749 GSF

Constructed: 1956

Remodeled: N/A

Acquired: 2001

Agency Tenants:

- Department of Health Care Policy & Financing

FCI: 60.07/100.00, 9/2010

Cost to Remodel:

- If all recommendations in the facility assessment are implemented as a single project, including the top five priorities, the cost estimate is: $5,573,428.
- If all recommendations in the facility assessment are implemented system by system as multiple projects, including the top five priorities (systems), the cost estimate is: $5,643,711.

Five Major Deficiencies:

1. Modernize elevators. This recommendation encompasses life safety issues and is due to the age of the elevator systems. Cost estimate: $71,420.
2. Replace windows. This recommendation encompasses loss of use/reliability issues and overall energy efficiency issues and is due to the age and condition of the windows. Cost estimate: $1,133,406.
3. Modify fire sprinkler system. This recommendation encompasses life safety issues and is due to egress issues from the building and fire protection code issues. Cost estimate: $545,534.
4. Replace HVAC. This recommendation encompasses loss of use/reliability issues and overall energy efficiency issues and is due to the age of the HVAC systems. Cost estimate: $1,900,098.
5. Replace AHU system in basement. This recommendation encompasses loss of use/reliability issues and overall energy efficiency issues and is due to the age of the system. Cost estimate: $294,642.

NOTE: All of the above costs are in 2014 dollars and should be escalated to the year construction will occur.

4.3.4 NORTH CAMPUS WEST BUILDING

1001 EAST 62ND AVENUE (DENVER)

Building Area: 37,763 GSF

Constructed: 1968

Remodeled: N/A

Acquired: 1976

Agency tenants:

- Department of Personnel & Administration (Division of Central Services)

FCI: 39.78/100.00, 8/2012

Costs to Remodel:

- If all recommendations in the facility assessment are implemented as a single project, including the top five priorities, the cost estimate is: $4,939,494.
- If all recommendations in the facility assessment are implemented system by system as multiple projects, including the top five priorities (systems), the cost estimate is: $5,469,429.

Five Major Deficiencies:

1. Correct fuel testing room code issues. This recommendation encompasses life safety issues and is related to the hazardous materials stored and tested in the room and fire protection code and National Electrical Code issues. Cost estimate: $189,661.
2. Correct print shop code issues. This recommendation encompasses life safety issues and is due to the levels of paper dust accumulation throughout and fire protection code and National Electrical Code issues. Cost estimate: $202,396.
3. Replace fire alarm/install fire sprinkler system. This recommendation encompasses life safety issues and is due to the age of the fire alarm system and fire protection code issues related to the fuel testing room and print shop code issues. Cost estimate: $289,938.
4. Replace roof and add fall protection. This recommendation encompasses life safety and loss of use/reliability issues and is due to the age and condition of the roof and the fact that no fall protection is provided. Cost estimate: $565,523.
5. Replace HVAC. This recommendation encompasses loss of use/reliability issues and overall energy efficiency issues and is due to the age and condition of the HVAC system and the inability to maintain a consistent comfortable working temperature within the building. Also provide air distribution, as part of the overall project, in the main entrance and lobby spaces which currently use portable heaters to provide heat. Cost estimate: $687,552.

NOTE: All of the above costs are in 2014 dollars and should be escalated to the year construction will occur.

4.3.5 1881 PIERCE BUILDING

1881 PIERCE STREET (LAKEWOOD)

Building Area: 122,542 GSF

Constructed: 1972

Remodeled: N/A

Acquired: 1983

Agency Tenants:

- Department of Revenue

FCI: 61.51/100.00, 12/2010

Costs to Remodel:

- If all recommendations in the facility assessment are implemented as a single project, including the top five priorities, the cost estimate is: $9,583,603.
- If all recommendations in the facility assessment are implemented system by system as multiple projects, including the top five priorities (systems), the cost estimate is: $9,724,003.

Five Major Deficiencies:

1. Install fire sprinkler system throughout the first floor. This recommendation encompasses life safety issues and is due to egress and fire protection code issues. Cost estimate: $949,488.
2. Accessibility upgrades. This recommendation encompasses life safety issues and is due to a number of non-accessible drinking fountains and other non-accessible features found throughout the restrooms and break rooms. Cost estimate: $328,957.
3. Repair/replace site paving. This recommendation encompasses life safety issues and loss of use/reliability issues and is due to the overall deterioration of the site pavement which is creating a potential tripping hazard. Cost estimate: $2,830,816.
4. Asbestos assessment and abatement. This recommendation encompasses life safety issues. Cost estimate: $634,199.
5. Replace HVAC system. This recommendation encompasses loss of use/reliability issues and overall energy efficiency issues and is due to the age and condition of the HVAC system and the inability to maintain a consistent comfortable working temperature within the building. Cost estimate: $542,650.

NOTE: All of the above costs are in 2014 dollars and should be escalated to the year construction will occur.

4.3.6 STATE OFFICE BUILDING

201 EAST COLFAX AVENUE (DENVER)

Building Area: 78,115 GSF

Constructed: 1921

Remodeled: 1985

Acquired: N/A

Agency Tenants:

- Department of Education

FCI: 69.02/100.00, 9/2007

Cost to Remodel:

- If all recommendations in the facility assessment are implemented as a single project, including the top five priorities, the cost estimate is: $5,476,204.
- If all recommendations in the facility assessment are implemented system by system as multiple projects, including the top five priorities (systems), the cost estimate is: $5,724,206.

Five Major Deficiencies:

1. Replace fire sprinkler piping. This recommendation encompasses life safety issues and is due to the age of the fire sprinkler piping and fire protection code issues. Cost estimate: $782,031.
2. Provide fall protection at roof. This recommendation encompasses life safety issues and is due to code issues and the fact that inadequate fall protection is provided at the roof. Cost estimate: $26,857.
3. Replace north chiller. This recommendation encompasses loss of use/reliability and overall energy efficiency issues and is due to the current system's inability to meet the building load. Cost estimate: $613,487.
4. Replace windows. This recommendation encompasses loss of use/reliability issues and overall energy efficiency issues and is due to the age and condition of the windows. Cost estimate: $1,076,998.
5. Replace/repair exterior sealant and grout. This recommendation encompasses loss of use/reliability issues and is due to the overall deterioration of the sealant and grout which is creating access points by which water can penetrate the building envelope. Cost estimate: $80,342.

NOTE: All of the above costs are in 2014 dollars and should be escalated to the year construction will occur.

4.3.7 LEGISLATIVE SERVICES BUILDING

200 EAST 14TH AVENUE (DENVER)

Building Area: 59,301 GSF

Constructed: 1915

Remodeled: 1986

Acquired: N/A

Agency Tenants:

- General Assembly
- Joint Budget Committee
- Legislative Council

FCI: 54.12/100.00, 5/2012

Cost to Remodel:

- If all recommendations in the facility assessment are implemented as a single project, including the top five priorities, the cost estimate is: $4,528,638.
- If all recommendations in the facility assessment are implemented system by system as multiple projects, including the top five priorities (systems), the cost estimate is: $4,609,638.

Five Major Deficiencies:

1. Add panic devices on alley gates to allow exit to public way. This recommendation encompasses life safety issues and is due to egress issues from the building. Cost estimate: $51,056.
2. Upgrade fire alarm. This recommendation encompasses life safety issues and is due to the age of the system and fire protection code issues. Cost estimate: $33,881.
3. Floor 3, Hearing Room: need fire rated wall and change door swing. This recommendation encompasses life safety issues and is due to fire protection code issues related to assembly occupancies. Cost estimate: $98,727.
4. Replace windows and exterior doors. This recommendation encompasses loss of use/ reliability issues and overall energy efficiency issues and is due to the age and condition of the windows and exterior doors. Cost estimate: $332,038.
5. Replace electric panel boards. This recommendation encompasses loss of use/ reliability issues and overall energy efficiency issues and is due to the age of the panel boards. Cost estimate: $602,620.

NOTE: All of the above costs are in 2014 dollars and should be escalated to the year construction will occur.

4.3.8 HUMAN SERVICES BUILDING

1575 SHERMAN STREET (DENVER)

Building Area: 145,370 GSF

Constructed: 1952

Remodeled: 1987

Acquired: 1964

Agency Tenants:

- Department of Human Services

FCI: 60.27/100.00, 1/2013

Cost to Remodel:

- If all recommendations in the facility assessment are implemented as a single project, including the top five priorities, the cost estimate is: $15,146,974.
- If all recommendations in the facility assessment are implemented system by system as multiple projects, including the top five priorities (systems), the cost estimate is: $16,503,123.

Five Major Deficiencies:

1. Replace engine generator. This recommendation encompasses life safety issues due to the age of the generator which is used for emergency power. Cost estimate: $438,599.
2. Replace electrical panels and receptacles. This recommendation encompasses life safety, loss of use/reliability, and overall energy efficiency issues and is due to the age of the panels and receptacles. Cost estimate: $3,848,536.
3. Accessibility upgrades. This recommendation encompasses life safety issues and is due to non-accessible features found throughout the restrooms and break rooms. Cost estimate: $136,051.
4. Replace roof. This recommendation encompasses loss of use/reliability issues and is due to the age and condition of the roof. Cost estimate: $609,958.
5. Light fixture and controls upgrade. This recommendation encompasses loss of use/reliability issues and overall energy efficiency issues and is due to the age of the T8 fluorescent fixtures and controls. Cost estimate: $1,012,390.

NOTE: All of the above costs are in 2014 dollars and should be escalated to the year construction will occur.

4.3.9 STATE SERVICES BUILDING

1525 SHERMAN STREET (DENVER)

Building Area: 165,930 GSF

Constructed: 1960

Remodeled: 1992 and 2013

Acquired: N/A

Agency Tenants:

- Department of Personnel & Administration
- General Assembly
- State Auditor

FCI: 69.77/100.00, 10/2012

Cost to Remodel:

- If all recommendations in the facility assessment are implemented as a single project, including the top five priorities, the cost estimate is: $10,168,019.
- If all recommendations in the facility assessment are implemented system by system as multiple projects, including the top five priorities (systems), the cost estimate is: $10,438,019.

Five Major Deficiencies:

1. Replace fire alarm. This recommendation encompasses life safety issues and is due to fire protection code issues and the age of the system. Cost estimate: $643,728.
2. Replace engine generator. This recommendation encompasses life safety issues. Cost estimate: $161,301.
3. Insulate exterior walls. This recommendation encompasses loss of use/reliability and energy. Cost estimate: $1,188,172.
4. Replace roof. This recommendation encompasses loss of use/reliability issues and is due to the age and condition of the roof. Cost estimate: $638,206.
5. Repair/replace exterior sealant. This recommendation encompasses loss of use/reliability issues and is due to the overall deterioration of the sealant which is creating access points by which water can penetrate the building envelope. Cost estimate: $569,715.

NOTE: All of the above costs are in 2014 dollars and should be escalated to the year construction will occur.

4.3.10 POWER PLANT BUILDING

1341 SHERMAN STREET (DENVER)

Building Area: 25,690 GSF

Constructed: 1939

Remodeled: N/A

Acquired: N/A

Agency Tenants:

- Department of Public Safety - CSP

FCI: 60.98/100.00, 4/2012

Cost to Remodel:

- If all recommendations in this report are implemented as a single project, including the top five priorities, the cost estimate is: $4,598,921.
- If all recommendations in this report are implemented system by system as multiple projects, including the top five priorities (systems), the cost estimate is: $4,970,686.

Five Major Deficiencies:

1. Install a full fire alarm and detection system throughout. This recommendation encompasses life safety issues and is due to the lack of a full detection fire alarm system. Cost estimate: $32,101.
2. Provide fall protection at roof. This recommendation encompasses life safety issues and is due to code issues and the fact that inadequate fall protection is provided at the roof. Cost estimate: $20,269.
3. Replace all electrical panels and receptacles that are past their useful life. This recommendation encompasses life safety, loss of use/reliability, and overall energy efficiency issues and is due to the age of the panels and receptacles. Cost estimate: $898,703.
4. Repair exterior walls and window leaks. This recommendation encompasses loss of use/reliability issues and is due to the age and condition of the windows and the cladding on the building and the overall deterioration of the mortar and sealant. Cost estimate: $665,694.
5. Replace lighting. This recommendation encompasses loss of use/reliability issues and is due to the age and condition of the fixtures. Cost estimate: $187,710.

NOTE: All of the above costs are in 2014 dollars and should be escalated to the year construction will occur.

4.3.11 DALE TOOLEY BUILDING

690 KIPLING STREET (LAKEWOOD)

Building Area: 67,035 GSF

Constructed: 1985

Remodeled: N/A

Acquired: 1985

Agency Tenants:

- Department of Public Safety
- Office of Information Technology

FCI: 64.71/100.00, 3/2010

Cost to Remodel:

- If all recommendations in the facility assessment are implemented as a single project, including the top five priorities, the cost estimate is: $8,857,325.
- If all recommendations in the facility assessment are implemented system by system as multiple projects, including the top five priorities (systems), the cost estimate is: $8,949,125.

Five Major Deficiencies:

1. Replace fire alarm. This recommendation encompasses life safety issues and is due to fire protection code issues and the age of the system. Cost estimate: $239,328.
2. Modernize elevators. This recommendation encompasses life safety issues and is due to the age of the elevator systems. Cost estimate: $204,275.
3. Upgrade the data center UPS. This recommendation encompasses loss of use/reliability issues and is due to the need for a UPS system that will provide adequate capacity, reliability, and redundancy. Cost estimate: $224,328.
4. Add electrical capacity. This recommendation encompasses loss of use/reliability issues and is due to the need for increased capacity. Cost estimate: $1,018,827.
5. Replace windows. This recommendation encompasses loss of use/reliability issues and is due to the age and condition of the windows. Cost estimate: $856,823.

NOTE: All of the above costs are in 2014 dollars and should be escalated to the year construction will occur.

4.3.12 700 KIPLING BUILDING

700 KIPLING STREET (LAKEWOOD)

Building Area: 60,964 GSF

Constructed: 1985

Remodeled: N/A

Acquired: 1992

Agency Tenants:

- Department of Public Safety

FCI: 69.92/100.00, 6/2010

Cost to Remodel:

- If all recommendations in the facility assessment are implemented as a single project, including the top five priorities, the cost estimate is: $9,113,674.
- If all recommendations in the facility assessment are implemented system by system as multiple projects, including the top five priorities (systems), the cost estimate is: $9,329,674.

Five Major Deficiencies:

1. Upgrade fire alarm. This recommendation encompasses life safety issues and is due to fire protection code issues and the age of the system. Cost estimate: $111,882.
2. Modernize elevators. This recommendation encompasses life safety issues and is due to the age and condition of the elevator systems. Cost estimate: $87,035.
3. Replace roof. This recommendation encompasses loss of use/reliability issues and is due to the age and condition of the roof. Cost estimate: $275,345.
4. HVAC upgrade. This recommendation encompasses loss of use/reliability issues and overall energy efficiency issues and is due to the age and condition of the HVAC system, including VAV boxes, and the inability to maintain a consistent comfortable working temperature within the building. Cost estimate: $2,864,999.
5. Repair exterior walls and window leaks. This recommendation encompasses loss of use/reliability and overall energy efficiency issues and is due to the overall deterioration of the mortar and sealant, which is creating access points by which water can penetrate the building envelope, and the age and condition of the windows. Cost estimate: $1,862,908.

NOTE: All of the above costs are in 2014 dollars and should be escalated to the year construction will occur.

4.3.13 STATE CAPITOL BUILDING

200 EAST COLFAX AVENUE (DENVER)

Building Area: 323,813 GSF

Constructed: 1895-1903

Remodeled: Life safety upgrade 2009, dome restoration 2014

Acquired: N/A

Agency Tenants:

- General Assembly
- Legislative Council
- Legislative Legal Services
- Office of the Governor
- Office of Lieutenant Governor
- Department of Treasury
- Department of Public Safety - CSP
- Department of Personnel and Administration - CCF

FCI: 44.47/100.00, 10/2009

Cost to Remodel:

- If all recommendations in the facility assessment are implemented as a single project, including the top five priorities, the cost estimate is: $60,328,458.
- If all recommendations in the facility assessment are implemented system by system as multiple projects, including the top five priorities (systems), the cost estimate is: $61,845,759.

Five Major Deficiencies

1. Replace roof. This recommendation encompasses loss of use/reliability issues and is due to the age and condition of the roof. Cost estimate: $2,873,728.
2. Repair short tunnel roof/structural. This recommendation encompasses life safety issues and is due to the age and general deterioration of the tunnel over the past 115+ years, ongoing maintenance efforts, and the potential hazard to motorists passing overhead. Cost estimate: $11,764,925.
3. Windows and facade restoration/repair. This recommendation encompasses loss of use/reliability and overall energy efficiency issues and is due to the age and condition of the windows and facade. Cost estimate: $10,467,816.
4. Plumbing system repair/replacement. This recommendation encompasses loss of use/reliability issues and is due to the age and condition of the plumbing as well as ongoing maintenance efforts. Cost estimate: $6,190,182.
5. Site repair: sidewalk, paving, and drainage. This recommendation encompasses life safety and loss of use/reliability issues and is due to the overall deterioration of the site pavement which is creating a potential tripping hazard. Cost estimate: $1,267,662.

NOTE: All of the above costs are in 2014 dollars and should be escalated to the year construction will occur.

4.3.14 NORTH CAMPUS NORTH BUILDING

6321 NORTH DOWNING STREET (DENVER)

Building Area: 23,630 GSF

Constructed: 1968

Remodeled: A west addition, approximately 10 years ago

Acquired: 1976

Agency Tenants:

- Department of Personnel & Administration (Division of Central Services - Primarily Storage)

FCI: 48.74/100.00, 8/2012

Cost to Remodel:

- If all recommendations in the facility assessment are implemented as a single project, including the top five priorities, the cost estimate is: $2,788,886.
- If all recommendations in the facility assessment are implemented system by system as multiple projects, including the top five priorities (systems), the cost estimate is: $3,036,190.

Five Major Deficiencies:

1. Add fire sprinkler system. This recommendation encompasses life safety issues and is due to egress and fire protection code issues. Cost estimate: $150,686.
2. Replace fire alarm. This recommendation encompasses life safety issues and is due to fire protection code issues and the age of the system. Cost estimate: $60,888.
3. Replace roof and add fall protection. This recommendation encompasses life safety and loss of use/reliability issues and is due to the age and condition of the roof and the fact that no fall protection is provided. Cost estimate: $378,738.
4. Upgrade lights. This recommendation encompasses loss of use/reliability issues and is due to the age and condition of the T8 fluorescent fixtures. Cost estimate: $185,071.
5. Replace original building skin, doors, and windows. This recommendation encompasses loss of use/reliability issues and is due to the age and overall deterioration of the original building skin, doors, and windows. Cost estimate: $341,604.

NOTE: All of the above costs are in 2014 dollars and should be escalated to the year construction will occur.

4.3.15 NORTH CAMPUS EAST BUILDING

6221 NORTH DOWNING STREET (DENVER)

Building Area: 39,195 GSF

Constructed: 1968

Remodeled: N/A

Acquired: 1976

Agency Tenants:

- Department of Personnel & Administration (Storage)

FCI: 53.57/100.00, 8/2012

Cost to Remodel:

- If all recommendations in the facility assessment are implemented as a single project, including the top five priorities, the cost estimate is: $2,126,672.
- If all recommendations in the facility assessment are implemented system by system as multiple projects, including the top five priorities (systems), the cost estimate is: $2,373,976.

Five Major Deficiencies:

1. Replace roof and add fall protection. This recommendation encompasses life safety and loss of use/reliability issues and is due to the age and condition of the roof and the fact that no fall protection is provided. Cost estimate: $551,571.
2. Replace windows. This recommendation encompasses loss of use/reliability issues and is due to the age and condition of the windows. Cost estimate: $37,954.
3. Add lighting controls. This recommendation encompasses loss of use/reliability and overall energy efficiency issues and is due to the need for automatic occupancy controls. Cost estimate: $51,644.
4. Repair/replace sealant. This recommendation encompasses loss of use/reliability issues and is due to the overall deterioration of the sealant which is creating access points by which water can penetrate the building envelope. Cost estimate: $64,028.
5. Repair/replace site paving. This recommendation encompasses life safety and loss of use/reliability issues and is due to the overall deterioration of the site pavement which is creating a potential tripping hazard. Cost estimate: $467,733.

NOTE: All of the above costs are in 2014 dollars and should be escalated to the year construction will occur.

4.3.16 EXECUTIVE RESIDENCE

400 EAST 8TH AVENUE (DENVER)

Building Area: 26,431 GSF

Constructed: 1908

Remodeled: Residence N/A, Carriage House 2006

Acquired: 1959

Agency Tenants:

- Governor's Residence

FCI: 51.65/100.00, 12/2011, Residence

69.13/100.00, 3/2012, Carriage House

Cost to Remodel:

- If all recommendations in the facility assessment are implemented as a single project, including the top five priorities, the cost estimate is: $7,266,211.
- If all recommendations in the facility assessment are implemented system by system as multiple projects, including the top five priorities (systems), the cost estimate is: $8,540,834.

Five Major Deficiencies:

1. Replace electric panel boards and wiring that are past their useful life. This recommendation encompasses life safety, loss of use/reliability, and overall energy efficiency issues and is due to the age of the panels and wiring. Cost estimate: $502,341.
2. Rebuild brick wall adjacent to visitor center. This recommendation encompasses life safety issues and is due to the fact that the wall is failing structurally along the eastern and southern portions of the terraced grounds, near the Tebo Visitor's Center. Cost estimate: $198,017.
3. Repair drainage problems. This recommendation encompasses loss of use/reliability issues and is due to damage that has occurred to the building and site retaining walls from standing water and other drainage problems. Cost estimate: $1,197,887.
4. Tuck point the stone and brick. This recommendation encompasses issues with the building's exterior finishes and is due to the deterioration of the mortar which is creating access points by which water can penetrate the building envelope. Cost estimate: $777,000.
5. Replace roof. This recommendation encompasses loss of use/reliability issues and is due to the age of the roof and problems with water leaks. Cost estimate: $518,845.

NOTE: All of the above costs are in 2014 dollars and should be escalated to the year construction will occur.

4.3.17 GRAND JUNCTION STATE SERVICES BUILDING

222 SOUTH 6TH STREET (GRAND JUNCTION)

Building Area: 52,000 GSF

Constructed: 1983

Remodeled: N/A

Acquired: N/A

Agency Tenants:

- Department of Personnel & Administration
- Department of Public Health & Environment
- Department of Labor & Employment
- Department of Local Affairs
- Department of Revenue
- Department of Transportation
- Department of Regulatory Agencies
- Department of Natural Resources

FCI: 57.32/100.00, 4/2011

Cost to Remodel:

- If all recommendations in the facility assessment are implemented as a single project, including the top five priorities, the cost estimate is: $6,419,618.
- If all recommendations in the facility assessment are implemented system by system as multiple projects, including the top five priorities (systems), the cost estimate is: $7,064,335.

Five Major Deficiencies:

1. Repair/replace parking lots/sidewalks. This recommendation encompasses life safety and loss of use/reliability issues and is due to the overall deterioration of the site pavement which is creating a potential tripping hazard. Cost estimate: $157,527.
2. Replace roof and provide fall protection. This recommendation encompasses life safety and loss of use/reliability issues and is due to the age and condition of the roof and the fact that inadequate fall protection is provided. Cost estimate: $220,378.
3. Replace condensing unit. This recommendation encompasses loss of use/reliability issues and overall energy efficiency issues and is due to the age of the condensing unit. Cost estimate: $101,273.
4. Upgrade lighting/add more controls. This recommendation encompasses loss of use/reliability issues and overall energy efficiency issues and is due to the age and condition of the T8 fluorescent fixtures and the building's current lighting control system which turns all lighting on at 5:30 a.m. and off at 9:30 p.m. Cost estimate: $996,129.
5. Replace waterproof membrane along the foundation on the south side of the building. This recommendation encompasses loss of use/reliability issues and is due to the overall deterioration of the waterproof membrane. Cost estimate: $82,630.

NOTE: All of the above costs are in 2014 dollars and should be escalated to the year construction will occur.

4.3.18 CAMP GEORGE WEST

15000 SOUTH GOLDEN ROAD (PLEASANT VIEW)

Site Area: 290 acres

Constructed: 1903

Remodeled: N/A

Acquired: 1999 (DPA)

Agency Tenants:

- Department of Corrections
- Department of Public Safety
- Department of Transportation

FCI: None

Cost to Remodel:

- If all recommendations in the facility assessment are implemented as a single project, including the top five priorities, the cost estimate is: $13,847,708.
- If all recommendations in the facility assessment are implemented system by system as multiple projects, including the top five priorities (systems), the cost estimate is: $14,697,457.

Five Major Deficiencies:

1. Assessment of underground utilities. This recommendation encompasses loss of use/reliability issues. Cost estimate: $332,779.
2. Add additional site lighting. This recommendation encompasses life safety issues and is due to areas of the site without any lighting and inadequate site lighting along roadways, parking lots, and storage areas. Cost estimate: $633,895.
3. Repair/replace broken and cracked concrete on site. This recommendation encompasses life safety and loss of use/reliability issues and is due to the overall deterioration of the site pavement which is creating a potential tripping hazard. Cost estimate: $2,125,156.
4. Drainage improvements. This recommendation encompasses loss of use/reliability issues and is due to problems with local flooding occurring on-site and the flooding of numerous existing structures during minor storm events. Cost estimate: $3,533,749.
5. Repair/replace site asphalt. This recommendation encompasses life safety and loss of use/reliability issues and is due to the overall deterioration of the site pavement which is creating a potential tripping hazard. Cost estimate: $5,406,945.

NOTE: All of the above costs are in 2014 dollars and should be escalated to the year construction will occur.

4.4 - Sustainability Goals

4.4.1 OVERVIEW

The long range planning of the State Capitol Complex is an excellent opportunity to integrate sustainability goals and approaches that can be implemented with the master plan. The goals are incremental with improved performance each year, to the year 2030. Achieving the sustainability goals are not only an important way for the State to demonstrate leadership around stewardship of the state's resources; it is also a good business case for increased efficiency of operation. The goals outlined in this report are focused on energy, water and waste as key drivers of performance. To achieve these goals it is critical that a Sustainability Manager position is created with the responsibility for the position recognized at all management levels within the department. However, while pursuing these goals it is important to also keep a focus on the pursuit of holistic sustainability, including the health and wellbeing of state employees, customers, and other visitors of state facilities. Social sustainability often goes hand-in-hand with energy efficiency goals as they can increase thermal comfort, improve air quality and enhance daylighting. In addition, there is a great opportunity to leverage the inherent sustainability in renovating existing buildings, particularly the historic state buildings in downtown Denver, which are an important part of the city's fabric.

An important component of the sustainability plan is the tracking of utility usage and cost. For DPA, one of the largest challenges has been its ability to track and report on utility information. DPA, through support from the Colorado Energy Office, has taken action toward tracking utility information with the implementation of EnergyCAP, a web-based energy accounting software that tracks and helps analyze energy and water utility bills. The entering of utility data into EnergyCAP has only recently been completed. A critical step is the verification of tracked utility data against the invoices from the respective utility vendors. The 2013 Capital Complex Energy Use table created from EnergyCAP data indicates a total energy cost that was lower than actual utility budget figures. It is critical that EnergyCAP data be verified against utility vendor invoices. A comprehensive tracking and management plan will result in better information and communication about progress and spur further performance improvements over time.

Policy and guidance for sustainability and energy efficiency within the State's own building portfolio is driven from state statutes, executive orders and department initiatives. Greening of State Government Executive Orders D011 07 and D012 07 were signed by Governor Bill Ritter, Jr. in 2007. The Greening Government executive orders called for a variety of goals to be achieved by June 20, 2012.

The state has had some success and some challenges in meeting these goals. The State of Colorado has been a long time leader in the use of energy performance contracting (EPC) to fund energy efficiency projects for State-owned buildings. For example, in 2010 there were 19 State entity projects that utilized EPCs for a total of $72 million. These projects save 16.1 million kWh of electricity, 77,881 MMBtu of fuel and $2.8 million in energy costs annually. One very notable EPC is the geothermal heating and cooling system project for the State Capitol completed in 2013. The project is a first of its kind for any state capitol and is projected to save the state $100,000 in heating and cooling energy costs in the first year.

The state introduced an environmentally preferable purchasing policy (EPP) in 2009. The policy is designed to reduce consumption, waste, and possible environmental impacts by following a set of green purchasing guidelines. Further efforts to reduce paper use and increase recycling have been introduced at agencies across the state government.

Greening Government Goals

1. Reduce energy use by 20%
2. Reduce paper use by 20%
3. Reduce water consumption by 10%
4. Reduce state vehicle petroleum consumption by 25% (volumetric reduction)
5. To track and report greening government performance, each state department and campus will create a sustainability management system.

The overarching goal is for a 2% reduction each year in energy, water and waste based on the aggregate tracking of all facilities within the capitol complex.

4.4.2 ENERGY, WATER AND WASTE REDUCTION GOALS

The buildings in the State Capitol Complex should achieve specific energy, water and waste reduction goals compared to a baseline of current consumption metrics. The State uses a program called EnergyCAP to track energy and water use at many of the facilities in the Capitol Complex. The data derived from EnergyCAP was used to help set energy and water use reduction goals for the Capitol Complex in this master plan. Currently waste and waste diversion/recycling activities are not tracked.

In concert with energy, water and waste reduction goals it is recommended that the Capitol Complex consider certifying buildings within the complex under LEED for Buildings Operations and Maintenance. Each building should be reviewed for the feasibility of LEED O+M certification. It is important for the State to utilize industry tools and benchmarks to improve and assess building operation over time and LEED O+M provides a valuable framework for meeting the energy, water and waste reduction goals in this master plan.

One of the most successful programs implemented by the state is the High Performance Certification Program (HPCP). The HPCP requires all new facilities, additions and renovation projects greater than 5,000 sf to conform to the policy adopted by the Office of the State Architect. For most qualifying projects the goal is LEED Gold. Further the State Architect has established sustainability priorities within the LEED rating system that include minimum energy performance, enhanced commissioning (over 20,000 sf), measurement and verification (over 50,000 sf), potable water reduction goals, indoor environmental quality goals and construction waste and materials goals. As a result of the state leading by example, Colorado was ranked 8th in the nation for LEED buildings per capita in 2013.

Energy Reduction Goals

The potential energy use reduction presented is based upon benchmarking buildings against industry standards. The EPA ENERGY STAR program and the Architecture 2030 Challenge are two industry recognized benchmarks relevant to DPA. The ENERGY STAR program was designed to compare similar buildings to indicate how they perform. The table below shows ENERGY STAR benchmark data applicable to the Capitol Complex using the average facility size for the Capitol Complex, an office building type, and a zip code of 80203. The 2030 Challenge has established goals to seek, once the buildings are benchmarked. The EnergyCAP program is the tool that provides the benchmark numbers. As stated, the information in EnergyCAP needs to be validated. The value of projecting savings is important to indicate potential savings; once the EnergyCAP data is validated, it is assumed that the final tracked savings will be greater.

The baseline energy use is derived from EnergyCAP using annual data for each building. It is useful to review the energy benchmarks by location and not for the Capitol Complex portfolio of buildings. The facility at 690 Kipling has a high energy use index (EUI) of 353.1 kBtu/sf/year because it houses a data center and therefore, is not representational of the remainder of the Capitol Complex. A useful subgroup of buildings to track is the buildings in downtown Denver connected to Xcel's central steam plant. This subgroup of buildings has a 2013 EUI of 54.1 kBtu/sf/year, and an ECI of $1.13/sf/year. The energy baseline includes energy use only associated with buildings in the scope of this master plan. The IDS building in Pueblo is not included in the scope of this plan and is not included in the EnergyCAP database. As a clarifying note the conversion of pounds of steam to BTUs is based on the ENERGY STAR conversion rate of 1,200 kBTU per MLB (1,000 LB of steam). Refer to the following table for details on the 2013 Capitol Complex energy use.

2013 Capital Complex Energy Use

					2013													
	Address	Bldg Name	Const	Gross Area	Electric		Steam		Natural Gas		Total Energy		Per SF	
1	1575 Sherman	Human Services Bldg	1952	145,370	1,391,959	kWh	877	MLB						
					4,749,364	kBtu	1,052,400	kBtu			5,801,764	kBtu	39.9	kBtu/SF
					115,690	$	20,193	$			135,883	$	0.93	$/SF
2	1525 Sherman	State Services Bldg	1960	165,930	2,551,925	kWh	565	MLB	4,793	DKTHM				
					8,707,168	kBtu	678,000	kBtu	4,793,000	kBtu	14,178,168	kBtu	85.4	kBtu/SF
					212,099	$	15,976	$	28,600	$	256,675	$	1.55	$/SF
3	1570 Grant		1956	47,749	401,523	kWh			1,762	DKTHM				
					1,369,996	kBtu			1,762,000	kBtu	3,131,996	kBtu	65.6	kBtu/SF
					46,791	$			10,041	$	56,832	$	1.19	$/SF
4	201 E Colfax	State Office Bldg	1921	78,115	1,160,046	kWh	239	MLB						
					3,958,077	kBtu	286,800	kBtu			4,244,877	kBtu	54.3	kBtu/SF
					96,832	$	9,147	$			105,979	$	1.36	$/SF
5	200 E Colfax	State Capitol	1903	323,813	2,087,938	kWh	5,915	MLB						
					7,124,044	kBtu	7,098,000	kBtu			14,222,044	kBtu	43.9	kBtu/SF
					173,536	$	101,640	$			275,176	$	0.85	$/SF
6	1313 Sherman	Centennial Bldg	1976	207,091	1,739,949	kWh	1,643	MLB						
					5,936,706	kBtu	1,971,600	kBtu			7,908,306	kBtu	38.2	kBtu/SF
					144,613	$	41,094	$	239	$	185,946	$	0.90	$/SF
7	1375 Sherman	Capitol Annex Bldg	1937	114,228	928,012	kWh	3,502	MLB						
					3,166,377	kBtu	4,202,400	kBtu			7,368,777	kBtu	64.5	kBtu/SF
					77,319	$	83,178	$			160,497	$	1.41	$/SF
8	200 E 14th	Legislative Services Bldg	1915	59,301	927,973	kWh	33	MLB	1,076	DKTHM				
					3,166,244	kBtu	39,600	kBtu	1,076,000	kBtu	4,281,844	kBtu	72.2	kBtu/SF
					77,127	$	3,911	$	6,661	$	87,699	$	1.48	$/SF
9	1341 Sherman	Power Plant	1939	25,690	579,983	kWh	483	MLB						
					1,978,902	kBtu	579,600	kBtu			2,558,502	kBtu	99.6	kBtu/SF
					48,204	$	12,947	$			61,151	$	2.38	$/SF
10	400 East 8th Ave	Exec Residence & Carriage House	1908	31,268	297,381	kWh			877	DKTHM				
					1,014,664	kBtu			877,000	kBtu	1,891,664	kBtu	60.5	kBtu/SF
					30,562	$			5,361	$	35,923	$	1.15	$/SF
11	690 Kipling	Dale Tooley Bldg	1985	67,035	6,348,216	kWh			2,012	DKTHM				
					21,660,113	kBtu			2,012,000	kBtu	23,672,113	kBtu	353.1	kBtu/SF
					489,141	$			11,249	$	500,390	$	7.46	$/SF
12	700 Kipling		1985	60,964	774,065	kWh								
					2,641,110	kBtu					2,641,110	kBtu	43.3	kBtu/SF
					101,743	$					101,743	$	1.67	$/SF
13	1881 Pierce		1972	122,542	1,535,981	kWh			3,051	DKTHM				
					5,240,767	kBtu			3,051,000	kBtu	8,291,767	kBtu	67.7	kBtu/SF
					130,144	$			16,654	$	146,798	$	1.20	$/SF
14	6321 North Downing	North Campus North Bldg	1968	23,630	No data in EnergyCAP									
15	6221 North Downing	North Campus East Bldg	1968	39,195	105,920	kWh			11	THERMS				
	(2011 Data as building was vacant in 2012 and 2013)				361,399	kBtu			1,100	kBtu	362,499	kBtu	9.2	kBtu/SF
	(Meter address in EnergyCAP as 6215 Downing)				8,873	$			257	$	9,130	$	0.23	$/SF
16	1001 East 62nd Ave	North Campus West Bldg	1968	37,763	672,362	kWh			16,847	THERMS				
					2,294,099	kBtu			1,684,700	kBtu	3,978,799	kBtu	105.4	kBtu/SF
					62,580	$			9,345	$	71,925	$	1.90	$/SF
17	222 South 6th	Grand Junction	1983	52,000	705,760	kWh			19,416	THERMS				
					2,408,053	kBtu			1,941,600	kBtu	4,349,653	kBtu	83.6	kBtu/SF
					62,985	$			11,420	$	74,405	$	1.43	$/SF
18	15000 S. Golden Rd	Camp George West, Site		0	No data in EnergyCAP, not a building									
	Totals													
	Buildings with Energy Data			**1,578,054**							**108,883,884**	**kBtu**	**69.0**	**kBtu/SF**
											2,266,152	**$**	**1.44**	**$/SF**
	Buildings with Energy Data			**1,511,019**							**85,211,771**	**kBtu**	**56.4**	**kBtu/SF**
	(excluding 690 Kipling)										**1,765,762**	**$**	**1.17**	**$/SF**
	Buildings on Steam			**1,119,538**							**60,564,282**	**kBtu**	**54.1**	**kBtu/SF**
											1,269,006	**$**	**1.13**	**$/SF**

The 2030 Challenge stipulates that existing buildings should reduce energy use by 50% by 2030 from an ENERGY STAR score of 50 as a baseline. The challenge includes incremental goals between now and the year 2030 to build to the 50% overall reduction. In this scenario the baseline ENERGY STAR score of 50 has a EUI of 96.7 kBtu/sf/year and would need to be reduced to 48.4 kBtu/sf/year by the year 2030 to meet the industry challenge.

The *Energy Reduction Goal Matrix to 2030* table outlines the impact of the Capitol Complex's energy reduction goal of a 2% reduction per year. It assumes a 2% reduction on the previous year's energy use for each year up to 2030. Note that the last year (2030) calls for a 3% reduction to bring the overall accumulative reduction to approximately 30% in 2030 compared with the 2013 baseline. This table uses the 2013 data from EnergyCAP for all Capitol Complex buildings as its baseline, and is therefore more aggressive than the 2030 Challenge. The annual and accumulative energy cost savings do not include escalation of energy cost, nor do they include a discount rate to account for the time value of money. Considering that the utility budget is just over $4 million in FY12-13 and the EnergyCAP data indicates the utility cost is just under $2.4 million, the projected accumulated saving could be over $10 million and not the $6,347,969 as indicated. Note that energy escalation typically outpaces inflation over time so these savings are conservative.

It is critical that the Sustainability Manager update the department's sustainable master plan to reflect industry energy benchmarks, energy related state statutes, executive orders, energy costs and an implementation plan outlining what can be achieved. The continuously updated plan can highlight successes and indicate additional steps necessary to maintain the overall goals. A key part of the master plan is the utilization of the State of Colorado Facility Audit Program. Energy audits for each building in the Capitol Complex will guide the identification of energy efficiency projects to implement.

ENERGY STAR Scores and Energy Use Intensity

ENERGY STAR Score	EUI (kBtu/sf/yr)
50	96.7
60	86.6
70	76.6
75	71.5
80	66.1
90	53.6
93*	48.4
100	28.8

* 50% reduction from score of 50

Energy Reduction Goal Matrix to 2030

Year	EUI kBtu/sf	ECI $/sf	Accumulative % Savings	Annual Savings	Accum. Savings
2013	69.0	$1.44			
2014	67.6	$1.41	2.0%	$46,128	
2015	66.3	$1.38	4.0%	$91,334	$137,463
2016	64.9	$1.36	5.9%	$135,636	$273,099
2017	63.6	$1.33	7.8%	$179,052	$452,151
2018	62.4	$1.30	9.6%	$221,599	$673,751
2019	61.1	$1.28	11.4%	$263,296	$937,047
2020	59.9	$1.25	13.2%	$304,159	$1,241,205
2021	58.7	$1.23	14.9%	$344,204	$1,585,409
2022	57.5	$1.20	16.6%	$383,448	$1,968,857
2023	56.4	$1.18	18.3%	$421,908	$2,390,765
2024	55.3	$1.15	19.9%	$459,598	$2,850,363
2025	54.1	$1.13	21.5%	$496,535	$3,346,898
2026	53.1	$1.11	23.1%	$532,733	$3,879,631
2027	52.0	$1.09	24.6%	$568,206	$4,447,837
2028	51.0	$1.06	26.1%	$602,971	$5,050,808
2029	49.9	$1.04	27.6%	$637,040	$5,687,848
2030	48.4	$1.01	29.8%	$687,121	$6,374,969

Note: 2% savings from each previous year and a 3% savings in the final year (2030)

Common energy efficiency upgrades and retrofits include:

- Lighting and lighting controls upgrades
- Plug load management
- HVAC controls upgrades
- HVAC equipment and efficiency upgrades (when equipment is scheduled to be replaced)
- Building envelope upgrades to reduce loads and strategically reduce the size and cost of HVAC equipment upgrades.
- Advanced metering by building / sub-metering

Water Reduction Goals

Baseline water use is derived from EnergyCAP using annual data for each building. The Capitol Complex portfolio has an overall 2013 water use intensity (WUI) of 16.4 gallons/sf/year and an overall water cost intensity (WCI) of $0.09/sf/year. Refer to table to the right for details on the 2013 Capitol Complex water use. Note that water use can vary significantly on a building by building basis, depending on water uses such as building fixtures, irrigation, and HVAC and process water.

The water data in the table was derived using data from the State's EnergyCAP account. It is highly recommended that the Capitol Complex Sustainability Manager (or similar role) verify the data in EnergyCAP and recalibrate the final 2013 baseline and water results. Some water data was missing or appeared irregular in EnergyCAP. Numerous additional water meters are included in EnergyCAP but not associated with a physical building. Note that the water baseline includes water use only associated with buildings in the scope of this master plan. Also note that the IDS building in Pueblo is not included in the scope of this plan and is not included in the EnergyCAP database.

The *Water Reduction Goal Matrix to 2030* table outlines the impact of the Capitol Complex's water reduction goal of a 2% reduction per year. It assumes a 2% reduction on the previous year's water use for each year up to 2030. Note that the last year (2030) calls for a 3% reduction to bring the overall reduction to 30% in 2030 compared with the 2013 baseline. This table uses the 2013 data from EnergyCAP as its baseline. The annual and accumulative water cost savings do not include escalation of water cost, nor do they include a discount rate to account for the time value of money.

It is critical that the Sustainability Manager update the department's sustainable master plan to reflect industry water benchmarks, water related state statutes, executive orders, water costs and an implementation plan outlining what can be achieved. The continuously updated plan can highlight successes and indicate additional steps necessary to maintain the overall goals. A key part of the master plan is the utilization of the State of Colorado Facility Audit Program. Water audits for each building in the Capitol Complex will guide the identification of water conservation projects to implement.

The EPA has a program focused on water efficiency called WaterSense. There are many WaterSense labeled products on the market. WaterSense labeled products have been certified to be at least 20% more efficient than standard fixtures without sacrificing performance. Further, Denver Water offers rebates on many products that are WaterSense labeled.

Water Reduction Goal Matrix to 2030

Year	WUI gal/sf	WCI $/sf	Accumulative % Savings	Annual Savings	Accum. Savings
2013	17.2	$0.10			
2014	16.9	$0.10	2.0%	$3,203	
2015	16.5	$0.10	4.0%	$6,343	$9,546
2016	16.2	$0.09	5.9%	$9,419	$18,965
2017	15.9	$0.09	7.8%	$12,434	$31,399
2018	15.5	$0.09	9.6%	$15,389	$46,788
2019	15.2	$0.09	11.4%	$18,284	$65,073
2020	14.9	$0.09	13.2%	$21,122	$86,195
2021	14.6	$0.09	14.9%	$23,903	$110,098
2022	14.3	$0.08	16.6%	$26,628	$136,726
2023	14.1	$0.08	18.3%	$29,299	$166,025
2024	13.8	$0.08	19.9%	$31,917	$197,942
2025	13.5	$0.08	21.5%	$34,482	$232,423
2026	13.2	$0.08	23.1%	$36,995	$269,419
2027	13.0	$0.08	24.6%	$39,459	$308,878
2028	12.7	$0.07	26.1%	$41,873	$350,751
2029	12.4	$0.07	27.6%	$44,239	$394,989
2030	12.1	$0.07	29.8%	$47,717	$442,706

Note: 2% savings from each previous year and a 3% savings in the final year (2030)

Common water conservation upgrades and retrofits include:

- Water leak detection and repair
- Tenant water conservation education
- Upgrade to EPA WaterSense fixtures
- Upgrade irrigation system and controls
- Upgrade or repair cooling towers to increase water efficiency and increase cycles of concentration
- Advanced metering / sub-metering

2013 Capital Complex Water Use

	Address	Bldg Name	Const	Gross Area	2013 Water		Per SF	
1	1575 Sherman	Human Services Bldg	1952	145,370	1,112	Kgal	7.6	gal/SF
					6,948	$	0.05	$/SF
2	1525 Sherman	State Services Bldg	1960	165,930	1,613	Kgal	9.7	gal/SF
					10,310	$	0.06	$/SF
3	1570 Grant		1956	47,749	932	Kgal	19.5	gal/SF
					5,944	$	0.12	$/SF
4	201 E Colfax	State Office Bldg	1921	78,115	No data in EnergyCAP			
5	200 E Colfax	State Capitol	1903	323,813	No data in EnergyCAP			
6	1313 Sherman	Centennial Bldg	1976	207,091	1,126	Kgal	5.4	gal/SF
					3,623	$	0.02	$/SF
7	1375 Sherman	Capitol Annex Bldg	1937	114,228	565	Kgal	4.9	gal/SF
					4,648	$	0.04	$/SF
8	200 E 14th	Legislative Services Bldg	1915	59,301	No data in EnergyCAP			
9	1341 Sherman	Power Plant	1939	25,690	No data in EnergyCAP			
10	400 East 8th Ave	Exec Residence & Carriage House	1908	31,268	1,275	Kgal	40.8	gal/SF
					6,424	$	0.21	$/SF
11	690 Kipling	Dale Tooley Bldg	1985	67,035	1,827	Kgal	27.3	gal/SF
					8,810	$	0.13	$/SF
12	700 Kipling		1985	60,964	404	Kgal	6.6	gal/SF
					2,973	$	0.05	$/SF
13	1881 Pierce		1972	122,542	7,103	Kgal	58.0	gal/SF
					36,835	$	0.30	$/SF
14	6321 North Downing	North Campus North Bldg	1968	23,630	No data in EnergyCAP			
15	6221 North Downing	North Campus East Bldg	1968	39,195	No data in EnergyCAP			
16	1001 East 62nd Ave	North Campus West Bldg	1968	37,763	1,530	Kgal	40.5	gal/SF
					13,605	$	0.36	$/SF
17	222 South 6th	Grand Junction	1983	52,000	635	Kgal	12.2	gal/SF
					3,677	$	0.07	$/SF
18	15000 S. Golden Rd	Camp George West, Site		0	53,792	Kgal	N/A	
	(Not a building, included for reference only)				37,260	$	N/A	
	Totals							
	Buildings with Water Data			**1,051,940**	**18,122**	**Kgal**	**17.2**	**gal/SF**
					103,797	**$**	**0.10**	**$/SF**

Waste Reduction Goals

Quantities of waste and diverted waste, such as recycling, have not been measured and tracked for buildings in the Capitol Complex. The first step in meeting a waste reduction goal of 2% per year is to conduct a waste stream audit on facilities in the Capitol Complex. This will establish the first year municipal waste and diversion baseline.

The municipal waste reduction goal is based on a 2% reduction of the prior year's waste, measured by pound per square foot. The table below shows the compounding impact of this goal through the year 2030. Note that the 2014 waste baseline has not been determined and the table uses 1.0 pounds/square foot/year as a place holder. Note that some waste industry experts estimate that offices generate between 2.5 to 4.0 pounds of waste per square foot per year.

Municipal Waste Stream Audit

- Put together an internal team to conduct the waste audit, manage the tracking of waste and implement strategies to meet waste reduction goals. Check with the contracted waste hauler to see if they can provide some of the audit and tracking services.
- Establish the time period for each building's waste audit (i.e. one day's worth of trash) and the frequency of audits per year.
- Weigh and track waste in each stream leaving the building (waste, recyclables, compost, etc.).
- Conduct a building walk through and questionnaire to determine types of waste being generated and the types and frequency of diversion techniques such as recycling.
- Extrapolate waste audit records to estimate annual waste and diversion volumes.

While the waste reduction goal is based on a measure of waste generated, it is useful to also track annual diversion rates to gauge the success of recycling programs. Increasing participation in recycling and expanding the types of recyclables collected are key strategies to meeting the waste reduction goal. The other key strategy is to reduce potential waste in the first place. This can be accomplished by implementing programs that target a reduction in use for the biggest waste generators by type, which can be identified in the waste stream audits. It is also important that hazardous waste and electronic recycling programs be integrated into the overall waste management program.

Construction waste associated with renovations and construction activities in the Capitol Complex should also be tracked against a reduction goal. Because these activities are often one-time events rather than a uniform waste stream, construction waste should be tracked separately. In the Denver region current best practice is to divert 75% of construction waste. For the construction waste reduction goal for the Capitol Complex this 75% diversion rate is considered the baseline and the goal is a 1% reduction per year starting in 2016 resulting in a 90% diversion rate by 2030.

It is critical that the Sustainability Manager update the department's sustainable master plan to reflect industry waste benchmarks, waste related state statutes, executive orders, waste related costs and an implementation plan outlining what can be achieved. The continuously updated plan can highlight successes and indicate additional steps necessary to maintain the overall goals. A key part of the master plan is the utilization of the State of Colorado Facility Audit Program. Waste audits, as described above, for each building in the Capitol Complex will guide the identification of waste reduction projects to implement.

Municipal Waste Reduction Goal Matrix to 2030

Year	Waste lb/sf	% Savings
2014	1.00	
2015	0.98	2.0%
2016	0.96	4.0%
2017	0.94	5.9%
2018	0.92	7.8%
2019	0.90	9.6%
2020	0.89	11.4%
2021	0.87	13.2%
2022	0.85	14.9%
2023	0.83	16.6%
2024	0.82	18.3%
2025	0.80	19.9%
2026	0.78	21.5%
2027	0.77	23.1%
2028	0.75	24.6%
2029	0.74	26.1%
2030	0.72	27.6%

Construction Waste Reduction Goal Matrix to 2030

Year	Diversion Rate
2015	75.0%
2016	76.0%
2017	77.0%
2018	78.0%
2019	79.0%
2020	80.0%
2021	81.0%
2022	82.0%
2023	83.0%
2024	84.0%
2025	85.0%
2026	86.0%
2027	87.0%
2028	88.0%
2029	89.0%
2030	90.0%

Waste Management Best Practices

- Provide all tenants with convenient recycling bins and recycling collection facilities. Right size recycling capacity vs. standard waste capacity.
- Provide single stream recycling that includes glass, plastics, paper, cardboard and metals. Include clear signage for what items can or can't be included in recycling collection.
- Provide facility for collecting batteries, toner cartridges, and electronic waste for recycling.
- Provide a composting program with facilities to collect food and organic waste.
- Provide a program for the donation of reusable durable goods such as office equipment and furniture.
- Require high levels of waste diversion in the construction contract for all facility renovations and alterations.

4.4.3 PROJECT SPECIFIC OPPORTUNITIES

There are several specific projects within the Capitol Complex master plan that offer targeted opportunities for deep energy, water and waste reductions as well as meeting a variety of other high performance objectives. These projects consist of three major renovations (1375 Sherman, 1313 Sherman and 1570 Grant) and a potential new 567,000 SF State office building at Lincoln and Colfax.

Colorado's High Performance Certification Program (HPCP) would apply to these renovations and new construction project. As outlined in the "State Sustainability Implementation Process" section of this report, the HPCP recommends a LEED Gold rating and meeting several OSA Sustainable Priorities. However, because these projects are in the Capitol Complex, high profile and relatively large in scale, this master plan recommends that the performance goals in the HPCP be expanded to include higher levels of performance and LEED certification.

1375 Sherman

The 1937 Capitol Annex Building is a 114,228 SF art deco architectural gem from the New Deal era and is listed on the Historic Register. The building has been identified as needing an extensive HVAC and lighting renovation or replacement, as well as extensive envelope improvements. Heating is currently supplied with Xcel steam and it is recommended to convert the building to natural gas heating or ground source heat pumps. Ground source heat pumps would also enable the building to be removed from the existing central chiller plant located in an adjacent building. This building is a great opportunity for a historic preservation sensitive deep green retrofit.

1375 Sherman - Recommended Deep Green Retrofit Performance Goals

- Perform energy efficiency upgrades including lighting, plug load management, HVAC & building envelope.
- Integrate a demand response system.
- Current water use intensity is 4.9 gal/SF/year, with a water cost of $0.04/SF/year. Low flow plumbing fixtures will further reduce water use.
- Implement advanced metering for energy and water use.
- Construction waste diversion of 75% or greater.
- LEED-NC v4 Platinum

1313 Sherman

1313 Sherman is a 207,091 SF, ten story 1970's office building known as the Centennial Building. The building is in need of extensive renovation including exterior envelope, HVAC and lighting. One key advantage that the Centennial Building has is good solar orientation along with relatively narrow floor depth. Enhanced daylighting and natural ventilation can be effectively explored in a deep green retrofit. Another excellent opportunity to explore in a deep green retrofit is in the integration of on-site photovoltaic systems, which could be installed on the building roof and over the adjacent, parking structure at 1350 Lincoln. If these two PV installations were optimized it may be possible to provide approximately 836 kW of PV. This system size would be able to generate approximately 42% of the existing energy use (38.2 kBtu/SF/year) of the building. It would generate approximately 61% of the target energy use (26.7 kBtu/SF/year). The building energy would need to be reduced to 16.4 kBtu/SF/year or lower to achieve net zero energy.

1313 Sherman - Recommended Deep Green Retrofit Performance Goals

- Perform energy efficiency upgrades including lighting, plug load management, HVAC & building envelope.
- Integrate a demand response system.
- Current water use intensity is 5.4 gal/SF/year, with a water cost of $0.02/SF/year. Low flow plumbing fixtures will further reduce water use.
- Implement advanced metering for energy and water use.
- Construction waste diversion of 75% or greater.
- LEED-NC v4 Platinum

1570 Grant - Recommended Deep Green Retrofit Performance Goals

- Perform energy efficiency upgrades including lighting, plug load management, HVAC & building envelope.
- Integrate a demand response system.
- Current water use intensity is 19.5 gal/SF/year, with a water cost of $0.12/SF/year. Low flow plumbing fixtures, improved cooling tower or ground source heat pump system will further reduce water use.
- Implement advanced metering for energy and water use.
- Construction waste diversion of 75% or greater.
- LEED-NC v4 Platinum

1570 Grant

The 1570 Grant building is a 47,749 SF office building and a great example of mid-century modern commercial architecture. The building has been identified as needing an extensive HVAC renovation or replacement. The HVAC replacement can be like-for-like with increased efficiency, but the feasibility of ground source heat pumps should also be explored. A ground source heat pump solution would have the dual advantage of increased energy efficiency while eliminating the water use for cooling. The high water use of the facility can be mostly attributed to the existing cooling tower. The exterior envelope is in fair condition and a deep green retrofit would be a great opportunity to enhance the performance of the envelope.

New State Office Building - Recommended Performance Goals

- Energy use intensity target of 25.0 kBtu/SF/year or less and explore opportunity for net zero energy.
- Building water use reduction of 40% or greater compared with LEED baseline.
- Integrate a demand response system.
- Implement advanced metering for energy and water use.
- Construction waste diversion of 75% or greater.
- Design project as model for occupant health and well-being and explore certifying the building under the Well Building Standard.
- LEED-NC v4 Platinum

New State Office Building at Lincoln and Colfax

New construction projects are excellent opportunities for advancing building performance. The new State office building should be designed to be the highest performing building in the Capitol Complex and a model for sustainability. Investments in energy performance will result in the lowest overall life cycle cost over the life of the building. Further, investments in design and operational features that promote health and wellness are important investments in state employees, which comprise the largest operating expense and most important resource for the facility.

The size and height of the new building will make net zero energy using on-site photovoltaics challenging, but integration of on-site renewables is encouraged and could be paired with a dedicated off-site source such as a solar garden.

4.4.4 STATE SUSTAINABILITY IMPLEMENTATION PROCESS

Benchmarking State Energy Management Practices with the ACEEE Scorecard

The American Council for an Energy-Efficient Economy (ACEEE) compiles an annual scorecard for state energy efficiency measures. The scorecard tracks a variety of state-level metrics including utility programs, transportation policies, building energy codes, combined heat and power policies, state government initiatives and appliance efficiency standards. For 2013 Colorado ranked 16th in the nation overall, with the top five states (in order) being Massachusetts, California, New York, Oregon and Connecticut.

For comparison in this master plan the state government initiatives metric is most applicable because it measures the state's internal initiatives around state-owned buildings. Rankings in this metric follow very closely with the overall scorecard rankings. The following are highlights of state-led initiatives by the top three states in the ACEEE scorecard, Massachusetts, California and New York.

Massachusetts

Massachusetts Executive Order 484 highlights:

- Establishes a "Leading by Example" program and council which shall direct efforts across state government to track and measure progress toward clean energy and environmental goals, develop long-term programs at state facilities and training efforts necessary to carry out the provisions of the executive order.
- Reduction in overall energy consumption in state-owned and leased buildings by 20% by 2012 and 35% by 2020 (2004 baseline).
- Procure 15% of agency annual energy consumption from renewable sources by 2012 and 30% by 2020.
- State agencies with new construction or major renovations over 20,000 square feet must meet the MA LEED Plus green building standard and perform 20% better than the state energy code.
- Reduce potable water use by 10% by 2012 and 15% by 2020 (2006 baseline)
- The state launched an Accelerated Energy Program in 2012 to accelerate the implementation of energy and water projects across the Commonwealth and help meet the goals of Executive Order 484.

Massachusetts Enterprise Energy Management System (EEMS):

- Awarded to EnerNOC in 2010
- Measuring real-time energy use at 480 state-owned buildings, comprising 25 million square feet of buildings, through the installation of 1,200 state of the art real-time energy meters.

California

California Executive Order B-18-12 highlights:

- Reduce greenhouse gas emissions by at least 10% by 2015 and by at least 20% by 2020 (2010 baseline).
- All new state buildings and major renovations beginning design after 2025 shall be constructed as net zero energy facilities with an interim target of 50% of new facilities beginning design after 2020 to be net zero energy. State agencies should also take measures toward achieving net zero energy for 50% of the square footage of existing state-owned building area by 2025.
- State agencies shall reduce grid-based energy purchases for state-owned buildings by at least 20% by 2018 (2003 baseline).
- State agencies shall participate in demand response programs.
- Any proposed new or major renovation of state buildings larger than 10,000 square feet shall use clean, on-site power generation and clean back-up power supplies, if economically feasible.
- New and major renovated state buildings and build-to-suit leases larger than 10,000 square feet shall obtain LEED Silver certification or higher.
- New and existing buildings shall incorporate building commissioning to facilitate improved and efficient building operation.
- All existing state buildings over 50,000 square feet shall complete LEED-EB certification by the end of 2015 (include ENERGY STAR rating of 75) to the maximum extent cost-effective.
- The Department of General Services shall work with other state agencies to develop by no later than July 1, 2013, policies and guidelines for the operation and maintenance of state buildings to achieve operating efficiency improvements and water and resource conservation, and to continually update and incorporate these in the State Administrative Manual.
- State agencies shall implement relevant and feasible voluntary measures from Divisions A4.5 and A5.5 of the California Green Building Standards Code to ensure healthy environments for occupants.
- State agencies shall reduce water use at the facilities they operate by 10% by 2015 and by 20% by 2020 (2010 baseline).
- State agencies shall identify and pursue available financing and project delivery mechanisms to achieve these goals.
- State agencies shall measure, monitor, report and oversee progress on measures in this Order.
- A Green Building Action Plan was developed for implementation of Executive Order B-18-12.

New York

New York Executive Order 88 highlights:

- 20% improvement in energy efficiency in all state facilities by 2020 (2010/2011 baseline)
- Build Smart NY is the implementation plan launched with the executive order. The guidelines for meeting Executive Order 88 include provisions for:
  - Reporting and benchmarking
  - Energy auditing plan
  - Capital project implementation
  - Retrocommissioning
  - Operations and maintenance
  - Submetering
- Under the Build Smart NY initiative the New York Power Authority (NYPA) will provide $450 million in low-cost financing for energy efficiency projects in the largest and least efficient state government buildings.

Sustainability Goals

Improving energy and water efficiency and sustainability starts with a comprehensive set of goals. As noted earlier in this report, statewide goals have typically been established through executive orders, as well as state statutes and initiatives. However, the last set of sustainability goals from executive orders in 2007 have expired. It is appropriate that the Capitol Complex has its own set of sustainability goals to guide long-term improvement and efficiency. It is recommended that the goals established in this master plan function as these long-term goals.

The Capitol Complex sustainability goals in this master plan are generally aligned well with the best practices of other states and specifically the top states highlighted in the ACEEE scorecard for state energy efficiency measures. It is noteworthy that Massachusetts and California both have state goals for renewable energy, and California has an aggressive net zero energy goal. Renewable energy and net zero, or near net zero, goals are highlighted in the master plan as project specific opportunities rather than Capitol Complex goals.

An important requirement of any plan is the continuous review and updating of the plan. The review needs to list achievements and failures as a learning tool, be compared to other state plans, and reflect industry benchmarks and changes. The energy, water and waste goals need to be updated to reflect new priorities, statutes, executive orders, and utility costs. The plan needs to emphasize the importance of an individual or a group assigned to implement the plan as their first task and not as time permits.

Current Guiding Policies and Programs

The State has several guiding policies and programs utilized to enhance building performance and sustainability. These core policies guide existing building operation, new construction performance standards and a funding mechanism for energy efficiency upgrades to existing facilities. The current state energy and sustainability policies are useful tools in helping to meet the sustainability goals in this master plan.

The Office of the State Architect's Energy Management of Existing Buildings Policy

- Policy outlines guidelines for the efficient operation and maintenance of existing buildings including a facility audit program and energy management program.
- Facility Audit Program

  Required to be established by all state agencies.

  A comprehensive operation and management tool which identifies, quantifies and prioritizes areas requiring necessary action as well as costs to renovate, retrofit, restore, modernize or maintain the building and equipment in a like new condition.
- Energy Management Program

  Required to be established by all state agencies to incorporate energy efficiency into the decision making process during the design and acquisition of buildings, the repair and replacement of existing systems, and should emphasize the use of renewable energy sources.

  High Performance Certification Program for new buildings and substantial renovation of existing buildings.

  Utilize EPA ENERGY STAR program to benchmark building's energy profile.

  Utilize LEED for Existing Buildings: Operations & Maintenance program to benchmark and verify success in building operation and maintenance programs.
- Energy Efficiency Projects Funding Options

  Controlled Maintenance Funds: For corrective repairs or replacement used for existing state-owned, General-Funded buildings, when such work is not funded in an agency's operating budget. Controlled Maintenance projects arise out of the deterioration of a facility's physical and functional condition.

  Energy Performance Contracts (EPC): Utilize the future energy savings of an energy efficiency program to finance the project through an energy service company (ESCO).

High Performance Certification Program (HPCP)

- Applies to new facilities, additions, or renovation projects of 5,000 square feet or more, and with a HVAC system. For renovation projects the cost of renovation should not exceed 25% of the current value of the building for the HPCP to apply.
- Achieve a LEED certification with a goal of a Gold rating.
- Strongly encouraged to meet OSA Sustainable Priorities in addition to prerequisites:

  24% reduction in energy cost

  Enhanced commissioning (greater than 20,000 square feet).

  Measurement and verification of energy and water systems (greater than 50,000 square feet).

  50% reduction in potable landscape water use.

  30% reduction in potable indoor water use.

  Low toxicity materials (achieve two of the following: IEQc4.1, 4.2, 4.3, 4.4)

  Daylighting for 75% of regularly occupied spaces.

  50% diversion rate of construction waste.

  Source as many materials as possible from Colorado region.

Energy Performance Contracting (EPC)

- Executive Order D014 03 directs each state agency to investigate the feasibility for an energy performance contract to improve energy efficiency of existing state facilities.

Organization and Implementation Process

The state has a decentralized model for implementing energy management and sustainability initiatives. There are a few entities that serve as central resources for state agencies. These include the Office of the State Architect (OSA), and the Greening Government Council and the Governor's Energy Office (GEO).

OSA develops the guidelines and policies for energy management and sustainability including the HPCP, as well as administrating controlled maintenance projects and providing review and resources to capital projects. GEO provides resources and technical guidance around energy issues for the entire state including assistance with energy performance contracting. The Greening Government Council was established with Executive Orders D011 07 and D012 07 to help implement the goals in these executive orders. The council also provides a central source for collaboration and communication between State agencies as each agency has a seat on the council.

State agencies and higher education institutions develop their own programs in accordance with State goals and have staff assigned to manage these energy and sustainability programs and plans. Each State agency manages a general operation and maintenance budget that can be used for energy efficiency projects as part of general operation and maintenance. State agencies work with OSA on controlled maintenance and capital projects, which also include energy efficiency improvements.

The Capitol Complex Facilities team serves as the property manager for all Capitol Complex facilities and includes an energy manager position on its staff. In order to meet the goals in this master plan it is recommended that this position be expanded into a full-time sustainability manager role. The current energy manager position description divides the position into several duties including energy management (35%), tenant project coordination (35%), manage building audit and CM program (10%), insurance claims (10%), and greening of state government (10%). In becoming a full-time sustainability manager position the duties should be reprioritized to remove non-sustainability duties such as insurance claims so that time involved in tenant coordination is in support of sustainability goals. In addition to roles outlined in the existing energy manager position description, the expanded sustainability manager roles should include the following:

Additional Duties of Sustainability Manager

- Develop and implement a comprehensive sustainability plan for the Capitol Complex that addresses goals and recommendations of this master plan in addition to other state sustainability goals and policies.
- Conduct energy and water audits on Capitol Complex facilities and develop energy and water efficiency projects in support of the comprehensive sustainability plan.
- Develop and implement an energy and water metering plan. The metering plan should include the installation of State-owned and operated real time meters and sub-meters (wherever practical). Coordinate the capture of real time energy and water data with database and analytical tools such as EnergyCAP or other appropriate programs. Track and report out energy and water use and cost in relationship to goals.
- Develop and implement a waste audit and waste reduction plan. Track and report out waste streams in relationship to goals.
- Work with tenants in both typical building operation and with renovation projects to provide resources, guidance and education to further energy, water and waste reductions.
- Manage LEED O+M certification and recertification for applicable buildings in the Capitol Complex.

Specific Sustainability Goals

- Create a sustainability program that is staffed by an individual whose sole responsibility is this program.
- Validate EnergyCAP data against utility vendor invoices.
- Perform energy and water audits of all buildings - most recent audit was in 2003 by EPC.
- Institute a plug load management program.
- Utilize EPA's ENERGY STAR and WATERSENSE programs for benchmarking, education, and potential upgrade ideas.
- Review LEED existing building operations and maintenance guidelines for certifying all DPA buildings.

4.5 - Security

Colorado State Patrol

Currently the Colorado State Patrol (CSP) Executive Security Unit has 60 employees and their central communications center is located in the 1341 Sherman Street Power Plant Building. The Executive Security Unit is responsible for security for the Capitol Complex and the Executive Residence. When requested, the CSP provides guidance to state agencies within the Capitol Complex on security needs. They operate the security check points at the Capitol and the Judicial Building and 1525 Sherman Street. The CSP also provides year round escort service for individuals to get to their cars when requested.

Space at 1341 Sherman Street is insufficient for CSP needs since troopers share locker and office space. The secure communications center is located downstairs and was recently renovated. Typically there are three individuals who monitor multiple security screens.

The CSP also has storage space throughout the Capitol Complex including bike storage space under the stairs of the Legislative Services Building at 200 E. 14th Street. Preferably the bike storage would be located in a more accessible location.

Due to the fact that the CSP is located in the Power Plant Building and their space is less than ideal and not large enough, it would be optimal for them to be relocated in a new space preferably within a block of the Capitol.

Security Systems

The security systems design guidelines outline electronic security systems infrastructure that would enhance security operations and provide a safe and secure environment for persons and assets within the Capitol Complex. The approach to the security systems should be implemented such that they can be easily and effectively monitored real time from CSP centralized communication center(s).

Physical Security Strategies

Physical security can be simply defined as the physical measures utilized in providing protection of assets against threats. These strategies are a combination of industry best practices and methods taken from such sources as ASIS (American Society of Industrial Security) International, various government agencies, commercial entities, and the consultant team's professional experience. Additionally the recommendations are supported by Crime Prevention through Environmental Design (CPTED). CPTED is defined as a multi-disciplinary approach to deterring criminal behavior through environmental design. CPTED strategies rely upon the ability to influence offender decisions that precede criminal acts by affecting the built, social and administrative environment.

Design Requirements

In general, there are multiple strategies that can be implemented that will supplement and support the effective security program. As the following explanations show, these strategies shall overlap and complement each other. Most importantly, they cannot stand alone as a singular method of mitigating a security incident. From an asset protection standpoint, complete protection is provided when security implementations meet the following three requirements:

- Deter – prevention of action through fear of penalty
- Detect – determination and communication that an event has occurred
- Delay and Deny – the ability of physical or psychological barriers to restrict or oppose the action

Combined, these three functions provide overall protection of the asset(s). Failure to meet one of the requirements opens the asset to attack and creates vulnerability.

In protecting an asset, the concept of Integrated Design establishes effective security programs through the integration of security technology with architectural components and operational elements. The premise for using this concept is that architecture, operations, and electronics must complement one another to create a strong security program. No one element of this group can standalone or operate independently to provide adequate protection.

Once established, the integrated design components are most effective when applied in a concentric manner beginning at the outlying edge of the site perimeter. As one moves across the site perimeter and in towards the building perimeter and interior secured spaces, the security controls and boundaries become increasingly more difficult to breach without detection and intervention. Zones of intervention between each level provide the ability for security operations to control, detect, evaluate, and respond to unauthorized activities.

Site Planning and Area Development

The planning and layout of a building and site contributes greatly in creating a physically secure structure and safe area. Perimeter protection, lighting, locking hardware, entrances and exits, flow and traffic patterns of building occupants and other pedestrians, and the location of service areas such as lobby reception, visitor services, and loading docks all assist in providing a protective ring for the building. In developing criteria to protect the facility the following recommendations can be used as guidelines.

- Locate high-risk areas in the interior of the installation. There should be a clear division between secure and unsecure spaces.
- Clear lines of sight should be established at all building entry points and site areas. Areas of concealment should be minimized to eliminate hiding spots. Landscaping and hardscaping should be laid out in such a way as to enhance the ability to view the entire area.
- Consolidate high-risk areas to take advantage of opportunities for security efficiency such as minimized control points.
- Maximize the distance (stand-off) between the perimeter and secure area to provide as much open space as possible. The maximization of stand-off distance is imperative in any blast mitigation measures.
- The arrangement of areas, with strongly delineated boundaries and buildings oriented to enhance surveillance opportunities, results in the creation of "defensible space" that can be protected more efficiently than scattered buildings or areas.
- Design entry roadways so that they do not provide direct or straight-line vehicular access to high-risk resources. All vehicular entries and exits should be provided with crash-rated barriers to prevent vehicle access.
- Whenever possible commercial, service, and delivery vehicles should have a designated entry to the installation preferably distant from high-risk resources. Where this is not feasible, all such vehicles should be inspected and cleared prior to admittance.

Entrances and Exits

All perimeter doors should be lockable, but always available for emergency exiting. All entrances and exits should be protected with security surveillance and the number of entrances should be minimized so that security surveillance and access control is manageable. The number of exits should be based on the local fire and building codes' means of egress requirements and building occupancy loads. Security should never impede the means of egress and exit from a building.

Lobbies

A lobby desk should be positioned on the first floor so that attendants or security personnel can screen visitors and view building entrances and access to the elevator banks. Turnstiles, optical portals, and other design control points can be positioned to funnel and control access to restricted space and upper floors. Public access and employee access should be segregated to provide efficient monitoring of pedestrian traffic. This lessens the possibility of someone trying to conceal themselves within a group of employees. All employee entrances should be monitored and controlled via the Security Management System.

Checkpoint facilities should be used to screen bags and personnel depending on the threat level. All public entries to the facility should be screened. Portable equipment can be utilized for other entrances and for use at special functions that do not require a permanent installation.

The Facilities

The following primary security systems are currently in place throughout the Capital Complex: access control (ACS), video surveillance, wireless duress and central monitoring by CSP. Electronic security systems that should be replaced and/or addressed include video surveillance, access control, intrusion alarm, duress alarm and audio intercom.

The access control system deployment is campus wide and currently exists throughout other state Capitol Complex buildings within the system. The ACS serves as the primary security management system for monitoring intrusion alarms. The state's existing wireless duress alarm system infrastructure is in place and operational. The existing security systems are controlled and monitored centrally from Colorado State Patrol's Central Command Center (CCC) in Denver. The single subsystem most in need of an upgrade are the security cameras and video management system.

By industry standards, the video surveillance system is considered an antiquated analog video based system. With that, poor video image quality is a direct result from the optical sensors and the transport mechanism currently in place. Analog video systems cannot be easily integrated into other security management systems, and the current user interface is not capable of meeting industry standards for evidentiary purposes.

This report is not designed as a specification but rather as an outline to provide information on required security system upgrades and security criteria recommended for implementation. The security systems must be planned and designed to allow CSP and security personnel the operational flexibility to provide proper security response in the event of an incident. Best practice security design methodology should be applied, including layered security, security in depth, and an integrated systems design. Applicable state of Colorado construction standards and design guidelines should be followed as a baseline.

The access control system deployment should follow as an expansion of the existing campus-wide system currently installed throughout other State Capitol Complex buildings and should utilize similar ACS door controllers and peripheral equipment. New proximity-type card readers shall operate with the existing proximity card credentials. A common practice for door devices should be to wire through a consolidation junction box above each door and be routed to the nearest intermediate distribution frame (IDF) room where door controllers and power supplies are located. ACS door controllers should be installed in telecommunications IDF rooms that will connect to the building's local area network (LAN) for communication with the ACS server.

New security equipment to be located within IDF rooms must be coordinated with the State IT technical staff. Each access controlled door should be equipped with a card reader, an electrified lock, a door position switch and a request-to-exit motion device (or hardware integral request-to-exit switch). All doors described as a card reader controlled access door should be designed with the standard equipment listed, unless specifically defined elsewhere to vary from this configuration. For new controlled doors, the use of magnetic locks and electronic strikes is not recommended. Electrified lever sets and panic hardware are to be equipped with request-to-exit switch built into the exit hardware. At controlled door locations, the specific electrified hardware requirements must be compatible and coordinated with the ACS control interface circuit.

The ACS shall also serve as the primary security management system for monitoring intrusion alarms. Intrusion alarms, such as door status and motion detection alarms, are to be integrated with and monitored through the access control security management system. Alarm device additions and modifications should be coordinated with the State during the design phase. Security personnel should be able to monitor the security system's alarm notification devices through network connected client workstations, where authorized.

The current video surveillance system (VSS) is in need of an upgrade from analog to digital, and the implementation IP cameras integrated to new network video recorders (NVRs) should be a high priority. New IP cameras should have the capability to communicate with the VSS over an IP infrastructure transport system (CAT6). Security camera deployment should consider the use of fixed field of view and pan-tilt-zoom (PTZ) type cameras, with minimum resolution requirements and clearly defined mega-pixel rating as well as be Power-over-Ethernet (PoE) devices. Camera network cabling should follow basic guidelines supporting 10-Gigabit transmission to pull to the nearest IDF room providing connectivity to the building's LAN. IP camera network cabling should terminate to building PoE network switches. Security personnel shall be able to monitor the security video surveillance system through network connected client workstations, where authorized.

The State's existing wireless duress alarm system infrastructure should be expanded, where needed, to support new locations of wireless duress buttons. Duress alarms should be installed at all public interface and cash-handling locations. CSP Central Command Center monitors a wide network of wireless duress buttons at multiple State Capitol Complex facilities in Denver. This is accomplished using wireless mesh coverage by use of repeaters located at State facilities. The duress system currently utilizes wireless duress buttons, which transmit radio frequency (RF) signals to an infrastructure of wireless RF receivers and repeaters. System repeaters should be provided, if necessary, to boost the wireless signal strength. Currently deployed duress alarms in the buildings are monitored by the existing CSP head-end system.

Consideration of an IP-based Intercom Communication System (ICS) is highly recommended to enhance security operations across the Capitol Complex facilities for security personnel, staff and visitors. Intercom over IP (IoIP) systems provide superior audio quality utilizing the latest digital technology and provide much greater flexibility for locating both master and substations anywhere on the local area network via IP communications. Security personnel in CSP CCC should be provided with two-way audio communications to any remote building, and this could be accomplished via an IP intercom substation.

As part of any renovation work, all security head-end equipment should be located or moved to IDF rooms, where possible, and coordinated with State IT technical staff. New security network video recorders (NVRs) to support IP cameras should also be relocated/located within the appropriate IDF rooms. It is highly suggested that all head-end security control equipment be placed on emergency power circuits or UPS units. State security personnel and other authorized staff may remotely monitor access control events, system alarms and security video through network connected client workstations.

Any building renovation work with requirements for security device additions/upgrades and specific security system functionality should be coordinated with CSP and State security personnel during design and construction phases.

Any security installation work, construction standards and operational requirements should be reviewed and approved by the appropriate staff and closely coordinated with the State by the electronic security integrator. Security cabling within IDF rooms shall be piped to wire gutters and or security equipment panels. Within IDF rooms, a 4-foot-by-8-foot section of wall space must be reserved for security equipment and supplied with fire treated plywood backboard. Rack mounted security equipment may share space in telecommunication equipment racks, where appropriate and as coordinated with the appropriate state IT personnel. One dedicated 120VAC 20A emergency power circuit is required at each security wall board location to support head-end equipment. All mission critical electronic security equipment shall be provided with back-up UPS. All UPS units shall be stand alone, dedicated for security and sized accordingly based on required run time.

As a practice, security system cabling should share cable routes with that of the building structured network cabling system wherever possible. The network cabling paths and riser locations generally provide the most direct route through a facility and typically contain sufficient space for security cabling requirements. Data cabling required for IP security cameras is to be provided and installed by approved telecommunications contractor(s). As a recommendation, this should be the approved construction method for provisioning of the IP camera network cabling to support the new VSS system. State IT construction standards for network and security cabling types and jacket color must be adhered to. Security cabling must never be exposed and must be contained in protective conduit wherever cable is accessible to vandalism or accidental damage or where it traverses any unsecured space. Security cabling shall be plenum-rated where required by codes.

4.6 - Key Recommendations

CHAPTER 4.0 - FACILITY ASSESSMENT KEY RECOMMENDATIONS

- THE CAPITOL ANNEX BUILDING, LOCATED AT 1375 SHERMAN STREET IN DENVER, NEEDS TO HAVE ALL SYSTEMS REPLACED AND BE TOTALLY RENOVATED.
- THE CENTENNIAL BUILDING, LOCATED AT 1313 SHERMAN STREET IN DENVER, NEEDS TO HAVE ALL SYSTEMS REPLACED AND BE TOTALLY RENOVATED.
- THE REMAINDER OF CAPITOL COMPLEX FACILITIES-MANAGED BUILDINGS (ASSESSED AS PART OF THIS MASTER PLAN) NEED TO UNDERGO A SERIES OF SYSTEM UPGRADES TO ADDRESS ISSUES WITH LIFE SAFETY, LOSS OF USE/RELIABILITY, AND/OR OVERALL ENERGY EFFICIENCY. THE COMPREHENSIVE RECOMMENDED SYSTEM UPGRADES ARE OUTLINED IN THE INDIVIDUAL FINDINGS & RECOMMENDATIONS (F&R) NEEDS ASSESSMENTS PER BUILDING AND THE CAMP GEORGE WEST SITE.
- IN ADDITION TO REPAIRING AND REPLACING FAILING SYSTEMS, THE STATE COULD EMPLOY A CONSULTANT TO EVALUATE AND MAKE RECOMMENDATIONS CONCERNING THE RESTORATION OF THE REMAINDER OF THE CAPITOL INCLUDING THE GOVERNOR'S OFFICE, COMMITTEE ROOMS, AND OTHER SPACES.
- THE CREATION OF A FULL-TIME, SUPPORTED SUSTAINABILITY MANAGER POSITION FOR THE CAPITOL COMPLEX IS PIVOTAL TO THE COST-EFFECTIVE AND SUSTAINABLE OPERATION OF THE CAPITOL COMPLEX. THE SUSTAINABILITY MANAGER WOULD CONDUCT BUILDING ENERGY, WATER AND WASTE AUDITS AND DEVELOP AND IMPLEMENT A SUSTAINABILITY MANAGEMENT PLAN.
- IT WOULD BE BENEFICIAL FOR THE STATE PATROL TO MOVE OUT OF THE POWER PLANT BUILDING, LOCATED AT 1341 SHERMAN STREET IN DENVER, AND INTO ANOTHER BUILDING WITHIN THE CAPITOL COMPLEX WITH MORE SPACE FOR PERSONNEL AND EQUIPMENT REQUIREMENTS.