Facilities and Infrastructure Report
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Dear MSU Community:

Infrastructure Planning and Facilities (IPF) has taken care of Michigan State University’s physical assets for the past 150 years. With rapid changes in higher education, the question becomes: How does IPF care for the campus now, and into the future, in a way that delivers the best value and advances the university’s mission?

MSU must fulfill its land-grant mission amidst many changing factors. Reduction in state funding support, fewer Michigan students in the K-12 pipeline and increased competition for research funds are trends that will impact the strategies MSU pursues to remain competitive.

With these challenges in mind, IPF has focused its efforts in four areas: stewardship, university customers and partners, employee development and innovation. The Facilities and Infrastructure Report demonstrates how IPF is supporting the university mission and leveraging its resources in these areas, resulting in lower costs, better service and innovative solutions to facilities-related issues.

IPF is proud to be part of the MSU community and is committed to helping lay the foundation for another successful 150 years.

Sincerely,

Dan Bollman

Associate Vice President for Strategic Infrastructure Planning and Facilities
STEWARDSHIP

As a result of the state’s reduction in higher education funding, MSU’s reliance on student tuition as a funding source has grown. Infrastructure Planning and Facilities manages a large portion of university funds and considers enhancing stewardship to return value to MSU one of its main priorities.

ENERGY PLANNING
In April 2016, MSU ended coal burning in the T.B. Simon Power Plant, significantly reducing emissions from the plant. This change avoided a $4.5 million investment for the installation of a sorbent injection system, which also avoids future costly Environmental Protection Agency mandates. Additionally, in September 2015, the Board of Trustees approved the planning to create five solar carport locations on campus. The solar carports will increase the amount of renewable energy available to campus and reduce emissions, and have an estimated lifetime savings of $3.5 million.

To accommodate growing energy needs as the university expands its research capacity, the installation of an electrical substation will be complete by spring 2017. The substation creates a connection between the power plant and the regional electric grid, providing firming capacity for the power plant, allowing for revised plant operations that result in $6,000 per day savings.

A Natural Gas Operations team continues to develop long-term strategies for acquiring natural gas and other commodities supplies while also providing near-term oversight for immediate recommendations in the natural gas market. Purchasing strategy methods prevent future market increases and provide certainty in purchase decisions. These efforts aid the university by managing costs, ensuring reliability and moderating risk exposure and tolerance to commodities markets.

Figure 1: Energy and the environment indicators

This graph illustrates the progress made by MSU in relation to the energy planning and cogeneration facility performance stretch goals. The bright green line represents MSU’s actual progress as a campus in relation to the stated goal or benchmark.
**IMPROVING EFFICIENCY, REDUCING COSTS**
IPF professionals manage resources and operations to implement efficient practices that guarantee the best care and stewardship of MSU’s campus.

**Figure 2: Cost and staffing vs. peer group average**

This graph illustrates IPF’s current costs and staffing levels as a campus facilities group in relation to a peer group of similar research universities in similar climates. The dark green line indicates the peer group average for any one metric, and the bright green line indicates MSU’s costs or staffing levels for the 2015-16 calendar year.

**Figure 3: Preventative vs. reactive maintenance**

This graph compares IPF’s preventative maintenance efforts to the time spent on trouble calls or reactive maintenance. It is more efficient for the unit to dedicate resources to preventative maintenance. Future efforts will focus on completing preventative maintenance efforts in order to prevent trouble calls.
Nearly $140 million was budgeted for 21 major projects. The final cost of these projects was just over $129 million, resulting in a total of $9.9 million being returned to the university. The return represents nearly eight percent of the original project budgets.

Change orders on major construction projects dropped from 7.15 percent to 4.81 percent from fiscal year 2014-15 to fiscal year 2015-16, resulting in $9.9 million of returned funds at project closeout. The data set includes 21 major projects with a combined planned project cost of $139,845,359.

This graph illustrates Capital Project performance in relation to budgets and completion schedules. In 2015, a higher percentage of projects did not meet schedule. The average number of days late for the six projects in 2015 was 12 days. Academic programs were not impacted by the missed substantial completion date of these six projects. The performance management team in Planning, Design and Construction is looking at ways to improve meeting the planned substantial completion dates.

This graph represents change order rate by reason code as a percentage of total Capital Project payments by fiscal year.
SMART PURCHASING
Through competitive bidding and strategic purchasing, IPF has continued to enhance its financial stewardship to the university.

IPF’s materials and logistics cost avoidance in fiscal year 2016 was $495,451, contributing to the total maintenance and construction materials cost avoidance of $2.275.

More than $1.4 million has been saved through the addition of an embedded purchasing agent within Project Services, including savings for: Project Services, Maintenance Services, T.B. Simon Power Plant, Commissioning, Transportation Services and Maintenance Stock Warehouse.

Additional IPF competitive bidding and strategic purchasing highlights include:

- Over $106,940 was saved in flooring and furniture purchases
- Over $66,000 was saved by Landscape Services competitive bidding
- Over $59,598 was saved in labor as a result of implementing off-set shifts in overtime avoidance

MSU DATA CENTER UNDER CONSTRUCTION
Based on an average cost comparison with similar size (2.5 MW) data centers, more than $10 million in construction costs are being saved for the MSU Data Center. When consolidated into the new energy efficient data center, the annual utilities cost avoidance for the 15 largest data centers on campus will be $600,000 annually.

CONSTRUCTION RECYCLING AND REUSE
Through a construction recycling and reuse pilot of the 1855 Place project, the Surplus Store and Recycling Center diverted 60 percent of the volume of construction waste, saving $46,000 in landfill costs and diverting 216 tons of waste from the landfill.
This graph illustrates IPF’s current costs and staffing levels as a campus facilities group in relation to a peer group of similar research universities in similar climates. The dark green line indicates the peer group average for any one metric, and the bright green line indicates MSU’s costs or staffing levels for the 2015-16 calendar year.

EMPLOYEE EFFICIENCY
IPF employees continuously endeavor new, innovative practices to be enhanced stewards of their time, resulting in saved university dollars. Specific examples include:

- 7,500 hours of overtime and $360,000 of labor expenses were saved through operating efficiencies at the T. B. Simon Power Plant.
- Over 3,140 hours have been allocated as a result of Landscape Services employees reducing sick time, which equates to gaining 1.5 full-time employees.

PARTNERING WITH CENTRAL IT FOR CENTRAL SOLUTIONS
In partnership with MSU IT, IPF is transforming how it manages technology across the unit. Through increased alignment and collaboration, IPF is able to increase IT efficiencies and decrease costs. This allows IPF IT staff to support the business technology needs of the unit rather than commodity services. Key initiatives include:

- Network support with MSU IT
- Collaborative governance and advisory groups
- Consolidated Service Desk software and change management processes

FUTURE DIRECTIONS
FRIB IMPACT
Planning, Design and Construction is partnering with the Facility for Rare Isotope Beams (FRIB) staff as well as other national construction experts to identify best practices in construction procurement and scheduling.

Construction underway at FRIB, October 2016.
INFORMATION AND COMMUNICATIONS TECHNOLOGY STRATEGY
Throughout the next year, IPF will pursue implementation of its Information Communication Technology (ICT) strategy. This strategy was developed by a collaborative team of internal and external professionals to identify opportunities for consolidation and restructuring of IPF’s ICT teams. Restructuring IPF’s ICT resources will facilitate strategic goals, mitigate risks, leverage central IT resources and reduce costs through efficiencies gained by consolidation.

CAPITAL PROJECT REPORTING FOR TRANSPARENCY
To increase transparency, IPF is working to continually improve methods for Capital Project reporting. In the last year, a quarterly Capital Projects Report was developed to keep Board of Trustee members well-informed of project budgets, schedules and status updates. Additional processes and tools also being developed to support this effort include:

• Owner and contractor meetings
• Monthly client representative meetings with key stakeholders
• Construction manager monthly reports
• Customer construction status reports
INNOVATION

Creating a focus on innovation allows Infrastructure Planning and Facilities departments to collaborate and implement breakthrough change to meet stewardship and customer goals.

USING TECHNOLOGY TO INCREASE THE SPEED OF CHANGE

Technology is used in the field on mobile platforms to allow the workforce immediate access to information and enhanced communication for greater productivity. These technologies are designed to streamline work processes, track data, and build metrics and key performance indicators. The Surplus Store and Recycling Center uses a customized data-tracking system to manage material routing and record quantities. Additionally, Landscape Services has implemented nine new applications that are used on a daily or monthly basis by crew members.

RESEARCH COLLABORATIONS: SOLVING PROBLEMS TOGETHER

IPF is leveraging MSU’s world-class faculty and research programs to collaborate on projects that utilize the campus infrastructure to operationalize solutions at MSU. By partnering with faculty, IPF is launching demonstration projects that show leadership, educate students and accelerate innovation. Ongoing projects include:

- **Solar water heater research** to test the effectiveness of solar water heaters in Michigan’s climate, specifically on MSU’s campus
- A [smaRt Institute](#) (Sustainable Manufacturing and Recycle/Reuse/Remanufacture Technology) proposal, in partnership with the College of Engineering, to develop modular metal reclamation technologies and systems
- A Landscape Services [collaboration with the Civil Engineering Department](#) to assess campus pavements and determine future maintenance activities that will prolong pavement lifespan
- Partnership with the MSU Department of Biosystems and Agricultural Engineering (BAE) and an organization known as PHYCO2 to [research a technology that recycles carbon dioxide](#) emissions to accelerate the growth of algae
- Building Performance Services collaboration with the Applied Engineering Department to create an analysis tool for air filtration system optimization
AUTOMATED FAULT DETECTION DIAGNOSTICS
Building Performance Services is piloting software to complement the existing HVAC building control system that allows for real time identification, tracking and monetization of operational faults. The automated fault detection and diagnostics (AFDD) platform is web-enabled and allows for the custom development of building-specific energy and operational performance dashboards. This predictive vs. reactive approach to reaching a higher level of building operational performance is currently deployed in six campus buildings. Using a conservative estimate of 1 percent utility avoidance for the initial five building pilot results in approximately $50,000 and an accommodating payback of less than four years.

DEMONSTRATING LEADERSHIP AND EXPERTISE
IPF employees are demonstrating leadership and innovation on campus and around the globe by presenting their expertise at conferences and workshops. Presentation highlights in 2015-16 include:

• An Evidence-Based Landscape Management Plan That Aligns With the Master Plan, Society for College and University Planning Conference, Landscape Services Interim Manager Adam Lawver and Campus Planner Steve Troost

• Campus Energy Systems: An International Perspective, Tertiary Education Management Conference, Associate Vice President Dan Bollman

• Workload For High Performance, APPA Annual Conference, Facilities Services Manager Sean Fox-Elster and Custodial Services Manager Brandon Baswell

The unit has also received recognition in the form of several awards over the last year, including:

• Distinguished Service Award from Mid-Michigan Environmental Action Council

• APPA Innovation Award (Infrastructure Planning and Facilities Emergency Response and Business Continuity Program)

• Integrated Design Solutions was named a 2016 Honor Award winner by the American Institute of Architects Detroit chapter for its work on MSU’s Bio Engineering Facility

FUTURE DIRECTIONS
Future trends in nearly all industries point to one similar theme: the speed of change is only getting faster.

An organization’s ability to anticipate change and rapidly respond with smart and innovative strategies will improve its chance for success and sustainability.

As a key support unit to Michigan State University, IPF is not only working to foster innovation, but to improve its ability to assess, implement and evaluate solutions for improvement. As a result, IPF has identified implementation of analytics and technology, along with agile project management solutions, as a key priority for upcoming years. Those tools, along with an engaged staff, will help IPF and MSU continue to be successful now and into the future.
CUSTOMERS

IPF is a partner to the academic and research enterprises at MSU. This partnership allows the unit to have an impact on groundbreaking teaching, research and outreach.

CUSTOMER STAKEHOLDER GROUP
In 2015, IPF organized a Customer Stakeholder Group representing key customer groups across the university to better understand stakeholder needs through a two-way communication process. In evaluating the effectiveness of this group, participants reported their feedback was heard and they believe the exercise will contribute to a better experience.

Figure 1: Customer Service Index

The results from five questions asked on a 2015 customer survey (2016 data available in January 2017) were combined to determine an overall customer satisfaction score. This satisfaction index compared MSU to peer Big 10 universities. MSU’s customer satisfaction score of 72.5 was closely in line with most of the other universities.
CUSTODIAL SERVICES
FIRST SHIFT INITIATIVE
In continuous pursuit of service excellence and stewardship, Custodial Services has taken the innovative approach to restructure its cleaning for a 5 a.m. to 1:30 p.m. schedule. This new approach offers many benefits, including:

• Better relationships with customers who get to see and know the people entering their space
• Greater accountability for customers and workers when anonymity is removed
• Cleaner buildings, as you can see more in the daylight
• A healthier schedule for Custodial Services employees

IMPROVING CAMPUS WAYFINDING
In partnership with IT Services, IPF has updated MSU’s interactive campus map to enable users to receive directions on how to get from place to place. Users can now pinpoint their location anywhere on campus and, after selecting a destination, the map will provide a graphic of the quickest route available on foot. The wayfinding map includes construction detours and is compatible with any size screen.

BILLING ENHANCEMENTS
In partnership with the Controller’s Office, IPF has built a new document that will route all IPF billing charges to fiscal officers prior to posting the ledger. This will allow fiscal officers to add accounting string data immediately, as opposed to after the fact through time-consuming journal entries. The document will also provide a direct web link to IPF’s supporting documentation for the services billed. This new initiative allows for more efficient use of support staff time.

FUTURE DIRECTIONS
CUSTOMER REQUIREMENTS AND SERVICE LEVEL EXPECTATIONS
IPF is actively working toward more systematic approaches to identify, communicate and assess customer feedback and data to provide clear expectations on service levels. This work will lead to service level agreements for IPF’s core products and services. As a result, academic partners will have a clear sense of the level of service provided from the initiation of the service request, scope of work and customer communication. Defining levels of service also helps IPF evaluate its process and standards for continuous improvement.
In order to create value and best serve customers, IPF employees need to be engaged and have skills to lead IPF to be the most high-performing, leading-edge facilities organization in the nation. IPF is committed to engaging employees in innovation and problem solving, and will continue to develop new skill sets among employees for engagement and leadership.

**Figure 1: IPF Total Personnel Strength**

This chart shows the total number of IPF employees by function. There are significant changes shown in 2012 and 2013, due to organizational restructuring.
MAKING IPF A BEST PLACE TO WORK ENVIRONMENT
IPF strives to be a best-place-to-work environment. That’s why the unit asked full-time staff members to complete a survey in August 2016. Nearly 500 IPF employees—67 percent—answered questions about the way they feel about their work environment, support from supervisors, communication and organizational culture, and the treatment of staff.

Business leaders will create tangible action plans to address at least one area of improvement that the teams have identified. This process will be repeated annually with the goal of continuing to build a positive, engaged work environment.

DIVERSITY AND INCLUSION REVIEW
Infrastructure Planning and Facilities and Residential and Hospitality Services are embarking on an internal Diversity and Inclusion Review, demonstrating a dedication to examining the impact on diversity and inclusion practices within the units. An external review process will also take place in which outside experts will share their perspectives about the successes and gaps that exist related to diversity and inclusion. The areas of measures that are being reviewed include:

• Staff engagement opportunities
• Supplier and partner diversity
• Recruiting, hiring, retaining and promoting staff
• Communication and branding
• Campus work environments

With the need to diversify core areas within IPF, there is a strong focus in providing greater diversity throughout the organization. Efforts in place include:

• Improved processes and peer review
• Planning, Design and Construction participated in the Michigan Minority Supplier Development Council – Minority Business Women’s conference
• Recruiting IPF employees to participate in the Women’s Advisory Committee for Support Staff

SUCCESSION PLANNING
With approximately 40 percent of IPF employees retirement eligible, strategies are being implemented to plan for the future workforce and ensure the success of new employees. Departments are reviewing succession planning data against future organizational needs and workforce trends to consider ways to efficiently meet human resource needs. Succession planning strategies include:

• Cross-training programs, including job shadowing and mentorship
• Leadership development
• Temporary employee hiring support
• Program improvements for key touchpoints in the employee lifecycle – orientation, onboarding, mentoring and career developing

FUTURE DIRECTIONS
A CHANGING EMPLOYEE PIPELINE
MSU is constantly responding to rapid changes in the higher education environment due to shifts in technology, demographics and economics. To adjust to a changing workforce, IPF employees must continue to be nimble and willing to adapt their skills to help lead through these shifts.

At the same time, many industry leaders are citing fewer people pursuing careers in skilled trades, creating a more competitive environment for recruiting several IPF roles. Diversity in IPF’s workforce is also limited in several employee categories and business units, which may have further implications on the organization’s ability to service customers and recruit, hire and retain employees.

Over the next year, IPF will identify opportunities to further support succession planning and diversity and inclusion in its workforce.