**NC State 13 Building Performance Contract**

**Cox Hall**

* Replacement of existing incandescent and fluorescent exit signs with

new LED exit signs

* Replacement of existing incandescent lamps with long life compact

fluorescents

* The retrofit of all existing T12 and T8 fluorescent fixtures with

25 watt reduced wattage T8 lamps and high efficiency multivoltage

electronic ballasts to reduce energy needed for lighting

* Installation of occupancy sensors in various areas to control operating

hours of the lighting systems

* Furnish and install Variable Frequency Drives for supply and return fans to save energy by allowing the volume of air moved to match the system demand at any given point in time
* Test and Balance of water side and air side systems to improve occupant comfort
* Replace all Air Handling Unit control devices (sensors, actuators, etc.) to help ensure accuracy and maximum performance
* Replace existing supply fan motors with premium efficiency inverter duty motor for energy savings and longer equipment life
* Provide weather stripping for 25 Doors to reduce heat loss/ gain through air leakage
* Provide steam jacket insulation for all uninsulated Pressure Reducing Valves, condensate return units, steam traps, and heat exchangers to save steam boiler energy
* Replace steam traps to save energy and water and maintain pressure in steam system
* Electrical smart meter installation to remotely track energy usage
* Replacement of 10 toilet valves and 3 flush valves for water conservation

**Poe Hall**

* Replacement of existing incandescent and fluorescent exit signs with

new LED exit signs

* Replacement of existing incandescent lamps with long life

compact fluorescents

* The retrofit of all existing T12 and T8 fluorescent fixtures with
1. watt reduced wattage T8 lamps and high efficiency multivoltage

electronic ballasts to reduce energy needed for lighting

* Installation of occupancy sensors in various areas to control

operating hours of the lighting systems

* Replace constant volume dual duct with dual duct Variable Air Volume boxes for fan energy savings and better dehumidification
* Replace all Air Handling Unit control devices (sensors, actuators, etc.) to help ensure accuracy and maximum performance
* Revise building schedule to match class schedules to maximize savings while the building is not in use
* Furnish and install Variable Frequency Drives for supply fans to save energy by allowing the volume of air moved to match the system demand at any given point in time
* Test and Balance of water side and air side systems to improve occupant comfort
* Incorporate integrated enthalpy economizers to avoid or minimize consuming energy by running air compressors
* Install weather stripping 12 Doors to reduce heat loss/ gain through air leakage
* Provide steam jacket insulation for all uninsulated Pressure Reducing Valves, condensate return units, steam traps, and heat exchangers to maintain high heat in the system and save steam boiler energy
* Replace failed steam traps to save energy and water, and maintain pressure in steam system
* Electrical smart meter installation to remotely track energy usage
* Replacement of 34 toilet valves and 20 urinal flush valves for water conservation

**Tompkins Hall**

* Replacement of existing incandescent and fluorescent exit signs with

new LED exit signs

* Replacement of existing incandescent lamps with long life compact

fluorescents

* The retrofit of all existing T12 and T8 fluorescent fixtures with

25 watt reduced wattage T8 lamps and high efficiency multivoltage

electronic ballasts to reduce energy needed for lighting

* Installation of occupancy sensors in various areas to control operating

hours of the lighting systems

* Furnish and install Variable Frequency Drives for supply and return fans to save energy by allowing the volume of air moved to match the system demand at any given point in time
* Replace all Air Handling Unit control devices (sensors, actuators, etc) to help ensure accurate data collection
* Close O.A. Dampers, reset temperatures, and shut off fan during unoccupied hours to maximize savings while the building is not in use
* Testing and Balancing of water side and air side systems to improve occupant comfort
* Install weather stripping for 5 Standard Doors to reduce heat loss/ gain through air leakage
* Remove and replace leaky ductwork and terminal units with new ductwork and single duct VAV boxes with DDC controls to enable remote access and control for this equipment
* Testing and Balancing of water side and air side systems to improve occupant comfort
* Replace the existing chilled water pump motor with an inverter duty motor

and add a Variable Frequency Drive to the new premium efficiency pump motor to save energy by allowing the volume of water to match the system demand at any given time

* Furnish and install Variable Frequency Drive for chilled water pump to save energy by allowing the volume of water to match demand at any given point in time
* Static pressure reset to reduce fan energy and pressure in ductwork
* Electrical smart meter installation to remotely track energy usage
* Replacement of 6 toilet valves and 3 urinal flush valves for water conservation

**Caldwell Hall**

* Replacement of existing incandescent and fluorescent exit signs with

new LED exit signs

* Replacement of existing incandescent lamps with long life

compact fluorescents

* The retrofit of all existing T12 and T8 fluorescent fixtures with 26 watt reduced wattage T8 lamps and high efficiency multivoltage electronic ballasts to reduce energy needed for lighting
* Installation of occupancy sensors in various areas to control operating hours of the lighting systems
* Provide Variable Frequency Drives for supply and return fans for fan energy savings and better humidity control
* Replace all Air Handling Unit control devices (sensors, actuators, etc.) to help ensure accuracy and maximum performance
* Testing and Balancing of water side and air side systems to improve occupant comfort
* Close O.A. Dampers, reset temperatures, and shut off fan during unoccupied hours to maximize savings while the building is not in use
* Furnish and install Universal Network Controllers (UNC) for remote access and control of energy and performance data via campus intranet
* Static pressure reset to reduce fan energy
* Hot water temperature reset
* Replace the existing chilled water pump motor with an inverter duty motor

and add a VFD to a new premium efficiency pump motor

* Weather Stripping 12 Standard Doors
* Provide steam jacket insulation for all uninsulated Pressure Reducing Valves, condensate return units, steam traps, and heat exchangers to maintain high heat and save steam boiler energy
* Replace failed steam traps to save energy and water, and maintain pressure in steam system
* Electrical smart meter installation to remotely and accurately track energy usage

**Winston Hall**

* Replacement of existing incandescent and fluorescent exit signs with

new LED exit signs

* Replacement of existing incandescent lamps with long life

compact fluorescents

* The retrofit of all existing T12 and T8 fluorescent fixtures with
1. watt reduced wattage T8 lamps and high efficiency multivoltage

electronic ballasts to reduce energy needed for lighting

* Installation of occupancy sensors in various areas to control

operating hours of the lighting systems

* Replace all Air Handling Unit control devices (sensors, actuators, etc.) to help ensure accuracy and maximum performance
* Testing and Balancing of water side and air side systems to improve occupant comfort
* Close O.A. Dampers, reset temperatures, and shut off fan during unoccupied hours to maximize savings while the building is not in use
* Static pressure reset to reduce fan energy
* Furnish and install Universal Network Controllers (UNC) for remote access and control of energy and performance data via campus intranet
* Provide Variable Frequency Drives for both the supply and return fans to save energy by allowing the volume of air to match the system demand at any given time
* Replace the existing chilled water pump motor with an inverter duty motor and add a VFD to the new premium efficiency pump motor to save energy by allowing the volume of water to match the system demand at any given time
* Install weather stripping for 10 Standard Doors to reduce heat loss/ gain through air leakage
* Electrical smart meter installation to remotely and accurately track energy usage
* Replacement of 13 toilet valves and 6 urinal flush valves for water conservation

**College of Textiles**

* Replacement of existing incandescent and fluorescent exit signs with

new LED exit signs

* Replacement of existing incandescent lamps with long life

compact fluorescents

* The retrofit of all existing T12 and T8 fluorescent fixtures with
1. watt reduced wattage T8 lamps and high efficiency multivoltage

electronic ballasts to reduce energy needed for lighting

* Installation of occupancy sensors in various areas to control

operating hours of the lighting systems

* Replace all Air Handling Unit control devices (sensors, actuators, etc.) to help ensure accuracy and maximum performance
* Incorporate integrated enthalpy economizer to avoid or minimize consuming energy by running air compressors
* Replace the existing supply fan motors with inverter duty premium

efficiency motors

* Install Variable Frequency Drives on each of the supply fans to save energy by allowing the volume of air to match the system demand at any given time
* Replace existing constant dual duct terminal units with new VAV dual duct terminal units for fan energy savings and better dehumidification
* Furnish and install DDC VAV controllers, space sensors, discharge air

sensors for dual duct boxes to enable remote access and control for this equipment

* Testing and Balancing of water side and air side systems to improve occupant comfort
* Provide Weather Stripping for (62) Exterior Standard Doors, (25) Standard Interior Doors, (2) Roll-Up Doors and seal 2,584 linear feet of roof/wall intersections to reduce heat loss/ gain through air leakage
* Insulate 900 sq.ft. of exterior wall surface to reduce heat loss/gain
* Install new premium efficiency inverter duty motors on existing chilled water pumps
* Install Variable Frequency Drives on each of the chilled water pumps controlled by differential pressure to save energy by allowing the volume of water to match the system demand at any given time
* Static pressure reset to reduce fan energy
* Provide steam jacket insulation for all uninsulated Pressure Reducing Valves, condensate return units, steam traps, and heat exchangers to maintain high heat and save steam boiler energy
* Replace failed steam traps to save energy and water, and maintain pressure in steam system
* Electrical smart meter installation to remotely and accurately track energy usage
* Replacement of 46 toilet valves and 10 urinal flush valves for water conservation

**McKimmon Center**

* Replacement of existing incandescent and fluorescent exit signs with new LED exit signs
* Replacement of existing incandescent lamps with long life compact fluorescents
* The retrofit of all existing T12 and T8 fluorescent fixtures with29 watt reduced wattage T8 lamps and high efficiency multivoltage electronic ballasts
* Installation of occupancy sensors in various areas to control operating hours of the lighting systems
* Replace all Air Handling Unit control devices (sensors, actuators, etc.) to help ensure accuracy and maximum performance
* Revise building schedule to match class schedules to maximize savings while the building is not in use
* Incorporate integrated enthalpy economizer to avoid or minimize consuming energy by running chillers
* Replace the existing supply fan motor with an inverter duty premium efficiency motor
* Replace existing terminal units with new DDC VAV terminal units with hot water reheat to enable remote access and control for this equipment
* Furnish and install Variable Frequency Drives for supply fans and new relief fans to save energy by allowing the volume of air to match the system demand at any given time
* Furnish and install DDC VAV controllers, space sensors, discharge air sensors

for single duct VAV terminal boxes to enable remote access and control for this equipment

* Incorporate integrated enthalpy economizer to avoid or minimize consuming energy by running air compressors
* Weather Stripping (39) Exterior Standard Doors and (3) Roll-Up Doors and seal 500 linear feet of roof/wall intersections to reduce heat loss/ gain through air leakage
* Install new premium efficiency inverter duty motors on existing chilled water

Pumps to reduce motor heat and increase efficiency

* Install Variable Frequency Drives on each of the chilled water pumps controlled by differential pressure to save energy by allowing the volume of water to match the system demand at any given time
* Lower the pump speed to the minimum required speed to meet the load of the building for the variable speed pumping system
* Existing JCI controls on Annex AHUs and VAV boxes shall be replaced with new Direct Digital Controls to enable remote access and control for this equipment
* Electrical smart meter installation to remotely and accurately track energy usage
* Replacement of 32 toilet valves and 18 urinal flush valves for water conservation

**Monteith Research Center**

* Retro-commission the entire system to ensure system is functioning as

intended in the original construction documents

* Test systems for proper airflow, hazardous material containment, and exhaust stream emissions
* Testing and Balancing of water side and air side systems to improve occupant comfort
* Rebalance the return fan on AHU-1 so the fan blades do not collide with the

fan housing

* Weather Stripping for (10) Exterior Standard Doors, (2) Garage Doors, and (15) Interior Mechanical Closet Doors to reduce heat loss/ gain through air leakage
* Replace the existing induced draft cooling towers with new induced draft cooling towers with variable fan drives to save energy by allowing for multiple fan speeds based on demand
* Reuse rejected boiler water for cooling tower water for water savings
* Static pressure reset to reduce fan energy
* Provide steam jackets for all uninsulated PRVs, valves, condensate return

units, steam traps, heat exchangers, and boilers to maintain high heat and save steam boiler energy

* Replace existing failed traps as necessary to save energy and water, and maintain pressure in steam system
* Electrical smart meter installation to remotely and accurately track energy usage

**Research I**

* Replace inlet guide vanes with variable speed drives
* Replace the supply fan motor with a premium efficiency inverter duty motor
* Convert 68 terminal units from pneumatic to DDC to improve performance and to enable remote access and control for this equipment
* Replace existing AHU supply and return air temperature and relative humidity

sensors, damper actuators, and control valve actuators to help ensure accuracy and maximum performance

Revise building schedule to match class schedules to maximize savings while the building is not in use

* Incorporate integrated enthalpy economizer to avoid or minimize consuming energy by running air compressors
* Testing and Balancing of water side and air side systems to improve occupant comfort
* Furnish and install Variable Frequency Drives for supply fans and new relief fans
* Furnish and install DDC VAV controllers, space sensors, discharge air sensors

or sixty-eight (68) single duct VAV terminal boxes to enable remote access and control for this equipment

 Weather Stripping (10) Exterior Standard Doors, (3) Roll-Up Doors, (17) Interior Doors and seal 663 linear feet of roof/wall intersections to reduce heat loss/ gain through air leakage

* Static pressure reset
* Furnish and install Universal Network Controllers (UNC) for remote access and control of energy and performance data via campus intranet
* Install new premium efficiency inverter duty motors on existing chilled water

pump and a variable secondary pumping system

* Provide steam jackets for all uninsulated PRVs, valves, condensate return

units, steam traps, and heat exchangers, and both boilers to maintain high heat and save steam boiler energy

* Electrical smart meter installation to remotely and accurately track energy usage
* Replacement of 13 toilet valves and 3 urinal flush valves for water conservation

**Dabney Hall**

* Convert the constant volume fume hood systems to a variable volume system.
* Furnish Tek-Air fume hood Accu Valve w/ Vortek flow sensor, face

velocity controller, sidewall sensor, and sash position sensor hardware

for one hundred and eleven (111) fume hoods to convert existing constant volume fume hoods to variable air volume fume hoods and therefore reducing energy usage

* This building has an existing Johnson Controls DDC system installed

for AHU and central plant equipment which will remain.

* JCI integration for lab control system point data and develop graphical

user interface screens on the existing system for fume hood energy data (CFM) to building automation staff

* Provide steam jackets for all uninsulated PRVs, valves, condensate return

units, steam traps, and heat exchangers.

* Weather Stripping (25) Exterior Standard Doors to reduce heat loss/ gain through air leakage
* Electrical smart meter installation to remotely and accurately track energy usage
* Replacement of 26 toilet valves and 10 urinal flush valves for water conservation

**Carmichael Gymnasium**

* Replacement of existing incandescent and fluorescent exit signs with new LED exit signs.
* Replacement of existing incandescent lamps with long life compact fluorescents.
* The retrofit of all existing T12 and T8 fluorescent fixtures with 30 watt reduced wattage T8 lamps and high efficiency multivoltage electronic ballasts.
* Installation of occupancy sensors in various areas to control operating hours of the lighting systems.
* Existing high bay high intensity discharge (HID) fixtures in the basketball courts will be replaced with T5 linear fluorescent high bay fixtures
* Install a solar thermal system on the Northeast corner of the roof of the 50 meter pool. The solar thermal system shall be plumbed to the existing domestic hot water heating system as a pre-heat application
* Installation of a solar thermal system (112 collectors) on the south side of the roof of the 25yd pool as a direct heating loop to the existing pool heating system (no heat exchanger)
* Installation of an ozone system for the three washing machines for energy and water savings in addition to chemical reduction
* Electrical smart meter installation to remotely and accurately track energy usage
* Provide steam jackets for all uninsulated PRVs, valves, condensate return

units, steam traps, and heat exchangers to maintain high heat in the system and save steam boiler energy

* Replace existing failed traps as necessary to save energy and water, and maintain pressure in steam system
* Weather Stripping (78) Exterior Standard Doors and seal 1,056 linear feet of roof/wall intersection to reduce heat loss/ gain through air leakage
* Replacement of 59 toilet valves, 19 urinal flush valves, 141 showerheads for water conservation

**Structures Lab**

* Seal roof/wall intersections
* Weather Stripping (25) Exterior Standard Doors, (1) Standard Roll-Up Doors, (3) Large Roll-Up Doors to reduce heat loss/ gain through air leakage
* Replacement of 2 toilets for water conservation

**Monteith Research Center Parking Garage**

* Replacement of existing incandescent and fluorescent exit signs with new LED exit signs
* Replacement of existing incandescent lamps with long life compact fluorescents
* The retrofit of all existing T12 and T8 fluorescent fixtures with 30 watt reduced wattage T8 lamps and high efficiency multivoltage electronic ballasts to reduce energy needed for lighting
* Existing high intensity discharge (HID) fixtures in the parking areas will be replaced with new LED fixtures