

ATTACHMENT #1 - Item 156-1001-R0912

**The University of Montana - Missoula
UNIVERSITY CENTER ENERGY PROJECTS**

Facility Improvement Measure Summary

Facility Improvement Measures	FIM Description	Building	Budget *	Annual Utility Savings	Annual Operational Savings **	Simple Payback (SPB)	Potential Incentives ***	Non-Guaranteed Net Customer Cost (with Incentives)	Non-Guaranteed Simple Payback (SPB) (with Incentives)
MAUs Upgrade	Replace existing MAUs with new variable flow MAUs to allow makeup air units to modulate and match exhaust flow. Add VFDs to two large exhaust fans (EF-1 & EF-3) and to two medium exhaust fans (EF-5 & EF-7) to further modulate air flow and increase energy efficiency. Modify control sequences to allow for variable flow.	University Center	\$304,746	\$21,923	\$0	13.9	\$7,700	\$297,046	13.5
Lighting Upgrade	Replace existing energy inefficient lighting with T-8 lamps and electronic ballasts, screw-in compact fluorescents, and LED exit signs. New fixtures will be installed as deemed appropriate.	University Center	\$49,835	\$3,049	\$179	15.4	\$3,448	\$46,387	14.4
Water Fixture Upgrade	Remove high flow older plumbing fixtures (faucets, toilets and urinals) and replace with new modern low-flow fixtures. Verify that existing plumbing infrastructure is capable of handling lower water flows.	University Center	\$46,205	\$4,156	\$0	11.1	\$0	\$46,205	11.1
Building Controls Upgrades and Retro Commissioning	Remove existing pneumatic control components and replace with direct digital controls (DDC), and retrocommission existing DDC. Add demand controlled ventilation capabilities to spaces with variable occupancy such as the Commons, ballrooms, theater, and meeting rooms. Modify all MZU dampers and control sequences to minimize simultaneous heating and cooling and to allow for better variable flow to more adequately match the demands of the space. A comprehensive retro-commissioning and balancing effort will be completed in order to ensure optimum equipment performance.	University Center	\$418,357	\$33,870	\$0	12.4	\$0	\$418,357	12.4
Chilled Water System Upgrade	Isolate building chilled water loop from ground water with heat exchanger. Install heat exchanger, sand separator and associated pumps, piping, and controls. Add VFDs to pumps on building chilled water loop and well pumps. Reconnect Quick copy cooling unit to building chilled water loop. Provide additional heat exchanger from building heat pump loop to building chilled water loop to allow heat pumps to reject heat to the ground without use of the chiller. Add OA preheat coil to AHU-1 to allow heat rejection to preheat incoming ventilation air before rejecting heat to ground.	University Center	\$773,237	\$13,788	\$3,100	45.8	\$22,000	\$751,237	44.5
Building Envelope	Provide new weathstripping on doors (60 total), seal the roof/wall joint with 2 part foam.	University Center	\$21,583	\$1,229	\$0	17.6	\$0	\$21,583	17.6
Mechanical Insulation	Much of the steam and condensate piping, including valves and fittings remains uninsulated. Add insulation to all exposed pipe.	University Center	\$35,166	\$4,027	\$0	8.7	\$0	\$35,166	8.7
Totals			\$1,649,130	\$82,042	\$3,279	19.3	\$33,148	\$1,615,982	18.9