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*Sustainability Goals and Results Dashboard*
Message from the Director

Operations is committed to providing exceptional support to the students, faculty, staff, patients and visitors to the University of Virginia and within our community. This is achieved through the commitment and dedication of individuals and teams who take great pride in supporting the University and our community by:

✓ committing to **operational excellence, stewardship, and sustainability**

✓ achieving organizational goals including
  - reducing carbon and nitrogen emissions
  - reducing energy and water use
  - increasing recycling and reducing the generation and landfilling of waste
  - advancing health and enhancing indoor environmental quality through green cleaning
  - maintaining the beauty of Grounds using sustainable landscaping methods
  - protecting waterways and local habitats
  - stewarding this special place through the care of facilities

✓ monitoring, measuring, and reporting on progress in achieving goals

✓ promoting personal and professional growth and development

✓ engaging with faculty, staff, students, and our community

✓ respecting the cultural and historical legacy of the University

Please refer to the dashboards that begin on page 35 to see goals, trends and results of UVA’s Sustainability Goals.

Please also let us know how we can improve our service and support your work here at the University. I welcome your calls (434-982-5887) and comments (clg9y@virginia.edu).

Cheryl Gomez, PE, LEED AP  
Director
Office for Sustainability

OFS Team

The UVA Office for Sustainability's team of 14 full-time staff and 16 part-time student employees is focused on facilitating strategic sustainability planning, new and existing building sustainability initiatives, outreach and engagement with the UVA community and beyond, and seeking connections between operations, curriculum and research to use the Grounds as a learning tool.

Collaboration is a focus of the office, with OFS also supporting pan-University work led by others, such as the University Committee on Sustainability and its subcommittees and working groups, efforts to achieve UVA’s recent AASHE STARS Gold rating, and tracking progress towards UVA’s 2016-2020 Sustainability Plan.

Sustainable Building Highlights

**Leadership in Energy and Environmental Design (LEED) Operations and Maintenance (OM):** Clark Hall achieved LEED Silver certification this year, becoming the first LEED version 4 OM project to become certified in Virginia, and one of the first higher education projects in the country to achieve certification under this version of LEED.

Clark Hall, home to the Department of Environmental Sciences at UVA, is a multiuse building with classrooms, offices, research labs, dining, and a library. Delta Force, UVA’s energy efficiency and building retro-commissioning program, led this initiative that upgraded energy and water infrastructure in the building and required extensive collaboration with multiple FM partners and Environmental Sciences. The $2 million investment in Clark Hall has resulted in over $700,000 in utility savings and 30,000 MMBTU’s of electricity, heating, and cooling use each year.

Energy/Infrastructure Upgrades

- Converted all lighting to energy-efficient LEDs
• Upgraded controls to eliminate pneumatics
• Functional Performance Testing of all air handlers
• VAV box repairs and calibration
• Pressure Independent Control Valve installation on air handlers
• Conducted risk assessment of labs to identify energy reduction opportunities
• Scaled back air flow rates where safe and appropriate in lab support spaces
• Installed low flow toilets, urinals, and sink aerators throughout
• Piloted new recycling/waste stations

Engagement
• The Environmental Sciences administrative office earned UVA Green Workplace Silver Certification for adopting sustainable practices
• All labs cooperated with Green Labs risk assessments and 4 labs participated in deeper dive interviews about green practices
• 3 labs participated in the North American Freezer Challenge
• Purchasers helped identify green procurement options
• Housekeeping staff adopted green cleaning practices
• Recycling staff spearheaded a waste audit to understand Clark Hall’s unique recycling needs
• 471 students and 117 employees participated in transportation and comfort surveys

Other Areas of Impact
• Green Cleaning
• Procurement
• Food
• Pest Management
• Landscape Management
• Waste Management
**Existing Buildings:** The Delta Force program continues to expand its portfolio and impact, with new additions to the portfolio in Housing & Residence Life and energy conservation measures across buildings such as window film. In 2017, the Delta Force program contributed to $6.1 million in avoided costs.

**New Construction and Major Renovations:** OFS is supporting the development and implementation of UVA’s first Green Building Standards, launched this year as an Appendix to the Facility Design Guidelines. The Standards outline UVA’s minimum expectations for aligning University-wide sustainability goals with building design, construction, and maintenance.

**Green Labs:** The Green Labs program engaged lab occupants in reducing energy and waste through participation in initiatives such as the North American Freezer Challenge, a Shut the Sash competition, and a waste management event series.

**Grounds as a Learning Tool:** OFS worked with several courses throughout the year. In Civil Engineering 3050 Intro to Green Engineering, students worked with Professor Andres Clarens and the Office for Sustainability to identify opportunities for rooftop solar at UVA. Students were provided with a dataset of overall roof segments (over 4,000) on Grounds and used that data to identify optimal locations for solar panels.

**Pan-University Engagement and Partnership Highlights**

**Student Engagement:** New student programs included training 120 resident advisors and orientation leaders in sustainable living, with the launch of UVA’s first Green Living certification program. And, for the first time, UVA Sustainability was included in summer new student orientation. OFS is also supporting the development of the UVA Career Center’s comprehensive sustainability focus area to support pathways to careers in sustainability.

**Faculty and Staff Engagement:** The Green Workplace program continued its growth with the first full school – the School of Nursing – achieving certification.

**Alumni Engagement:** In partnership with the Alumni Association, the Career Center, UVA Clubs, and several others, the Sustainability Alumni Network was started to bring together alumni to connect and advance a collaborative vision for sustainability at UVA. To develop the program, summer sustainability alumni receptions were held in San Francisco, Boston, Norfolk, and Washington, D.C.

**Community Engagement:** OFS was either connected to or supported nearly 90 events, including 25 during Earth Week and seven during UVA Sustainability Days, and a major partnership event as part of the 2018 MLK Celebration. OFS also continued collaborating with other institutes of higher education through leadership in VASHE, AASHE, and Listening Post/Ivy Plus sustainability working groups to advise EVPs prioritized sustainability topics.
UVA Recycling Team

The UVA Recycling team’s 23 members collect and process materials from across Grounds to be reused or recycled. The team works with faculty, staff and students to encourage awareness of alternatives to landfills. Several commodities, including but not limited to, paper/cardboard, plastic/metal/glass containers, electronic waste, office supplies, and compostable items can be placed in containers on Grounds, which generates savings from reduced landfill costs. To increase the ability to recycle cardboard, two new balers have been installed at dining facilities.

Strategic Initiatives

Recycling initiatives continue to engage students and courses. In the spring 2018 Civil Engineering 3500 Solid Waste Management course, students performed waste audits to inform UVA’s Materials and Waste Action Plan. Additionally, the Recycling team supported enthusiastic students in the Materials Working Group, who piloted composting in residence hall rooms and paper towel composting in residence hall restrooms.

A new recycling coordinator was hired to transform UVA’s system of recycling to include complete co-location of recycling and landfill bins in all interior spaces. Through these efforts, the team has been able to systematically provide updated bins and signage to facilitate easier and clearer recycling methods. This past year, 19 buildings were fully transitioned to include new bins and signage.

Additionally, UVA Recycling has been supporting increasing interest across Grounds in hosting zero waste events. The team encourages all event organizers to look at opportunities to reduce landfill discards by swapping out non-compostable wares and providing composting bins. Major zero waste events this year included the Bicentennial Launch event, the Women’s Global Leadership Forum, three Game Day Challenge events (football, basketball, baseball), and dozens more. Thanks to students and other volunteers, these events diverted 60-89 percent of waste from landfills.
Environmental Resources

Jeff Sitler retired from Environmental Resources (ER) after more than 20 years of service at UVA. Jeff’s career at UVA began in 1998 at Environmental Health and Safety, and he joined Facilities Management in 2012. Jeff helped usher in a new era of environmental management at the University where stormwater is seen as a resource. He also oversaw programs related to petroleum management and air permitting as well as countless other environmental compliance efforts.

His work to reduce the University’s impacts on the environment helped lay the groundwork for many of the University’s sustainability-related commitments. Jeff’s illustrious career was honored on Founder’s Day, when a tree was planted in the Dell in his honor.

Stormwater Under the Stars

The newly renamed Clean Water Working Group (formerly the Water + Stormwater Working Group) created an educational video to promote efforts UVA is taking with respect to stormwater stewardship around Grounds. The short film highlights the history of water and stormwater at UVA, starting from its birth 200 years ago to the present day. The video examines how water has played a fundamental role in the operation of the University, and how some of its sustainable uses have changed over time. The video can be accessed from the Environmental Resources website.

As part of UVA’s Earth Week activities, the Clean Water Working Group hosted “Cinema Under the Stars,” an outdoor movie event at O’Hill Field which screened the “Story of Water” video before the Disney film “Moana”. Thanks to the Bicentennial Committee and the Environmental Stewardship Subcommittee to the Committee on Sustainability for providing project funding.
Refrigerant Management

In the fall, ER met with zone HVAC supervisors to discuss recent changes to federal refrigerant regulations and to better understand the type of equipment and processes they use to manage refrigerant. This information was incorporated into a revision of FM’s refrigerant management directive 797D, which was finalized in March. The revised directive reduces the paperwork burden for small equipment and captures the necessary information required by regulation. ER presented an overview of the new refrigerant management requirements at the HVAC Roundtable for apprentices, assistants, mechanics, leadsmen and supervisors held on January 30, 2018. ER has also been working with zone staff to update our inventory of equipment that contains at least 50 pounds of refrigerant per circuit; this equipment is more heavily regulated.

Project Support Services

ER completed several Environmental Site Assessments for property acquisitions for both UVA and the UVA Foundation and eight Environmental Impact Reports (EIRs) for new UVA projects. EIRs are required by the State for all large projects, over $500,000, involving exterior disturbances. In addition, ER reviewed stormwater management and erosion and sediment control (E&SC) plans for 12 new projects and conducted approximately 400 individual E&SC inspections of UVA project sites. ER also inspected the installation of new stormwater management features such as permeable pavers and biofilters at Gooch-Dillard, Wilson Hall, the Student Remembrance Garden, and Disharoon Park.

Dawson Garrod observes a performance test conducted on a new biofilter at Disharoon Park.
Behind the Scenes at the Bicentennial

The Central Grounds Zone played an essential logistical role in the incredible launch event celebrating the University’s 200th anniversary.

The production company, veterans of many Superbowl halftime shows, praised FM’s efforts as “Critical to the success of the event,” and “The best support ever by an event venue’s team.”

Maintenance Coordinators

Applying Data to the Day-To-Day

Excellence in maintaining facility assets requires the application of both business and systems performance data.

Two years ago, FM created a work process coordinator position in our Fire & Life Safety shop, and the impact was immediate and positive. Late in FY17, FM added five new maintenance coordinator positions, in each of its academic maintenance zones.

Working closely with technicians, supervisors, and managers, these data experts use AiM, Tableau and Excel to discover patterns, communicate opportunities, and revise work processes.

The results are very positive: response rates, on-time completions, and customer satisfaction survey results are all up, and more work is getting done on more assets using the same workforce.
An Ounce of Prevention is Worth...

John Quinn, Maintenance Coordinator in the Central Grounds Zone, analyzed the data on lighting work performed in that zone’s 80 buildings. He understood that reactive lighting calls negatively impact academic programs and take more time per fixture than preventive maintenance (PM) routines.

By increasing the number of PMs in targeted buildings, the frequency of lighting failures dropped dramatically, and there was a 35 percent reduction in the overall time spent on lighting-related service work. Data-driven decisions like these can reduce costs, but they also improve employee morale, work quality, and customer satisfaction!
The Key to Success: Co-locating the University and Housing Lock Shops

The University and the Housing Lock Shops were merged three years ago, but the renovation of the McCormick Road dorms provided the impetus to physically bring these two teams together.

Fun fact: There are over 80,000 keyed locks in UVA buildings!

In the spring of 2018, FM remodeled and expanded its University Lock Shop, which is located in Lacy Hall. The new shop is now home to all seven locksmiths, who can more easily cross-train to provide keying and access services across grounds.

Service Above and Beyond

Living in an ancient structure in a very public space comes with unique challenges. Among the many customized services provided by maintenance zones, one is providing the pavilion residents with direct access to a dedicated zone employee who coordinates and oversees facilities work in and around their homes.

E.R. Deane, a 46-year FM employee, has provided the personal touch for residents of many of the University’s historic homes for over twenty years. His retirement in August 2018 marks the end of an era, but not the end of FM’s commitment to the type of personalized services he provided so well.

“There’s No Substitute for Experience”

That old saying certainly applies to maintaining the University’s 500-plus buildings. Knowing your way around the seven million gross square feet of UVA’s academic facilities and being aware of the myriad of factors that affect student and faculty performance are part of what makes FM maintenance services uniquely valuable.

Academic facilities maintenance plays an important role in training the next generation of master technicians. In 2018, 17 apprentices worked alongside senior mechanics in academic maintenance zones, ensuring that FM’s tradition of superior service will continue uninterrupted.
Building Goodness in April (BGiA) is a student-run charitable program in the Darden Graduate School of Business. Each spring, students and professionals team up to improve local homes and non-profit facilities.

Since 2010, FM Academic Maintenance employees have supported this program, working both on and off the clock, guiding student volunteers and performing repairs that require advanced skills.
Fiscal year 2018 brought many changes for the Housing Facilities teams, including a number of new team members with valuable expertise and experience. These additions to the Housing Facilities group have allowed the team to increase service efficiency and speed – both of which were core mission goals for the year. Housing Facilities also worked extensively with Housing & Residence Life as well as other teams within Facilities Management to support major project phases at the Gooch-Dillard, the International Residential College, and McCormick Road complexes, and as a large number of smaller projects across the Housing inventory to continue addressing building issues and improving UVA’s living and working environments.

Housing Facilities has made significant progress toward its goals of increasing operational performance as well as customer satisfaction. The maintenance and custodial organizations now work closely together with new leadership in Conference Services to efficiently handle summer turnover and conference operations, and new scheduling and staffing patterns have resulted in sustained operating efficiencies. The Housing Maintenance group also added capabilities in order to be more self-sufficient and to handle routine needs more effectively.

Facilities Management also continues to prioritize strong internal working relationships and the partnership that has been created with Housing & Residence Life. The two departments have made significant progress in aligning services with needs and expectations, and a number of information-sharing and decision-making processes have been strengthened. At the same time, Operations continues to support condition assessment processes and facilities renewal and improvement opportunities to build future success.

The Student Council Community Service Committee hosted a Custodial Appreciation Luncheon for the Housing Custodial team in April 2018.
Custodial Services

Goal: Define and deliver on value propositions with customers and department constituents.

Value Proposition with Customers: “Provide undeniable value, deliver promised levels of service, build trusting and supportive partnerships, support customers’ core business.”

- Connect with new customers and understand their expectations
- Convey our primary purpose: support student learning and occupants’ work via clean, healthy environments
- Share commitment to FM Core Values

Officially Welcome New Customers

Continue Taking our Customers’ “PULSE” – Request Critical Feedback

- Continued quarterly five-question customer surveys to learn and understand perceptions
- Utilized data from 300 meetings and sessions to implement new solutions

Value Proposition with Frontline Staff and Supervisors: “Use ‘fun at work’ and training to promote engagement and inclusion, enhance self-value and professionalism, stress safety focus and retention.”

- Advanced inclusion and value of diversity through training
- Recognized: 21 new recipients of “This is How We Do It!” award and results included celebrating eleven rewards and recognition recipients.
- Promoted: “Stronger Together” & “Spreading Smiles while Going the Extra Miles!”

Change in Customer Satisfaction 2017-2018

Change in QA Results 2017-2018

Audit Result
- High Quality: 20%
- Needs Improvement: 9%
- Low Quality: -30%

Workplace Satisfaction Survey: 82 percent favorable responses.
Value Proposition with Managers: “Provide multi-dimensional framework for success, create ‘compass’ to guide priority focus, utilize professional coach and sustain momentum with in-house training and leadership mentoring.”

- Managers received one on one sessions with a professional coach from the UVA Talent Development group and simultaneous in-house customized coaching and mentoring
- Emphasized LEAN protocols
- Learned about critical thinking, complex problem solving and coordinating with others.

Goal: Increase Our Sustainability Footprint in UVA’s Built Environment

GS-42 compliance continues for fifth year

The US Green Building Council Green Seal sustainable cleaning standard (GS-42) was continued for the fifth year. Attaining GS-42 certification requires that use of sustainable cleaning products, detailed green cleaning, procedures and practices, achievement standards, extensive training and focus on safety. The 2018 recertification process focused on how to demonstrate adherence with over 30 rigorous requirements and guidelines. The goal for 2019 is to use a newly created training program to facilitate GS-42 individual certification for all E & G team members by 2019.

O’Neil Hall served to demonstrate GS
New Landscape Installations

The Landscape Services department collaborated with Project Services and Facilities Planning and Construction to install new landscapes as part of several major projects this year including, Gooch-Dillard Courtyard, Wilson Hall Plaza and Disharoon Park. A large element of each of these projects was improvement in the stormwater management of the areas by installing stormwater basins and porous paving. Our team also made smaller improvements to Grounds including the landscape associated with the Student Remembrance Garden, adding a seated rock garden on the east side of Shannon House and a new landscape for Facilities Management’s own front door at the Leake Building.
Ongoing Landscape Maintenance

Our Landscape Maintenance groups made great improvements to the Grounds renovating existing plantings and installing new sod this past year:

- Our Pavilion Gardeners and our Turf Crew have now completed two years out of a three-year plan to install new sod in all 10 of the historic Pavilion Gardens.
- Our Turf crew coordinated the re-sodding of the Northern most flat of the Lawn as the start of a systematic annual replacement of a portion of the Lawn’s turf where one flat will be stripped and sodded each year.
- Our equipment maintenance group partnered with FM Fleet to replace our aging water tanker with a new truck that has the capabilities to switch beds. This truck now can be used to perform countless functions simply by replacing the implement loaded on the frame.
- Our Zone Maintenance groups have been experimenting with battery powered grounds maintenance equipment. Our plan is to replace as many pieces of fuel burning equipment as possible to reduce the noise.

Shannon House rock garden.
Wilson Hall stormwater basin.
Landscape staff adjusting the grade of the Lawn following Final Exercises.
and eliminate the exhaust from around our classrooms and patient care facilities. We are limited in what can be replaced immediately due to restriction in battery life, but technology is making great progress on this issue and we will continue to test and purchase new equipment as it becomes available until we’ve transitioned totally away from fuel burning equipment used in our day to day operations.

New water tanker with switch-n-go bed system.

Landscape staff member Shereaka Dowell working to support Final Exercises in the rain.

Landscape staff member blowing mulch in the Pavilion Gardens.
Energy & Utilities

Utilities Distribution

The Utilities team installed 700-feet of 18-inch steel pipe in the McCormick Road tunnel. This portion of tunnel will be utilized to provide heating hot water to Chemistry, Gilmer, McCormick Road Dorms and West Grounds.

The diverse skills of the Utilities team allowed them to self-perform this work. The team grouted anchors and supports, painted all support steel, rigged the pipe into location, set expansion joints, and welded the pipe. One hundred percent of the welds were x-rayed and completed by our certified welders.

The Utilities team built our second mobile boiler trailer. These mobile boiler systems are used to support construction, planned plant outages, or emergent building system failures. This new unit includes four boilers capable of 1,200,000 BTU’s combined. The first boiler trailer was built three years ago and has been in operation every year since completion. The first boiler trailer is capable of 600,000 BTU’s. The trailers allow the Utilities team to provide rapid response to emergencies, and the most economical support of long-term projects. The majority of this new boiler trailer was constructed by our Utilities apprentice and his mentor.
The Utilities team installed this Spirotherm air and dirt eliminator in the South Chiller Plant. The unit weighs 9,000 pounds, is 16 feet tall and 5 feet in diameter. The installation team discovered an innovative method of installing the unit, which saved the project a substantial amount of money and time. This project came in on time and under budget.

The management of 11 large heating water tertiary distribution loops was consolidated under the Utilities team. The team employed a Lean 5S process to the loops, which resulted in the installation of standardized chemical shot feeders, safety systems, and corrosion coupons.

This rigorous approach to the water treatment program will ensure that our piping distribution systems will last long into the future.
Heat Plants
Planning, Scheduling and Work Management

The Heat Plant Team implemented a new Planning and Scheduling program to better prioritize, plan, assign and schedule preventive and corrective maintenance work, and operational duties required to acquire equipment performance and reliability data for development of equipment histories. Equipment status boards, visual weekly schedules, and thrice weekly planning meetings have been introduced and include management and staff from the maintenance, operations, engineering, and inventory groups. We are currently working on finding an interactive scheduling software, overhauling our AiM asset database, and evaluating all planned preventive maintenance so we can shift to a more proactive reliability centered maintenance plan.

Lockout/Tagout (LOTO) Program

A focus team of operations and maintenance personnel was implemented in order to develop a LOTO program specific to the Heat Plant. New engraved/numbered system locks for the Main Heat Plant, JPJ, and North Grounds were purchased to make lockouts more intuitive. Engraved/labeled personal locks and tags with populated information are now being used by all employees working under a lock out. New piping and instrumentation diagrams (P&ID’s) as well as equipment-specific procedures are currently being developed.
Continuous Improvement

Small cross-functional teams have been created to solve repetitive problems that align with safety, sustainability and stewardship with the A3 approach. We have begun using distributed/lean maintenance techniques on our inventory building as well as introducing the 5S process to improve our overall work place environment. We have also been working to optimize the heat plant structure which has included shifting responsibilities between working groups and re-evaluating schedules to level the work load.

Boiler #5 Emissions Issues

Boiler #5 was unable to be operated on natural gas due to high NOx and CO emissions. We pulled and repaired both natural gas burners, reworked the burner refractory to manufacturer specifications, eliminated all tramp air and then tested the boiler and re-tuned the air-to-fuel curves in the control system. With the modifications we were able to reduce NOx emissions from 0.045 to 0.024 lb/mmBTU and CO emissions from 10.3 to 0.0 lbs/hr; well within the permitted limits.
Boiler #3R Emissions Issues

NOx emissions on Boiler #3R were increasing to the point that the boiler could not be run in automatic. During the annual outage the boiler was inspected and deterioration due to excess heat and residual flame was found on the burner. Heat Plant employees fabricated new burner parts to replace the corroded pieces and the burner management program was modified to eliminate the residual flame. With the modifications, NOx emissions dropped from 0.036 to 0.026 lb/mmBTU; well within the permitted limits.

Chiller Plants

A photo essay exploring the Chiller Plants was featured on the Facilities Management website in June 2017.

Water Management Plan

The Chiller Plant water management plan has been fully implemented, strengthening an already robust water treatment operation that is critical to the long-term success of the central chilled water plants. The plan requires regular testing of all the water systems for which we are responsible and lays out appropriate mitigating actions based on test results.

Assembly Overhaul – South Chiller Plant, Chemistry Chiller Plant, Clark Chiller Plant

The Chiller Plant team requires agility and diversity of skill in order to address the broad range of plant related work tasks. In addition to the technical challenges related to changing cooling tower rotating equipment, this work requires a tremendous amount of planning and coordination in order to be successful. This year, the Chiller Plant team has worked together to perform three gearbox assembly overhauls and did so with flawless execution in all aspects of the job including preplanning, coordination, rigging, alignment, and startup.
The Chiller Plant team has put much energy into a plant-wide 5S program focused on lean inventory management. The team has consolidated and organized inventory and implemented a 5S approach to each plant. Team members have also found innovative ways to do work more efficiently and more safely. Specific examples include the design and fabrication of a custom rigging device to assist with changing heavy variable frequency drive units and the design and fabrication of a vacuum chamber used during the maintenance of the ATCSs (automatic tube cleaning system) we use in our plants.

Completion of a project to add a large air/dirt separator to the South Chiller Plant has already proven successful. Water treatment testing results have provided clear indication that the newly installed equipment is providing value. We’re especially proud of this project because of the collaboration between internal E&U departments (Chiller Plants team led the project, and the Utilities Team performed the installation) and the minimal dependency on outside resources from conception through completion.

### Power & Light

**Copeley Substation Renewal**

The Copeley substation was built in 1953 and was beyond its useful life. Failure would have resulted in an extended outage for the customers connected to this small substation. The Power and Light team self-performed the renewal of the Copeley substation and moved critical loads to the North Grounds Substation (Klockner stadium, Miller Center, Faulkner Dorms, McCue center, Disharoon Park).
35kV Underground Ductbank

As part of completing the 35kV underground express ductbank project, Power and Light team implemented a new automation sequence at Cavalier substation on May 12, 2018. The team collaborated with Dominion to resolve harmonic distortion and UPS malfunctioning issues, which were due to resonance within the new underground circuit. This project has broadened the team’s focus from just power reliability to include power quality.

Electrical Safety training and PV solar

A photovoltaic solar array designed and installed by UVA FM personnel was added to the Alderman Substation roof and put in service in the fall of 2017. Our newest PV roof top solar installation on Ivy Stacks was inspected and commissioned in spring 2018. The Power and Light team provided engineering guidance during design and will provide ongoing operations and maintenance once put into service.

The Power and Light team also provides frequent tours of our solar installations to students, faculty, staff, and the community.

Arc Flash Hazard Analysis Program

The UVA In-House Arc Flash Hazard Analysis program, started in 2015, is on track to complete the study and labeling of 100 percent of all significant buildings on Grounds within five years, at which point the studies will be reviewed and updated per NFPA 70E 130.5(2). In fiscal year (FY) 2017-2018 arc flash hazard studies and labeling were completed for 28 buildings, totaling 1,669,261 GSF or 11.43 percent of the total area under consideration. Some major buildings completed in FY18 include West Complex, Fontaine Research Park, the Heating Plant, Pinn Hall, and the Aquatics & Fitness Center.
Automation Services continues to advance in key building automation system (BAS) services including cybersecurity improvements, new construction BAS installations, building optimization projects, and BAS maintenance enhancements.

**Cybersecurity**

With an increasing desire to have building systems automated and networked together, operational technology (OT) continues to merge with information technology (IT), making cybersecurity of OT critically important to the safety and reliability of physical assets managed by facilities management. Automation Services has been in the process of implementing improvements to our BAS cybersecurity and we have dedicated team members to focus on this area of our systems, including network health reviews, patching/updating devices, and inter-building network communication.

**In-house Controls Installations**

We accomplished our first in-house BAS installation in a large research facility with the completion of the Materials Science HVAC project. The team engineered, installed, and programmed controls for the entire building, including a critical lab exhaust system that was converted from dedicated exhaust fans to a manifold system with variable speed drives controlled by the BAS. The new controls have made significant improvements to the controllability of the systems and the operational performance of the equipment.
Building Optimization Team

Our building optimization team continued to work closely with engineers from the Office for Sustainability on retro-commissioning projects throughout the University. We have increased our in-house controls engineering expertise, so we are now better able to design and implement optimum sequences of operations for the equipment that we upgrade. Additionally, the engineering expertise has allowed us to provide better support and design reviews for capital projects. As we are upgrading and improving the performance of existing equipment, we are also taking our findings from the field and updating our standard control schematics and sequences to provide design engineers with a better starting point for their controls designs.

BAS Maintenance

Our BAS maintenance team continues to provide controls support to all zones across Grounds. We have been working to improve communication with customers, including zone personnel, by writing detailed notes on the work orders after a technician responds. The team has also focused on building up in-house expertise on various controls; an effort that has been enhanced by the installation of a controls test wall in our health system shop where technicians can test and troubleshoot controllers, sensors, and related equipment. Maintenance technicians also installed numerous temperature monitoring devices for critical research freezers and worked closely with Systems Control on alarm setup and emergency response.
Geospatial Engineering Services

Space Management

The team released a new space management system to customers across the University. The system provides access to interactive floorplans and data for buildings owned or leased by UVA. There are over 55,000 rooms represented in the centralized space management system. Customers now have self-service access to space information to facilitate the strategic utilization of space as an asset.

The team also created customizable reports that can be utilized to gain insights into the details of the space portfolio.

![Image of space management system interface]
**Damage Prevention**

The team continued to expand our damage prevent outreach to teams in FM and our contractors performing excavation on Grounds. Staff completed the SCC Damage Prevention Train the Trainer Certification Program. The team also implemented a stand down training for sites with utility damage.

The team participated on the Excavation Safety Committee, presented at contractor safety days, exhibited equipment and outreached to 811 Day, GIS Day, and FM Girls Day attendees.

The team has also provided damage prevention outreach and awareness to the FM team at the College at Wise. The team completed a large data collection initiative to improve the utility dataset that represents Wise infrastructure.

Monthly, the team averaged processing over 300 utility locate ticket requests for excavation.

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**UVA GES Damage Prevention Message**

**MissUtility Locate Tickets**

![Bar chart showing MissUtility Locate Tickets from July 2017 to June 2018.](chart.png)
Document Management

The document management team supported the mission of a variety of teams across the University through their information and document management services.

The team also collaborated with colleagues across the University to provide an understanding of the University’s history creating lasting publications of the history and supporting the Bicentennial events.
Geographic Information Systems

The team provided mapping and data analysis support to a variety of customers. The team focused on creating self-service tools for greater access to information and automation of routine mapping tasks.

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<tr>
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<td>ADA Standard</td>
<td></td>
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</tr>
<tr>
<td>Y1</td>
<td>ADA Standard</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>Y2</td>
<td>ADA Standard</td>
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</tr>
<tr>
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<td>Carpool</td>
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</tr>
<tr>
<td>Y1</td>
<td>Department/Lease</td>
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</tr>
<tr>
<td>Blue</td>
<td>Motorcycle/Moped</td>
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<tr>
<td>Y1</td>
<td>Motorcycle/Moped</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Blue</td>
<td>Permit</td>
<td></td>
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<tr>
<td>South Visitor</td>
<td>Permit</td>
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The team created an application to report on the types of parking available around Grounds. This self-service tool provides the Parking & Transportation team with reports and graphical analysis for maintaining and strategically utilizing the parking inventory. In addition, the team continued to provide maps and application support to our customers on a daily basis.
Systems Engineering

Metering & Expense Allocation

Data Integrity, Data Reconciliation, and Data Visualization

Data Integrity, Data Reconciliation, and Data Visualization are the three primary focus areas for the Metering team, which is entrusted with growing and maintaining the breadth of University meters. Over 350 meters were newly installed, upgraded, or connected this year via automation systems yielding over 3,000 active University physical and virtual meters. The team has a goal of greater than 95 percent reconciliation between meters and consumers, and for fiscal 2018, the team achieved almost 99.7 percent. The team also has a goal of greater than 95 percent on a per plant or distribution system basis for total unit volume and total dollars. Positive steps are taken each year towards these goals, including adding steam and medium temperature hot water distribution meters and regional reconciliation definitions to help target areas of greatest opportunity. This also includes utilizing software to help expose metering problems more quickly as well as Power Monitoring Expert (PME) system as a focal point for BAS-connected meters. Currently, there are over 800 meters connected using the PME system. The team continues to use Veoci software to manage the monthly process for expense allocations including acquiring manually read meter readings, tracking issues and making progress in using work flows and tasks. The team also worked this year to implement and update its Meter Plan to help guide upgrades and replacements in the coming years.

Of special note also is the large amount of work the metering team performs in support of construction and renovation projects, often stepping in to fully install or complete metering work. The team is also highly respected for their professionalism, workmanship, and attention to safety.

Information Systems

Information Systems includes a multitude of technologies, such as Microsoft (MS) .Net, MS SharePoint, MS SQL Server, MS Reporting Services, Building Automation and Supervisory Control and Data Acquisition Systems (BAS and SCADA), and also physical resources, such as server hosts and virtual machine (VM) servers.

The Systems Engineering team welcomed Mary Ann Stumbaugh as a new Systems Engineer this year. Mary Ann will be a part of all the information systems related activities for the team and has already been actively developing data visualizations using Tableau and is active in billing and metering processes.

General information systems initiatives focus on data development and reporting. Some of the team efforts this year included: software trend visualization improvements, solar data for the new Renewable Energy Tracker, server upgrades, publication of project data visualizations, transition of University Hospital electric monitoring onto PME (over 150 meters), creation of a web API to help deliver trend data to faculty and students, and initial planning for trend data consolidation for all BAS-related trending and associated data warehousing. The team also regularly:

- Works with master’s degree program students and faculty, such as with the Data Science Institute, to provide building and electric substation data for projects related to data modeling and forecasting.
- Provides data to FM, University, and consulting staff for various construction and improvement projects.
- Supports Delta Force and Office for Sustainability efforts.
Visualization/ project samples:

- Qlik-Sense Visualization
  - Building Cost History

- Renewable Energy Tracker Web Site

- Tableau Server Visualization
  - Sustainability Project – Demand Data

- Sample Tableau Server Visualization
  - Building Cost History

- Qlik-Sense Visualization
  - Main Heat Plant
ICONICS

We continue to leverage the ICONICS platform to develop and enhance information, trending, and visualization for buildings, plants, and distribution systems. Visualizations and associated trends and calculations were added this year for solar array information on Grounds. Improvements were also made relating to high-frequency trending and distribution systems real-time reconciliation.

ICONICS visualization samples:

BAS Trend Graph tool

Building Information Page

Utility Systems Overview

Chilled Water Distribution System Overview
Systems Control Center

Mission Overview

Operating around the clock, the Systems Control Center’s (SCC) 12 operators provide real-time monitoring of utility and building systems, ensuring optimal operating conditions for more than 250 buildings across Grounds. On any given day, the Systems Control Center is challenged by system vulnerabilities and natural weather threats of varying size and scope. In addition to the 14,410 work orders dispatched, SCC coordinated recovery of more than 103 significant utility outages and other facility events affecting the University, including the Medical Center. During all these events, SCC strives to provide timely, consistent, and meaningful communication to the University community.

As the emergency coordinator for Facilities Management (FM), SCC works to ensure that FM’s emergency response plans integrate with the University’s emergency response. During the August 2017 protests in Charlottesville, Facilities Management was called on to provide various resources, all of which were coordinated through the Systems Control Center.

Focus Areas

The Systems Control Center experienced an extremely challenging year, with great dedication from the entire team to overcome deep staffing shortages. With creative scheduling and the support of the entire Operations team, SCC was able to continue to improve processes and provide field support to maintenance teams.

Operators reviewed 66 controls projects and freezer installations before moving these systems and equipment to the production server for the building automation systems (BAS). It is through these reviews that the team assures the BAS guidelines for point naming and alarming are followed. That resulted in a reduction of nuisance alarms by 20 percent this year. Additionally, SCC continues to be a key partner for sustainability initiatives, working with facility coordinators, Green Workplace Champions, and the Green Labs focus group, identifying building equipment energy waste and scheduling opportunities.