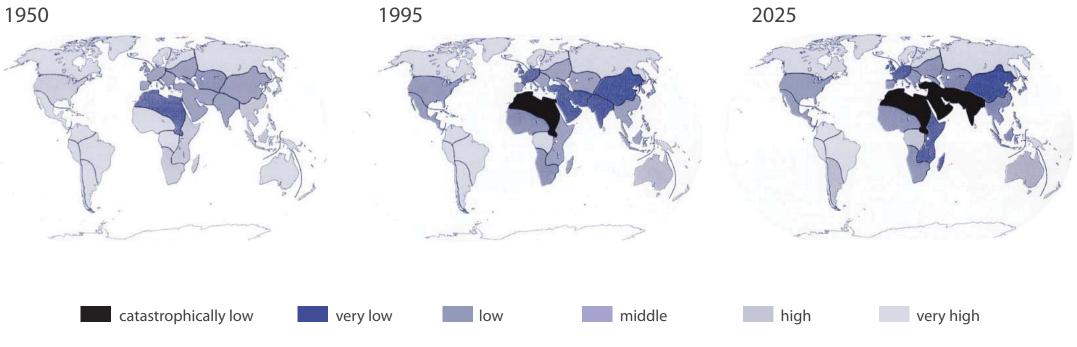
IPRO 344 - Residential Rainwater Harvesting

Background:

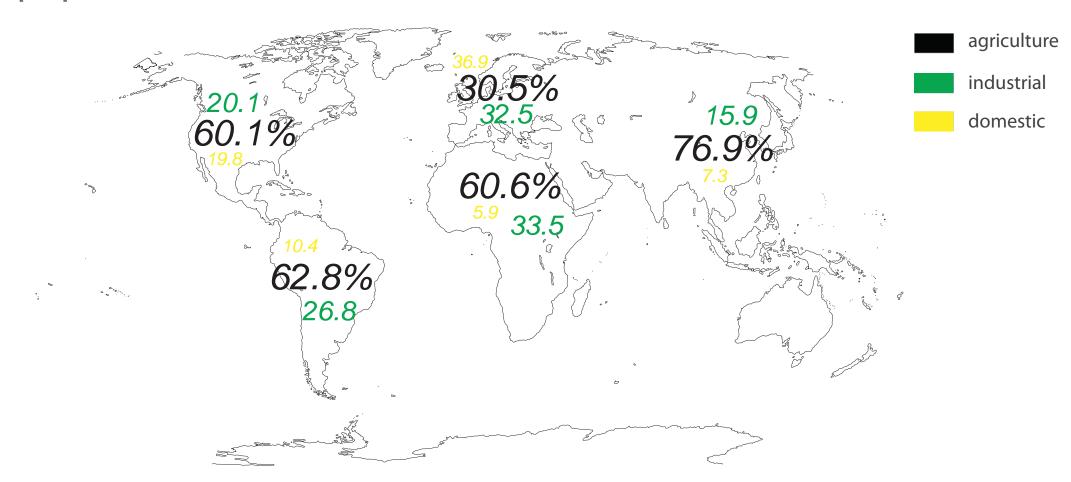
The global water availability is on the rise. Over 20% of the worlds population does not have access to safe drinking

More than 2.2 million people die each year from diseases Related to contaminated drinking water.



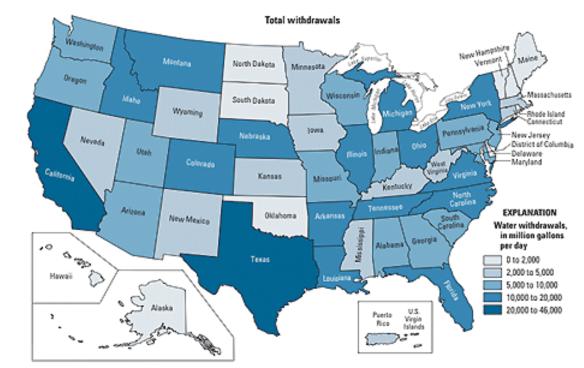
Global Water Availability

Over 450 million people today in 29 countries (mostly in Africa and the Middle East) are suffering from chronic water shortages. Which translates to roughly 1/5th of the world's population.



Illinois has one of the highest water withdrawal amounts in the country (9,000-13,500 million gallons of water per day).

1,000,000,000 gallons of Lake Michigan are consumed in Chicago everyday



United States Water Consumption

Problem:

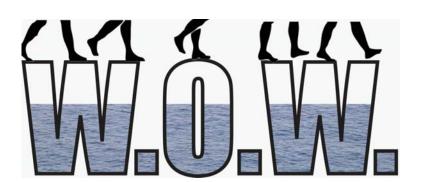
The intention of this IPRO team is to develop a product in which could become the catalyst to the implementation of rainwater harvesting systems to the urban and rural residents, on a mass scale in the Unites States.

The team is comprised of various disciplines. Many of which have previous knowledge and research into aspects of rainwater collection or similar areas of study.

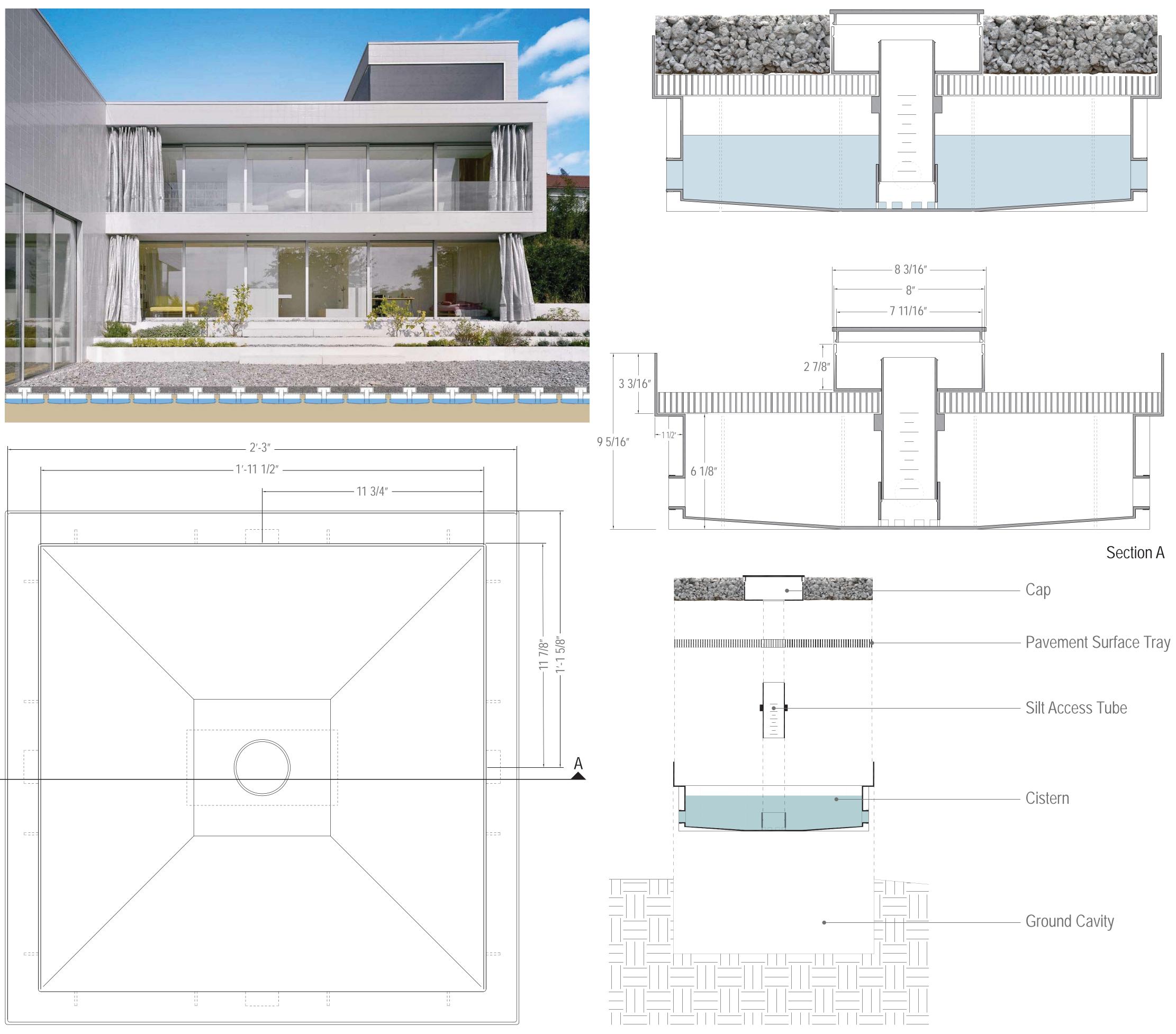
The team is highly motived to develop a product that will benefit Pentair Water and it's goals, while creating a product that helps improve the quality of life.

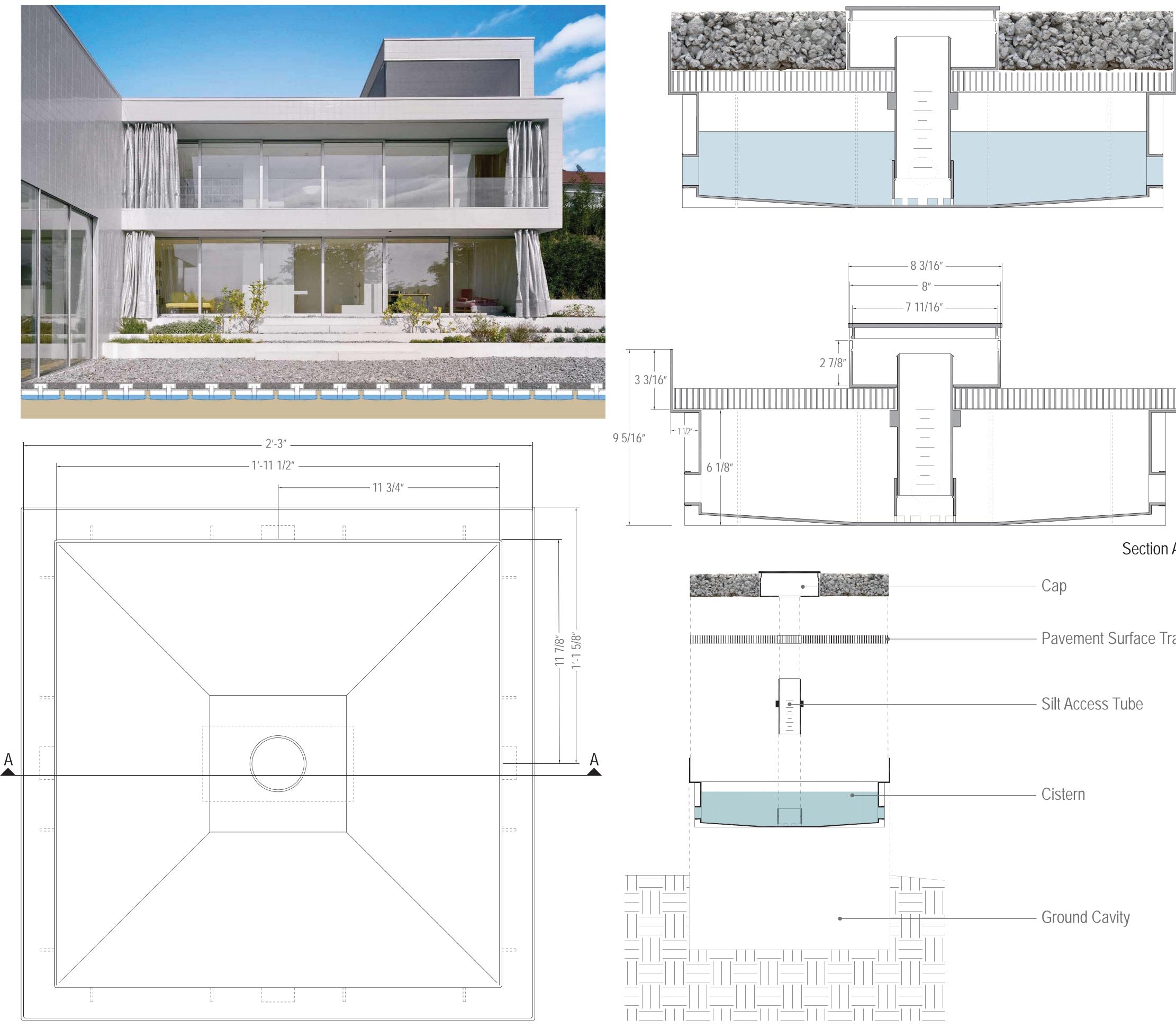
Ideas > Product > Marketability





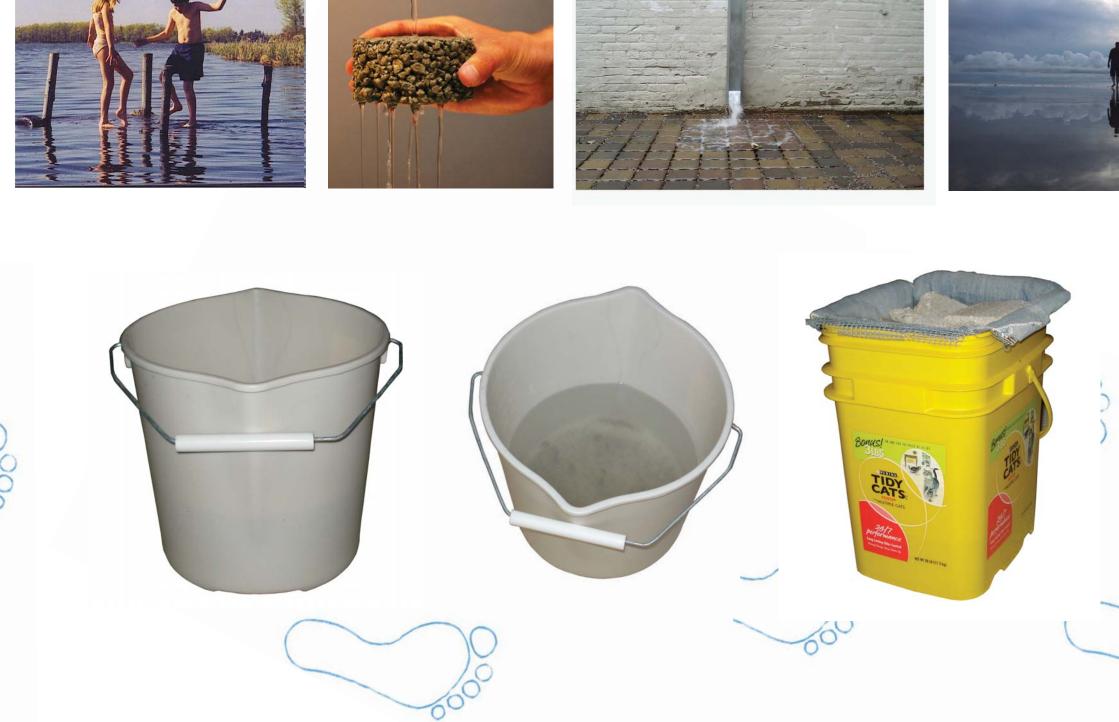
Product Design:





Cistern Plan

Prototypes / Process Studies:



Pentair's "Walking on Water" - Integrated Residential Paving / Collection System

Exploded Sectional Diagram of System Components

 \sim

Objectives:

Our IPRO objective is to design and market a rain water collection system that is efficient, user friendly and aesthetically pleasing, to that of the current products on the market.

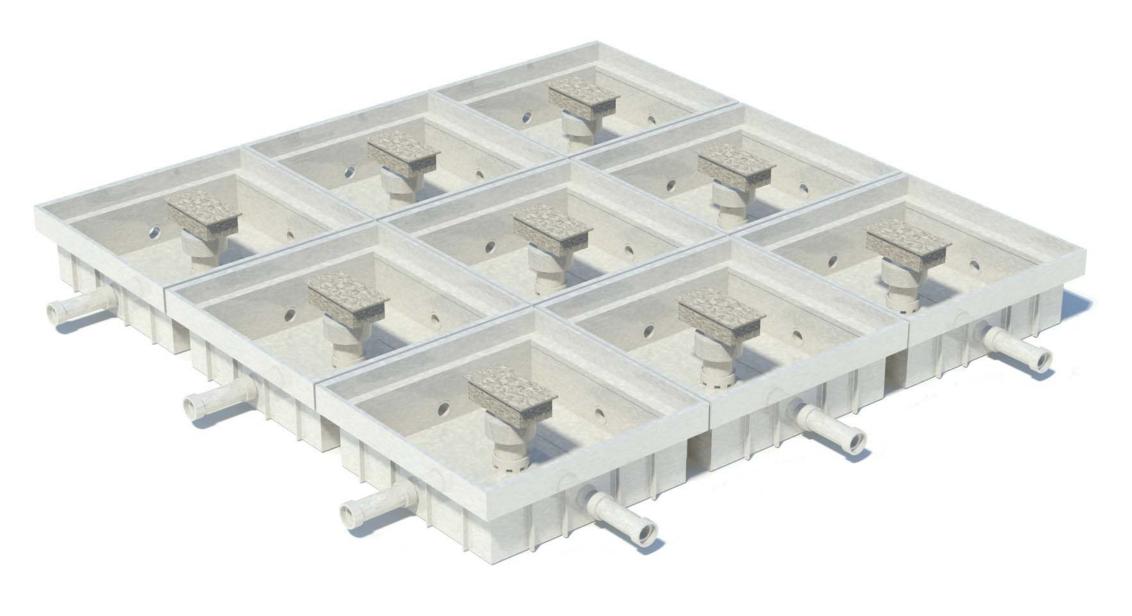
Methodology:

- Research current practices and systems
- Discuss the appropriate solutions to the problem
- Develop the conceptual ideas
- Visit and present conceptual ideas to Pentair, Inc.
- Develop a product
- Develop working drawings and prototypes
- Develop a marketing plan
- Visit Pentair for further insight into product specifications

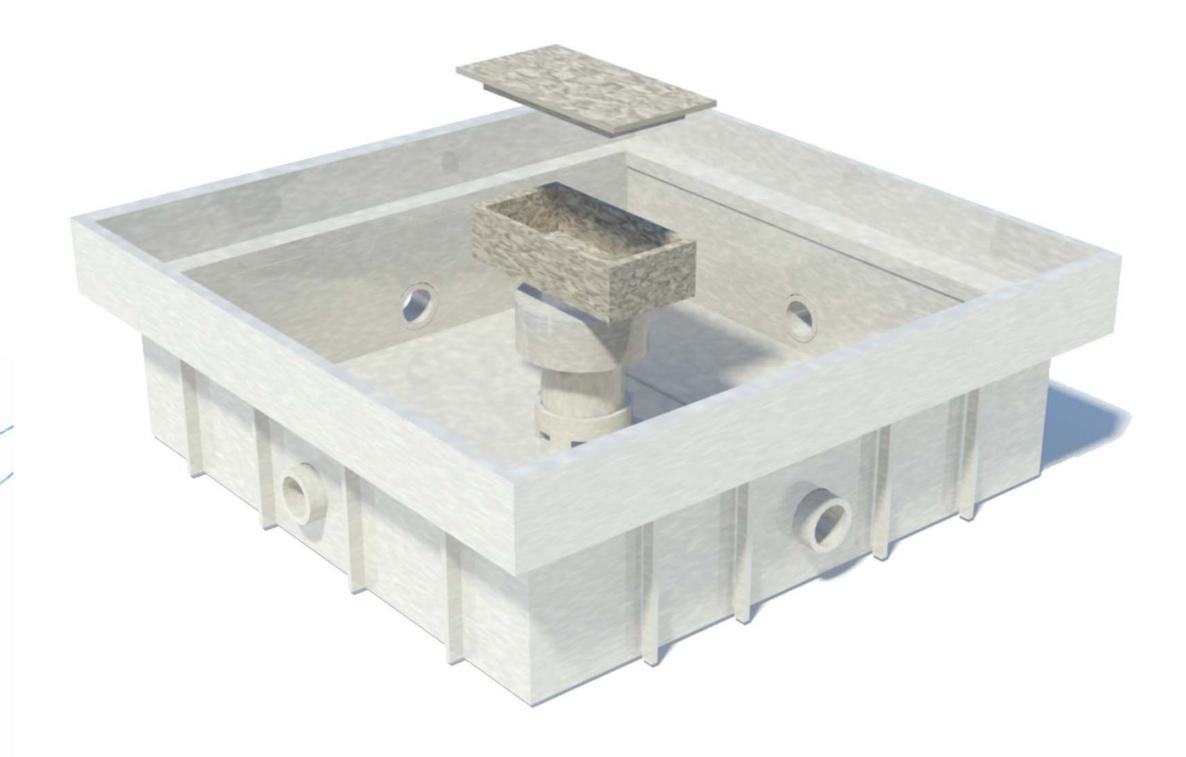
Research:



Renderings:



Module / Cistern Configuration (9 modules)



Pentair Cistern Module (with removable cap)

IPRO 344 - Residential Rainwater Harvesting

Technical Data:

Dimensions Of Cistern:

Length: 2'-0" Width: 2'-0" Depth: 0'-6"

Total Volume: (2 Cubic Feet)

1 Cubic Foot Water - 7.5 gallons of water 2 Cubic Feet Water - 15 gallons of water / module

Calculations:

To Water 800 Sqft Of Garden:

800 sq. ft X 0.5 gal/sq. ft = 400 gallon (required) 400 gal / 15 gal per module ~ 27 Modules 27 modules (2'-0"x 2'-0" surface area) = 108 sq .ft of modules

One module of 15 gallons waters > 30 sq. ft of garden

Ratio area approximately 1:8 E.G. 4 sq. ft of surface (1 Module) Accommodates ~ 32 sq. ft of garden

10 inches of rainfall per year:

24" x 24" (area of module) x 10" = 5760 cubic inches 5760 cu. in. / 1728 cu. in. / cubic foot = 3.34 cubic feet 3.3 cubic feet x 7.48 gallons/cubic foot = 24.684 gallons 1 module = 25 gallons/year for 10 inches of rainfall per year.

Example:

How many gallons can be saved, if the consumer purchased 30 modules? Assuming, they live in an area that receives approximately 40 inches of rainfall annually?

40 in. of water per year = 100 gal. per year per module 30 modules x 100 gal. /module = 3000 gal. per year <u>saved</u>

Pump Requirements:

9 gallons per minute (gpm) desired (approximate water flow rate of a typical residential garden hose).

16 Gal / 9 Gpm = 1.64 min 1.66 minutes (100 Seconds) to empty One module at flow rate of 9 gpm

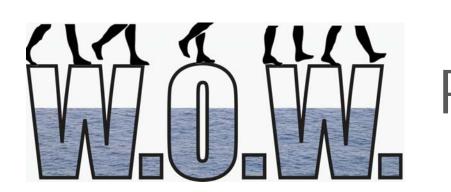
In order to water 800 sq. ft of garden:

27 modules are required. It would take 45 minutes (27 modules X 100 seconds per module / 60 seconds) to

In The Alotted Time Of An Hour:

Empty 36 modules with a total of 540 gallons: This would require a pump that can (at a minimum) push 540 gallons per hour (gph).

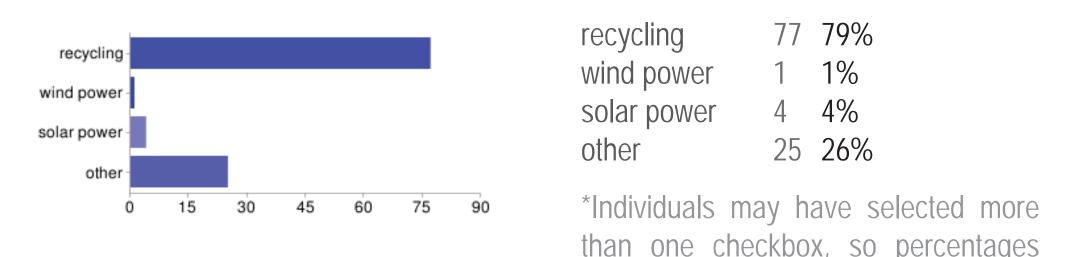
120v water pump needed that can pump water at a rate of 540 gph.



Pentair's "Walking on Water" - Integrated Residential Paving / Collection System

Survey Results:

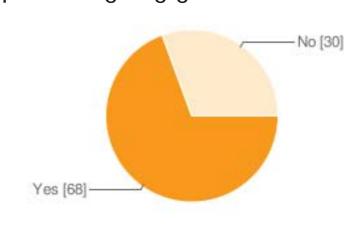
Are you currently applying "Green initiatives" like recycling, wind power, solar power, other. At your residence?

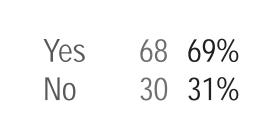


recycling	77	79%
wind power	1	1%
solar power	4	4%
other	25	26%

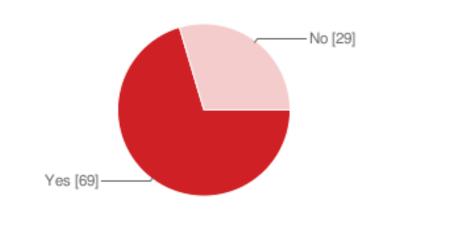
than one checkbox, so percentages may add up to more than 100%.

Do you plan on "going green" in the foreseeable future?



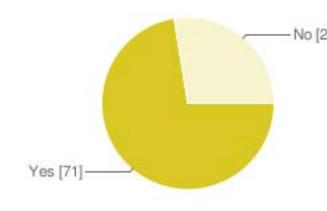


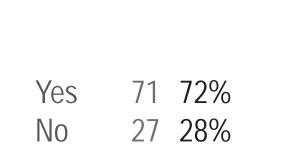
Are you aware that roughly 1/5th of the world's population is suffering from chronic water shortages and the need of water will continue to increase?



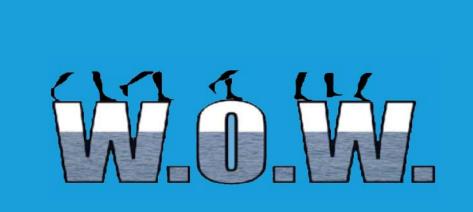


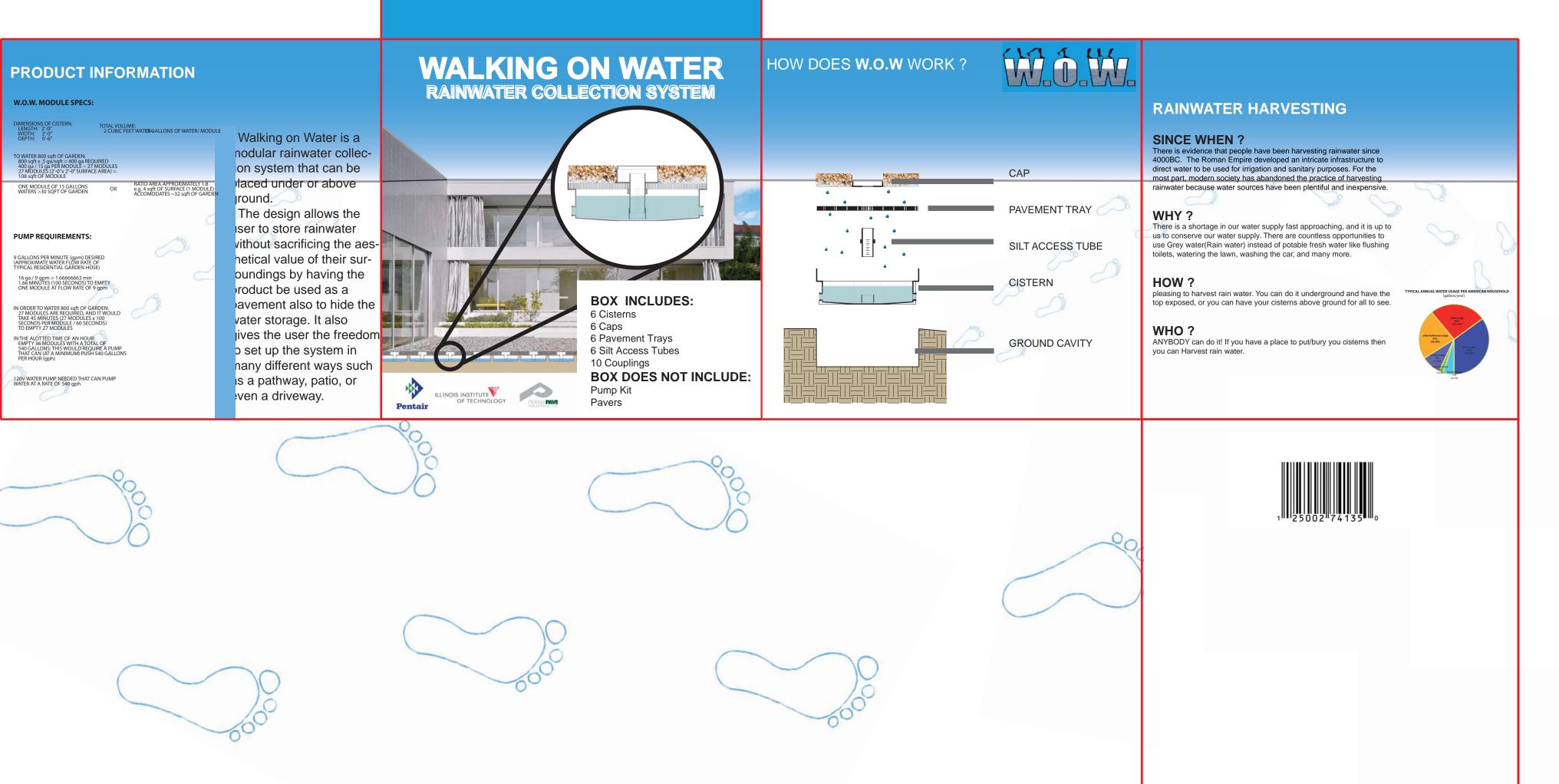
Are you aware of rainwater harvesting/ collecting?

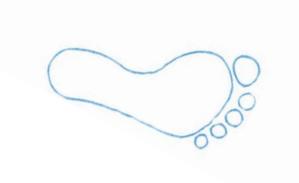


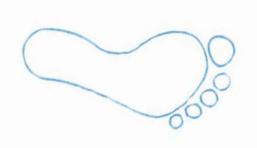


Product Marketing:

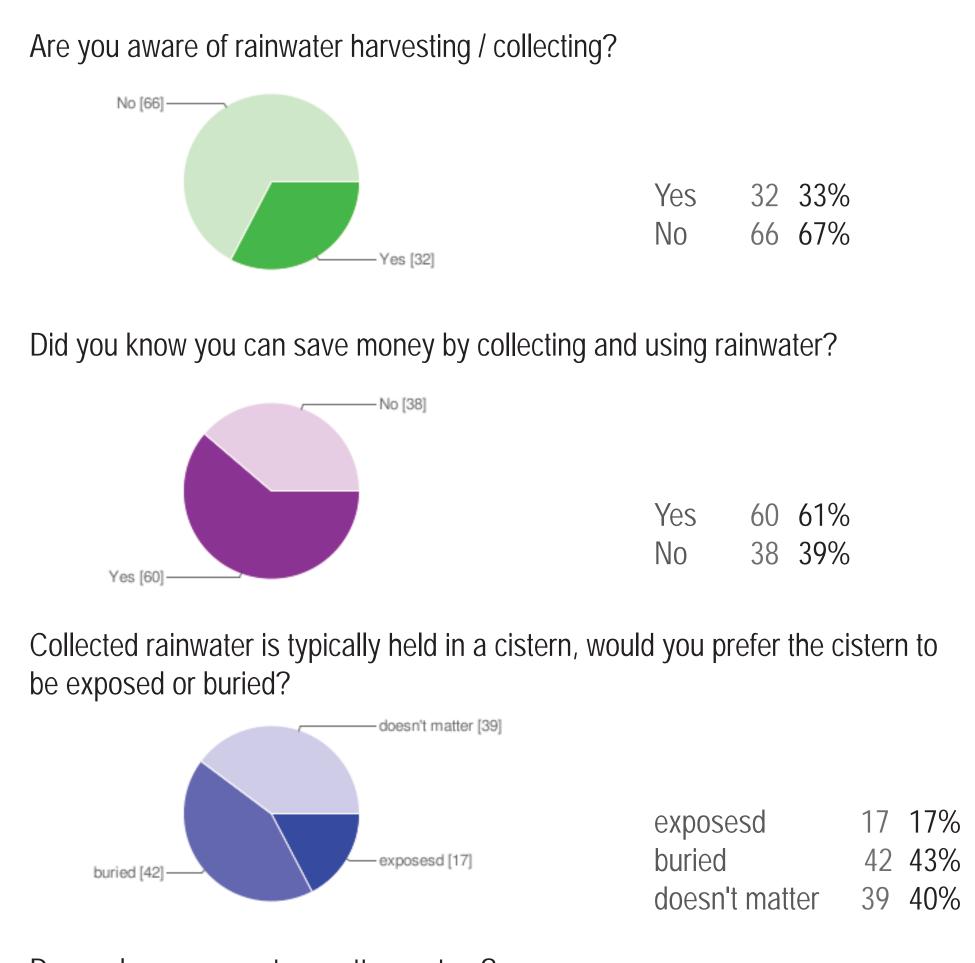












Do you have access to a gutter system?



If you are a renter of a property would you utilize a rainwater collection product in which your landlord or building owner implemented it in your building?



IPRO It takes a team! INTERPROFESSIONAL PROJECTS PROGRAM

Pentair Water Company: Pentair Water

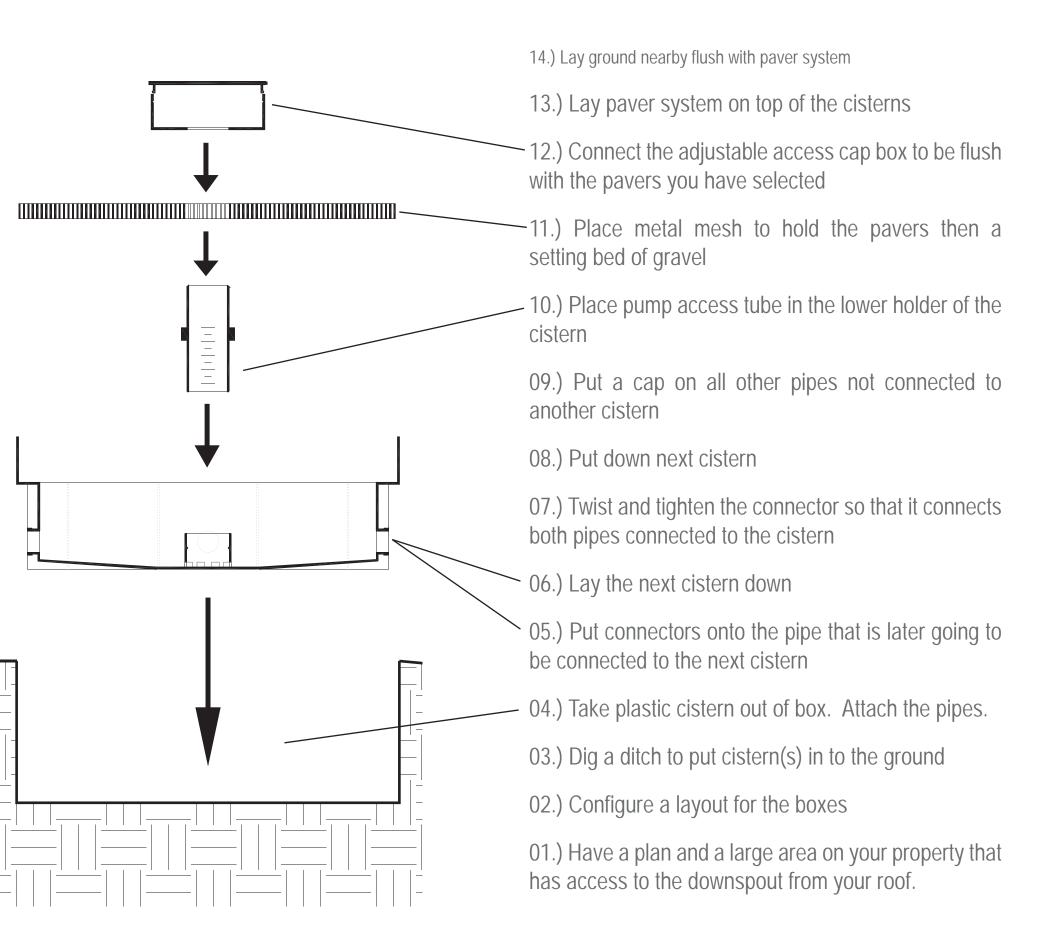


Pentair provides water solutions and technical products to meet the demands of today's ever-changing global environment.

Distribution of clean, safe drinking water around the world to keeping high-tech electronics and electrical equipment protected from overheating and other environmental factors, Pentair delivers solutions that improve lives daily.

Information curious of Pentair - www.pentair.com

Installation Instructions:



Assembly of team members:

Architecture Majors:

Sean Murray Declain McCloat Michael Gubser Mohammad Al-Sabah Adam Newman Alysa Kirkpatrick



Psychology Majors:

Juan Martinez (not pictured)

Biology Majors: Shuana Martin

Business / Humanities Majors: Muqadas Munir

Instructors: Phil Lewis

