

NORTH CAROLINA
DEPARTMENT OF ADMINISTRATION



ENERGY MANAGEMENT PLAN 2018-19

MARCH 1, 2019
(INCLUDING EO-80 GOALS AND STRATEGIES)

Prepared By: Consulting Services Section
State Construction Office
Department of Administration

EXECUTIVE SUMMARY

Facilities owned and administered by the Department of Administration (DOA) through Facility Management Division comprise approximately 65 buildings, totaling over 6 Million gross square feet. Almost all DOA buildings are located in Wake County, North Carolina. A concentration of these buildings are in the Downtown Government Center in Raleigh. These buildings are occupied by, and serve almost all of the State agencies, both Cabinet agencies and Council of State agencies. (See Appendix A)

Most DOA buildings receive steam from the Central Boiler Plant in the downtown complex in Raleigh. Chilled water is supplied to these buildings from two central chiller plants in the downtown complex. Facilities engineering and maintenance services are provided to DOA buildings by the State Construction Office and the Facility Management Division of the Department of Administration.

The following pages of this report detail:

- Energy usage data for DOA buildings including FY2002-03 baseline and most recent year consumption, FY2017-18
- 2016 – 2017 energy savings accomplishments
- 2017 – 2018 energy savings accomplishments
- 2018 – 2019 DOA energy management strategy and planned activities to reduce energy usage

While DOA management is committed to striving to meet the energy savings goals specified in Executive Order 80, it is essential to note that achieving the energy goals detailed in this report is dependent on receiving the funding specified in the following pages.

PURPOSE

The Department of Administration prepares the Energy Management Plan annually in accordance with the requirements of GS 143-64.12. The Plan identifies the present strategy for reducing energy and water consumption in the buildings assigned to DOA. By 2015, the overall goal was to reduce energy consumption by 30% from the 2002-03 baseline usage. This plan has been updated in response the Executive Order 80, effective October 29, 2018. The revised goal is to reduce energy consumption in DOA owned and operated building by a minimum of 40% from the FY 2002-03 baseline consumption. In addition to identifying the present strategy, this plan reviews accomplishments of the previous year.

OVERVIEW

DOA is assigned most of the State buildings in the Raleigh Downtown Government Campus and DOA Facilities Management is responsible for operating and maintaining these buildings; including paying the water, electric, and natural gas utility bills. Occupants in these buildings work for various State Agencies and the buildings have diverse functions – office, assembly, museum, record storage, laboratory, maintenance shop, and parking decks. DOA also operates a central steam heating plant, two chiller plants, and chilled water storage tanks. The central plants provide chilled water and steam to many of the DOA buildings and a few buildings that are being reported to Energy Office by other state agencies.

CURRENT ENERGY PERFORMANCE

The table below identifies the DOA baseline energy usage of 2002-03 and the present energy usage for 2017-18.

FY	Energy + Water Cost (\$)	Total Energy Cost (\$)	Total Energy Usage (Btu)	Total Water + Sewer Cost (\$)	Total water Usage (mgal)	Total Building Area (gsf)	Energy Tracking Measure (Btu/gsf)
2002-03	\$8,621,411	\$8,621,411	696,827,809,264	Not Available	Not Available	4,659,040	149,565
2017-18	\$10,296,998	\$9,510,497	746,199,520,986	\$786,501	63,736	6,140,901	121,513

Data is under review to re-establish the baseline and validate energy usage figures.

Summary of buildings

The FY 2002-03 baseline needs to be adjusted. This report focuses on DOA Buildings. Since Veterans Affairs is no longer a division of DOA, the baseline will be adjusted to remove Veterans Cemeteries and VA Homes across the state. The report will concentrate of DOA Downtown Government Center buildings; parking decks; Motor Fleet and Textbook Warehouse; State Surplus Property Warehouse; and Federal Surplus.

The 2017-18 data will include the same set of buildings, with adjustments for building sold and demolished, including: Blount Street houses removed or sold; Motor Fleet Annex; YWCA. Adjustments will also include new buildings built, such as: Nature Resource Center; DEQ Office Building; New Chiller Plant; and Parking Deck 77. Buildings owned by other agencies will not be included, such as General Assembly; Museum of Art; Garner Road Complex; SBI Lab; and State Public Health Lab.

The original FY 2002-03 baseline was reported as 4,659,040 GSF. The new baseline is 5,361,406 GSF, which includes 1,625,600 GSF of parking deck.

The FY 2017-18 report claimed 6,140,901 GSF, based on reports dating back to FY 2011-12. A review of the set of buildings described shows a total of 6,010,974 GSF, including 1,897,923 GSF of parking deck.

Both the baseline and the current year energy and water usage reported include some buildings reported in Willowtec which are not owned by DOA. Efforts have been made to reconcile the figures; however the tools for accessing the data are not user friendly, and more effort is required to provide a complete review. DOA is working with DEQ to resolve this energy data reporting issue.

To better track and manage energy consumption, DOA will address the following concerns with energy data:

1. Validate the 2002-03 baseline figures for both GSF and energy usage.
2. Report GSF by building type. Reporting of GSF associated with parking decks has been problematic. Parking Decks are typically high in square footage and relatively low in energy consumption, which skews the overall energy usage intensity metric. Some of the parking decks

have lighting and ventilation equipment served from an adjacent building meters, so the metered energy usage cannot be reported separately.

3. Archive energy data to ensure access to all usage years.
4. Pursue new tools for tracking and reporting energy usage and billing data.

SUMMARY OF 2018-19 STRATEGY

A new DOA Energy Management Team was formed for 2017-18, and continues for 2018-19. The new team revised and reformatted the DOA Energy Management Plan to detail some specific activities and projects we have proposed to undertake, depending on funding availability. Part of the overall strategy is to spend time reviewing and understanding existing data. At present, the energy and water data are not a one-for-one match with the DOA Buildings and clarification of what data DOA is reporting is fundamental to understanding areas that can be improved upon. The following sections provide details of how DOA will work to manage energy this year. DOA has included an Energy Plan Mandate to encourage those responsible to commit to the success of this Plan. We consider this plan to be a working document that will have information added throughout the year. At present time, we have limited cost information but as we have time to further refine, this information will be inserted and the document will continue to evolve and improve.

The evaluation of actual savings from the projects that are undertaken is problematic as the systems are not static. Typically, once a system is repaired or upgraded, the tasks assigned to the system are drastically changed to lower the use of other existing less efficient systems. As the systems in the buildings are interconnected, projects typically cover multiple buildings over multiple budget cycles. The energy savings of any given project are at best engineering estimates based on judgement. Additionally, the downtown complex has had multiple buildings brought on line over the past 10 years to replace smaller less efficient buildings. The net result is an increase in both employee and public use of the State-owned buildings and an increase in cost to operate the spaces.

DOA is tasked with providing steam and chilled water to several buildings that are not operated by DOA. The use of steam and chilled water by those facilities impacts the overall energy performance being reported; however, the water and electric use by those facilities is not monitored by DOA and is not in the report. We will look at ways to better monitor energy use and maintenance costs for each facility served. The chilled water isolation project is providing the capability of measuring cooling Btu's delivered at the building interface. This provides better capability of analyzing individual building HVAC system performance.

It has become apparent that the newer energy efficient buildings and equipment use less water and electricity; but, require more maintenance and require greater training on the part of service personnel. The team will start working on ways to track these added maintenance costs.

ENERGY MANAGEMENT PLAN MANDATE

GOAL

Reduce annual Total Energy Consumption per square foot in buildings owned and administered by Department of Administration (DOA) by a minimum of 40% from a baseline established in fiscal year of 2002-03.

MEASURES

Our tracking measures will be: Total Energy Use in Btu per Square Foot per Year

COMMITMENT

- We recognize that energy and water consumption can be managed to our benefit. Energy and water management is a responsibility of the occupants at each facility, guided and supported by the Utility Manager and Utility Savings Initiative (USI) Liaison.
- The attached plan outlines the activities and expenditures required to reduce energy and water consumption to achieve the goals of the program.
- The Department Heads will review progress and results, and will support staff attendance at training in energy and water management.

I have read and support the Strategic Energy & Water Plan for my Organization Implemented this 1st day of March, 2019.



Joseph H. Baden, PE, DOA Agency Energy Manager



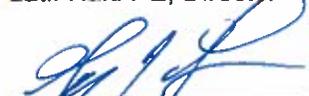
Greg Gittins, DOA Utility Manager



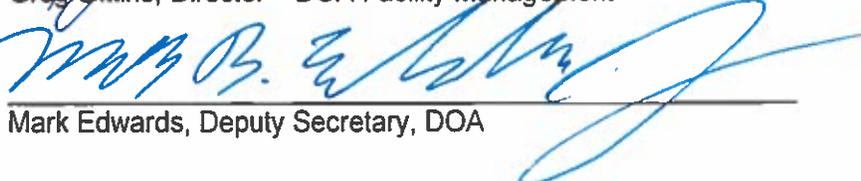
Robert L Talley, PE, SCO – Consulting Services



Latif Kaid PE, Director – State Construction Office



Greg Gittins, Director – DOA Facility Management



Mark Edwards, Deputy Secretary, DOA

Focus A: Supply Side				
Strategy 1	Install meters to monitor steam and chilled water usage at buildings connected to the DOA central steam and chilled water plants.			
Strategy 2	Recommission economizers and temperature reset schedules to take advantage of temperate outdoor air and Improve HVAC system.			
Strategy 3	Renovate systems that are failing.			
Strategy 4	Replace individual failed pieces of equipment with the most cost effective and energy efficient model available.			
Strategy 5	Improve tools for tracking and reporting energy use and cost.			
2018-19 Planned Activities	Savings Expected	Cost To Implement	Accountability	Funding Source
Review all energy metering data to better understand what is being measured and which buildings are being metered together.	0	\$49,000	Hany Botros	No present funding
Review Utility Rates to verify that DOA is receiving the correct rate for each building. Involve Utility Account Manager.	1%	\$15,000	Greg Gittins/ Ralph Taylor	No present funding
Currently chilled water meters exist on the buildings supplied from Chiller Plants 1 & 2. These meters are connected to the main HVAC monitoring system. Data is being logged into a history; but, not analyzed. Replace all meters with utility grade type to produce reliable results. Need a staff position to oversee the data collected. (Eight buildings have updated meters, and eight additional planned for this year, as part of Downtown Complex Chilled Water Isolation Project, under separate funding. Needs to be imported to the Building Automation System as new control points.)	0	\$500,000	Ken Vendel	No present funding
Provide utility grade steam meter at each building served by the central steam plant. Steam meters will allow DOA to understand steam usage at the buildings and know which buildings have most potential for improving steam consumption and detecting leaks.	Ability to track steam usage and identify problems	Estimated \$500,000	Ken Vendel	No present funding
Cooper Building HVAC floors 4, 5, 6	20%	\$2,000,000	Hany Botros	Not funded
New Education Bldg. – VAV box renovation Phase 2	15%	\$700,000	Ken Vendel	2018 R&R
Lay groundwork for improved energy & water/utility bill data management system to replace current tracking methods	Better data mgmt. and reporting	Unknown	Greg Gittins John Felix Ralph Taylor	Unknown

Downtown Complex Chilled Water Isolation Project – project is designed to isolate the buildings from the loop and prevent contamination of the loop and the possible loss of the loop in event of a failure. Once all buildings are isolated there will be an energy savings associated with the loop pumps. This project was ongoing through 2017-18, and continues through 2018-19, with additional R&R funding provided for additional buildings. 8 of 13 building complete, and 3 additional building added with additional funding.	\$160,000 annual	\$3,670,000 +\$1,097,000	Ken Vendel	2015 R&R; 2018 R&R
Old Chiller Plant Cooling Tower Replacement. Premature deterioration and failure of cooling towers requires replacement of cooling towers for continued operation of two chillers at Old Chiller Plant, serving the Downtown Complex Chilled Water loop.	Continued ability to operate chillers on district loop	\$639,000	Hany Botros / Ralph Taylor	2017 R&R
District Chiller Plant and Steam Plant Upgrades	More efficient equipment operation	\$12,523,000		CI Funding requested for FY 2019-20

2017-18 Accomplishments	Savings Expected	Cost To Implement	Accountability	Funding Source
Downtown Complex Chilled Water Isolation Project – project is designed to isolate the buildings from the loop and prevent contamination of the loop and the possible loss of the loop in event of a failure. Once all buildings are isolated there will be an energy savings associated with the loop pumps. Steady progress was made as the project installed equipment in several buildings. 8 of 13 building complete.	\$160,000 annual	\$3,670,000	Ken Vendel	2015 R&R; 2018 R&R
Chilled Water meters were installed in 8 buildings as part of Downtown Complex Chilled Water Isolation Project, under separate funding.	Unknown	Funded under other project.	Ken Vendel	Funded under other project.

2016-17 Accomplishments	Savings Expected	Cost	Assigned to	Funding Source
Replacement of old chillers at Chiller Plant 1 with energy efficient units. Project also includes use of VFDs on pumps to further save energy.	30%	\$3,500,000	Hany Botros	2012-13 R&R
DOA has completed project at Central Steam Plant that involved repairs and tune-up of all 4				

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boilers. Engineers are working on report about anticipated energy savings from tune-ups condensate leak repairs.	10%	\$1,233,245	Hany Botros	2009-10 R&R
Renovation of the Albemarle Building	30%	\$44,500,000	Bob Talley	2014 R&R

Focus B: Demand Side	
Strategy 1	Continue to expand central monitoring of building HVAC systems. This allows the DOA HVAC control technicians to identify problem areas and troubleshoot for improvements.
Strategy 2	Reduce energy consumption by replacing remaining magnetic ballasts and T-12 lamps. This is very timely since the T-12 lamps are no longer being manufactured.
Strategy 3	Replace failing lighting contactors and investigate feasibility of providing more sophisticated lighting control that is related to actual occupancy and HVAC rather than simple time clock.
Strategy 4	Replace individual failed pieces of equipment with the most cost effective and energy efficient model available.
Strategy 5	Reevaluate use of building HVAC setbacks. Identify computer server rooms that need HVAC separate from building HVAC in order to allow building setbacks that do not interrupt operation of computer server rooms.
Strategy 6	Major building renovations to provide more efficient building systems and energy efficient operation.
Strategy 7	Demolish deteriorating buildings that no longer meet the needs of State Government.

2018-19 Planned Activities	Savings Expected	Cost	Accountability	Funding Source
DOA recommissioning projects – including reactivation of building economizers, adding more buildings to the central HVAC monitoring station, and segregating server room HVAC systems.	5%	\$492,000	Ken Vendel	Not funded
Identify those buildings that still have T-12 lamps and prepare plan to retrofit. Archives Building still has T-12 lamps and challenge of working in building with spray-on asbestos fireproofing.	10%	TBD	Ralph Taylor	Not funded
Project is to upgrade obsolete and inefficient electrical lighting in the Downtown Government Complex buildings to achieve energy efficiency and operational effectiveness. Project will replace T-12 fluorescent lighting with T-8 fluorescent or LED lighting and incorporate lighting controls in spaces where energy savings will provide a good payback. T-12 fluorescent lamps are no longer being manufactured, and availability is limited. Lighting upgrade will be a combination of retrofitting existing lighting fixtures, replacing fixtures with new fixtures, and installing lighting controls. This project will not address all lighting needs, so available funding will be prioritized. Surge suppression will be added on lighting panels when LED lighting option is selected	\$475,000/ yr	\$2,396,000	Ralph Taylor	R&R Funding requested for FY2022-23

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Prepare list of buildings with lighting contactors and prioritize based on failing contactors. Identify possible retrofits that would provide energy savings.	TBD	TBD	Ralph Taylor	None identified yet
Recommissioning of CO controls and replacement of fans and drives for Parking Garage 65. This project is an HVAC Improvement at Parking Deck 65. Work will replace supply and exhaust fans, add variable frequency drives and replace the non-working carbon monoxide sensors and automation system. This project will upgrade the supply and exhaust fans to direct drive type fans that will help lower maintenance issues over the life of the fans.	45%	\$375,000 \$530,000	Ken Vendel	R&R Funding requested for FY2019-20
New Revenue HVAC/BAS Renovation – update obsolete Building Automation System controls at the Air Handling Units.	10%	\$400,000	Ken Vendel	2015 R&R
New Revenue Building - HVAC Control Replacement at terminal units.	More efficient operation & better control	\$2,303,000	Ken Vendel	R&R Funding Request for FY2019-20
Caswell Building HVAC Renovation – project is under construction, continuing from previous year, replacing AHU's and VAV boxes on four floors.	30%	\$1,677,000	Ken Vendel	2015&16 R&R
HVAC Small System Repairs for Cotton, Archives & Old Education Buildings	TBD	\$153,000		R&R Funding Request for FY2019-20
Demolish Bath Building (funding requested for FY 2019-20 and 2020-21) Replace older inefficient building stock	TBD	\$42,993,000	Bob Talley	CI Funding Request for FY 2019-20 & FY 2020-21
Administration Building Major Renovation to include higher efficiency building systems (lighting, HVAC)	TBD	\$75,955,000	Bob Talley	CI Funding Request for FY 2020-21 thru FY 2022-23
Request funding for Major Building Renovations in future years, to include: Agriculture Building; Archdale Building; Brown-Rogers Building Dobbs Building;	More efficient building system operation	\$61,282,000 \$107,541,000 \$4,987,000 \$90,646,000	Bob Talley	CI Funding Requested over next 5 years
Request funding for new buildings to replace aging deteriorating buildings, to include: New Cooper Building; New State Government General Services Shop; Shore Building; State Records Center;	More efficient building system operation	\$28,792,000 \$8,902,000 \$13,539,000 \$21,045,000	Bob Talley	CI Funding Requested

<p>Old Education Building Window Replacement This project at the Old Education Building involves removing all of the original single pane windows and replacing them with energy efficient double pane windows. This will make the building more energy efficient and correct any water infiltration at the windows, thus saving the state money.</p>	TBD	\$2,231,000	Alan Eaton	R&R Funding Request for FY2023-24
<p>Archives and History - HVAC Renovation - Steam to Hot Water Heat Conversion This building has suffered leaks and component failures. The replacement mechanical parts are no longer suited for these types of steam reheat systems. Due to the age and condition of the facility the entire HVAC reheat system needs to be replaced including the following items; pumps, hot water convertor, control system, valves and coils. The heating coils for the various heating zones throughout the building are all located in the basement, some serving areas more than 3 floors away. The system lag causes the steam reheat valves to hunt. Converting to a hot water reheat system will allow for a more variable temperature control over the existing building areas.</p>	TBD	\$458,000		R&R Funding Request for FY2019-20
<p>Archdale – HVAC Renovation - Replace Air Distribution Boxes and Pneumatic Controls Due to the age and condition of the facility the entire HVAC DDC Controls (over twenty years old) need to be replaced including the following items; Air Handling Unit Supply and Return Fans and Drives, Motorized Dampers, Terminal Box Controls , Air Handling Unit control system components and small single zone Air Handling Units.</p>	More efficient system operation	\$2,706,000		R&R Funding Request for FY 2020-21
<p>Old Textbook Warehouse – HVAC Due to the age and condition of the building Air Handler Units, there is a need to replace the units. The AHU coils are fouled and units no longer meet design air flow. AHU need frequent repairs. Full package replacement of (2) Split system DX Air Handler Units with Steam reheat.</p>	More efficient system operation	\$122,000		R&R Funding Request for FY 2021-22

2017-18 Accomplishments	Savings Expected	Cost	Accountability	Funding Source
New Revenue HVAC Renovation Phase 2 – Replaced chiller at New Revenue Building	10%	\$860,000	Ken Vendel	2015 R&R
Caswell Building HVAC Renovation - project began construction, and reached 25% complete in 2017-18. Replaced AHU and VAV boxes serving Second floor and 's portion of First floor.	30%	\$1,677,000	Ken Vendel	2015&16 R&R

2016-17 Accomplishments	Savings Expected	Cost	Assigned to	Funding Source
Labor Bldg – Replace AHUs and Controls	35%	\$600,000	Hany Botros	R&R
New Education Bldg. – VAV box renovation Phase 1	15% for building	\$450,000	Ken Vendel	2012 R&R
New Revenue HVAC Renovations Phase 1	20%	\$1,238,000	Ken Vendel	2013 R&R
Old Revenue HVAC Renovations	10%	\$908,000	Ken Vendel	2013 R&R
Administration Bldg – Replace fans in AHUs	30%	\$277,000	Hany Botros	2012-13 R&R
Shore Building HVAC Repair	10%	\$1,390,000	Ken Vendel	2013 R&R

Focus C: Communication and Training					
Strategy 1	Coordinate with DOA Facility PM Shop to better understand Preventative Maintenance tasks and schedules. Identify ways to use feedback from this group to help guide energy savings strategies.				
Strategy 2	Investigate ways to make energy savings more visual, possibly through some charts on DOA Facility Management website.				
Strategy 3	Identify training opportunities.				
Strategy 4	Team with building tenants of different agencies to address behavioral impact on energy usage.				
2018-19 Planned Activities		Savings Expected	Cost	Accountability	Funding Source
Schedule periodic meetings with Facility Mgmt PM Shop to review and identify those tasks that could impact energy use.		Highlight energy issues	\$0	Bob Talley	Not Required
Request information about specific training opportunities from State Energy Office, particularly no cost and low cost.		TBD	Unknown	Bob Talley	Unknown
Establish initial monitoring project. DENR had set aside funding in Green Square project to monitor energy saving and green features of the NRC, DENR Office Bldg, and the DOA Deck 77. Determine if this information is available on line and how DOA can establish a link to this information. If information does not exist, investigate why it was not implemented and what can be done to capture this information and share on the DOA website.		TBD	Unknown	Ken Vendel	Not funded
Send multiple SCO and FM staff members to Energy Management Diploma Series class, 14 days of training scheduled over a 7 month period.		TBD	Funded by USI program	Latif Kaid Greg Gittins	Funded by USI program
2017-18 Accomplishments		Savings Expected	Cost	Accountability	Funding Source
Held initial meeting with Facility Mgmt PM Shop to review and identify those tasks that could impact energy use.		0	\$0	Bob Talley	Not Required
Requested information about specific training opportunities from State Energy Office, particularly no cost and low cost.		0	Unknown	Bob Talley	Unknown
2016-17 Accomplishments		Savings Expected	Cost	Assigned to	Funding Source
SCO regularly meets with FMD to identify energy "problems" and plan for solutions		0	Unknown	Bob Talley	Staff

Focus D: Water

Strategy 1	Coordinate with DOA Facility Management and Fiscal Management to identify ways to obtain water usage data. In past, data has not been consistent and has not been reported as part of the DOA Energy Management Plan.
Strategy 2	Contact City of Raleigh to determine if there are any options for electronic download of water usage data.
Strategy 3	Investigate use of sewer meters to reduce sewer charges at buildings with cooling towers.
Strategy 4	Remove the low flow water fixtures that were previously installed without replacing the cast iron waste lines. This is a failed ECM.

2018-19 Planned Activities	Savings Expected	Cost	Accountability	Funding Source
FMD to coordinate with DOA Fiscal, to see what options City of Raleigh has to provide electronic data of water and sewer usage that can be downloaded into the Willow Tec Energy software. Laying groundwork for a more user-friendly software package and service for collecting and managing usage and cost data.	TBD	Staff time	Greg Gittins/ Ralph Taylor	Unknown
Contact City of Raleigh to check about rate opportunities and meter costs that would allow for separate metering of cooling towers so that DOA is not paying sewer fees for water being evaporated from cooling towers. Review data from existing sewer meter at Chiller Plant 2 cooling towers to see what savings can be expected.	TBDini	Staff Time	Greg Gittins	Not Required
Replace the low flow water fixtures that were previously installed without replacing the cast iron waste lines. Savings will be from lower maintenance cost.	Yes, by reducing back ups	Unknown	Hany Botros	No present funding

2017-18 Accomplishments	Savings Expected	Cost	Accountability	Funding Source
FMD has manually collected and entered water/sewer meter data and cost data into the Willow Tec Energy software for 2017-18.	0	Staff time	John Felix	Unknown
Replaced some of the low flow water fixtures that were previously installed without replacing the cast iron waste lines. Savings will be from lower maintenance cost. Some fixtures were replaced using maintenance funds. Require additional funding.	Yes, by reducing back ups	Unknown	Hany Botros	No present funding

2016-17 Accomplishments	Savings Expected	Cost	Assigned to	Funding Source
DOA did manually capture water usage and cost information from data provided by DOA Fiscal. This may allow a baseline for comparing water usage in future years. Unfortunately, data from previous years was not reported due to difficulty in obtaining.	0	unknown	Greg Gittins	No present funding

APPENDIX A

Tenants of DOA Buildings

Department of Administration; Department of Environmental Quality; Department of Commerce; Department of Health & Human Services; Department of Information Technology; Department of Military and Veteran's Affairs; Department of Natural and Cultural Resources; Department of Public Safety; Department of Revenue; Department of Transportation; Department of Insurance; Department of Labor; Department of Agriculture; Department of Public Instruction; Department of Justice; Secretary of State; State Auditor; Office of the Lieutenant Governor; Office of the Governor; Administrative Office of the Courts; Community Colleges; and Ethics Commission.