



# MN Dept of Administration



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## Organization Background

The Minnesota Department of Administration Facilities Management Division maintains and operates 22 state-owned buildings, including the State Capitol, plus 32 parking facilities, 25 monuments, and associated grounds for a total of 4.4 million square feet. The division also coordinates events on the Capitol Complex and assisted in the restoration of the State Capitol and Governor’s Residence.



*“This summer might’ve been spent away from home but it didn’t feel that way. All of the MnTAP staff, especially my advisor, were there to support me in any way possible and I am extremely grateful to them. It has been an honor to work with the Department of Administration in finding ways to make the Capitol Complex more sustainable. The entire staff were open and very helpful in supporting new ideas and I’m incredibly thankful for all their help and support. I feel like I helped make a difference at the Capitol Complex and gained an out of classroom experience that you couldn’t find anywhere else.” ~ YK*

## Project Background

The focus of this project was to find ways to conserve energy and water. There were four main processes focused on in this project. Lighting retrofits, irrigation water optimization, bathroom flush valve retrofits, and air compressor savings opportunities were all analyzed as part of this project.

## Incentives To Change

The Department of Administration is committed to running the government buildings in the most sustainable ways possible. There is an Executive order issued by Governor Tim Walz; Executive Order 19-27, “Directing State Government to Conserve Energy and Water and Reduce Waste to Save Money,” which describes how the Department of Administration will work on making the government more sustainable. There are six sustainability goals the Minnesota State Government would like to reach with this Executive Order, and this project helps with two of those goals directly: to reduce energy consumption by 30% by 2027 and to reduce water consumption by 15% by 2025 relative to an adjusted 2017 baseline. Reductions in energy use will help with a third goal of reducing greenhouse gas emissions by 30% relative to a 2005 calculated baseline.

## SOLUTIONS

### Lighting Retrofits, Fluorescents to LEDs

LED lights use less energy and give off more light than older, fluorescent style lights. The LED lamps in this project draw anywhere between 7W and 16.5W, depending on the length of the lamp, while the fluorescent lamps draw 25W to 32W. Therefore, there are cost and energy conservation opportunities by replacing the fluorescent lamps with LEDs. With, rebates through Xcel Energy, resulting payback periods for lighting projects in the various buildings in this project range from 1-2 years, making these LED retrofits not only more efficient, but extremely cost effective.

### Irrigation Optimization, Reduce Water Use with Seasonal Adjust Dials

The Capitol Complex is a high profile area with many events and much foot traffic. Therefore, it is important to the teams maintaining the lawns that they are sufficiently watered to stay green and healthy.

In researching historical weather data near the Twin Cities Metro Area, the team found that average rainfall for the Capital Complex is 0.9” per week. General best practices

# Solutions

suggest that lawns require a total of 1" of water per week. Therefore, irrigation systems should provide 0.1" of water per week during the irrigation season.

Irrigation meter water bills were used to calculate the amount of irrigation water currently being used. This was then compared to the 0.1" per week that should be required on average over the summer. The calculations found that some zones were already receiving very close to the recommended 0.1" per week, while other zones had opportunity to turn back on irrigation water use. Seasonal adjust dials on irrigation systems allow irrigation managers to easily turn back zone irrigation times using just one percentage based dial. Calculations were completed for each zone to identify the ideal amount to turn back that dial for each zone to meet the average 0.1" per week lawn needs. The irrigation team is planning to start slowly turning back these dials to approach the theoretical water requirements while observing the impact of the changes on the lawns in order to optimize water use for Capital Complex irrigation.

## Retrofitting Bathroom Flush Valves

For tankless toilets, flush valves regulate how much water is dispensed every time the toilet is flushed, thereby controlling the water used per flush. Flush valves vary from allowing 1.28 gallons per flush (GPF) to 3.5 gallons per flush, depending on the type. The EPA recommends that commercial toilets have flush valves that at most use 1.6 GPF.

Current flush valves in the Capital Complex are estimated to be using roughly 2.5 gallons per flush. The Capitol Complex has thousands of workers and visitors that use their facilities every day, which means there are many

flushes per year. This project suggests retrofitting these to meet the EPA standard of 1.6 GPF, which throughout the 10 Capital Complex buildings assessed will save an estimated 2.88 million gallons of water annually.

## Replacing Current Air Compressor

In the Transportation Building, an air compressor is used for multiple different systems, including fire suppression and life support operations. Previously, compressed air was also used to pneumatically control variable air volume climate control systems. Then those systems were updated to electronically controlled systems, compressed air demand became smaller. The type of modulating load/unload air compressor studied in this project operates less efficiently at smaller loads, so this portion of the project served to find the savings potential associated with upgrading to a smaller air compressor that could handle this smaller load more efficiently.

Additionally, in order to keep water out of the air lines, there are three timed air drains throughout the piping which collect condensate water and at a set interval open to release the water from the system. When purging on a timer, the purge time does not exactly match the time needed to drain condensate. Usually, the purge time is longer, resulting in compressed air leaking through the purge opening. Because compressing air requires energy, purging air in this way is a source of energy loss in the system. An alternative to timed drains are no-loss drains, which use a float valve which opens and closes based on condensate levels instead of on a timer, saving energy by ensuring that air is not lost through the condensate purging process.

Recommendation	Annual Reduction	Annual Savings	Status
Retrofit fluorescent fixtures with LED lamps in six buildings	900,000 KWh	\$81,000	In Progress
Use seasonal adjust dials for irrigation water conservation	6,900,000 gallons	\$30,000	In Progress
Retrofit the toilet and urinal flush valves with new diaphragms	2,500,000 gallons	\$30,000	Recommended
Install start-stop air compressors and zero loss drains in one building	17,000 KWh	\$2,000	Recommended

MnTAP Advisor: Jon Vanyo, Engineer