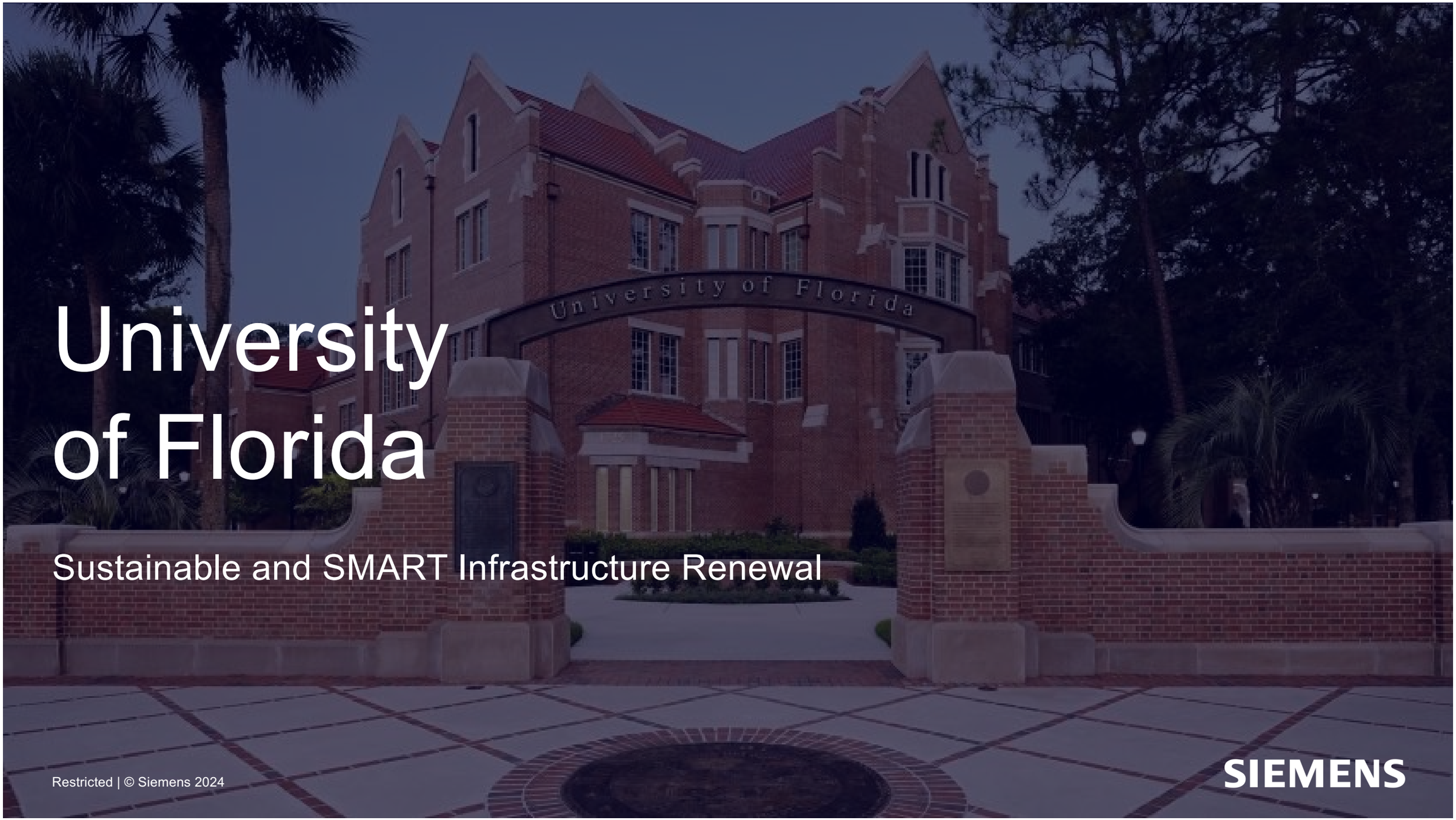


University of Florida

Sustainable and SMART Infrastructure Renewal

SIEMENS

AIA Continuing Education Provider

Credit(s) earned on completion of this course will be reported to the American Institute of Architects (AIA) Continuing Education Session (CES) for AIA members.

Certificates of Completion for both AIA members and non-AIA members are available upon request.

This course is registered with AIA CES for continuing professional education. As such, it does not include content that may be deemed or construed to be an approval or endorsement by the AIA of any material of construction or any method or manner of handling, using, distributing or dealing in any material or product.

Questions to specific materials, methods or services will be addressed at the conclusion of this presentation.

AIA Approved Continuing Education

Course Description

AIA Continuing Education Provider

Renewing infrastructure, reducing deferred maintenance, and deploying smart tech are keys to the University of Florida's campus transformation through utility efficiency projects, which used a blended capital funding model paired with financed work re-paid with guaranteed savings. Presenters will discuss how the campus is shifting to data-driven insights via advanced IoT tech, digital twins to optimize facilities' lifecycles, and a microgrid system to improve sustainability and resiliency—all with the participation of the University's students.

AIA Approved Continuing Education

Learning Objectives

AIA Continuing Education Provider

1) **Deepen understanding** of current applications of ESCO projects and contracting structure to renew infrastructure on university campuses.
2) **Discover** how ESCO projects have evolved to support major infrastructure projects and cutting-edge digital technology deployment.
3) **Understand** how to bridge the divide between facilities and academia through project work that supports both facility renewal and student and researcher engagement.
4) **Learn** how a top tier University is exploring digital technology, IoT, digital twins, and robotics to improve campus services and transform to a SMART campus.

AIA Approved Continuing Education

Presenters

Marc Craddock

SIEMENS Florida ESCO
Higher Ed Leader

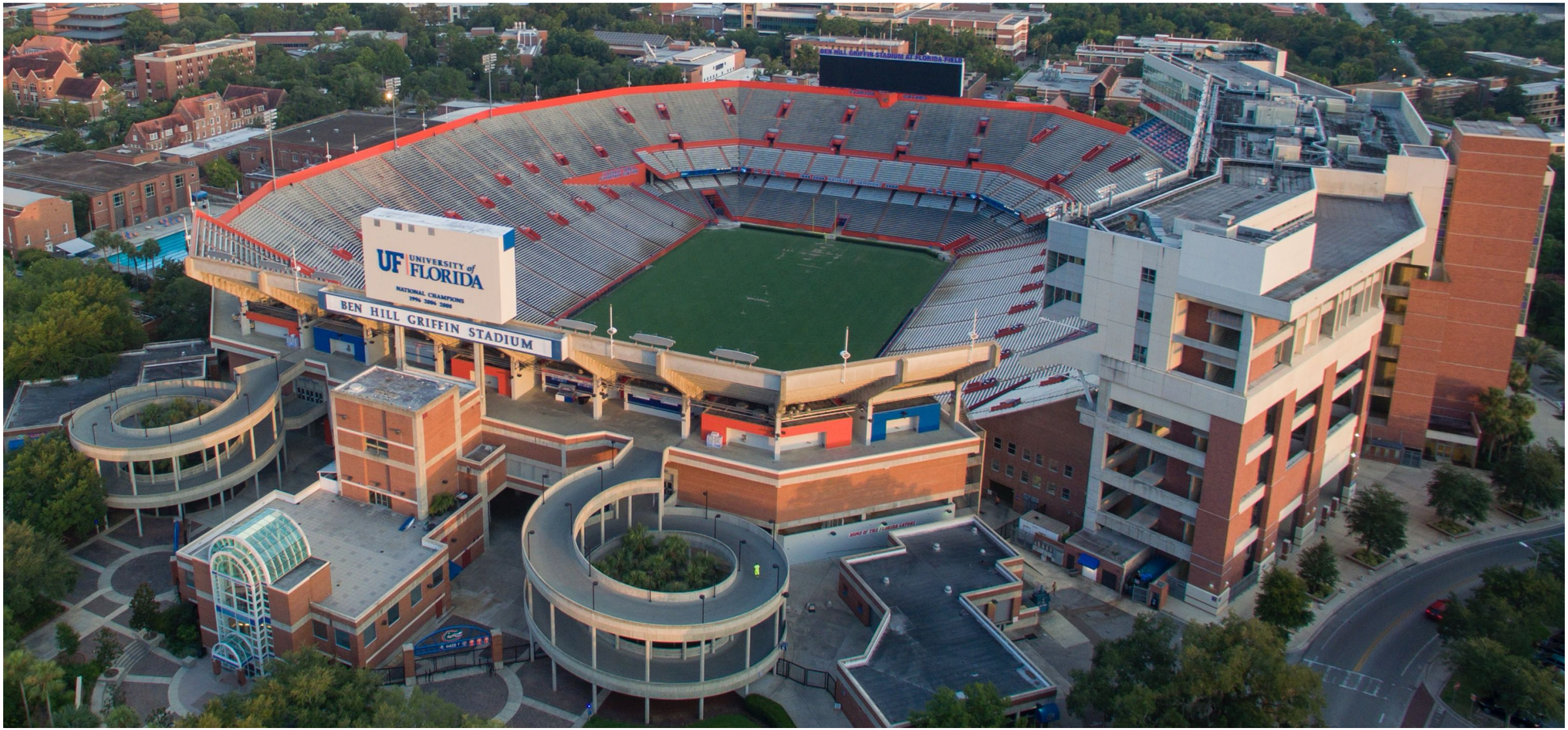
marc.craddock@siemens.com

Mark Helms

University of Florida Associate
Vice President for Facilities Services

markhelms@ufl.edu

University of Florida Overview



Siemens and UF History

1996
Beginning of Relationship

2007
Lab Efficiency Project

2013
1st ESCO Project

2013
Siemens Educational Grant

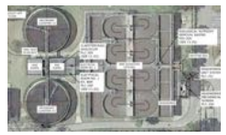
2015
Green Building Learning Collaborative Board

2018
2nd ESCO Project – Vet Med

2019
UF Execs Visit Siemens Tech Ctr

2020
Siemens UF Interns

2021
Waste Water Plant Efficiency Project



2022
UF Board of Trustees Authorizes 4 New ESCO Project Developments with Siemens

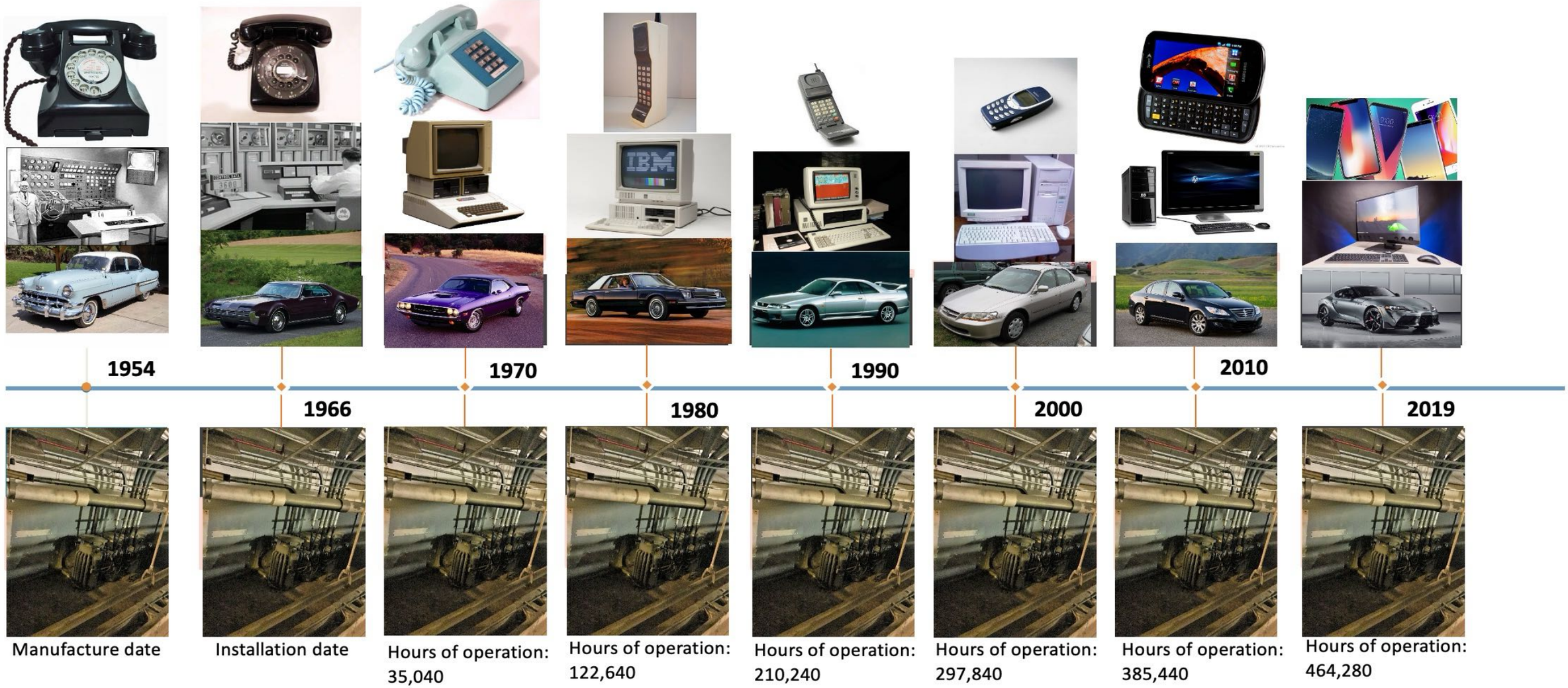
2023
3rd ESCO Project – Holland District

1996 2013 2018 2021 2022 2024

The Challenge of Aging Infrastructure

UF UNIVERSITY of FLORIDA

Evolving Technology / Static Infrastructure



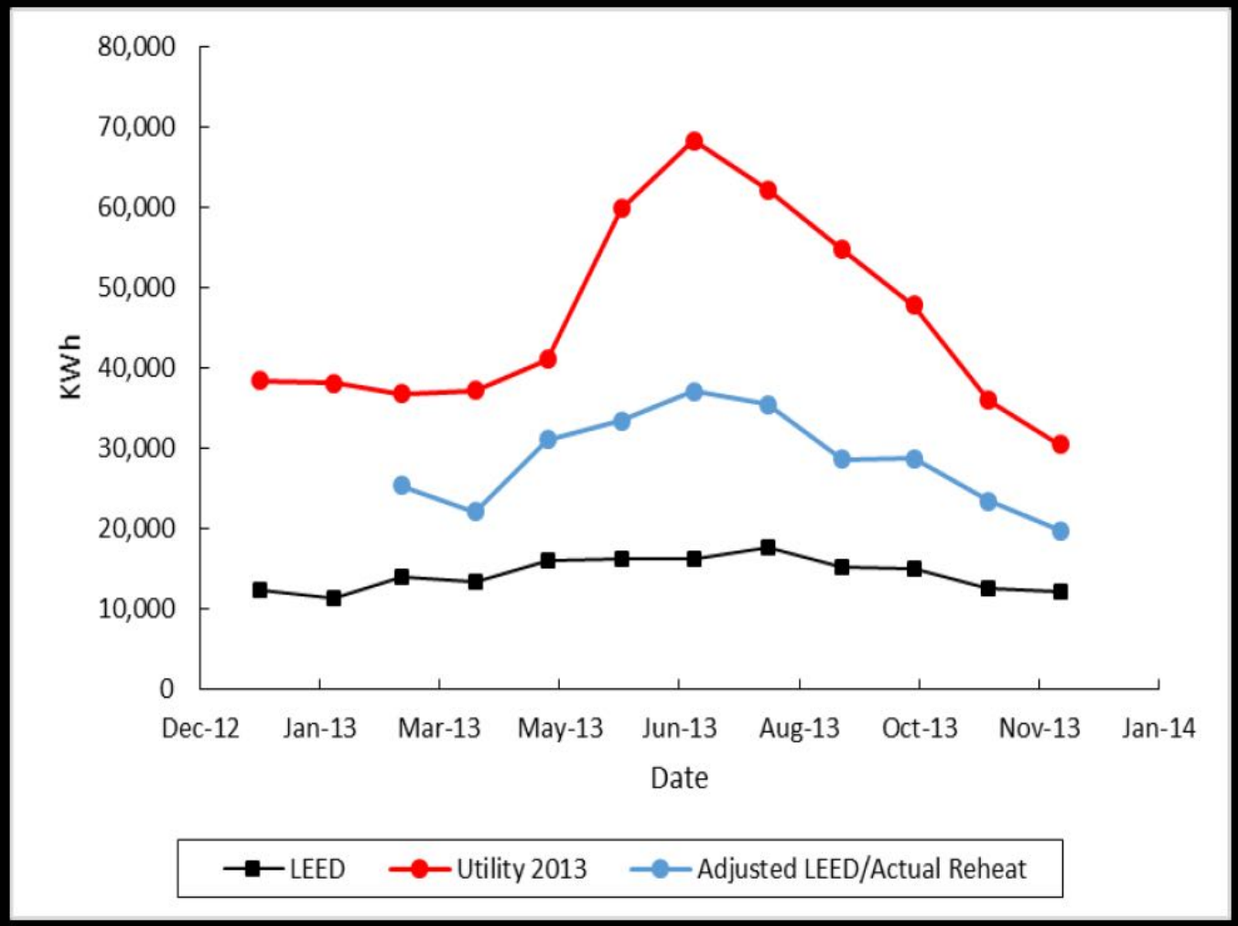
Lifecycle Challenge of Traditional Renewal / Construction Projects

”Show me the incentives, and
I’ll show you the outcome.”
- *Charlie Munger, 1955*

Lifecycle Challenge of Traditional Renewal / Construction Projects

UF UNIVERSITY of FLORIDA

Energy Consumption Comparison



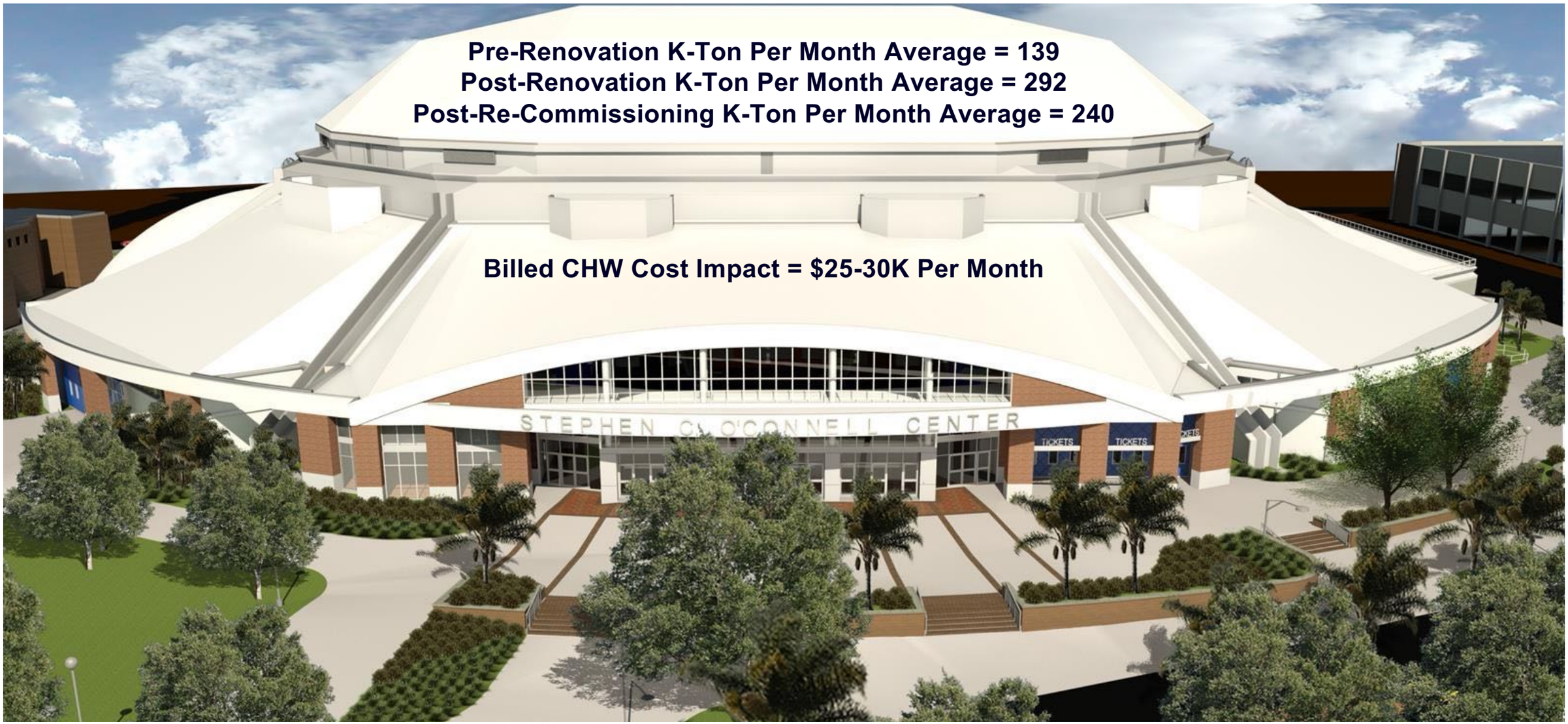
Post-Occupancy Energy Evaluation

Case Study: LEED Gold-Certified IFAS Professional Development Center
University of Florida
Gainesville, FL

Architects: McCullar & Boatright Architects
Engineering, Surveying, & Planning: Cauusseaux, Hewett, & Walpole, Inc.
Southard Engineering Inc.
MEP Engineer & Lighting Designer: Moses & Associates, Inc.

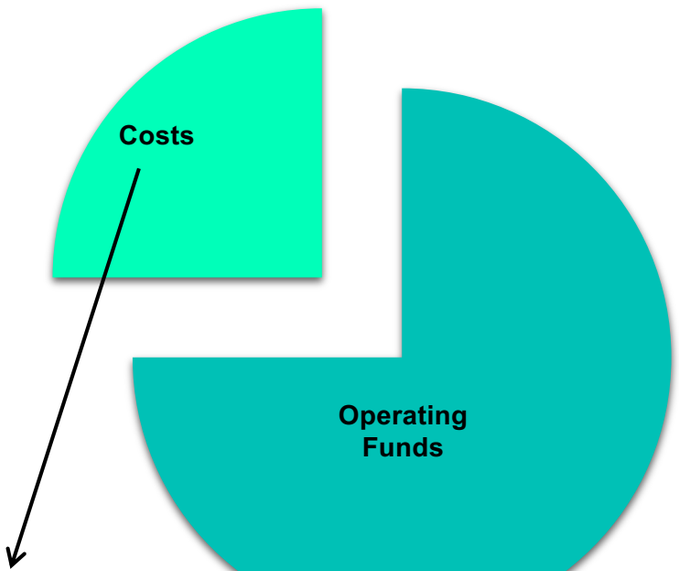
Zilsalina Mendieta & Arun Subbiah
ARC6911 | Optimizing Performance in the Built Environment
Prof. Michael Richmond, Prof. Bahar Armaghani, Prof. S.A. Sherif

Lifecycle Challenge of Traditional Renewal / Construction Projects



Energy Savings Contracting (ESCO) – Incentives & Outcomes Aligned

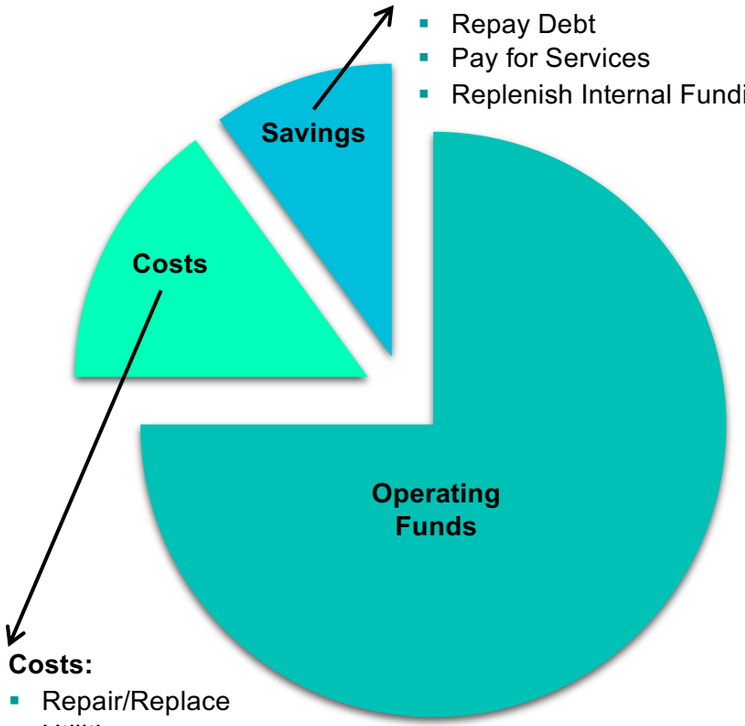
Before Program Term



Costs:
- Repair/Replace
- Utilities
- O&M

During Program Term

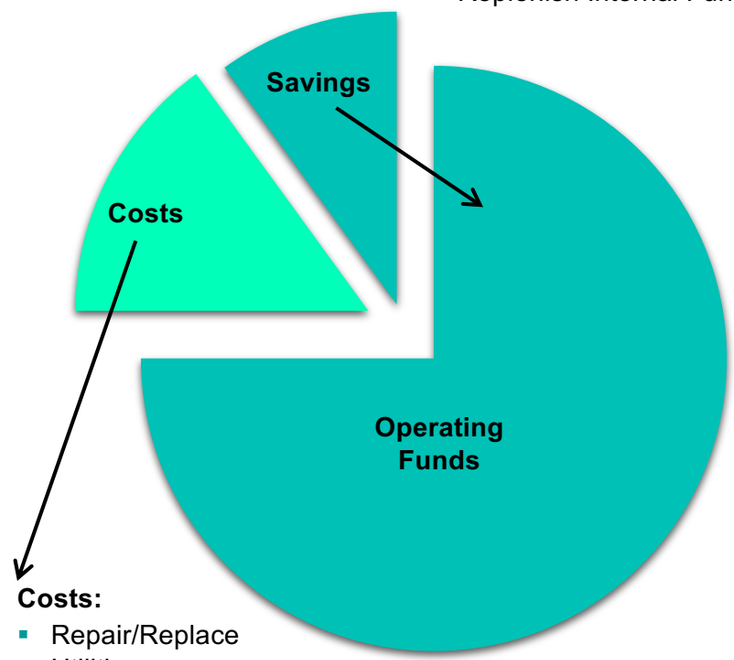
Investment:
- Repay Debt
- Pay for Services
- Replenish Internal Funding



Costs:
- Repair/Replace
- Utilities
- O&M

After Program Term

Investment:
- Repay Debt ~~PAID~~
- Replenish Internal Funding



Costs:
- Repair/Replace
- Utilities
- O&M

Energy Savings Contracting (ESCO) Benefits

- Incentives and Outcomes Aligned
- Guarantees of Performance & Savings
- Strong Owner (Facilities) Influence in Design & Construction
- Asset Ownership
- Florida Legislation Encourages ESCO (F.S. 1013.23 & 489.145)
- Allows for Lease or Bond Debt to Fund Entire Project
- Debt is Issued at Tax Exempt Rates vs. Taxable Rates

The 2021 Florida Statutes

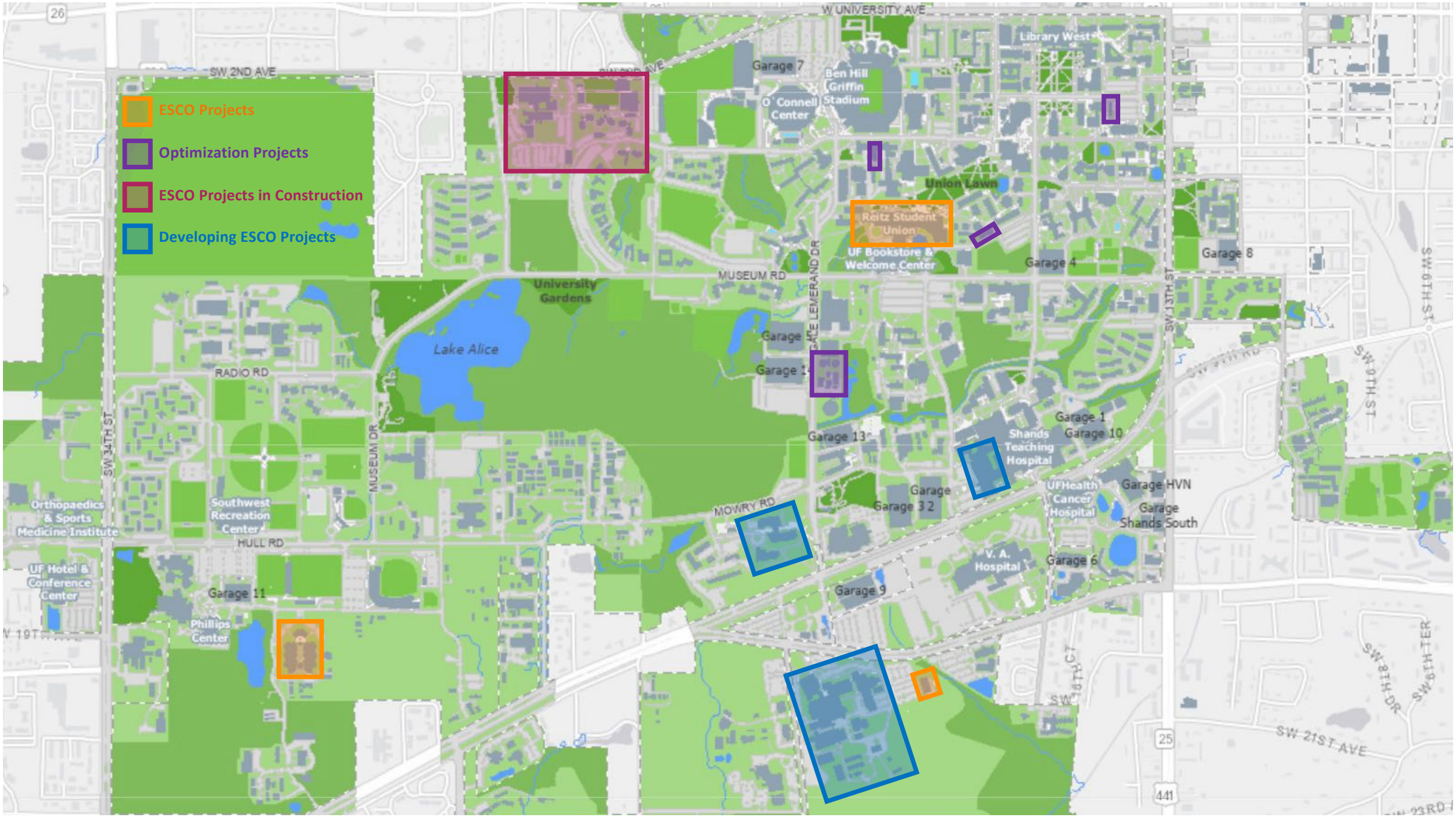
Title XLVIII
EARLY LEARNING-20 EDUCATION CODE

Chapter 1013
EDUCATIONAL FACILITIES

View Entire Chapter

1013.23 Energy efficiency contracting.—

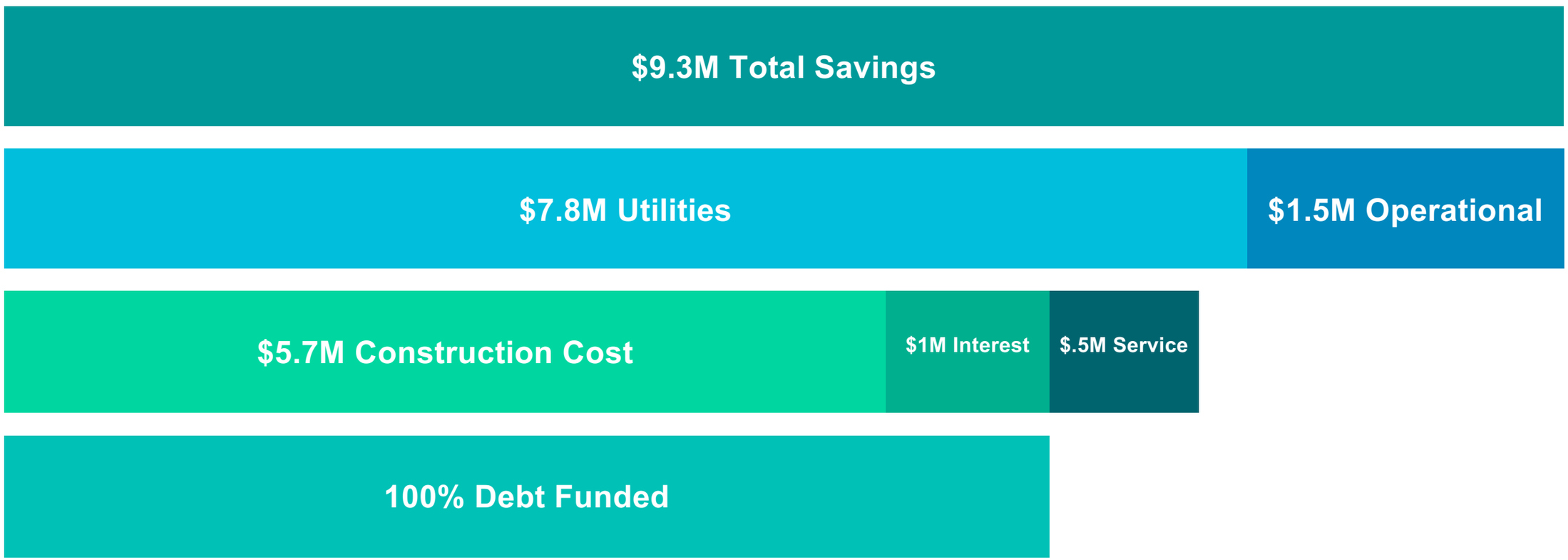
(1) LEGISLATIVE INTENT.—The Legislature finds that investment in energy conservation measures in educational facilities can reduce the amount of energy consumed and produce immediate and long-term savings. It is the policy of this state to encourage school districts, Florida College System institutions, and state universities to invest in energy conservation measures that reduce energy consumption, produce a cost savings, and improve the quality of indoor air in facilities, and, when economically feasible, to build, operate, maintain, or renovate educational facilities in such a manner so as to minimize energy consumption and maximize energy savings. It is further the policy of this state to encourage school districts, Florida College System institutions, and state universities to reinvest any energy savings resulting from energy conservation measures into additional energy conservation efforts.


ESCO Projects
Optimization Projects
ESCO Projects in Construction
Developing ESCO Projects
W UNIVERSITY AVE
SW 2ND AVE
Garage 7
Ben Hill Griffin Stadium
O' Connell Center
Library West
Union Lawn
Reitz Student Union
UF Bookstore & Welcome Center
Garage 4
Garage 8
MUSEUM RD
University Gardens
Lake Alice
LAKE LEVERAND DR
SW 13TH ST
SW 9TH ST
RADIO RD
SW 34TH ST
MUSEUM DR
Garage 13
Garage 1
Garage 10
Shands Teaching Hospital
UFHealth Cancer Hospital
Garage HVN
Garage Shands South
Garage 32
MOWRY RD
V. A. Hospital
Garage 6
Garage 9
Orthopaedics & Sports Medicine Institute
Southwest Recreation Center
HULL RD
UF Hotel & Conference Center
Garage 11
Phillips Center
SW 8TH DR
SW 8TH TER
SW 21ST AVE
25
441
26

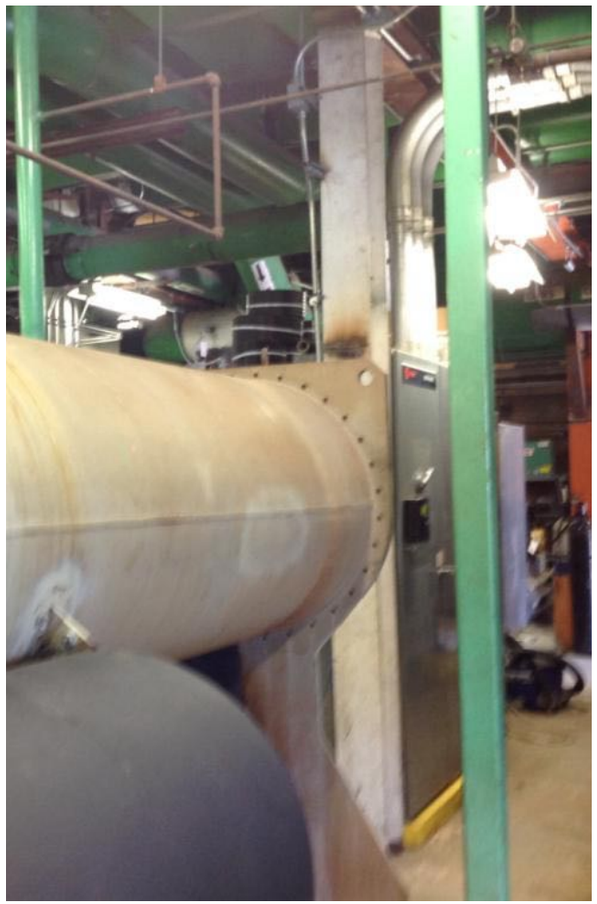
Entomology Building [Before]

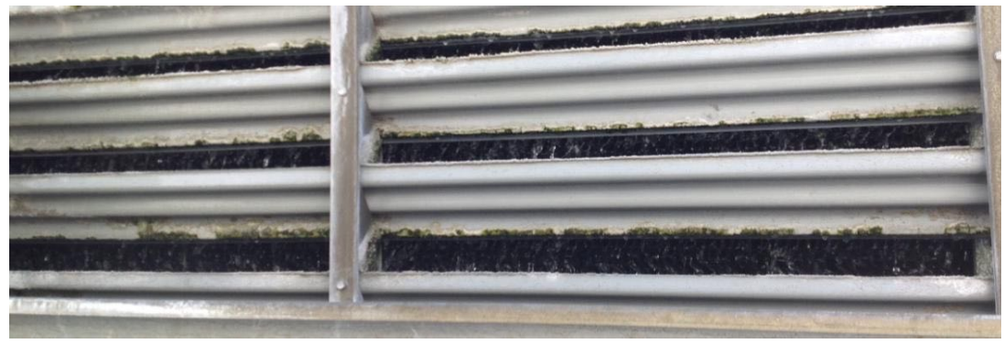
Entomology Building [After]

Entomology ESCO Project Financials



College of Veterinary Medicine Energy Plant [Before]





College of Veterinary Medicine Energy Plant [After]

College of Veterinary Medicine Energy Plant [After]

College of Veterinary Medicine Energy Plant [After]

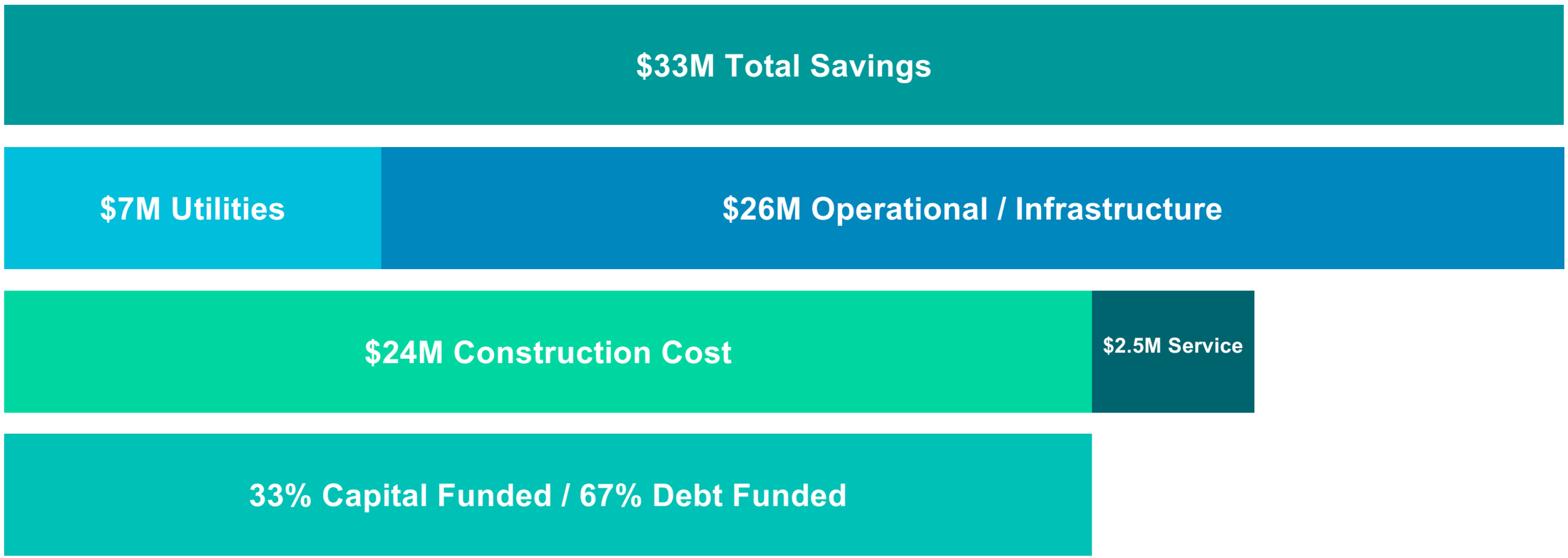
Chilled Water Plant Efficiency (006)

Monitoring Period: 9/7/2021 to 9/14/2021

Name	Wet Bulb Temperature (°F)	Baseline kW/ton	Target kW/ton	Actual kW/ton	Variance from Target (kW/ton)	% Variance/ Priority
VM Cooling System	74.9	0.91	0.68	0.58	-0.10	-15%

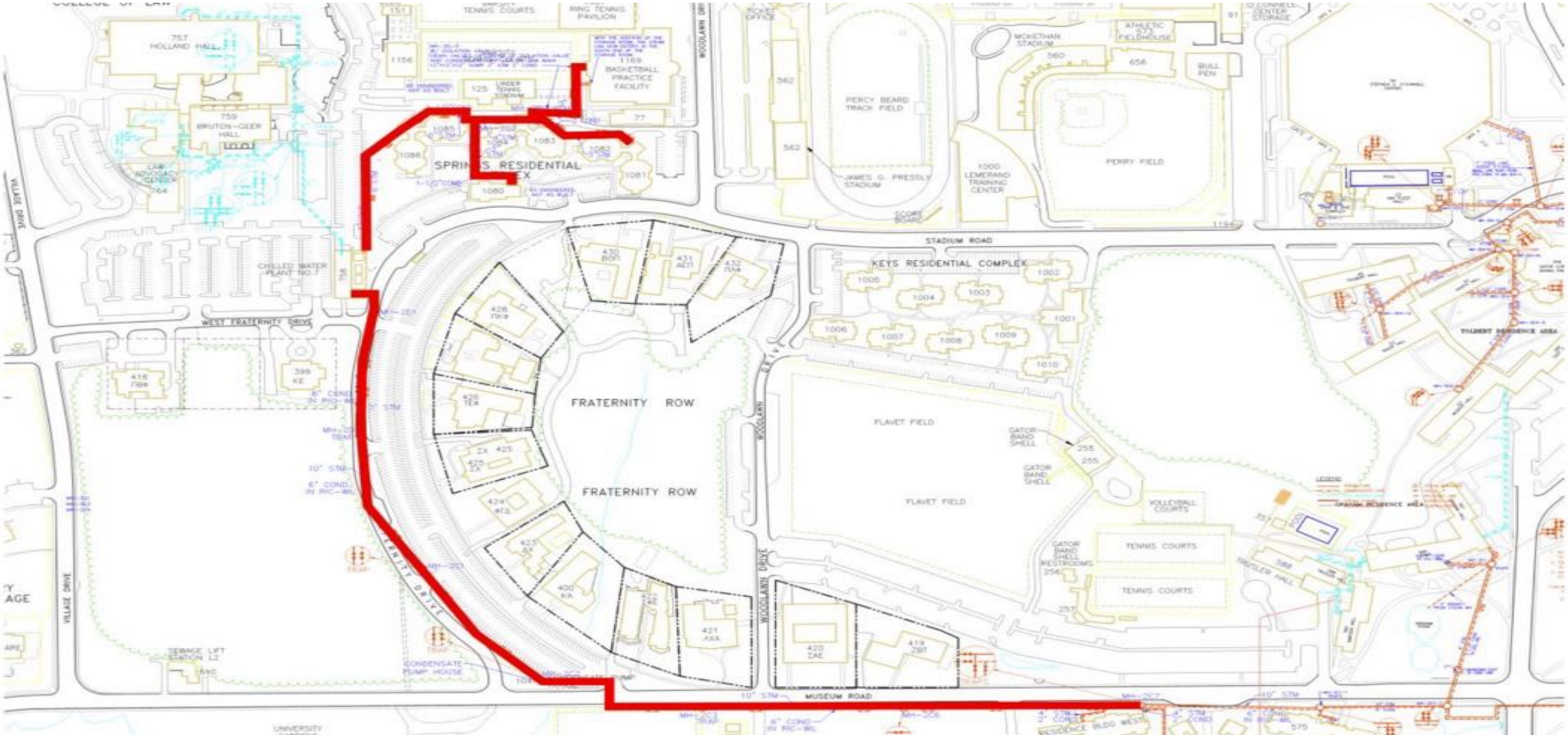
College of Veterinary Medicine Energy Plant [After]

Vet Med ESCO Project Financials

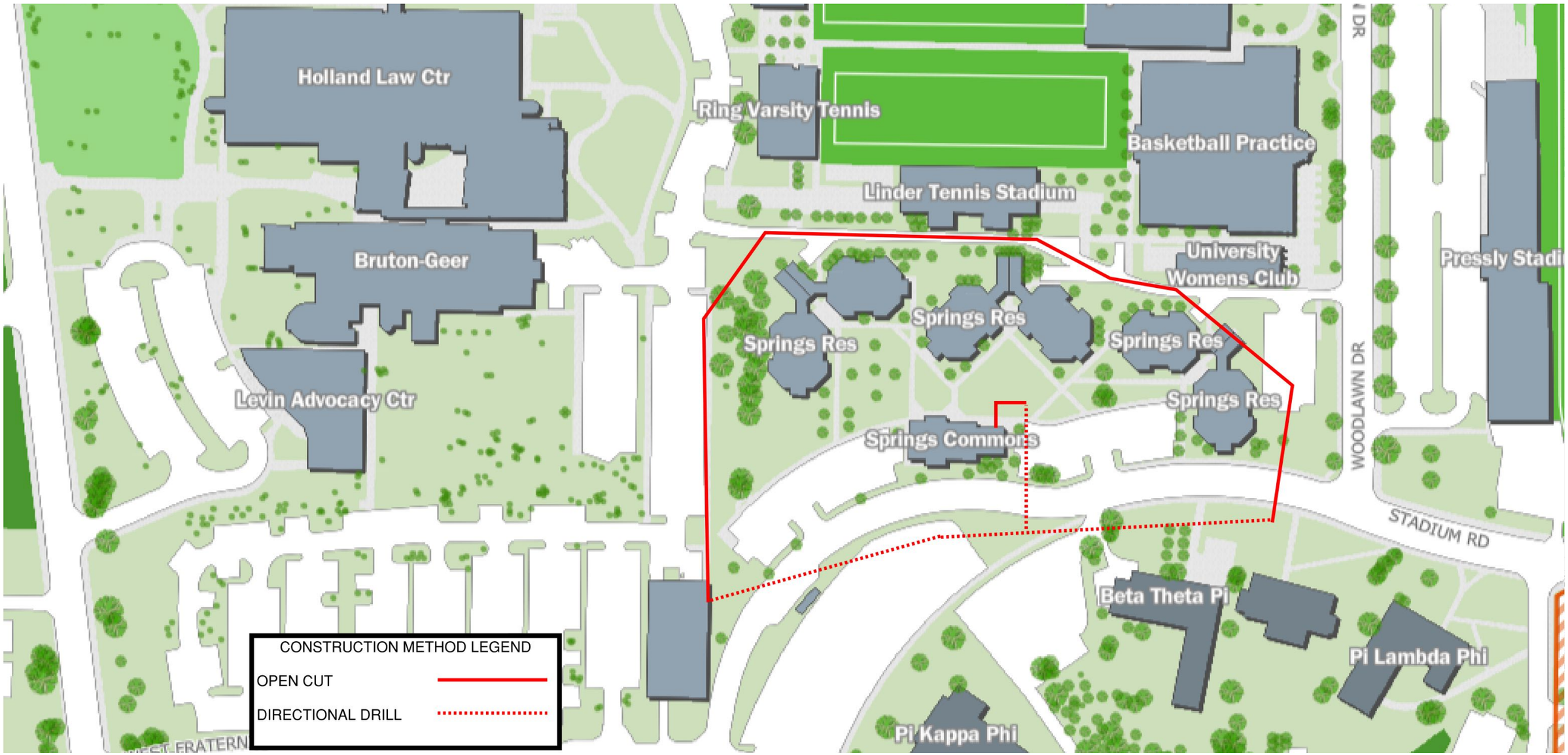


Holland District Project

Holland District Project

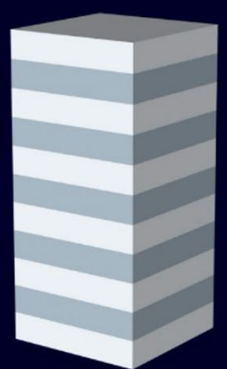


Holland District Project



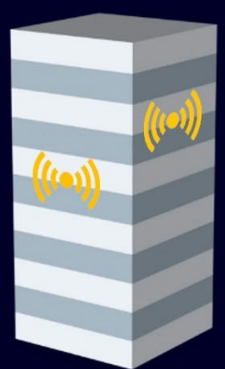
Holland District Project – Intelligent Infrastructure

Traditional
building



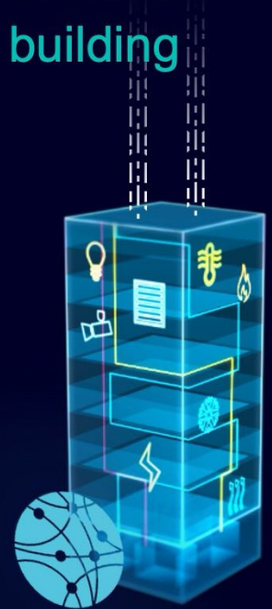
Domain know-how
- On-site solutions
- On-site services

Automated
building



Fully integrated management stations and remote connectivity

Smart
building



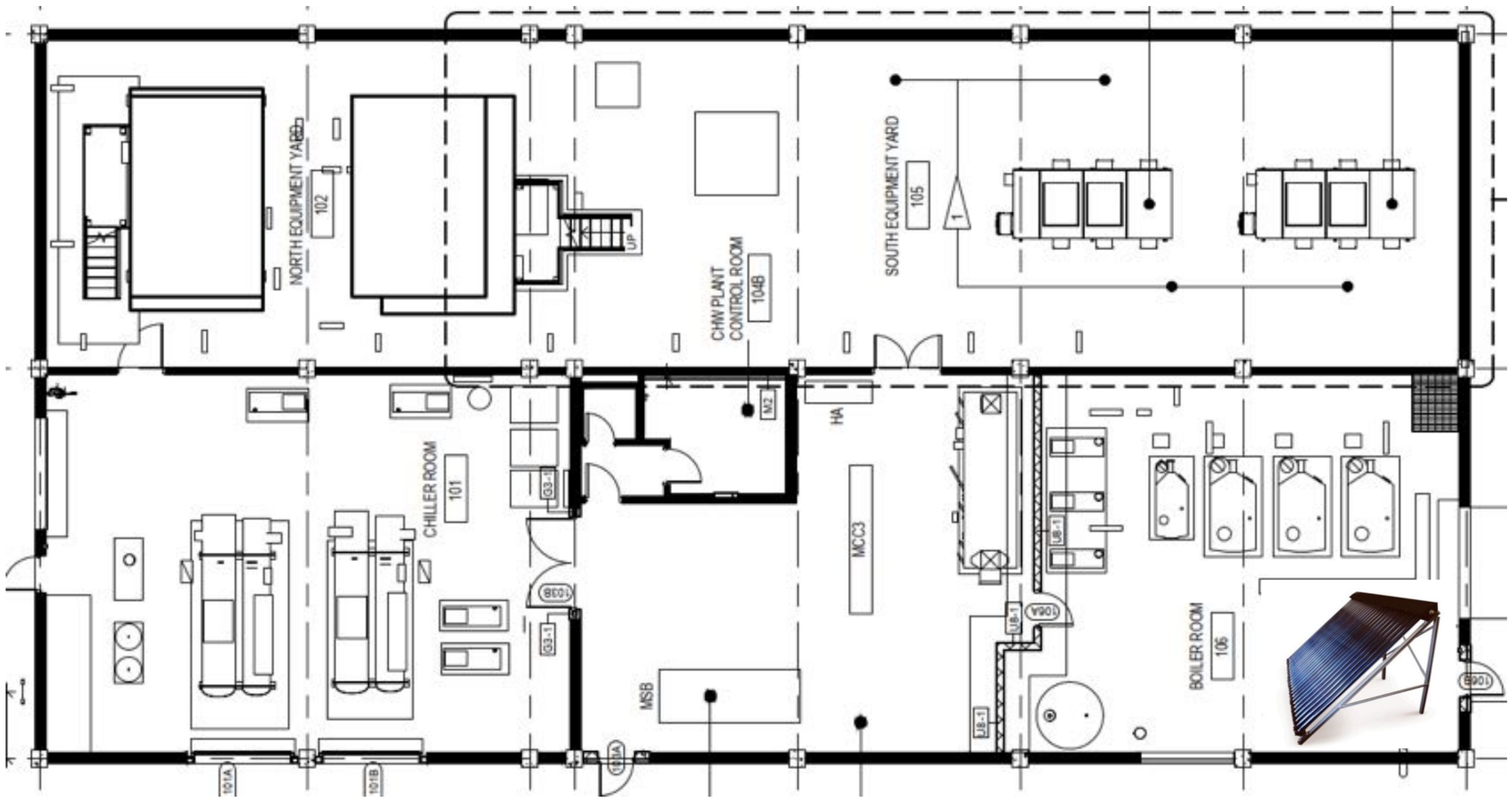
- Automated remote analytics
- Building twin

Autonomous
building

Simulation and artificial intelligence based on building twin

Holland District Project – Intelligent Infrastructure

Holland District Project – Intelligent Infrastructure



Holland District Project – Intelligent Infrastructure [IoT]

- **Lighting / HVAC Occupancy Control**
- **Daylight Harvesting**
- **Demand Response**
- **Space Occupancy and Utilization Data**
- **Asset Tracking**

Holland District Project – Intelligent Infrastructure

UF UNIVERSITY of FLORIDA

QA Building
100 Feet Rd Cooperative Nagar Gandhi Nagar, Adambakkam, Chennai, IN 600088

AREA (ft^2)	AVERAGE UTILIZATION	PEAK UTILIZATION
10,000	17%	100%

UTILIZATION ANALYSIS | CONFERENCE ROOM ANALYSIS | **VISUALIZATIONS**

QA Floor 1

3 Last week | Weekdays | 7 AM - 5 PM
Change Time Range

Motion Animation
View activity

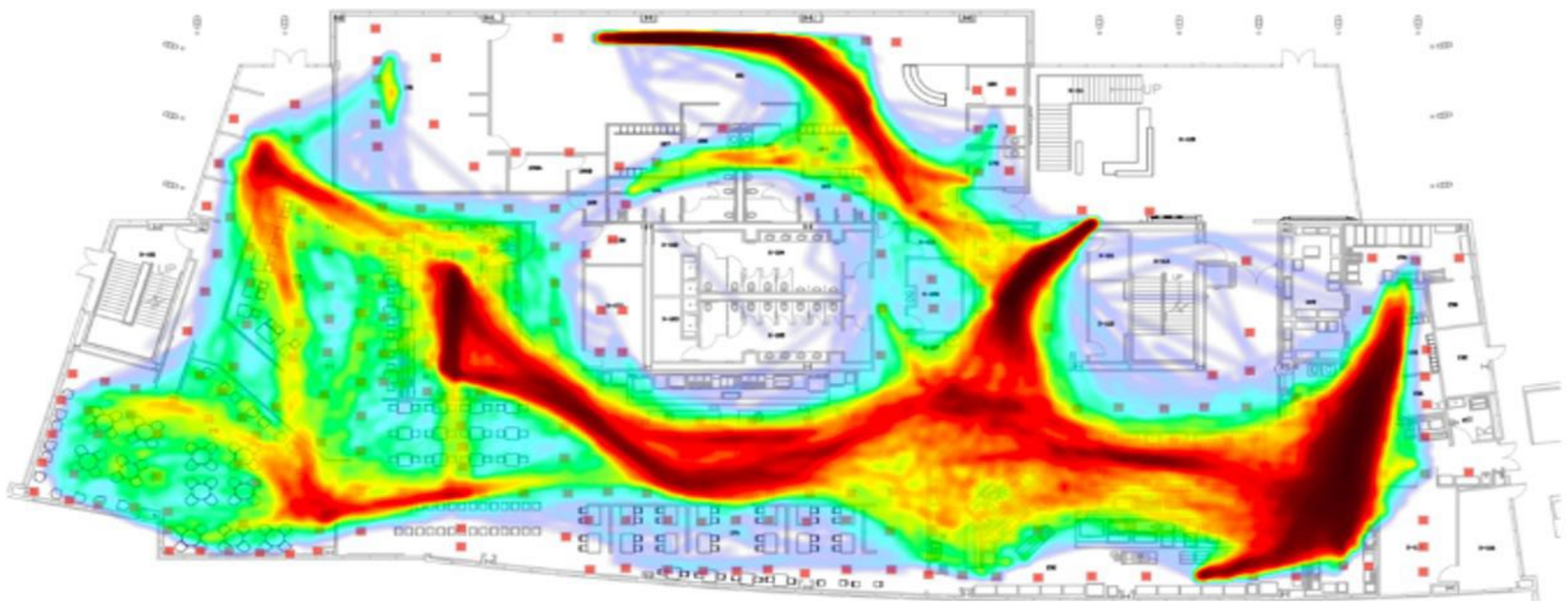
Heatmap
View areas with high activity

Motion Trails 2
View movement in the area

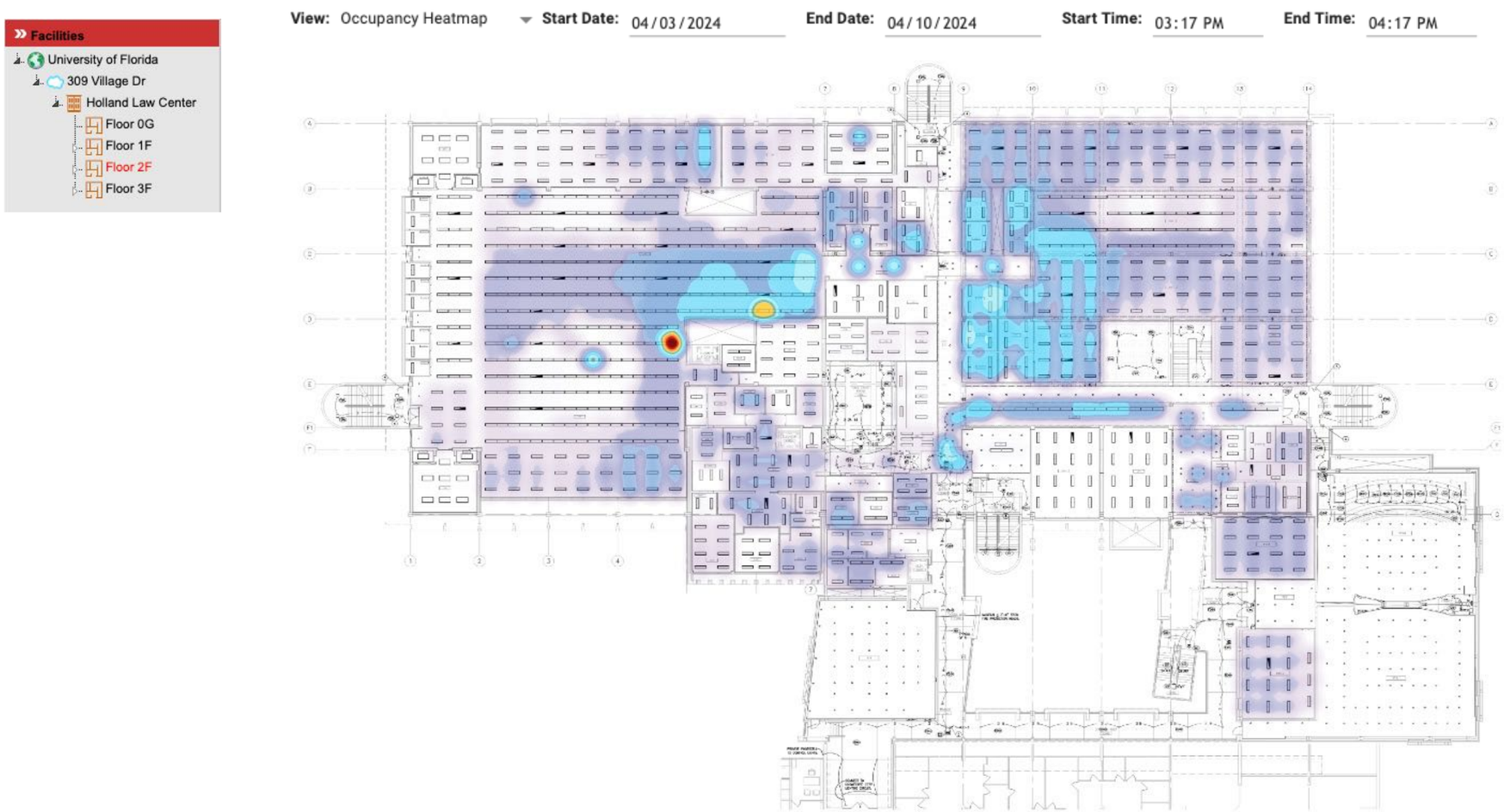
Utilization Map
View occupancy data

Timeseries
View occupancy trends

Utilization Details



Holland District Project – Intelligent Infrastructure



Holland District Project – Intelligent Infrastructure

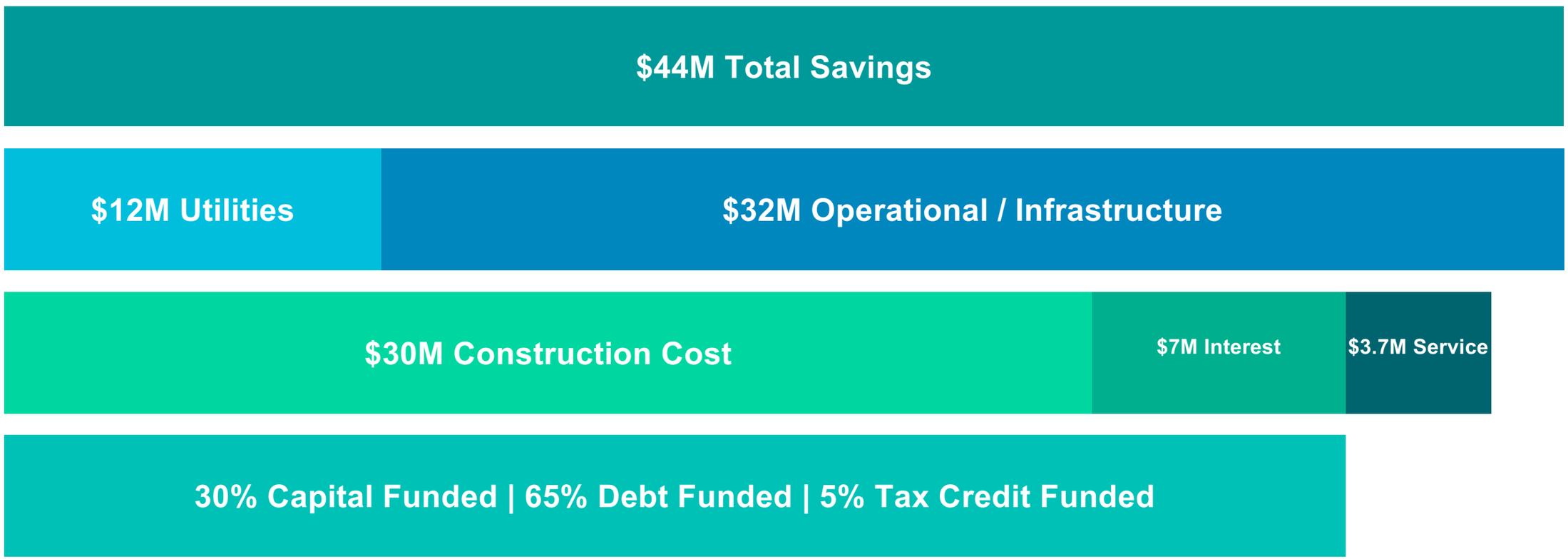
Applied to tasks that are “dark, dirty, dull (repetitive), or unsafe”

- Brett Adcock

Holland District Project – Intelligent Infrastructure

Holland District Project – Digital Twin Pilot

Holland District ESCO Project Financials

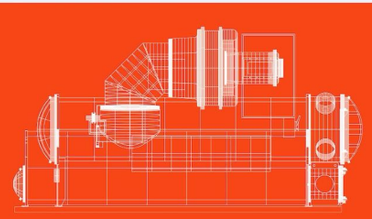


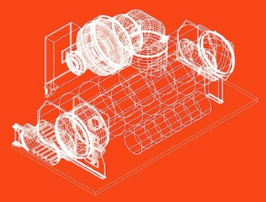
Student & Researcher Engagement

Student & Researcher Engagement – PR Campaign

Welcome to The Chiller Room

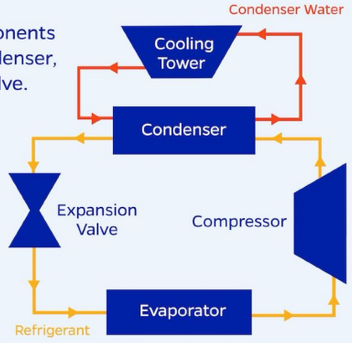
Welcome to the chiller room where you'll find four large chillers and an empty pad for a fifth. The chillers act as giant refrigerators to create a cold water supply. The various water flows are color-coded in the large pipes throughout the room and outside.





The purpose of the chiller room is to produce the Chilled Water Supply (in the dark blue pipes) which is sent to cool the Veterinary Medicine facilities.

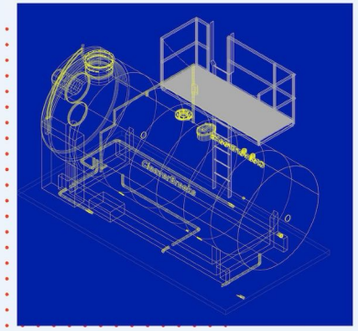
There are four major internal components to the chillers: a compressor, a condenser, an evaporator, and an expansion valve.



Don't forget to check out the Gator AR app for interactive learning experiences!

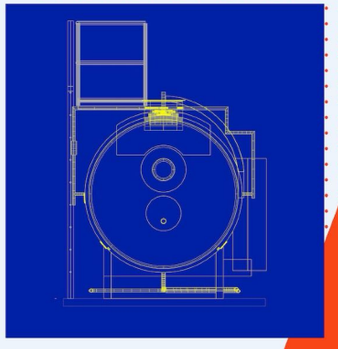
Welcome to The Boiler Room

Welcome to the boiler room. All devices seen in this room function to create a supply of high temperature water vapor to UF's Veterinary Medicine facilities.



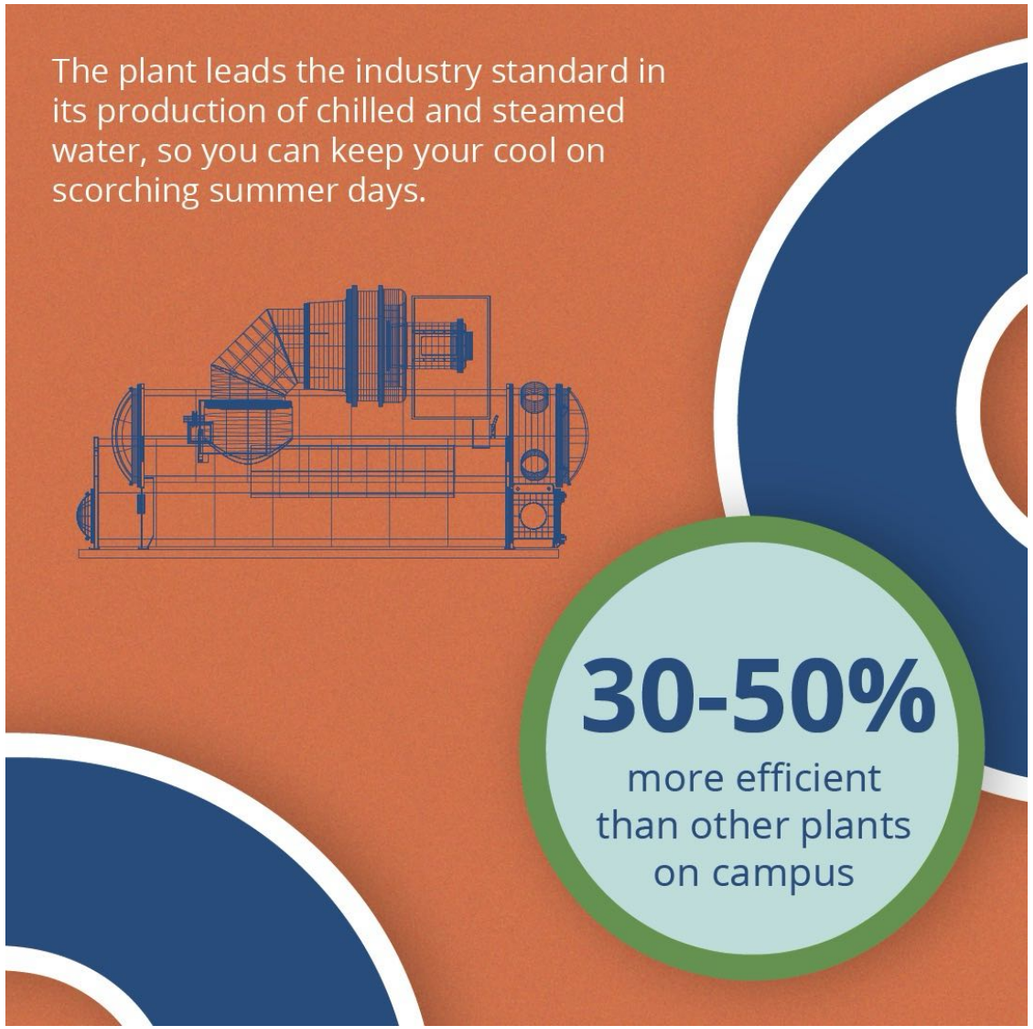
The three large boilers in the room burn natural gas to create extremely hot gas. That heat is used to boil liquid water (called feedwater) in the central tank to create steam. The steam is then sent to UF Veterinary Medicine for a variety of purposes, such as steam sterilization in an autoclave or to heat the buildings in winter.

Boiler Room operators work each day to monitor the plant's operating conditions such as pressures, temperatures, and water flow rates. Their main priorities include maintaining the equipment, ensuring that no accidents occur, and overseeing the adequate supply of chilled and steamed water.



Don't forget to check out the Gator AR app for interactive learning experiences!

Student & Researcher Engagement – PR Campaign



Student & Researcher Engagement – Thoughtful Design

UF UNIVERSITY of FLORIDA

Fall 2020: Design Planning

- **AR proof-of-concept**
  - Ray tracing and marker tracking
  - Model, animation integration
- **VR proof-of-concept**
  - Navigation and interaction
  - Model, animation integration
- **The Game-based Learning and Digital Experiences Lab (GLaDE)**

unity

Android Studio

SIEMENS

Student & Researcher Engagement – AR / VR Research Project

UF UNIVERSITY of FLORIDA

UF Herbert Wertheim College of Engineering

DEPARTMENT OF ENGINEERING EDUCATION

The AR Team

Tyler Allen

Anton Livingston

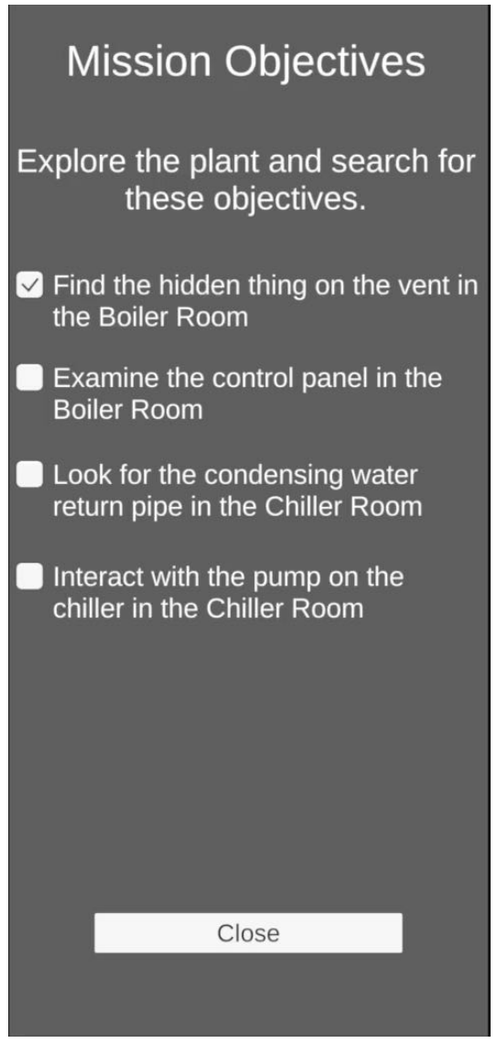
Leonel Cruz

The VR Team

Alexander Mills

Rachel Dowell

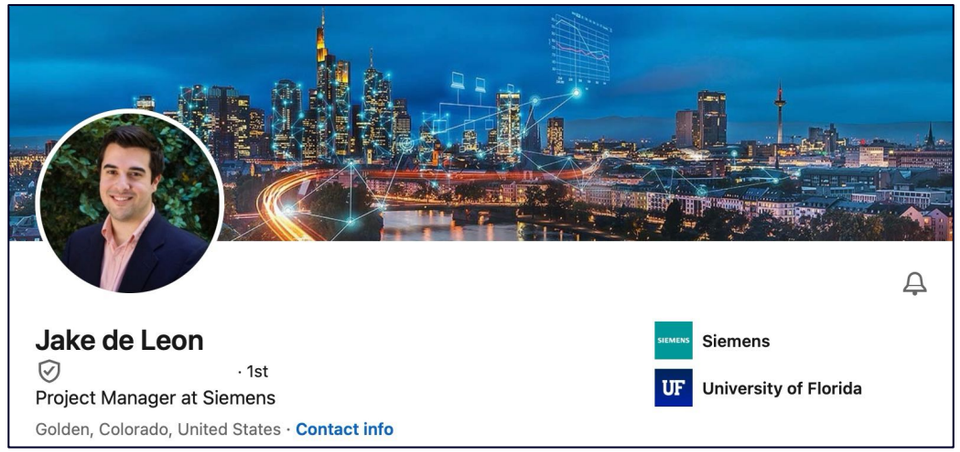
Daniel Labes



SIEMENS

Student & Researcher Engagement – Digital Twin

Student & Researcher Engagement – Talent Development



This concludes The American Institute of Architects Continuing Education Systems Course

AIA Approved Continuing Education