

# WOODWARD RESOURCE CENTER

WOODWARD



**ETHAN MORAN**  
MECHANICAL ENGINEERING  
IOWA STATE UNIVERSITY

**COMPANY PROFILE**

The Woodward Resource Center was established in 1917 and is operated by the Iowa Department of Human Services. The main purpose of the facility is to provide services as a licensed Intermediate Care Facility for the Intellectually Disabled. The mission is to prepare and support individuals to live in a community of their choice. There are currently 132 individuals living on campus being supported by more than 500 employees.

The Woodward Academy, a juvenile treatment facility, leases building space located in the middle of campus. It employs 235 staff to provide clinical services in addition to an education for more than 265 students. Woodward Academy is operated 24 hours per day, 365 days per year.

The Woodward-Granger Community School District also leases building space utilized as a stand-alone special needs public day school based on a state defined consortia model.

**PROJECT BACKGROUND**

The facility uses a steam heating system for 19 buildings on campus, which includes the Woodward Academy. Two 50-year-old water tube boilers burn natural gas to produce the steam. It is delivered to more than 475,000 square feet of building space through a utility tunnel system that is 8,000 feet long. The steam is used for clothes dryers, kitchen appliances, chillers, and room heating. Woodward Resource Center requested a 24-week intern project through the Iowa Pollution Prevention Intern Program to research opportunities and make recommendations to improve the efficiency of the steam system and reduce energy usage and associated costs.

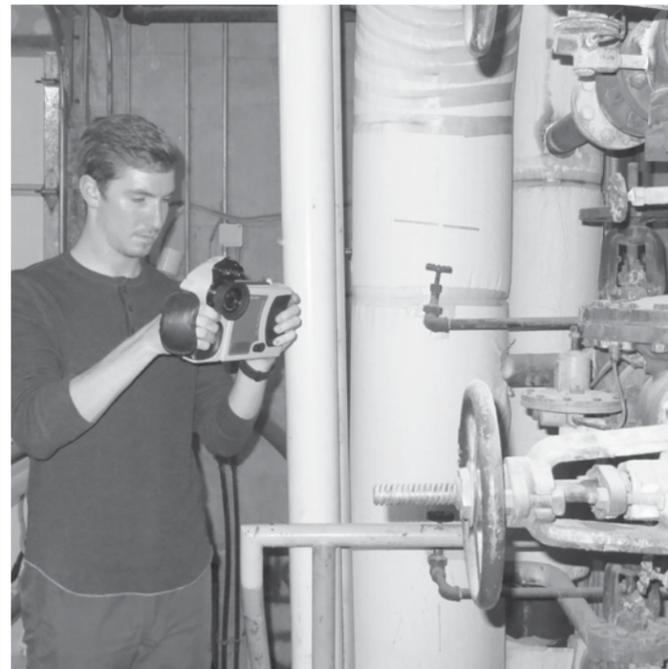
**INCENTIVES TO CHANGE**

Since installation, less than 50 percent of the steam infrastructure has been replaced. Over the years, the condition of much of the piping, insulation, and steam traps has deteriorated. This has led to inconsistent heating in employee work spaces. Leaking condensate has also been a concern in the basements of buildings and the utility tunnels. Improving the steam system infrastructure and reducing the amount of heat loss would increase the efficiency of the system, decrease emissions, and result in significant cost savings.

**RESULTS**

The intern concluded from initial observations that trap and insulation repairs would yield the highest energy-savings opportunities. The intern conducted campus-wide surveys and utilized visual, temperature, and ultrasonic testing to determine the total extent of heat energy being wasted. Data

collected during the surveys was compiled into an organized database and included comprehensive information about the locations of traps, trap specifications, and current trap status. Piping insulation status was also documented. It was found that the Resource Center is currently wasting more than 75 percent of the steam they produce due to failed steam traps and poor insulation.



**Trap Repair & Replacement:** During the audit there were several steam traps identified that had failed and should be replaced to reduce steam loss. This would significantly reduce the amount of steam produced because the steam would be used more effectively instead of being wasted. With less steam generated, the total amount of emissions produced from the boilers would decrease as well.

**Insulation Replacement & Installation:** Several sections of steam and condensate piping are exposed without insulation or have damaged insulation. Installing new insulation in these areas would reduce heat loss, which allows for the steam heating in buildings to be more effectively utilized. Another benefit is a reduction in steam produced by the boiler. Both the trap and insulation replacement recommendations have similar effects by increasing the efficiency of steam usage, which leads to less fuel and water used.



**Trap Maintenance Program:** After the initial failed traps are replaced, the facility will need a program to maintain the traps so the failure rate stays relatively low compared to the current failure rate. This will keep the costs and steam loss low for the future. It will also allow the facility to track historical records of trap replacements to identify trends in failures, which will further improve the program. This recommendation is a long term solution compared to the first recommendation.

**Insulation Maintenance Program:** Similar to the trap program, the facility will need a program to maintain insulation repairs and identify trends for the future as well. This program can be considered the long term solution compared to the second recommendation. The two recommended maintenance programs provide the framework from which Woodward can manage resources to conduct regular audits of the steam system and complete the necessary repairs in a timely manner and on a sustainable schedule.



PROJECT	ANNUAL COST SAVINGS	ENVIRONMENTAL RESULTS	STATUS
TRAP REPAIR & REPLACEMENT	\$974,288	653,053 therms 9,553,978 gal	IN PROGRESS
INSULATION REPLACEMENT & INSTALLATION	\$38,781	82,191 therms	IN PROGRESS
TRAP MAINTENANCE PROGRAM	\$493,935	353,472 therms 5,156,570 gallons	RECOMMENDED
INSULATION MAINTENANCE PROGRAM	\$8,623	18,920 therms	RECOMMENDED

