

Montoya Campus Restroom Renewal Recommendation Report

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Abstract

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The purpose of our recommendation report will aspire a course of action to reduce the amount of water and paper waste from the CNM Montoya Campus restrooms. We gathered data by measuring water flow and observed students to calculate the amount of water waste per hour. The results were calculated with the gathered data and presented as a recommendation report. This report explains the conclusions to support our recommendation for installation of automated faucets and automated hand dryers.

Introduction

The overall scope of a sustainability project based on the water consumption of only two buildings on the Montoya Campus could be immense. However, for the purpose of our technical writing class, we will limit the scope to handwashing water waste and paper towel waste. On a larger scale evaluation, considerations involving landscaping and waste water management could potentially impact sustainability efforts.

The average annual usage of water in both the I and J buildings is 113,152 gallons. Automatic sensor faucets will save more than 9.4% of water usage annually and will potentially lead to other conservation efforts in the future.

Research Methods

We began our research by planning our analysis of the Montoya Campus restrooms. We needed to know the rate of dispensed water and the usage of water by secretly observing students. With this research data, we calculated and compared results. Matthew sent an interview email to Molly Blumhoeffler for further research. Her response instructed us to focus on the I and J buildings considering they had a connected water meter. Molly also provided us with annual water and paper towel usage.

Following Molly's suggestions, we focused on the I and J buildings. The tasks were divided into four sections:

1. Campus Analysis of faucet water flow rate.
2. Secretly observe students washing their hands and time them; then, observe the rate of traffic for one hour for a set of restrooms.
3. Interview Facilities Manager and Molly Blumhoeffler.
4. Calculate, Compile and Compare data to support our recommendation.

Task 1: Montoya Campus Analysis

Colleen and Marshall visited each building on the Montoya Campus to gather data on the number of sinks and hand dryers. Using this data, we calculate the cost for upgrading the faucets and dryers.

Marshall gathered data on how much water is dispensed per second from the faucets. He used a timer and a measuring cup. He turned the faucet on for ten seconds and then turned it off. The volume of water in the cup was used to calculate how much water was dispensed per second by using total ounces divided by ten.

The final piece of data needed is the hourly rate of restroom traffic. Marshall tallied the number of students, both male and female, entering and exiting the restroom facility. This data allowed us to calculate the water waste at an hourly rate.

Task 2: Random Field Test with Student Observation measurements

Colleen and Marshall randomly entered bathrooms with students using the sinks to secretly time them. We observed twenty male and twenty female students. We realized that secretly observing people wash their hands would avoid skewed data. Asking a student for permission to observe them while they washed their hands, they may become conscientious towards water usage and waste. Students may use more water if they believe we are observing them for correct handwashing. Students may use less water if we announce the observations are for water conservation. Therefore, the best method we chose is random, anonymous, secret observation. Colleen and Marshall initiated their observations once students turned on the water. Then we noted the number of seconds their hands were not touching the water for the duration of sink usage. The most important part of this observation is the number of seconds their hands do not touch the water. This key data is the water waste duration since automated faucets eliminate this aspect.

Task 3: Interviews

Matthew emailed Andrew Litts, the Maintenance and Operations Supervisor at the Montoya Campus, and Molly Blumhoeffer, the Campus as a Living Lab and Sustainability Project Manager. The Email interview consisted of the following questions:

- How much water is used monthly in the restrooms?
- How much paper towel is used monthly?
- When does daily maintenance occur in the restrooms?
- What measures have been taken to reduce the amount of potable water waste?

The answers to these questions gave us the information needed to compare with Colleen and Marshall's field research.

Task 4: Calculate, Compile and Compare Data

The data collected from these tasks were calculated, compiled and compared. From a total of forty students, we multiplied the water per second with the number of seconds their hands did not touch the water, and then we multiplied that number by the appropriate ratio of hourly students using the facilities. The result gave us the amount of water waste one restroom facility experienced in one hour.

Results

In this section, we present the results of our research. For each of the tasks we performed, we present the most important data acquired.

Task 1: Montoya Campus Analysis

Colleen and Marshall visited all public restrooms on Montoya Campus and tallied up the number of sinks and paper towel dispensers. The results conclude 94 sinks and 40 paper towel dispensers.

Marshall performed a controlled water test with the faucets from the sinks. Every sink at the Montoya Campus are using the same faucets, making it necessary to perform the test in one restroom on three faucets. Marshall tested the faucets in a lower restroom facility in I building. The faucet was turned on for the duration of ten seconds while water filled the measuring cup. The result measured ten ounces per second, simplifying our calculations.

Task 2: Random Field Test with Volunteer Student/Staff Observation measurements

Forty female and male students were secretly observed. Female students had 350 seconds of water usage with approximately 180 seconds of their hands not touching the water. Male students had 485 seconds of water usage with approximately 162 seconds of their hands not touching the water. From our observations, we noticed students would use water to wet their hands and wash off soap. At other times, the water was unused, resulting in waste water.

Task 3: Calculate, Compile and Compare Data

To calculate the amount of water waste per hour, we used the formula discussed earlier in this report. A visual of water waste calculations in the following table:

Category	Ounces of Water Waste using formula
20 Females	180 ounces
20 Males	162 ounces
Total:	342 ounces

This table concludes that automated faucets will save 342 ounces because it was calculated as their hands were not using the water.

We also calculated daily, weekly, monthly, and yearly water waste in the I building for one set of bathrooms. Before showing these results, we provided the formulas used to calculate. The table will display the amount of water waste and conversion to gallons. Below will describe what we classify as a day, week, month and year.

- **Daily Water Waste** equals hourly waste multiplied by 6 hours (9am – 3pm primetime class hours).
- **Weekly Water Waste** equals daily water waste multiplied by 4 (Monday – Thursday).
- **Monthly Water Waste** equals weekly water waste multiplied by 4 weeks.
- **Annual Water Waste** equals daily water waste multiplied by 166 (365 days) - (Non-Instructional days + Friday thru Sunday + Campus Closures).

Periodicity	Factors					Water Waste	Conversion to Gallons
Daily	342	*	6			= 2,052 ounces	16
Weekly	342	*	6	*	4	= 8,208 ounces	64
Monthly	342	*	6	*	4*4	= 32,832 ounces	256.5
Annually	342	*	6	*	166	= 340,632 ounces	2,662

Task 4: Interview with Facilities Manager

We received a response to our questions via email from Molly Blumhoeffer. The I building and the J building share a water meter. The annual water usage from both buildings average 113,152 gallons. This figure includes all water use for the buildings not limited to the restrooms, landscaping, and laboratories, and may vary for different parts of the year.

We were also able to obtain the amount of paper towels used at all CNM Campuses. All campuses combined use 948 rolls every month. This figure also contains the paper towels used in the laboratories as well. CNM has about thirty buildings on all campuses. This could average to eight rolls per restroom per month. That would be 768 rolls of paper towels annually for the I and J buildings alone.

Molly pointed out that daily maintenance occurs intermittently throughout the day and cleaning occurs at night when the buildings are vacant.

Flushometers have been installed in some buildings. Flushometers vary the amount of water used to flush the toilets based on whether solid or liquid waste needs to be flushed. The liquid waste setting uses 1.3 gallons per flush and the solid waste setting uses 1.6 gallons per flush. An average toilet uses 3.2 gallons per flush. The Flushometer can save a fair amount of water.

Conclusion

In this section, we present our conclusions based on the research and observations based on the four tasks we performed.

Field Test Observation with Measurements

While we want to believe students to be conscientious about water usage, the short study shows that we cannot trust them. It appears that students do not think about water usage when they do not pay for it directly. Automated Faucets will prevent water waste without having to trust students with improper usage.

Calculations of Data

Forty students had a total of 835 seconds of hand washing during our observation. Students did not use the water at an estimate of 342 of those seconds. Automated faucets will reduce water waste by 41%.

Calculations show that over the course of a year of school operation, automated faucets will save around 2,662 gallons in one restroom facility in the I building. The I building has two public restrooms, which saves around 5,324 gallons a year for one building. To get more accurate numbers, at least one to three months of data collection would be necessary.

The calculation for paper waste is not necessary since we do not have a specific number of cases used for our campus; installing automatic hand dryers will eliminate 100% paper towel waste from the restrooms.

Facilities Manager Interview

CNM has taken action in conservation. The L building at main campus is a great example. However, there could be more done to increase sustainability, especially at the Montoya Campus. We hope to suggest some viable opportunities to save more water at all the campuses.

Recommendation

We recommend that the CNM Administration pursue the following option:

Installation of Automated Faucets and Automated Hand Dryers

Automated faucets reduce 41% of the water used to wash hands in a single session. Per year, it will save over 10% water usage for two buildings. The price for automated sensor faucets range from \$58 to \$275. The installation can be done by CNM maintenance personnel. There are multiple companies that could quote the installation process.

Paper towel usage will be eliminated from restrooms with the installation of automated hand dryers. The prices range from \$150 to \$1,040. Automated hand dryers will be taken to a greater extent to install. CNM Montoya public restrooms have a total of forty paper towel dispensers. It will be cost effective and safer to have a company install these.