FOD Utilities completed Fiscal Year 2016 with the following results:

1. Financial

- FY16 expense spending was $5,774,922 or 99.5% of the 5% reduced budget target. The reduced budget target was achieved through:
  a. Elimination of server replacement costs because of the successful transition to the virtual server environment for the plant control systems
  b. Extending test cycle for electrical relay checks from 6 to 10 years
  c. Carrying three employee vacancies through the end of the fiscal year
  d. Transfers of shop overtime hours in support of auxiliary projects
  e. Alternate financing for hydraulic valve operator

- Scorecard financial results for FY16 were $28,753/Utility served million GSF/month compared to the target of ≤ $29,072/GSF. Utility operations expenses per GSF were slightly under budget. FY16 costs per GSF were 14% below FY15 because of reduced costs combined with increases in Utilities service area. Ongoing service area changes include:
  a. New central chilled water plant service connections completed for the summer 2016 cooling season:
     1. 407,541 GSF in the Celeste Quad (includes Celeste Lab, Newman and Wolf from Lab, McPherson Lab, and Evans Lab started up May 18, 2016
     2. 66,550 GSF for Lazenby Hall started up April 25, 2016
  b. The North Residence District Transformation (Phase 2)
     1. Planned additions in August 2016 of approximately 500,000 GSF in new space (Buildings B (Houston), F (Busch), I (Blackburn), K (North Recreation Center), and L (Nosker) to the electrical, chilled water, gas and domestic water service areas.
     2. Removal of 18,240 GSF in demolished Lane Ave Apartments from electrical and domestic water service areas.

- Demand response
  a. The demand response contract for the summer of 2015 was successfully completed with a contract payout of $439,630. There were no emergency calls and contract requirements were met during a planned test on September 10, 2015 when five generators were operated and produced an average load of 9.79 MW over the test period.
  b. A demand response contract was executed for the period June 1, 2016 through May 31, 2017. Contract payout rates will be $27,375/MW – year, adjusted for any non-compliance fees.
  c. An account was established to collect demand response payouts and fund generator deferred maintenance projects.
     1. A project to replace the obsolete Smith Generator controls was initiated in February. A design contract is in place and engineering work is underway.
2. A voltage regulator upgrade project was completed in April for the 1200KW Generator

- Utilities Repair and Renovation (RR)
  a. Utilities RR spending in FY16 was $631,397. Nine projects were completed over the fiscal year.
  b. 11 projects were underway at year end with $438,581 in encumbered costs for equipment or repair contracts.
  c. The Utilities RR Project Plan was updated quarterly in FY16. The carryforward projects and future needs projects were projected into FY17. To address the increased chilled water equipment replacement and renewal needs as the South Central Chiller Plant and the East Regional Chilled Water Plant age, an increase in the Utilities FY17 RR budget to $634,000 was approved, utilizing the budgeted savings from the campus wide Chemical Bid.
  d. Utilities RR spending averages for the prior three years (FY14 - FY16) are $257,944 (47%) to steam, $95,461 (18%) to domestic water, $87,250 (16%) to electrical, $63,625 (12%) to chilled water, and $41,120 (7%) to gas.

- Utility rates: Utility Division supported the FY17 Utility and POM Rate setting process:
  a. The rate toolset was modified this year to split out tunnel and utility plant water costs to allow for improved modeling and cost comparisons in support of the Energy Project.
  b. Detailed analysis of debt service and project bond redirects was completed in support of Finance Shared Services to have the appropriate debt service in the FY17 rates absent the long awaited bond reconciliation.
  c. Preliminary estimates of leave behind costs in the event of a utility system lease were prepared for management. Discussions are ongoing and are focused on an improved organization with supporting rate structure for an envisioned combined water and sewer operations and maintenance group within FOD.

- Water Treatment Chemicals and Services:
  a. Supported the campus-wide bidding process for Chemicals and Service, reviewed bid results, participated in vendor meetings, submitted award recommendations and completed the transition to the selected best value suppliers.
  b. Spending on chemicals and service in FY16 was $306,675, well under the $407,000 budget. Cost savings were because of lower pricing that resulted from the campus wide contract bidding and lower than planned use of boiler chemicals (polymer and sulfite) because of improved control of chemical feeds.
  c. The new supply contracts, coupled with prior year chemical cost savings, have provided a cash carryforward balance. This balance is held in reserve to fund future RO membrane replacements.

- Energy Project
  a. The Division supported the development of performance standards for consideration by the Energy Project.
  b. Conducted utility site tours and technical briefings for the 6 teams participating in the RFP stage.
c. Provided information in response to numerous data requests.
d. Provided rate modeling and future staffing proposals for consideration.
e. Participated in numerous meetings to establish contract demarcation points for the RFP stage.

2. Operations and Customer Scorecard

- Utility reliability goals were achieved. The composite reliability uptime was 99.988% and met the target of >99.96%. Total overall customer service downtime hours for FY16 were 898, under the goal of <3000 hours. The number of outage events was 36, under the goal of <92. The detailed yearly report is available for review, including analysis and recommendations.

- Chiller electrical conversion efficiency for FY16 was a best ever 0.755 kw/ton. Chilled water electricity use bettered the scorecard target of <0.808. Cumulative savings in purchased electricity since startup of the South Campus Central Chiller Plant and East Regional Chilled Water Plant have been estimated at 28,610 mwhrs, reducing campus electricity costs by $2,000,000.

- FY16 Steam Plant fuel conversion efficiency was 1.403 mmbtu/mlb; boiler fuel use bettered the scorecard target of <1.44.

- Condensate Return for FY16 was 37.6% and did not meet the scorecard target of 41%. Condensate return studies were initiated and reports were presented at the April and July 2016 Energy Committee Meetings indicating the return shortfall was the result of building equipment issues. A survey focused on buildings adjacent to working condensate pipelines is being used to identify and target condensate return opportunities.

- Metering
  a. Chilled water metering accountability for each of the three chiller plants was tracked monthly. The overall FY16 accountability was 99.3%.
  b. Continued to update and refine the detailed building by building, service by service meter review with Energy Services and Sustainability to determine the future building metering needs for steam, heating hot water, chilled water, gas, and electricity.
  c. Temporary work assignments were made in May to provide limited coverage to Energy Services metering following the unexpected resignation of two Energy Services employees.

3. Learning and Growth Activities

- The employee survey was posted January 29, 2016, and resulted in a 39% participation rate within Utilities. Results were received 5/12/16 and were dominated by comments and survey feedback that the Energy Project has resulted in a negative work environment. Review and discussion of results with FOD and Utilities Leadership is underway to determine next steps.

- A near miss accident reporting system was initiated for Utilities in May, designed to improve proactive reporting and correction of situations that could have resulted in injury or equipment damage.
Training/development

a. The Skilled Trades Title/Reclassification study was expanded campus wide with integration activities to ensure new titles address needs in both Utilities and FOD Ops. Utilities personnel supported the collaborative campus effort attending meetings and offering accepted suggestions to the proposed FOD Ops titles. The proposed Utility Technician title series and Stationary Engineer 2 title submitted last year were reviewed and aligned with new Ops titles for pay bands, skill competencies and experience requirements.

b. Job-specific training

1. EHS online training profiles for each Utility shop were reviewed and updated.

2. Individual Shop training elements are were reviewed and updated to better document and track training for recent and future hires.

3. Continuing education requirements to maintain Licenses for the five Registered Professional Engineers in Utilities were completed. Utility staff members attended the September Big Ten Energy Conference at the University of Maryland and May Big Ten and Friends Utility Conference at the University of Minnesota.

4. Training for Qualified Tasks under Gas Pipeline Safety Standards and Abatement Oversight were completed.

5. The overall group retains a total of 42 individual certifications and licenses.

4. Capital Projects

Utility Infrastructure renewal and expansion continued with the group supporting the last $30 million in active utility system capital projects being completed as part of Phase 1 of the 2006 Infrastructure Master Plan, as amended to align with the One University Framework Plan in 2010 and the 2014 Utility Master Plan Update. The total university commitment to Infrastructure capital spending since 2006 is $487 million and represents spending equal to 74% of the original $663 million identified in the 2006 Master Plan for the period 2006 to 2020.

Steam and Condensate Distribution Phase 3

a. Bid Pack 1 construction activities were completed in December in the lower 12th Avenue Tunnel. Work included gas line relocation out of the tunnel, replacement steam and condensate pipelines, new tunnel roof and various improvements to lighting, ventilation, and flood mitigation systems.

b. Bid Pack 2 was initiated, completed design and was successfully bid on 5/19/16. This work will address deferred maintenance in the South Neil Avenue Utility Tunnel and includes work scope to support new chilled water service and repaired condensate return system for the Pomerene Hall Renovation.

East Regional Chilled Water Plant: 18th Avenue Tunnel Construction continued in FY16. Gas and domestic water lines were completed, and the new/refurbished tunnel and steam and chilled water piping systems are approximately 85% complete.

Boiler Replacement Project

a. The final punch items for #8 Boiler were addressed, with the issue of boiler vibration impacting working conditions in adjacent office areas still under study by the A/E of
record, the boiler contractor, and an independent engineer. Acoustic resonance in boiler outlet duct is a suspected cause and computational fluid dynamic (CFD) modeling is planned to confirm the cause and evaluate changes which could reduce the vibrations.

b. Ackerman Gas regulator station was relocated and the old gas house removed. The new regulator station with increased capacity is in operation and the decorative fencing has been installed.

c. A new McCracken Power Plant fence and gate installation was completed and new parking established in the McCracken lot.

- Provided utility infrastructure support to campus development projects:
  a. Pomerene/Oxley Renovation planning and design.
  b. North Residence District Transformation Project: completed utility connections and construction and startup support to open the first 5 buildings in August 2015 and throughout the Phase 2 construction of the remaining 5 buildings.
  c. Cannon Drive: completed Phase 1 and Phase 2 design reviews. Initiated design on a Utility Enabling Project that will extend utility pipelines under new road construction in preparation to future buildings connections. The goals are to minimize future underground utility conflicts and any disruption to the new roads and traffic flows by future utility connection projects.
  d. Sports Medicine: supported utility connections and started up the permanent electrical service.
  e. Celeste Cooling Project: supported design, construction, commissioning, and startup of the new central chilled water cooling system.
  f. Brain and Spine: supported an enabling project for future chilled water loop extension to Postle Hall during the entranceway improvements to 301 West 10th Avenue. Timely installation of buried chilled water lines will prevent future rework and patient access issues at the new Brine and Spine entranceway.
  g. Compressed Natural Gas (CNG) Fueling Station: completed design reviews and support to gas service line revisions.
  h. Covelli Arena: utility planning and infrastructure comments.
  i. Lazenby Cooling Project: supported design, construction, commissioning, and startup of the new central chilled water cooling system.
  j. Vet Medicine Renovation: support design and construction activities to relocate utilities in support of building additions.
  k. McCracken Fire Suppression: completed removal of the at-risk sprinkler system for the 3rd floor, no longer needed following the relocation of the old paint shop.
  l. Pre-design for Wrestling Practice Facility: utility planning and infrastructure comments.
  m. RPAC Plumbing Repairs: support design reviews and evaluation of new condensate system alternatives.
• Provided leadership and support to other utility projects:
  a. Design was completed on Selected Tunnel Repairs Bid Pack 2 to address water and
     gas pipeline issues along Neil Avenue. The construction bids came in over budget,
     and the project was value engineered within budget and successfully rebid in
     February. Construction work was initiated in May.
  b. Natural Gas Capacity Upgrade Bid Pack 2 completed an A/E transition. Design was
     completed and base bid work scope successfully bid in May. Construction started
  c. Hot Water Pipe Upgrades Project is converting the last 20 campus buildings served
     from the obsolete and high risk central Domestic Hot Water system in McCracken
     over to local water heater systems. Bid Pack 1 construction in coordination with the
     18th Avenue Tunnel work was completed and is in closeout phase. Bid Pack 2
     Construction Design documents were developed, and the project base bid was
     successfully awarded.
  d. Engineer selection has been completed for Utility Distribution Renewal, which will
     address high risk issues in the Ohio State domestic water system. Design is
     underway at year end.
  e. Electrical Infrastructure Project selected an A/E and received November approval by
     the Controlling Board. Project design was completed, and the project is in the bidding
     stage.

5. Capital Planning

• Completed project definition and budget cost estimating for future Utility Projects and
  submitted a revised capital needs inventory (CNI) in November for the 2017-2021 Capital
  Plan.
• Utilities personnel reviewed and updated steam and chilled water distribution models to
  ensure utility plant and pipeline capacity is available to support campus expansion in the key
  focus areas of Cannon Drive, Postle Hall, 15th & High, and west of High.
• Supported the One University Framework 2.0 study.
• Utilities employees are participating in a workgroup to develop a reporting baseline and cost
  information in support of The Ohio State Sustainability and Resource Stewardship Goals.

6. Improved Standards, Operations Procedures and Administrative Policies

• Gas System Safety
  a. Completed pipeline assessments and the annual PU CO audit. Received notice that
     no future action is required regarding the 7/30/13 Notice of Probable Noncompliance.
  b. The Distribution Integrity Management Plan was completed and issued on October
     21, 2015.
  c. The project working group continued activities to reduce Gas Pipeline Safety Risks:
1. Met with the Ohio Utility Protection Service (OUPS) and initiated steps to become a member.

2. Continued work to formalize the draft Construction Risk process to address excavation incidents.

3. Updated Div 01 of the Building Design Standards to address gaps in the inspection and project closeout sections.

d. Purchased, trained, and began use of building leak detection equipment. Verified integrity of several Midwest campus building gas systems. Planned and completed gas outage and repair work during spring break to address distribution pipeline issues.

e. Developed list of building gas system compliance needs and obtained approval for recovery of $250,000 in building gas service line repairs in the FY17 utility rates.

f. Installed new gas pipeline markers at river and road crossings with Ohio State emergency contact information stickers to comply with CFR 192.707.

- Continued assessment and security risk reduction activities for the Utilities Process Control Network.

- Periodic black start testing of Utility Plant generators:
  a. Smith Generators A and B load shed and black start testing was completed 10/29/15 and 11/5/15 respectively.
  b. Procedures were developed and employees trained, and Smith Generator auto-start controls were enabled January 28, 2015.
  c. Developed additional procedures and shift operations training to facilitate manual generator starting for next years’ Demand Response Contract.

- Utilities Maintenance Initiative
  a. Completed and reviewed monthly PM hours report, quarterly work order report, and yearly shop asset report.
    1. 100% of the assignable hours for all three shops (High Voltage, Support Services, and Electronics) were tracked against AiM work orders in FY16.
    2. The group worked 8215 hours (22.5%) on Preventive Maintenance orders and 28,271 hours (77.5%) on Corrective orders.
  b. An AiM optimization working group was initiated to share best practices and establish future goals.
  c. High Voltage: 715 active PM templates established. 202 remaining assets to add, including 106 motors, 38 VFDs, and 48 miscellaneous equipment items.
  d. PM scheduling was completed for the chiller turnarounds in the fall and work was completed as scheduled during the off-cooling season time period.
  e. Boiler turnaround planning was completed in the winter and the planned boiler outage cycle was initiated in April.
  f. Electrical extended cycle PMs were completed in April for the last 6 of the 41 GE Medium Voltage Breakers for Smith Substation.
• Building Design Standard (BDS)
  a. Division 01 updates submitted in October, addressing gaps in the BDS related to inspections of new utility systems. The new standard was posted to the FOD website with a November 30, 2015 issue date.
  b. Division 33 was reviewed and updates were submitted in October. A new section was developed and issued for domestic water distribution, consolidating distribution standards in 33 and leaving the building standards in Division 23. Other updates addressed gaps in the BDS related to gas pipeline construction and misc. electrical items. The new standard was posted to the FOD website dated November 30, 2015. Additional minor updates were submitted to TSG in April, to be issued in the next update.
  c. Division 40 Section Drafts were completed in April 2016. The draft standard is being currently being revised to avoid any duplication or conflicts between issued Division 33 and draft Division 40. Target for a finalized version to go to TSG is fall 2016.
  d. Building Condensate design recommendation is being developed for Pomerene Renovation. Goal is to establish a new design standard to address the high maintenance and metering issues of the current standard. The new standard envisions condensate flow monitoring and a trial meter has been ordered for Celeste to be installed by the 18th Avenue Construction Project

• Support flood risk assessment and mitigation efforts.
  a. Identified 26 tunnel flood monitoring points for enhanced alarming system to be installed by the Tunnel Flood Alarm Project. This includes 17 existing alarms located in four disparate campus monitoring systems and 9 new alarms. A design build team was selected and design is underway at year end.
  b. Supported All Campus Hazard Study.
  c. Completed project working with FDC and others to remove the high risk McCracken third floor sprinkler system and water service line in the north McCracken tunnel.

• Completed a review of the Insurance Recommendations Report to identify improved fire response and risk mitigation steps.
  a. In early April OSU Utilities Staff provided a tour of the McCracken fuel oil tank system, fire protection, boiler operating floor, and Smith Sub Generator with OSU Emergency Management and Columbus Fire Department Units 1, 2, and 3.
  b. Two high risk report items were addressed and improvements to emergency shutdown systems for the oil/diesel pumps were completed.

• The “What if” risk assessment form was updated with instructions and posted on the new web site in April.