GREENING MEASURES FOR HAWAII'S HERITAGE HOMES

CLASS 2: WATER

MASON ARCHITECTS

ROTH ECOLOGICAL DESIGN INTERNATIONAL LLC



A membership-based, statewide non-profit organization, Historic Hawai'i Foundation encourages the preservation of historic buildings, sites and communities relating to the history of Hawai'i.

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Each session qualifies for 1.5 AIA/CES (HSW). AIA Honolulu is the registered provider.

OUTLINE OF TODAY'S CLASS

- Welcome and Overview (5 min.)
- ☐ Global-to-Local view of water (10 min.)
- Conservation, recharge, reuse, examples (15 min.)
- Overview of character-defining features (5 min.)
- ☐ Water conservation & design (15 min.)
- Fixtures, materials, permeability (10 min.)
- Practical actions (10 min.)
- Discussion (20 min.)

PRESENTERS

Lauren Roth Venu Founding Principal and President, Roth Ecological Design International

Lauren is considered a leader in the field of sustainable water resource management and green infrastructure design. She specializes in providing strategic solutions to enhance water security and restore ecological services to elevate the design and build resiliency. Her role is often to serve as a bridge between urban planners, civil engineers and landscape architects to develop sustainable, ecologically-based water infrastructure solutions. She is also actively engaged in water policy development within Hawaii and has served on a variety of committees and advisory groups over the last decade for the state, city and county of Honolulu, and non-profit groups to support water resiliency measures.

Some of Lauren's accolades include: a Region 9 Environmental Protection Agency awarded project (2005); being named one of the "Top Forty Under Forty Business Leaders" by Pacific Business News (2014); and named by Pacific Edge Magazine (2015) as an "Emerging Leader in Design."

PRESENTERS

Glenn E. Mason, FAIA
President, Mason Architects, Inc.

Glenn has extensive experience adapting historic buildings to meet modern functional and energy requirements, focusing on the preservation of the character-defining features of historic buildings. He meets the Secretary of the Interior's Professional Qualifications standards for Historical Architect and has been the principal in charge of award-winning preservation projects.

GOALS OF THE SERIES

- To share measures homeowners can implement to save energy, conserve resources and integrate respectfully with local culture and natural geography in a way that is harmonious and compatible with a property's historic character and features.
- To help historic homeowners <u>reduce their homes' carbon footprint</u> while retaining the properties' <u>historic integrity</u>.
- To <u>provide information and knowledge to help owners</u> preserve the historic property; save energy, money and resources; and contribute to the natural health and vibrancy of their neighborhoods
- To <u>encourage historic homeowners to approach maintenance</u> of their properties through the lens of sustainability in order to provide affordable and accessible sustainability tools and techniques to incorporate into their preservation maintenance plans.

MAINTENANCE PLANS

- Handout for developing a maintenance plan
 - Green tips
 - Inspection Checklist
 - Template for creating lists of:
 - Character-defining features
 - Key actions
 - Timing
 - References/Additional Resources

Sustainable Water Management



Climate Change



Hurricane Irma is now the strongest hurricane ever recorded in the Atlantic



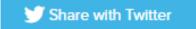
Hurricane Irma has already reached the Caribbean, and will possibly hit Florida by the end of the week. The storm grew fast and furiously. In...

Katherine Ellen Foley September 06, 2017

Hurricane Maria 'probably the single biggest hurricane catastrophe in the history of the US,' Puerto Rico governor says

By JULIA JACOBO and JOSHUA HOYOS • Sep 27, 2017, 6:24 PM ET





Tropical Storm Darby (2016)



Image credit: Honolulu Star Advertiser

Image credit: 6abc Action News



Study finds heavy rainfall events becoming more frequent on Hawai'i Island

University of Hawai'i at Mānoa

Contact: Pao-Shin Chu, (808) 956-2567

Professor, Atmospheric Sciences, School of Ocean and Earth Science and Technology

Marcie Grabowski, (808) 956-3151

Outreach Coordinator, School of Ocean and Earth Science and Technology

Posted: Feb 4, 2015

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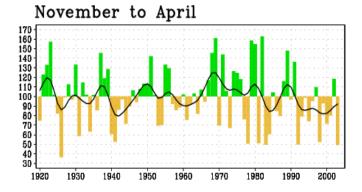
UH in the News

System news home

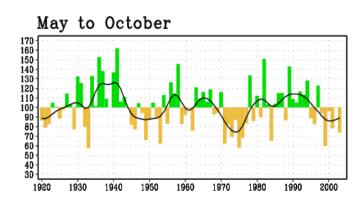
20yr storm is now every 3-5yrs!



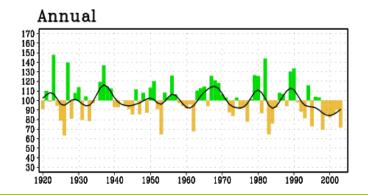
(Image by Chip Fletcher)











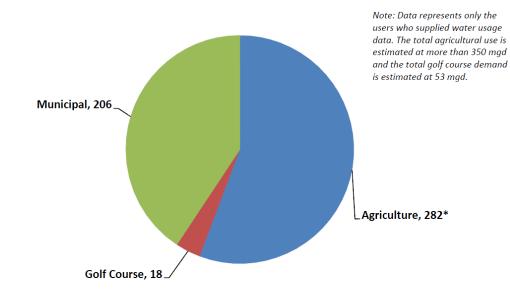
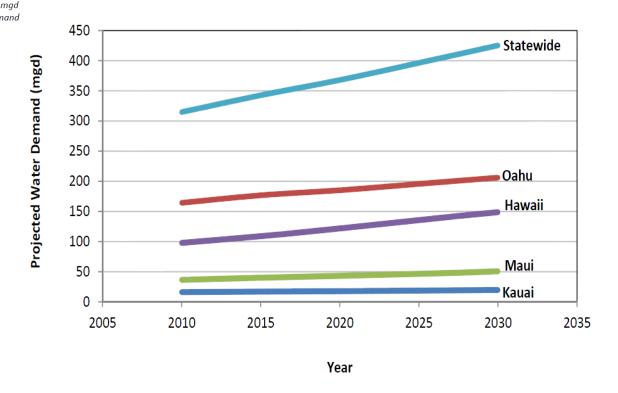
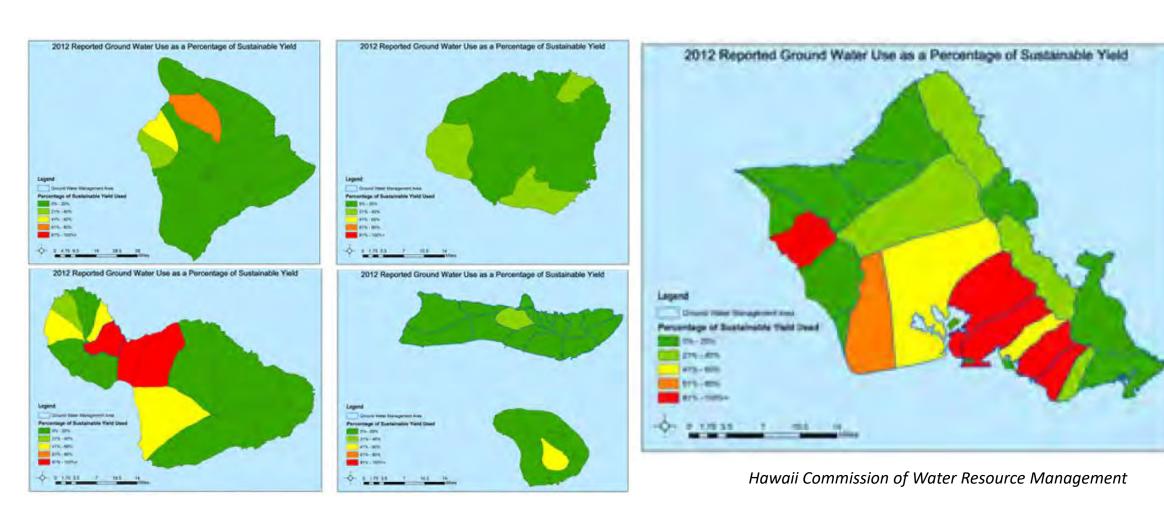


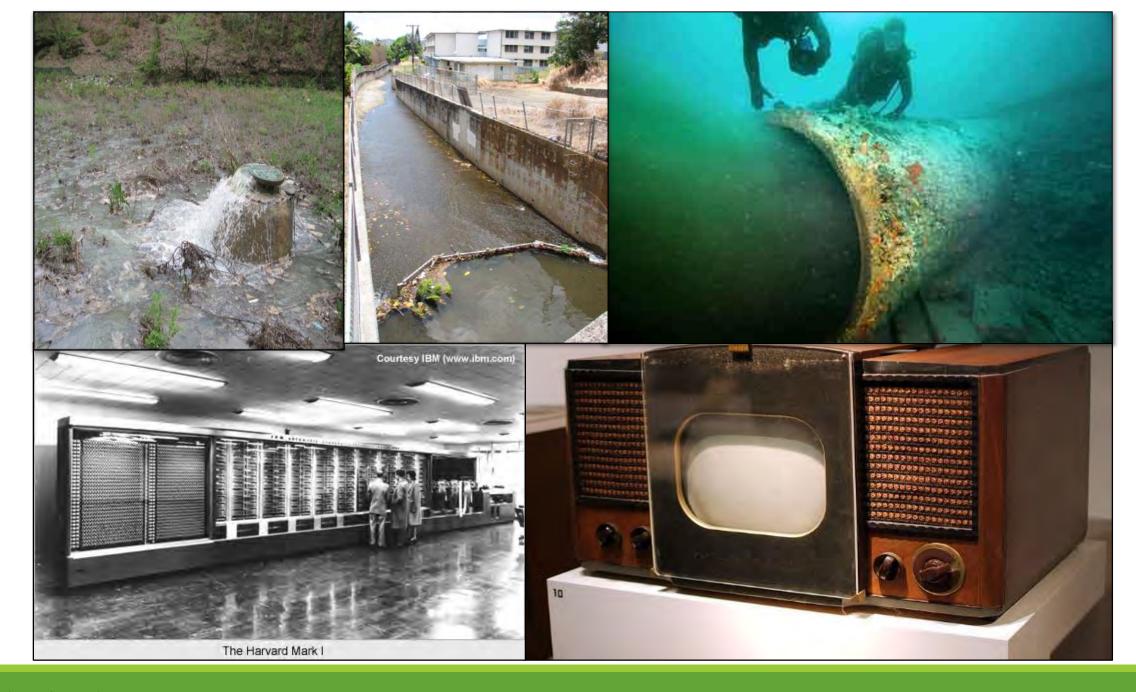
FIGURE 4-1
Statewide Reported Water Usage In million gallons per day
*Agricultural uses includes surface water and some brackish ground water



Hawaii Water Conservation Plan, 2013

2012 Groundwater Sustainable Yield





Hawai`i Fresh Water Initiative: Create an additional 100 MGD of water by 2030



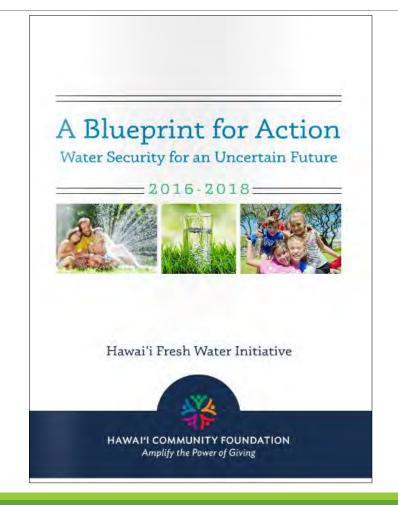
Conservation – Increase Water Efficiency (e.g. reduce residential use per capita by 25 gallons per day)



Reuse – Double the volume of reuse



Recharge – Stormwater back into the ground (30 million gallons per day)





- WATER EFFICIENCY: Increase by 8% by 2030

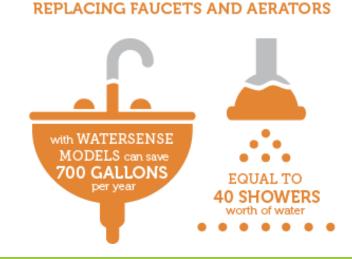
Conservation: Increase H20 Efficiency



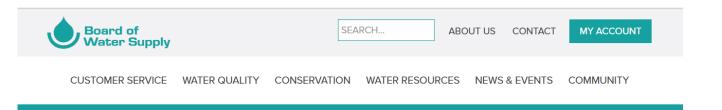






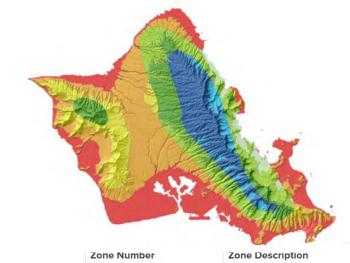


Conservation: BWS Resources



NATIVE HAWAIIAN PLANTS

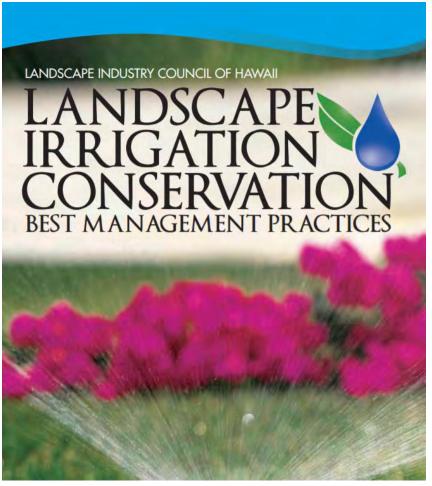
http://www.boardofwatersupply.com/conservation



Conservation	
BWS Conservation Progra	m
Conservation Calendar	
Leak Detection	~
Rain Barrel Catchment	
WaterSmart	
EPA WaterSense	
Restaurant Conservation	
7 Ways to Save Water	~
Xeriscape	~
Water Waste Hotline	
Energy Savings Performance Contract	~
Publications	~

Zone Number	Zone Description	
Zone 1	Dry (0-47" annual rainfall) Elevation <150ft	
Zone 2	Dry (0-47" annual rainfall) Elevation 150-1,000ft	
Zone 3	Dry (0-47" annual rainfall) Elevation 1,000-3,000ft	
Zone 4	Mesic (48-98" annual rainfall) Elevation <150ft	
Zone 5	Mesic (48-98" annual rainfall) Elevation 150-1,000ft	
Zone 6	Mesic (48-98" annual rainfall) Elevation 1,000-3,000ft	
Zone 7	Wet (>98" annual rainfall) Elevation <150ft	
Zone 8	Wet (>98" annual rainfall) Elevation 150-1,000ft	
Zone 9	Wet (>98" annual rainfall) Elevation 1,000-3,000ft	

Conservation: LICH Resource for Irrigation



https://www.boardofwatersupply.com/bws/media/files/publication-landscape-irrigation-conservation-2012-06-20.pdf





- INCREASE STORMWATER
RECHARGE WITHIN KEY
WATERSHEDS

- GOAL OF 30 MGD
INCREASE IN
GROUNDWATER

- **DOUBLE** THE VOLUME OF REUSE BY 2030

- GREYWATER
- RECYCLED WATER



What is stormwater?

"Stormwater is water that originates during precipitation events. When rain hits a surface such as a roof, road, or other surface it becomes stormwater."

What is stormwater runoff?

"Stormwater runoff is excess precipitation that is not retained by vegetation, surface depressions, or infiltration, and thereby collects on the surface and drains into a surface water body."

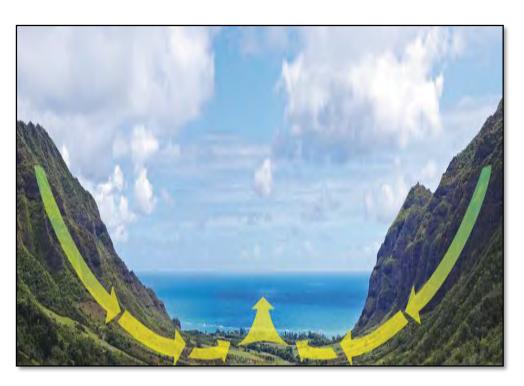
Why do we care?

95 streams, 21 estuaries, and 56 bays impaired (EPA 2006)

- Heavy metals
- Fertilizer
- Pesticides
- **.**Oil
- Sediment
- Cesspool/leachfield Leachate
- Flooding
- **...**









Stormwater Capture/ Recharge



What is a "Rain Garden"?

"A Rain Garden receives water from impervious (hard) surfaces such as rooftops, sidewalks, driveways and patios. The shallow depression of the **garden** holds the water so it can slowly infiltrate back into the soil as the plants, mulch and soil naturally remove pollutants from the runoff."

Rain Garden Checklist

- Site Planning
- Slope
- Soils that drain
- Slopes that are <12%
- Enough area to handle rainfall events
- Plants that can tolerate wet & dry conditions
- Plants that "fit" within the overall landscape
- Overflow? What % of rainwater will it recharge?







Rainwater Catchment





INTEGRATED LANDSCAPE AND BUILDINGS

Green screens, planters, and other elements can provide landscape on building facades, helping to cool buildings and the urban environment and increase biodiversity.



GREEN ROOF

Provide cool roof and enhanced amenity to residents, employees, and visitors.



ECO-BLOCK DEVELOPMENT

Decentralized water and energy infrastructure while building community resiliency, and reducing the development's carbon and water footprints.



DISCONNECTED DOWNSPOUT

Collects and treats rainfall from rooftops.



PERMEABLE PAVER

Stormwater runoff percolates through or around pavers to either infiltrate or be collected and directed to storm drain line. Added depth of subbase can retain stormwater.



CONSTRUCTED WETLAND

Engineered wetlands for stormwater or wastewater treatment and habitat restoration.



Stormwater percolates through pavement to either infiltrate or be collected and directed to storm drain line. Added depth of subbase can



PERMEABLE CONCRETE/POROUS ASPHALT

retain stormwater.



BOARDWALK

Allows stormwater to percolate through boards. Allow different look and provides structural support to bridge over green infrastructure or stormwater runoff storage areas.



BIORETENTION/GREEN INFRASTRUCTURE

Captures and treats stormwater runoff with natural processes.



STORMWATER TREE

Captures and treats stormwater runoff with natural processes. May be "linked" to other trees for increased runoff storage.

Stormwater: Rainfall Resource



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Contact Us: rainfall@hawaii.edu – Conditions of Use This website is hosted by the EPSCoR Hawaii Geospatial Data Repository.





GREYWATER







Greywater Shower Garden: Kalepolepo, Kihei, Maui



Reuse: Wastewater Treatment & Recycled Water



WASTEWATER



RECYCLED WATER





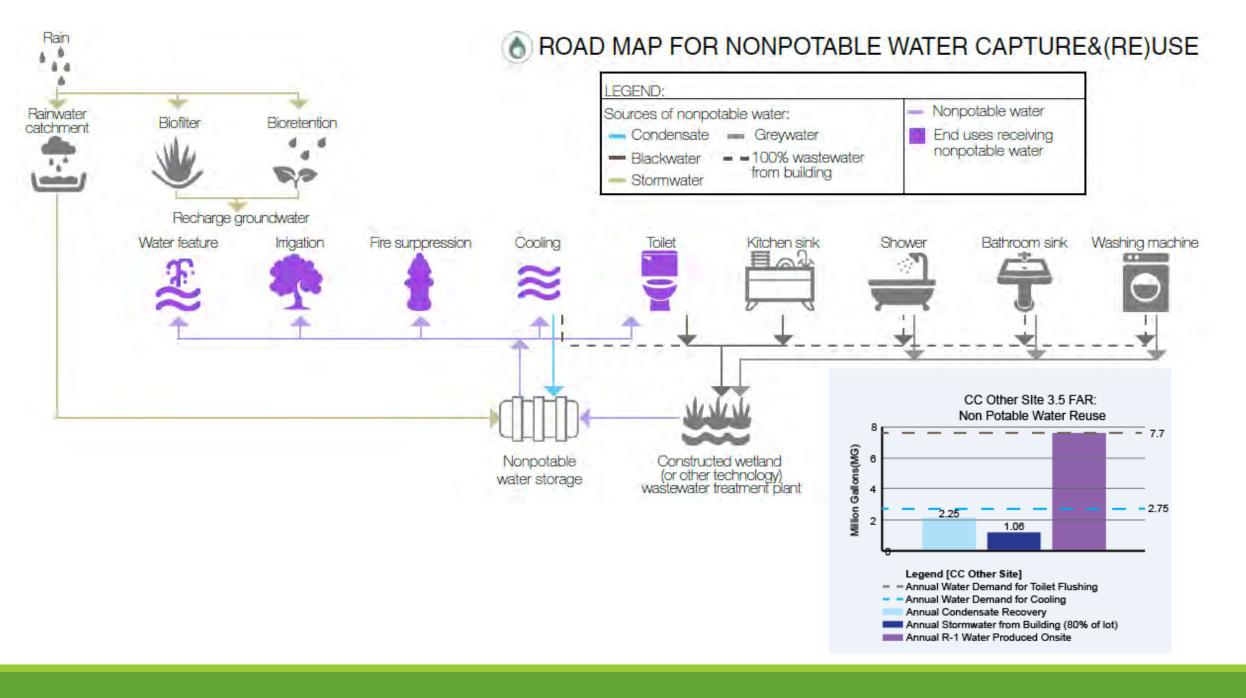




Distributed Infrastructure & Water Resiliency

= Balancing a development's annual water demand through efficient use, capture, reuse and recharge of water resources











Eco-Block: Hassalo on 8th, Portland OR



Hassalo on 8th3 Portland, Oregon (block development)

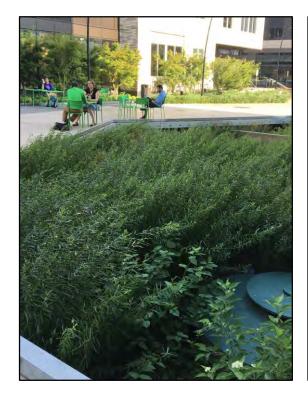
Building facts:

- . (3) buildings in a block layout
- · 657 residences (with commercial spaces on ground floor)
- 50,000 square feet

Green building features:

- · Green roof (Eco-roof garden)
- . Onsite wastewater treatment using trickling filters and constructed wetland technologies (45,000 gallons per day). Water is reused for flushing toilets, irrigation for the block's landscape, and feed for cooling tower.
- · 60,000 gallon cistem collects rainwater. Collected stormwater used for the block's water feature.
- . Over 1,000 bike parking stalls with access to bike valet and repair
- · EV charging stations
- Composting
- · Located next to Portland's light rail system









Emory University: ~ Neighborhood Scale





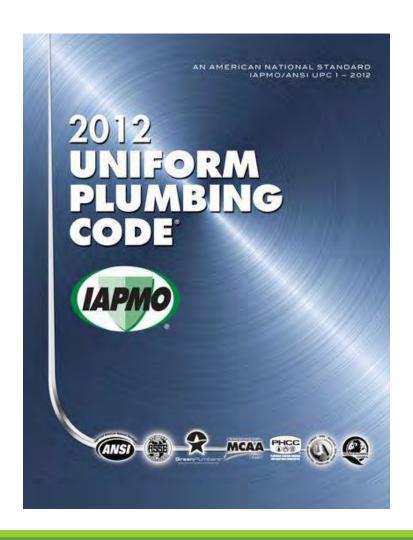
Building facts:

- 631 acres (neighborhood scale)
- · More than 70 buildings

Green building features:

- . Stormwater capture and use (saves 800,000 gallons per year of potable water)
- · Greywater reuse (saves 750,000 gallons per year of potable water)
- · 400,000 gallons per day of wastewater "scalping" from main trunk line. Treatment includes moving bed bioreactor (MBBR) and constructed wetland technologies. Recycled water is used for cooling, toilet flushing, and steam plant (146,000,000 gallons per year of potable water savings).

Plumbing Code Updates: Green codes become the new base code



- Water efficient fixtures
- Nonpotable reuse back inside buildings!
 - -Rain water catchment
 - -Stormwater reuse
 - -Recycled water

Questions?

Roth Ecological Design Int. LLC lauren@rothecological.com rothecological.com

SUSTAINABILITY IMPROVEMENTS AND PRESERVATION

- Understand CHARACTER-DEFINING FEATURES
- Explore ALTERNATIVES
- Don't let the salesman determine the solution
- If all else fails, the change should (must?) be REVERSIBLE

Character-Defining Features

- Overall setting including landscaping
- Form, including building and roof shape, lanais
- Fenestration
- Exterior materials and details
- Secondary features such as fireplaces, pent roofs over windows, etc.
- Interior characteristics: Spaces, materials, design features, indoor/outdoor relationships

Understand the hierarchy of importance of character-defining features

WATER CONSERVATION

This is about using less and capturing more

Catchment









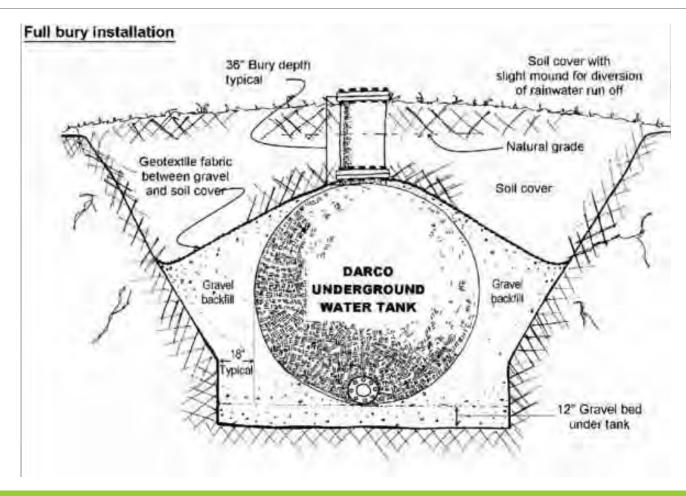


If you want to get more serious





If you want to get REALLY serious



If you want to capture water you need gutters

The gutter you choose should depend on the roof edge design.



Roof Edge Design

Do you have exposed rafter tails?







Roof Edge Design

Or a Fascia?

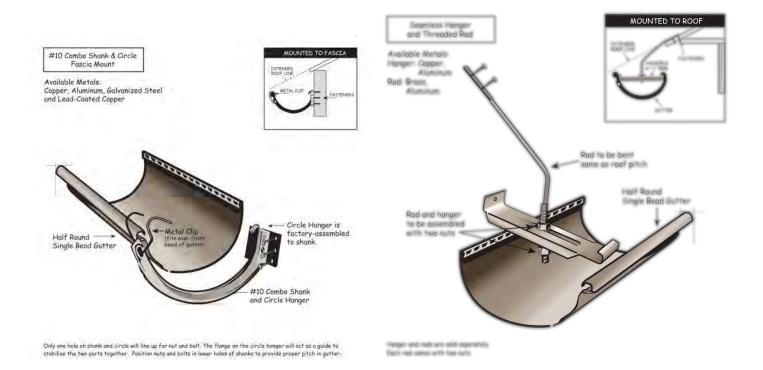


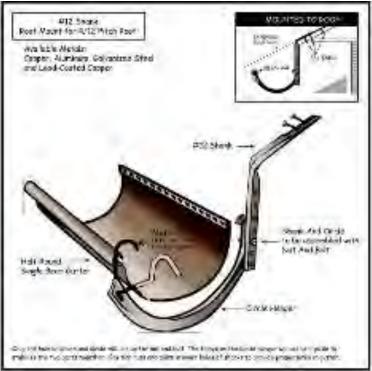




Gutter Hanging

Hanging a Round gutter.





Materials

Don't Get Hung Up on Copper

Copper corrodes due to tannic acid and in high salt environments. So do aluminum and galvanized steel.

But what is the budget and what is the life of the roof?

PVC lasts in corrosive environments but is rarely compatible with historic designs.





Using Less

Water conserving fixtures and appliances

Replace or retrofit?





Old fixtures are not easily modified to reduce flow







Roll over image to zoom in

LASCO

LASCO 08-2483 Plastic Thread on Shower Head Restrictor

39 customer reviews

Price: \$5.52 & FREE Shipping on orders over \$25. Details

Get \$50 off instantly: Pay \$0.00 upon approval for the Amazon Rewards Visa Card.

Try Fast, Free Shipping

In Stock.

Want it Tuesday, April 17? Choose Priority Shipping at checkout. Details

Ships from and sold by Amazon.com. Gift-wrap available.

- · Shower head flow restrictor
- · Plastic disc, thread into threads
- · Reduces water flow
- 2 GPM flow regulator
- · 2 pieces per card
- > See more product details

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Report incorrect product information.

AQUADANCE

Elegant powerful high pressure shower head

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AquaDance Shower Head with



Ad feedback

Frequently bought together

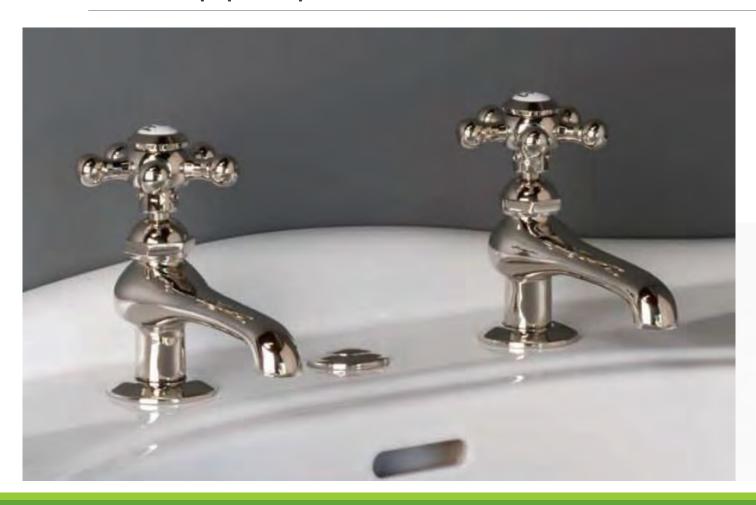


Total price: \$22.47

Add all three to Cart

Add all three to List

Period-appropriate modern fixtures





Not period-appropriate







Let Water Get Into the Ground





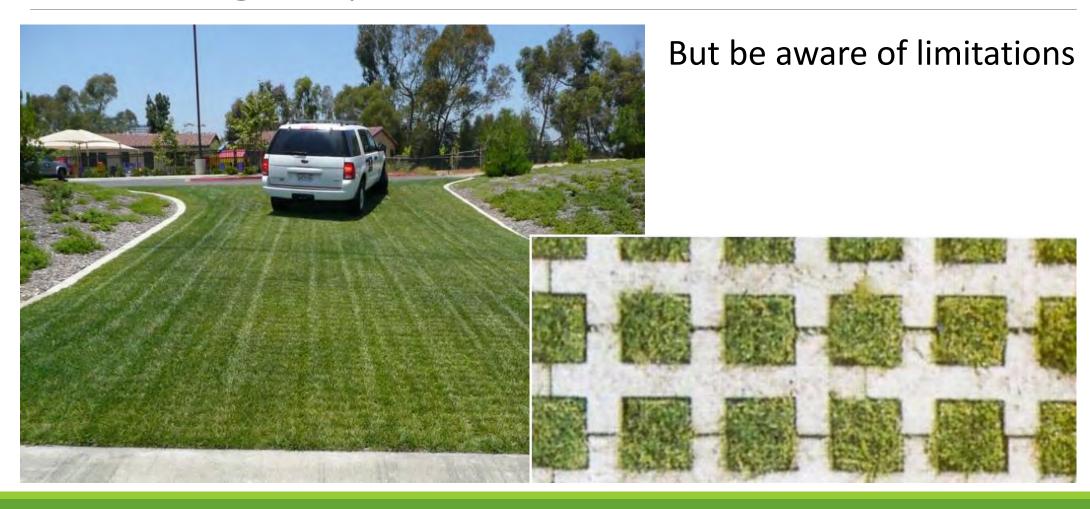
Not this, please.

Grasspave

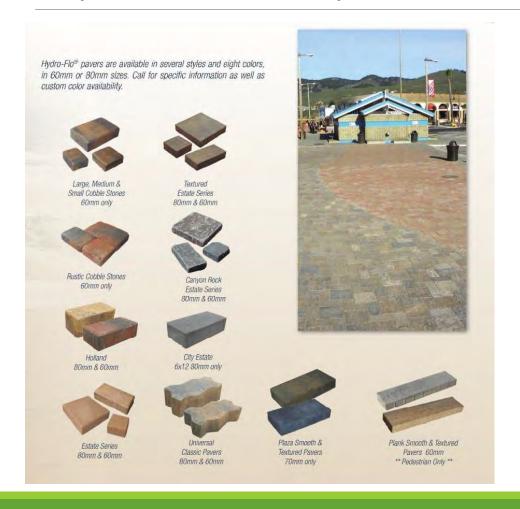




Concrete grass pave



If you need to pave use permeable materials



Just Add Water! * ASTM No 8-9 aggregate joint aggregate bedding course varies with design Hydro-flo® Technology ASTM No 5-7 stone open-graded base varies with design * ASTM No 2-3 drain stone Sub base - varies with design (if recommended by soil engineer) * Aggregate depth to be determined by a qualified soil engineer US Patent # 7927037 B2 CAN Patent # 2,746,731 Hydro-Flo Technology Pavers EU Patent # 2462284 Perforated DrainPipe as

DISCUSSION

GREENING MEASURES FOR HERITAGE HOME SERIES 2018

- April 9: SIGNIFICANCE & SUSTAINABILITY: What makes your historic home unique & sustainable measures to green it
- April 23: WATER: Water conservation, storm-water management and on-site water reuse
- May 7: ENERGY: Renewable energy & conservation: solar, wind, lighting, appliances, energy incentives
- MAY 21: WINDOWS: Sustainability measures to maintain/restore your historic windows
- JUNE 4: LANDSCAPE: Creating a sustainable & culturally-sensitive landscape