



National Perspective on the U.S. Rainwater Harvesting Industry

David Crawford, President



- Large-scale case studies
- Issues and obstacles in the industry
- Successful collaborations
- Moving forward



Manassas Park Elementary School

- 1 COUGAR LOWER ELEMENTARY SCHOOL
- 2 MANASSAS PARK ELEMENTARY SCHOOL
- 3 MANASSAS PARK PRE-KINDERGARTEN
- 4 PRIVATE FOREST
- 5 CAMP CARONDELET
- 6 GORHAM COMMUNITY CENTER
- 7 R...

61,500 sf of additional roof area (12,000 pre-k; 49,500 upper elementary)
Estimated project budget \$33 million



Illustration courtesy of VMDO Architects

Manassas Park Elementary School- Education component

RAINWATER

WHEN IT RAINS, WHERE DOES THE WATER GO?

Much of it is absorbed into the ground. The remaining water drains from the land around the school and is directed to stormwater retention ponds. These ponds help prevent floods by collecting water from heavy rains and then slowly releasing that water downstream.

After water leaves the retention pond, it flows through a series of streams until it reaches Bull Run Creek.

Water from the rooftops is piped to a large storage tank called a cistern. You're standing on top of a right now!

HARVESTING

Water travels 110 miles from Manassas Park until it reaches the Chesapeake Bay.

YOU ARE HERE

SYSTEM

CHESAPEAKE BAY

The Chesapeake Bay is an estuary, rich in ecological diversity. Salt water from the Atlantic Ocean meets with fresh water from rivers like the Potomac to create brackish water. Over 150 rivers and streams drain into the Bay.

HOW DOES RAINWATER GET TO THE CISTERN?

- Water is collected from the roof surfaces of two buildings - Manassas Park Elementary and the Cougar Pre-K/Kindergarten. The water flows through underground pipes to this cistern, which can hold about 79,000 gallons!
- The cistern's water is piped back to each building - where it is used to flush the toilets. Water is also used to irrigate all the plants around the campus. This saves an estimated 1.3 million gallons of water every year.
- If the cistern receives more water than it can hold, the excess water overflows out of the pipes in the back and makes its way downhill to the retention pond.

YOU ARE HERE

WATER IS PUMPED BACK TO TOILETS
OVERFLOW WATER
WATER IS PUMPED TO SPRINKLERS

- The rainwater gauge shows how much water is in the cistern right now. The water level is also monitored by an electronic sensor inside the cistern.
- Pumps draw the water through floating filters and send it out of the cistern. One pump sends water to the irrigation sprinklers, the other sends water to the Controls House.
- An underground water well provides extra water for the cistern during periods of low rainfall.
- An electronic control panel tells all the pumps when to start and stop. An expansion tank helps keep the water at an even pressure. This equipment can be seen in the window above.

HOW DOES RAINWATER GET FROM THE CISTERN TO TOILETS?

- The ozone generator kills bacteria in the water with ozone molecules. Ozone is also naturally found in the upper atmosphere, where it filters most of the Sun's harmful ultraviolet light rays.
- The storage tank holds water to make sure that there is plenty of clean water ready to be used anytime. Only water would slip up the plumbing and small ball.
- The distribution pump pressurizes the water and sends it back to both buildings - where it is used to flush all of the toilets.
- After you flush the toilet, the water goes to the city sewer to be treated before re-entering the hydrologic cycle. By using wastewater from the north, the school needs far less potable water to operate.

CITY SEWER





Home Depot



James Madison University






Gifford
Hall

Mammoth Cave



National Park Service
U.S. Department of the Interior

Mammoth Cave
National Park
Visitor Center





Charlottesville Area Transit



POTABLE WATER

NON-POTABLE WATER

NON-POTABLE WATER

NON-POTABLE WATER

NON-POTABLE WATER

NON-POTABLE WATER



Burton School



09.18.2008 17:31



TD Ameritrade





Federal Way Public School



ART WASH



Virginia Capital Project





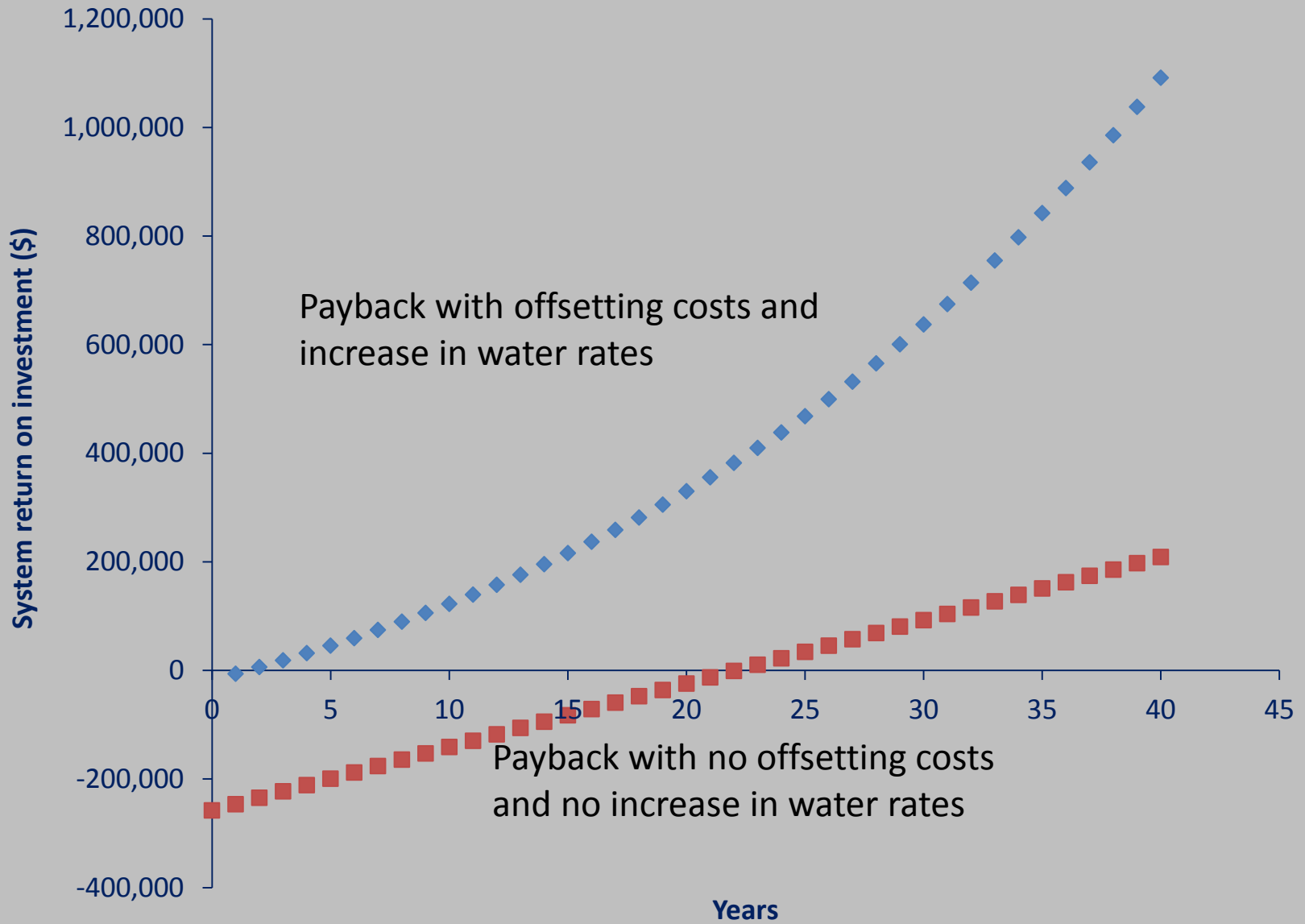
Western Virginia Regional Jail



Payback analysis

- Total system cost = \$258,000
- 3.9 million gallons of water saved
- Current water rate \$3 per 1,000 gallons
- Annual savings from water = \$11,675
- Total payback time = 22 years

But does that really include everything?



Oscar Smith Middle School

OSCAR F. SMITH MIDDLE SCHOOL

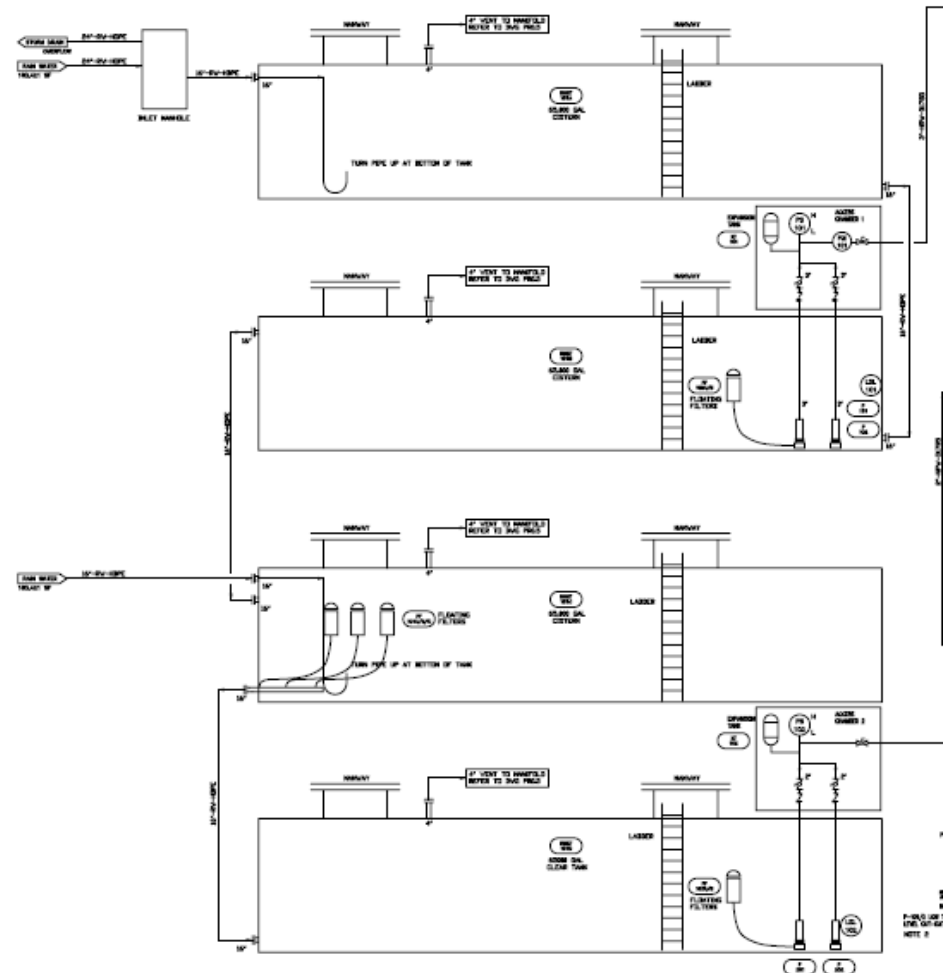


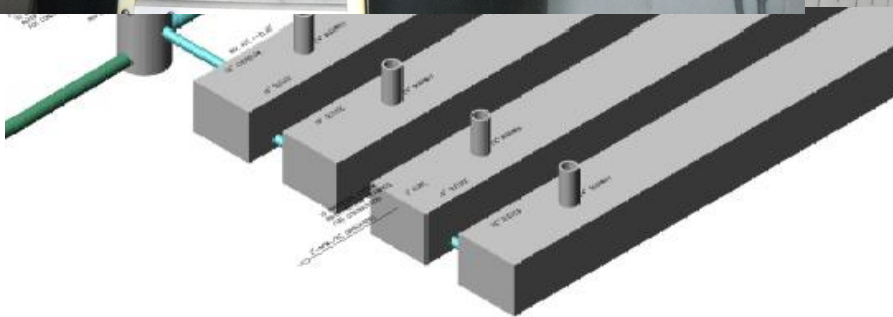
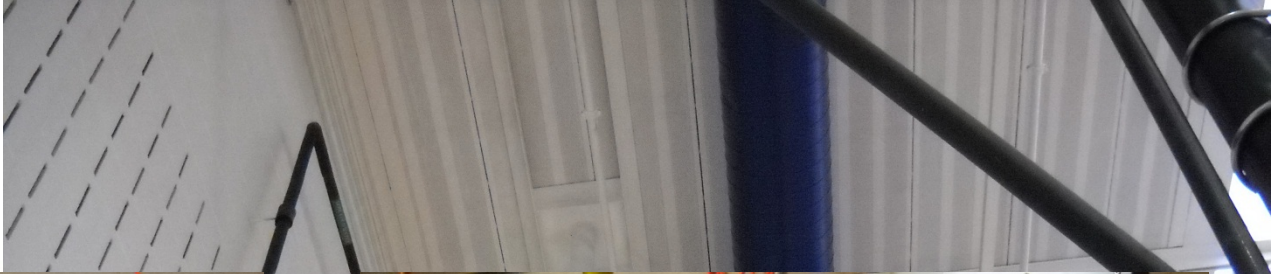
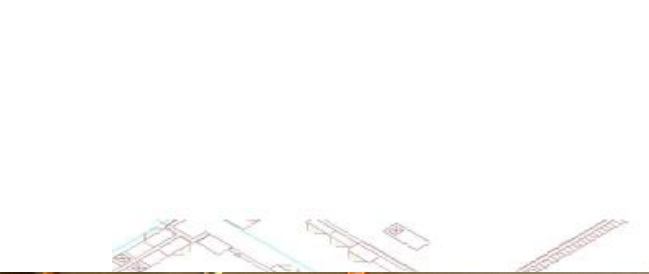
RESERVED



A two-tiered approach

- Two “clean” tanks are used for indoor use – toilets and urinals
- The other two tanks are used for irrigation





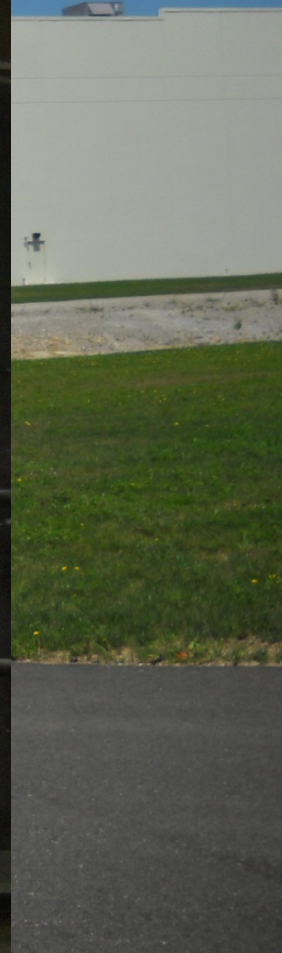


St. Francis Hospital





Avon Facility



Overcoming Obstacles

- Communication
- Work phasing
- Consistent, scalable design
- Design based on potential supply and possible demand
- Cross connections





Questions?

The American Rainwater Catchment Systems Association currently is leading the way in field training for residential systems. ARCOSA currently is revamping its training to include commercial systems and offering this to the public with our MOU and current relationship with ASPE. ARCOSA needs your help in funding and continued support to bring Rainwater Harvesting to the public.

