

# Replacing existing low-efficiency toilets with high-efficiency units

## Purpose

- This simple idea is practical and extremely beneficial: patrons (students) continue to use restrooms as they normally have, but potentially can make an immense difference in the reduction of greenhouse gases, utility costs, and water treatment
- This project is timely, as a majority of campus facilities are potential candidates due to <5 years of estimated remaining life of existing systems (UGL included)
- To provide a sizeable economic savings for utilized buildings to put back into their development goals - mitigating their total economic burden towards scheduled building improvements

## Objectives

- Designed as a smaller prospective study in anticipation for a much larger implementation (pending success and savings), I aim to target one heavily-used undergraduate building on campus. The undergraduate library (UGL) is an ideal location - frequent visitors throughout the academic calendar and a manageable amount of toilets to accurately monitor usage
- To provide a hygienic and practical solution to improve everyday functions. This will simultaneously improve building maintenance and development goals and potentially open opportunities for the rest of campus to follow.

# Replacing existing low-efficiency toilets with high-efficiency units

## Current UGL Plumbing Specifications

### P L U M B I N G F I X T U R E S A S S E S S M E N T D A T A

Item ID 299852

Description Water closets, bathroom sinks, janitor sinks, and urinals throughout building. Approx. 64 fixtures.

Overall Condition Fair

Date Installed 1/1/1969

Remaining Useful Life 5 Years      Nominal Useful Life: 50 Years

Equipment Tag -

Manufacturer -

Model Number -

Serial Number -

Size/Capacity -

HP/kW -

Voltage -

Material -

Recommendation -

Replacement Cost \$177,400

**0099**

#### UNDERGRADUATE LIBRARY

1402 WEST GREGORY DRIVE  
URBANA, ILLINOIS 61801

SYSTEM CONDITION INDEX	BUILDING SYSTEM REPLACEMENT COST	BUILDING GROSS SQUARE FEET	NUMBER OF BUILDING STORIES	ORIGINAL YEAR OF CONSTRUCTION
.539	\$ 7,242,900	95,906	2	1969
PRIMARY BUILDING USE	CLASSROOMS / LIBRARY	BUILDING SURVEY DATE	2/7/2013	
BUILDING SURVEY TEAM	CCJM: Josh Polasky (M), Stanley Panek (E)			



# Replacing existing low-efficiency toilets with high-efficiency units

## Limitations/Questions moving forward

- Students may be confused with the dual-flush functions (is up reduced flush or full flush?) resulting in extra flushes than the intended use.
- Replacing valve stems may be difficult (not really, but it incurs additional costs beyond using an existing valve system)
- How much can dual-flush systems save (compared to existing units)?
- What if we just use a simple low-flow flush option? How does that compare in savings to our existing units?
- Will this system be durable and expected to last without unnecessary maintenance?
- How will students perceive the proposed changes? Will there be an educational component for prolonged sustainability practices on and off campus?

# Replacing existing low-efficiency toilets with high-efficiency units

## Potential Impacts\*

3.2/2.5 gpf dual-flush\*\*

1.6 gpf only

Comparison of Annual Water Consumption		
	Toilets in Tripp & Adams	
	Existing Units (4.5 gpf) <i>(control units in Adams)</i>	New Units (3.5/2.5 gpf) <i>(for replacement in Tripp)</i>
Water Consumption	23,350,454.415 gallons	14,840,511.0282 gallons
	reduce consumption by 8,509,943.387 gals or 63.6%	
Water Utility Costs	\$139,656.73	\$88,759.61
	save \$50,897.12 in utility costs	
CO <sub>2</sub> -equivalent Greenhouse Gas Emissions	141,270.25 CO <sub>2</sub> -equivalent greenhouse gases	89785.09 CO <sub>2</sub> -equivalent greenhouse gases
	reduce greenhouse gas emissions by 51,485 pounds	
Buyback Period	N/A	0.30 years

Comparison of Annual Water Consumption		
	Toilets in Tripp & Adams	
	Existing Units (4.5 gpf) <i>(control units in Adams)</i>	New Units (1.6 gpf) <i>(for replacement in Tripp)</i>
Water Consumption	23,350,454.415 gallons	5,204,479.392 gallons
	reduce consumption by 18,145,975.02 gals or 77.7%	
Water Utility Costs	\$139,656.73	\$31,127.47
	save \$108,529.26 in utility costs	
CO <sub>2</sub> -equivalent Greenhouse Gas Emissions	141,270.25 CO <sub>2</sub> -equivalent greenhouse gases	39,397.91 CO <sub>2</sub> -equivalent greenhouse gases
	reduce greenhouse gas emissions by 101,872.34 pound	
Buyback Period	N/A	0.29 years

\*Based on similar study recently funded by UW-Madison's Green Fund (comparison of two nearly identical dormitories - control dorm vs. intervention dorm (n = 42 replacement toilet units).

\*\*Used as proxy for even more efficient 1.6/1.1 gpf dual-flush units