**Michigan State University**

**Infrastructure Planning and Facilities**

**Sustainable Building Operations and Maintenance Initiatives**

Infrastructure Planning and Facilities is proud to be a key player in MSU’s sustainability initiatives. Several IPF departments and crews work together to promote a greener campus:

﻿**Central Control**

Central Control, part of Building Services, is the hub for monitoring heating, cooling and electrical systems in over 100 buildings across campus. Using the Building Automation System, the crew identifies patterns and adjusts how systems run to optimize energy use.

Using remote digital controls and sensors, Central Control:

* Automates the systems that provide heat, cooling, ventilation and lighting to campus;
* Programs and schedules system operations to meet customer needs;
* Monitors the status of critical equipment and investigates system alarms;
* Optimizes system effectiveness and occupant comfort while reducing energy use.

﻿**Commissioning Services**

Commissioning Services, part of Building Services, measures how building systems are functioning and identifies steps to optimize performance in existing structures, new construction and major renovation projects. The crew conducts a comprehensive engineering analysis of all building system operations. This process ensures building performance, reduces energy use, improves indoor air quality and meets occupant needs.

Using a team of team of skilled technicians, engineers and consultants, Commissioning Services:

* Ensures that new construction and major renovations are built to MSU’s requirements;
* Documents the condition of equipment and systems in existing buildings;
* Validates the benefits of new building technologies such as automated lighting controls;
* Solves chronic maintenance and performance issues.

﻿**Energy Systems Mechanical Alterations and Improvements** (ESMAI)

ESMAI, an in-house team of highly skilled technicians, implements the energy-saving measures recommended by Commissioning Services. These improvements range from simple, low-cost adjustments to major facility upgrades.

Drawing on years of institutional knowledge, ESMAI focuses on:

* Steam-trap testing – preventatively locates, catalogs and tests steam traps; repairs defective traps; performs annual testing
* Vibration analysis – locates, catalogs and measures vibration in motor-driven equipment detects equipment to prevent problems before they develop
* HVAC controls installation – installs or upgrades Building Management Systems in facilities to allow for remote, automated control of climate and ventilation systems
* HVAC improvements – diagnoses and repairs system components identified through commissioning efforts; installs new equipment

﻿**Power and Water**

The T.B. Simon Power Plant is a co-generation plant that burns traditional and new fuels to power campus. The power plant is capable of utilizing various fuels: biomass, natural gas and coal. Since the plant is co-generation, about 60 percent of the stored energy in fuel is converted to direct energy. For most conventional electric power plants, that number is only 35. Several measures are in place at the T.B. Simon Power Plant to reduce emissions in the atmosphere.

**Energy consumption**

MSU tracks energy consumption in individual buildings. The university is reducing its energy consumption as part of its commitment to the Better Buildings Challenge.

**Energy policy**

The heating, ventilation and cooling (HVAC) systems across campus are scheduled to run at specific times to attain occupant comfort while avoiding waste. Extended runtime can be requested for specific events and extended periods by submitting a service request. Billing will occur for incurred cost where appropriate. All schedule changes must adhere to the HVAC policy.

**Consumption monitoring**

Central Control is responsible for monitoring HVAC operation equipment in most buildings on campus using a Building Automation System (BAS). This system optimizes the start-up and performance of HVAC equipment and alarm systems. A BAS greatly increases the interaction between the mechanical subsystems of a building, improves occupant comfort, lowers energy use and allows off-site building control.

**Green cleaning**

The Custodial Services crew of IPF Building Services makes every effort to align with MSU’s “Be Spartan Green” environmental stewardship initiative by using cutting-edge techniques and technology to sanitize spaces while protecting the heath of building occupants and the environment.

Over the past few years, the office has:

* introduced a cutting-edge cleaning technique with a focus on occupant health,
* implemented use of a chemical-free floor cleaner,
* sealed floors to protect from stains and decrease the need for harsh stain-removers,
* made increased recycling a top priority,
* reduced the amount of chemicals washed down campus drains,
* and lowered water consumption and electricity usage.

**Landscaping**

Michigan State University is known for its beautiful campus. It is even one of the aspects touted on the president’s website. The Landscape Services department balances the university’s operational and aesthetic missions while using environmentally-friendly practices in grounds care and upkeep.

**Stormwater management**

Several landscaping solutions are used to manage stormwater runoff to naturally cleanse the water and to reduce the risk of flooding.

**Trees: a valuable asset**

Trees are one of the most valuable natural energy-savers on campus. Shading reduces cooling costs. They act as windbreaks, which reduces heating costs. Trees also reduce heat islands that occur over hard surfaces in urban environments.

Since trees are such a valuable resource, MSU takes special means to protect trees in construction areas and tailgate zones. In some instances, trees have been relocated to accommodate for a new building while preserving the tree. A technique called air spading allows the entire root system to be exposed without damage, the correct planting depth and root flare to be identified and the tree to continue to flourish after transplant.

**Lighting**

MSU has used a variety of lighting strategies to meet occupant needs while reducing energy consumption. Crews from Infrastructure Planning and Facilities have researched and tested many methods to see which will provide the best solutions. The following lighting strategies are in place at various locations on campus:

Fluorescent lighting used in place of incandescent,

* new lighting technologies such as LED (Light Emitting Diode) and induction lamps,
* bi-level lighting (either 50% or 100% power),
* motion/occupancy sensors,
* replacement of lamps and ballasts for lower wattage and/or more lumens,
* controls: time-of-day scheduling with timers or through the BAS (Building Automation System), and
* photocells that monitor the amount of natural light and adjust fixture output from zero to 100% according to brightness.

**Preventive maintenance**

Poorly running equipment not only wears out more quickly, but also wastes unnecessary energy. Building Performance Services, one of the teams within IPF Building Services, works to prevent both of these conditions through its preventive maintenance program. Preventive maintenance (PM) is the term used for routine recurring maintenance performed on equipment to keep it running smoothly and efficiently and to help extend its life.

**Snow removal**

Much snow means much snow removal, so it is essential to assess the impacts of all techniques used to keep campus roads clear. Fortunately, MSU’s methods are innovative and environmentally friendly.

IPF crews pre-treat campus roads and sidewalks with an organic-based liquid deicer. Mixed with salt brine, this deicer melts snow and ice at colder temperatures than salt brine alone, making roads and sidewalks safer. When applied prior to a snow or ice event (known as “anti-icing”), this product additionally prevents the precipitation from bonding with the pavement, making snow removal easier. The product is also sprayed on rock salt to reduce the amount of salt needed, fasten its effects and help it stay on the pavement.