

### University of Montana Western

#### Location

Dillon

#### Project Completion

Aug, 2023 (est.)

#### Project Budget

\$410,000

#### Project Budget

Utility: \$ 27,000 (est.)

SBCEP: \$ 362,000 (est.)

#### Annual Estimated Savings

\$ 52,000

#### Project Summary

The project will upgrade lighting throughout the entire campus. LED lamps and fixtures will be installed both inside and outside the campus buildings along with controls for brightness to provide a comfortable and customizable learning environment for students and faculty. Vacancy sensing and trim level controls will also provide additional savings on energy and electricity cost.

#### Background

The University of Montana Western campus is a State-owned facility under the direction of the Montana University Systems and operated by the UMW facilities staff. The university's total fall semester enrollment is 1,347 students. The project will permanently remove over 2,000 florescent fixtures, a source of ongoing maintenance and energy cost incurred by UMW. This will allow UMW to capitalize not only on energy savings but also on reduced maintenance for tube and ballast replacement. The State

Buildings Energy Conservation Program financing package has a projected 10-year payback. However, savings will continue throughout the expected equipment lifespan of 30 years.

#### A State-of-the-Art Learning Environment

The lighting on the UMW campus is outdated and provides inadequate illumination for a significant number of interior and exterior spaces. New LED fixtures will simultaneously improve the lighting environment across campus and reduce the energy usage and cost substantially. The new LED luminaires will include integrated occupancy sensors and daylight harvesting connected to a wireless area controller. A campus wide lighting design standard will insure that all lighting fixtures and environments will be consistent across buildings and connected to wireless controls and the campus local area network. The network of connected luminaires throughout campus will allow facilities to monitor, control and gather information and data from potentially over a thousand sources.

In this project, all florescent and sodium vapor lamps and corresponding ballasts will be replaced with LED lamps and fixtures. Dimming lights provides energy savings with uniform illumination and lamps with the highest possible color rendering index were used. Consistent color temperatures, low contrast, and dimming capability will improve the overall facility. LED lights in the parking lot and along egress sidewalks will result in improved safety. The LED lights are expected to reduce the baseline electrical load by ~40% and have 2-5 times the operating life of the existing bulbs. Adding advanced controls further reduces the overall energy use, resulting in additional energy and cost savings and prolonged life of the equipment.





### Montana School for the Deaf & the Blind

#### Location

Great Falls

#### Project Commissioned

Jan 16, 2023

#### Project Budget

\$850,000

#### Funding Sources

Utility: \$27,400

DEQ: \$80,000

DOA: \$70,000

MSDB: \$99,000

A&E: \$256,000 (abatement)

SBECP: \$318,000

#### Annual Estimated Savings

\$27,100

#### Project Summary

The project upgraded lighting throughout the entire campus. LED lamps and fixtures were installed, along with controls for color temperature and brightness to provide a comfortable and customizable learning environment for students with sensitivities to light. Vacancy sensing and trim level controls also provide additional savings on energy and electricity cost.

#### Background

The Montana School for the Deaf and the Blind (MSDB) is a State-owned facility under the direction of the State Board of Education. MSDB provides public education to students 18-months through age 21 who are deaf, hard of hearing, blind, visually impaired, or deafblind. This includes part- and full-time students, so the campus has residential facilities for students residing outside of the Great Falls area. MSDB's belief is that all children are capable and confident, and will receive an education through the whole-child educational philosophy, which includes sensory specific access to communication and curriculum in safe learning & living environments. This project aligned with MSDB's mission by creating safer learning and living environments, along with providing ongoing cost and energy savings. The project upgraded roughly 1700 fixtures and 1200 fluorescent ballasts; a source of ongoing maintenance

cost incurred by MSDB. This allows MSDB to capitalize on energy savings and reduced maintenance for lamp and ballast replacement. The project is expected to pay for itself, through utility savings, in 12 years. Savings will then continue through the expected 30 year lifespan of the installed equipment. Early data logging suggests the project will realize more energy savings and a shorter payback period than estimated.

#### A SAFE ENVIRONMENT FOR TEACHING AND LEARNING

Lighting at MSDB was outdated and in poor condition with several florescent lamp ballasts failing and requiring replacement. A mixture of lamp color temperatures and deteriorated lenses and fixtures also created variable color illumination in spaces resulting in poor visual contrast and less than ideal learning environments. Material sampling also unveiled asbestos in the acoustic ceiling tiles which adjusted the project scope and required abatement before continuing with the lighting project. Project costs exemplified strong cross agency partnership and commitment to MSDB with funding sourced through DEQ, MSDB, DOA, and A&E. All lamps, along with corresponding ballasts, were replaced with best-in-class LED lamps and fixtures. Classrooms received tunable white lights that provide a color spectrum from 3000K to 5000K (warm yellow to cold

blue color range). Classroom controls include dimming, front-and-back room zones, and vacancy sensing. Four settings are programmed in classrooms to provide lighting scenes for general use, reading, testing, or energy scenarios. Hallways and general use areas in the main school building are unoccupied while students are in classrooms, so controls were installed to detect occupancy and automatically "trim" to lower lighting settings when these areas are vacant after a preset time. Wireless controls are generally used in these projects, however hard-wired controls

were necessary since wireless control signals could interfere with hearing devices used by students and staff. Recent research proves a multitude of benefits provided by dimming and color tuning controls in classrooms, including improvement to circadian rhythms of occupants. Upgrading to LED lights reduced the baseline electrical load by 40% and have 2-5x the operating life than the original fixtures. Adding advanced controls further reduces the overall energy use, resulting in more energy and cost savings and prolonged life of the equipment. Preliminary data-logging has indicated that areas using trim level controls reduced electrical use 85% from baseline and will likely extend the life of the equipment by another 2x, effectively eliminating maintenance costs. MSDB staff reported positive behavioral change in the students almost immediately. Students set the lighting to their preferred scene upon arrival to class, and certain students no longer cover their heads in the school thanks to the reduced lighting intensity. The project provides uniform illumination, consistent color temperatures, low contrast, and dimming capability to improve the overall campus.

