

1170: Facilities Management

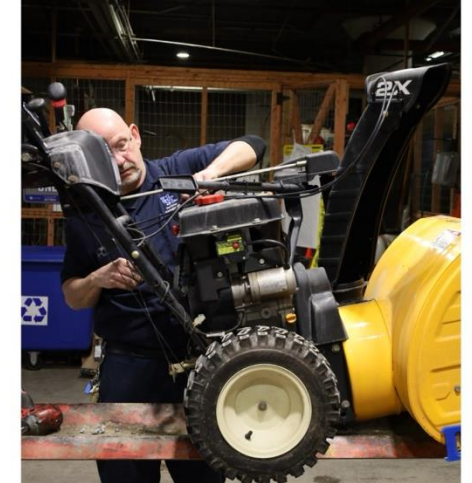


Introduction and Welcome!

Wayne Thomas
Capital Construction Director
University of Kentucky

What do you know about Facilities Management?

What do you want to know about Facilities Management from this session?





Multiple Identities of Facilities Management



Operations



Building Maintenance



Physical Plant



Campus Services



Facilities



Engineering



Construction

Complexities of Organizational Structures in Facilities Management

Building Maintenance	Fire Safety	Estimating	Parking/Fleet	Vehicle Garage	Grounds
Custodial	Warehouse	Mail Service	Space Management	Waste	Sustainability
Utilities	Key & Campus Access	University ID	Safety	Environmental Health	Asbestos & Mold Management
	Compliance	Reporting	Business Services	Planning	

What is “facilities” called on your campus?



The Four Core Functions in Facilities Management

- Planning, Design, and Construction
- General Administration
- Utility and Energy Management
- Operations and Maintenance



Planning, Design, and Construction

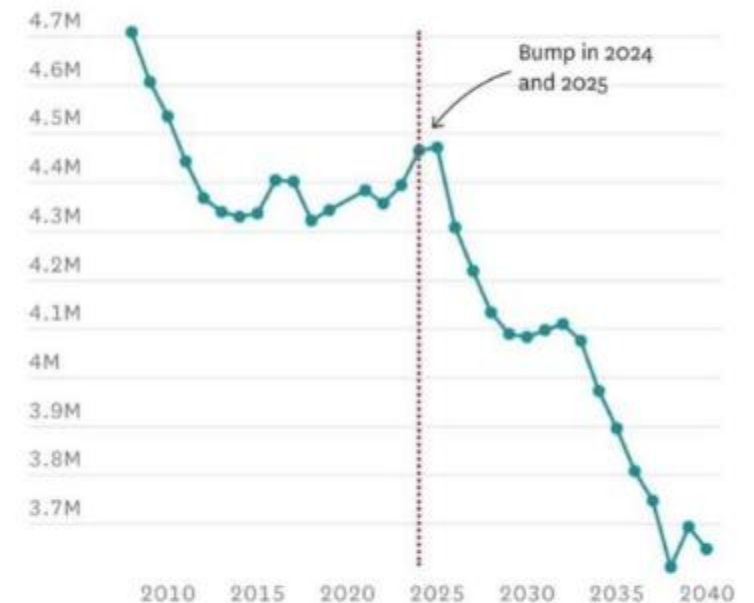
Wayne Thomas
Capital Construction Director
University of Kentucky

The Demographic Cliff

- Fewer babies were born after the 2008 recession.
- Starting in 2025-26, fewer students will be graduating high school.
- Universities must work harder to attract students.

Estimated number of 17-year-olds in the U.S., at the start of each school year

Projections based on current population, not accounting for immigration



Analysis for 2024 onwards includes the projected number of people who will be 17 years old on July 1 of each year, based on data from 2023.

Chart: Lydia Sidhom / The Chronicle - Source: United States Census Bureau

Why do students choose to attend a school?

Top factors in choosing a university:

- Modern, inviting campus facilities
- State-of-the-art labs and research spaces
- Comfortable, safe dorms and campus amenities
- Accessible, sustainable campus design
- Student-centered spaces for collaboration and innovation

According to a 2022 *Inside Higher Ed* study, 66% of incoming students cited campus facilities as a factor in their decision.



The Gatton Student Center



Cornerstone

Planning, Design, and Construction



- Campus Planning
- Facilities Project Management
 - Projects costing less than \$1M
 - May use construction contractors or work with in-house forces
- Capital Project Management
 - Projects costing more than \$1M
- Interior Design
 - Support for campus and healthcare interior renovations

Campus Planning

- Campus district master planning
- Programming for building construction projects
- Space Planning
- Six-year Plan
 - Series of three two-year plans
- Projects require:
 - Authorization by Kentucky legislature
 - Approval by UK Board of Trustees



Project Management

- Project managers assigned to projects from start to finish
- Support education campus and healthcare
- Facilities Project Management
 - Projects <\$1M
 - 11 project managers, two coordinators, shared business office
 - ~200 active projects, ~\$60M
- Capital Project Management
 - Projects >\$1M
 - 10 projects managers, five coordinators, shared business office, QC group
 - ~80 active projects, ~\$6.5B



Design Delivery Methods

- Master Agreement contracts
 - Pre-qualified list of design companies
 - Hourly not-to-exceed fees
 - Standardized hourly rates
 - Projects with total fees less than \$150,000
- Request for Professional Consulting (RFPC)
 - Two-step, qualification-based selection
 - Fees negotiated after selection



Construction Delivery Methods

- In-house skilled labor
 - Limit to project scale
- General contractor (GC)
 - Single prime contract
- Construction manager (CM)
 - Three-step, qualification and cost-based selection
 - CM at risk (CM/GC)
 - CM at risk with guaranteed maximum price (GMP)
 - CM holds all trade contracts
- Job order contracting (JOC)
 - Cost certainty
 - Price book with pre-competed contractor adjustment factors
- Request for proposals (RFP)
 - Qualification and cost-based selection





General Administration

Tara Tecau

Facilities Financial & Business Services Director
University of Kentucky

General Administration

- Facilities Management is one of the largest and most complex business functions in higher education.
- General Administration encompasses the leadership, financial business, and organizational systems that enable facilities operations.



Why Should Business Officers Care?

- Long-lived capital assets
- Ongoing operating expenses
- Deferred risk



Accounting Problem Before It's an Operations Problem

Basic Accounting in Facilities Management

Facilities decisions affect:

- Capitalization vs. expense
- Asset value & useful life
- Timing of costs (now vs. later)

Without basic accounting literacy:

- Renewal looks optional
- True cost of ownership is misunderstood

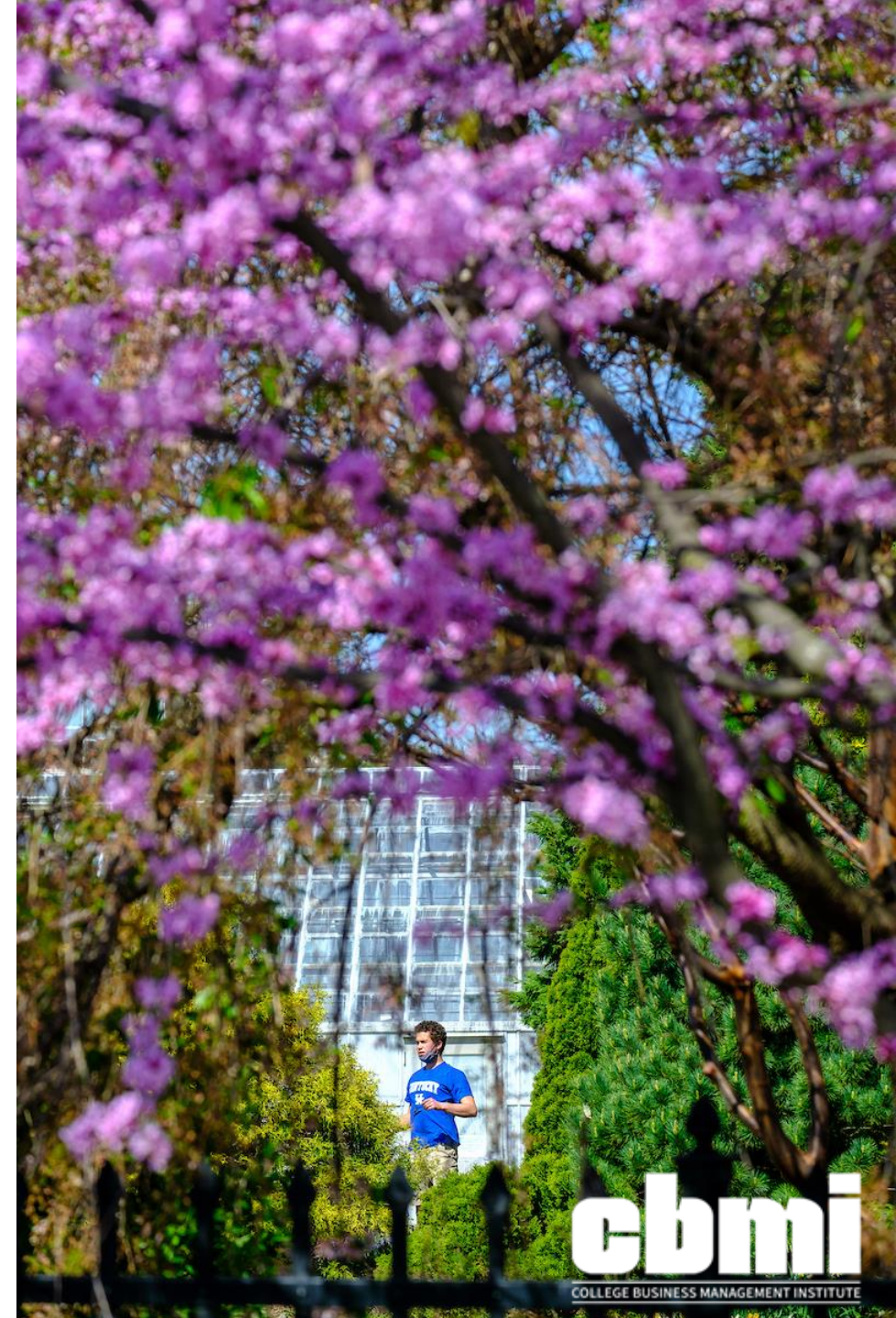


Capital vs. Expense: A Core General Administration Issue

Capitalization Fundamentals

Facilities leaders must understand:

- Capital Thresholds
- Depreciation and asset life
- Operating budget impacts



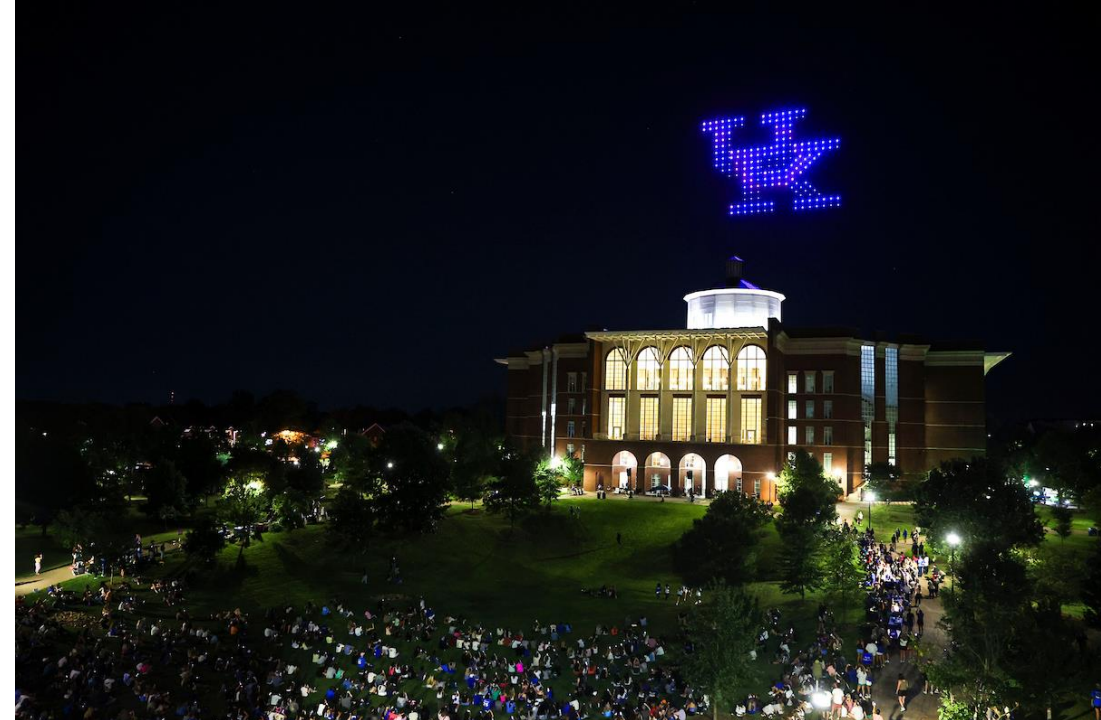
Replacement Value, Renewal, and Deferred Maintenance

Financial Concepts Every Facilities Leader Should Use

- Current Replacement Value (CRV) as a planning anchor
- Renewal as a planned financial strategy, not a discretionary fix
- Deferred maintenance as:
 - An unfunded obligation
 - A risk profile, not just a dollar amount
- Facilities leaders should talk about risk and consequence not just backlog totals

Facilities Financial Modeling

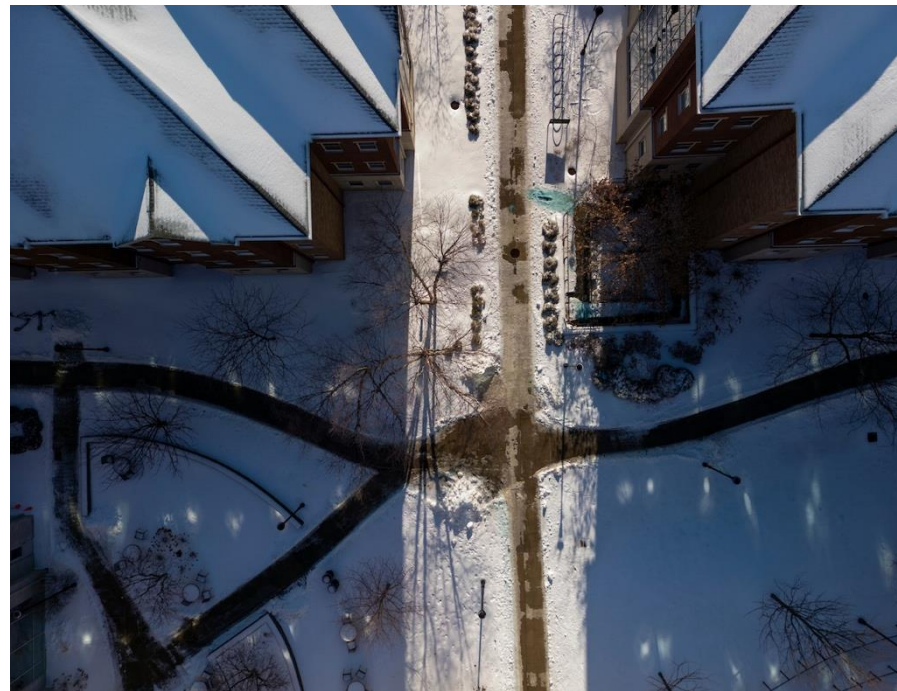
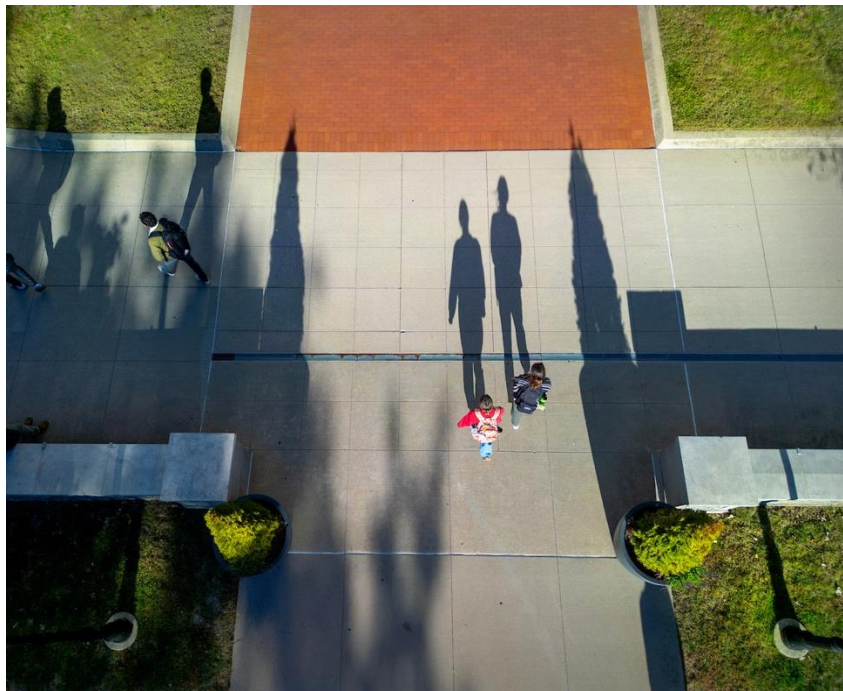
- Lifecycle cost thinking (build, operate, renew, replace)
- Multi-year outlooks
- Scenario thinking
- Every square foot has a recurring cost
- Space utilization is a financial management issue, not just academic planning



Collaboration & Administrative Support

Facilities is a Service Partner; Not a Stand-Alone Unit

- Effective collaboration includes:
 - Shared understanding of financial constraints
 - Early engagement
 - Transparency of tradeoffs
 - Budget/Finance
 - HR
 - IT



How is the temperature of this room?

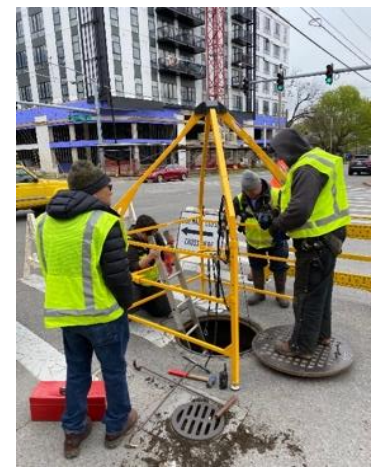




Utilities and Energy Management

Graham Gray
Utilities and Energy Management Executive Director
University of Kentucky

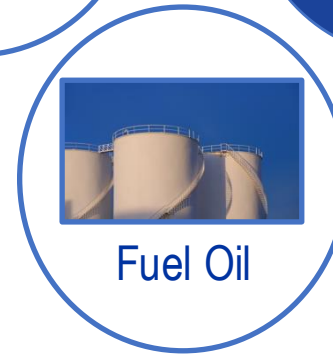
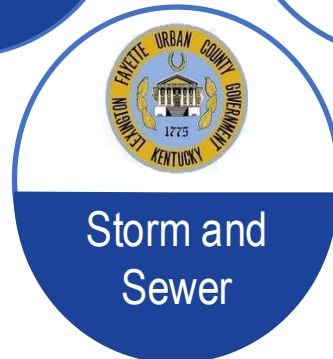
Utilities and Energy Management Team



Utility Services & Partners

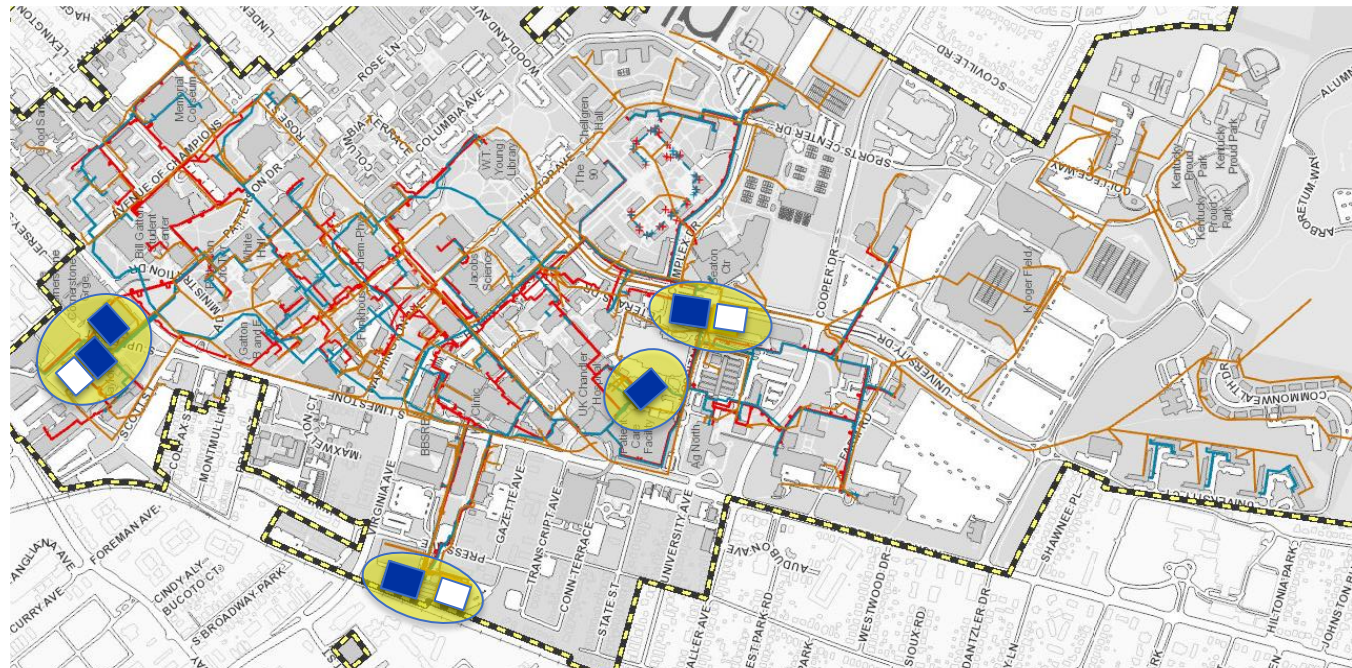
Mission Critical 24/7/365

*Our mission is to provide **safe, reliable and resilient utility and energy services** to our campus community, with a commitment to sustainability and customer service.*



Campus Overview

- 5 Heating and Cooling Plants
- 3 Electrical Substations
- 23.8 miles of high-pressure steam piping
- 18.6 miles of chilled water piping
- 44.6 miles of domestic water piping
- 21.9 miles of natural gas piping
- 24.3 miles of sanitary sewer piping
- 49.9 miles of storm sewer piping



Electricity



- Kentucky Utilities provides electricity to our substations at 69,000 volts.
- We distribute this power via UK's underground 12,470-volt high-voltage feeder network.

Only qualified UEM personnel in proper PPE should operate 12kv electrical gear.



Electricity

How much is the
annual electric bill for
the University of
Kentucky?



a PPL company

BILLING PERIOD AT-A-GLANCE

	THIS YEAR	LAST YEAR
Average Temperature	76°	73°
Number of Days Billed	29	31

■ Avg. Electric Charges per Day

Avg. Electric Usage per Day (kWh)

Mailed **7/6/18** for Account

AMOUNT DUE

\$26 Million

DUE DATE

Account Name: UNIVERSITY OF KENTUCKY M
Service Address: Na S Limestone Loop
LEXINGTON KY

Customer Service: (859) 367-1200 (M-F, 8am-6pm ET)
Online Self-Service: lge-ku.com

Next read will occur 7/30/18 - 8/1/18 (Meter Read Portion 20)

⚡ CURRENT METER AND USAGE INFORMATION

Contract: 2756776

Meter Number	Previous Read Date	Previous Reading	Current Read Date	Current Reading	Read Code*
-----------------	-----------------------	---------------------	----------------------	--------------------	---------------

Chilled Water



- Chilled water is produced year-round at UK's four cooling plants using water and electricity.
- Chilled water is then distributed at 42°F to buildings through an underground distribution system.

High Pressure Steam



- Steam is generated year-round using natural gas, coal or fuel oil.
- Steam is distributed underground to each building and condensate is returned to the plants for reuse.
- Peak demand was 410,000 lbs. per hour.

Only qualified UK UEM personnel are allowed to open or close main valves for high-pressure steam.



High Pressure Steam

Why do we
produce steam
year-round,
even when it's
hot outside?

Showers



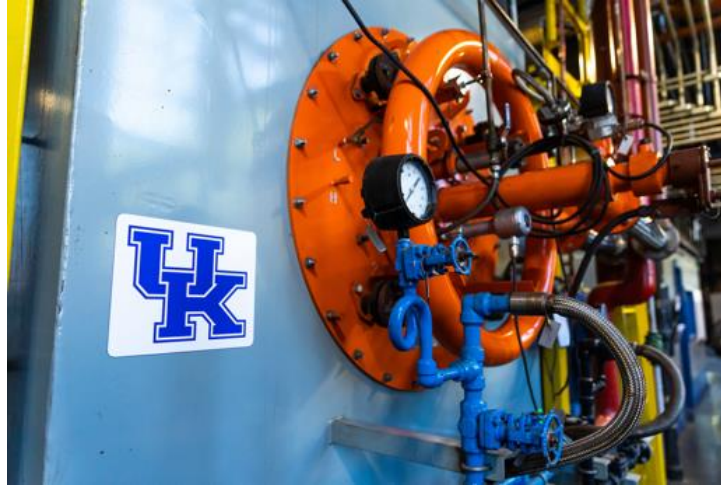
Sterilization



Hand Washing



Natural Gas



- Natural Gas is delivered to our main meters and some of our buildings by Columbia Gas of Kentucky.
- Natural Gas produces more than 95% of the steam on UK's campus.

Any digging activity on campus needs FM authorization plus KY811 utility locate ticket prior to work.

Domestic Water



- Domestic water is provided by Kentucky American Water to UK's water distribution loop.
- Domestic water is then distributed to buildings through an underground distribution system.

Sanitary & Storm Sewer



- Storm and sanitary sewers are returned to Lexington-Fayette Urban County Government through our underground distribution system.



Only stormwater should enter storm drains.

Hazardous waste should not be dumped into the storm or sanitary sewer.

Cenergistic® Energy Program

- **Energy Conservation** includes actions to reduce the amount of energy end use (turning out lights, setting back thermostats).
- **Energy efficiency** pertains to using less energy to provide the same service (upgrading to LED lighting).

While UK's campus has grown approximately 15% since 2016, in that same time, there has been a 19% reduction in energy per square foot.



Renewable Energy & Sustainability



Ralph G. Anderson
Solar PV Array



Davis Marksbury
Solar PV Array



Bruce Poundstone
Regulatory Services
Solar Thermal Array

Donovan and Johnson
Geothermal Wells

Storm Water Harvesting



Maintenance & Operations

Tim Armstrong
Facilities Management Campus
Executive Director

Operations and Maintenance (O&M)

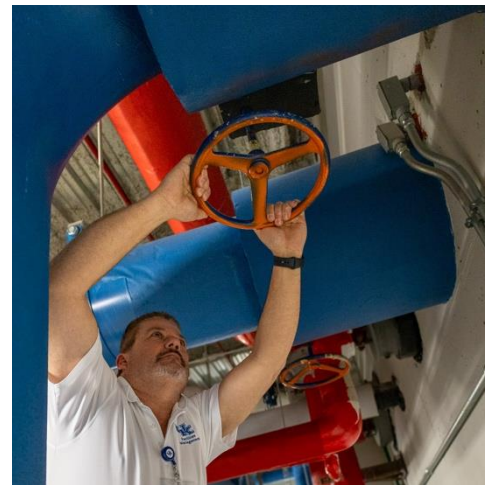
- Maintaining the physical environment of a facility or building
- Involves maintaining the systems and components that make up the building as well as maintaining the function of the building.
- This includes reactive maintenance — Repair of the system when it fails
- This includes preventative maintenance — Proactive scheduled inspection and servicing of the system to prevent unexpected failures.
- This includes predictive maintenance — Use of sensors, machine learning, and real-time system data to predict failures. (vibrations, temperature, acoustics, and fluid analysis)



Operations and Maintenance

Building physical space includes:

- Heating, Ventilation, & Air Conditioning (HVAC)
- Building Automation Systems (BAS)
- Plumbing
- Electrical
- Building envelope – Roof, Windows, Doors
- Finishes
- Foundation - Structural
- Security – Electronic Access, Cameras
- Classroom Technology



Operations and Maintenance: Maintenance

APPA Levels of Maintenance Service

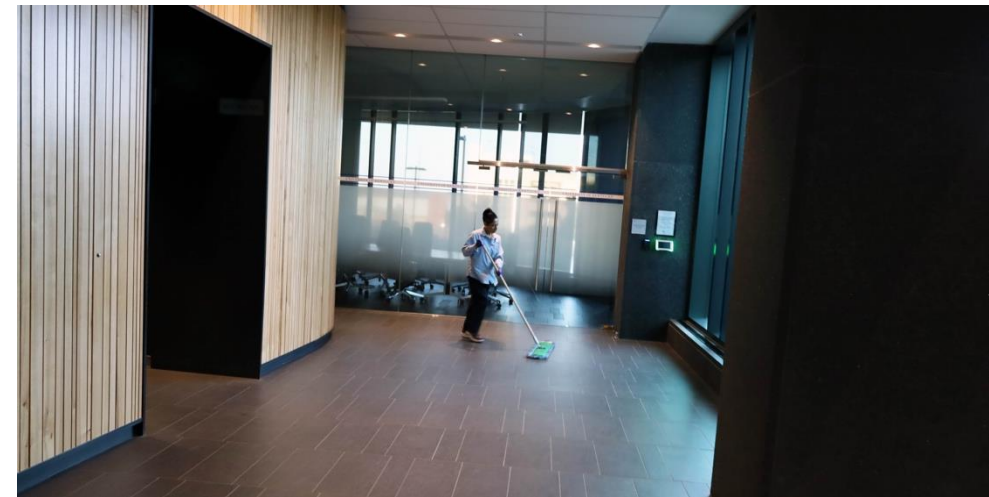


- **Level 1: Showpiece Facility:** Focused maintenance activities. Fully functional and excellent operating condition. Immediate response.
- **Level 2: Comprehensive Stewardship:** Organized maintenance activities. Usually functioning in good operating condition. Timely response.
- **Level 3: Managed Care:** Somewhat organized maintenance activities. Mostly functional with occasional failures. Response is not always timely.
- **Level 4: Reactive Management:** Somewhat chaotic and people-dependent maintenance activities. Routinely broken down and not operational. No timely response.
- **Level 5: Crisis Response:** Chaotic and without any direction on maintenance activities.

Operations and Maintenance: Custodial

APPA Levels of Custodial Service

- **Level 1: Orderly Spotlessness:** Highest standard; floors and surfaces are spotless and polished. Restrooms gleam and are odor-free. Service is daily.
- **Level 2: Ordinary Tidiness:** Surfaces are clean with minor dust/dirt allowed, but no major accumulation. Restrooms may need service. Service is 2x or more a week.
- **Level 3: Casual Inattention:** Generally acceptable, but dirt/dust is visible. Restrooms will have needs at times. Service once a week.
- **Level 4: Moderate:** Obvious signs of dust, dirt, and stains are common. Intensive cleaning to bring back to standard. Reports of unkept restrooms. Service less than once a week.
- **Level 5: Unkempt Neglect:** Characterized by heavily soiled, scuffed, and unmaintained areas. Reactive to all service requests.



Operations and Maintenance: Grounds/Landscape

APPA Levels of Grounds/Landscape Maintenance

- **Level 1 – State-of-the-Art:** Highest quality maintenance for prestigious, high-traffic areas (Marque buildings, main campus quads). Turf mowed every 3-5 days. Irrigation. Litter and trash receptacles daily. Weed control with less than 1% weed presence. Landscape plantings are refreshed frequently.
- **Level 2 – High-Level Maintenance:** Good quality in most well-developed areas, balancing aesthetics and cost. Turf mowed 5-7 days; moderate irrigation. Litter and trash receptacles daily. Weed control 5% or greater. Landscape plantings are refreshed with the seasons.
- **Level 3 – Moderate-Level Maintenance:** Applied to average, everyday areas with lower visitation. Turf mowed 7-10 days. Little irrigation. Litter and trash receptacles 2–3 times per week. Weed control greater than 15%. Landscape plantings only dead.
- **Level 4 – Moderately Low-Level:** Areas with low development or during budgetary constraints. Turf mowed 10-14 days. Litter and trash receptacles once per week. Weeding when it overtakes the landscape. No landscape beds.
- **Level 5 – Minimum-Level Maintenance:** Undeveloped, remote, or neglected areas. Turf infrequent mowing, only as needed for safety. Litter and trash receptacles only upon request/complaints.



Space Management and Planning

Benefits

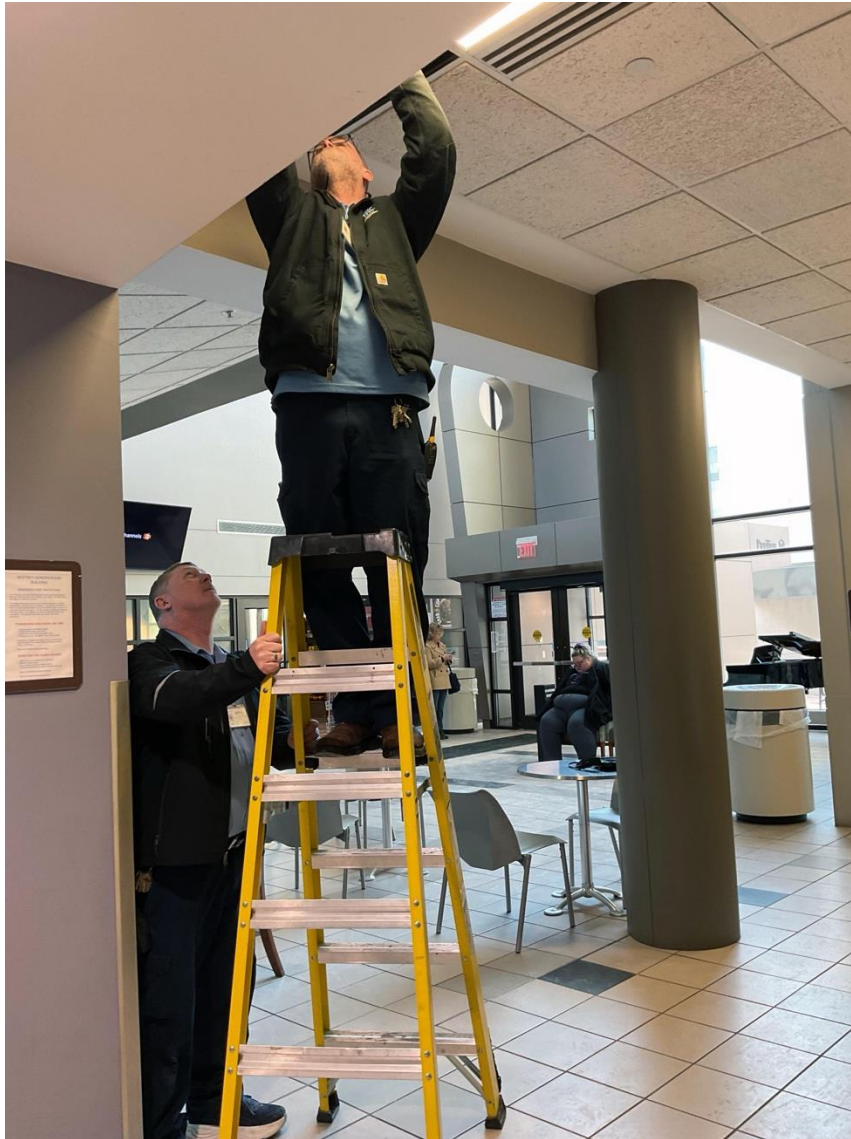
- Ensuring the optimal, compliant layout and usage of a facility.
- Includes managing space optimization for staff, employees and students.
- Planning for future space needs.
- Consideration and analysis of space usage, occupancy, functionality and the people.

Key Aspects

- **Utilization:** Tracking how space is currently used (e.g. vacancy rates, peak occupancy) to identify underutilized areas and improve efficiency.
- **Allocation:** Allocating space based on headcount, functional needs and adjacency to optimize workflows.
- **Optimization:** Reconfiguring, adding or reducing spaces to support long-term goals and hybrid work policies.
- **Technology & Tools:** Using facility management software (CAFM/IWMS) to map, track and report on space metrics.



Health, Safety and Security



Responsibility for Codes, Standards, and Regulatory Compliance

- Fire Marshall
- Occupational Safety and Health Administration (OSHA)
- National Fire Protection Association (NFPA)
- Environmental Protection Agency (EPA- Federal and State)
- American Disabilities Association (ADA)

Key Aspects

- **Risk Management & Assessment:** Proactive identification of hazards, including structural risks, fire hazards, and hazardous materials.
- **Safety Compliance:** Adherence to local building codes, life safety codes, and OSHA standards to prevent injuries and legal liability.
- **Security Systems:** Access control systems, surveillance cameras, and identification of unauthorized locations.
- **Environmental Health:** Clean, well-sanitized environments with proper ventilation to maintain air quality and minimize illness.
- **Emergency Preparedness:** Developing, training, and testing emergency procedures for incidents like fires, lockdowns, natural disasters or significant events.

Sustainability and Environmental Management

Reducing the Environmental Impact

- Energy Efficiency Systems and Performance
- Waste Reduction (Electricity, Water, and Landfill Waste)
- Utility Optimization
- Green Cleaning

Key Aspects

- **Energy Management:** LED lighting, high-efficiency HVAC systems, and renewable energy sources to reduce greenhouse gas emissions. PMs to ensure systems are at peak efficiency. Recommissioning systems.
- **Water Conservation:** Low-flow fixtures, urinals, toilets, and faucets, and implementing greywater systems.
- **Waste Management & Reduction:** Prioritizing recycling, composting, and food waste, and reducing waste in daily operations
- **Indoor Environmental Quality (IEQ):** Non-toxic cleaning products, optimized ventilation, and LEED Designs.
- **Green Procurement:** Sustainable materials, chemicals, and environmentally friendly practices.



Q&A