Paul Dedyo, PE, LEED, Associate
Tom von Schrader, PE, LEED, Principal
SvR Design Company, Seattle, WA
Civil Engineering, Landscape Architecture, Restoration

www.svrdesign.com

Cistern Project Examples, and the Water Rights Issue

Presentation

- Case Studies
  - Miscellaneous
  - Kitsap County
- Legal Issues

SvR Design Experience

- City Hall / Civic Center, City of Seattle, WA
- Growing Vine Street Cistern Steps, Seattle, WA
- Camp Muir, Mt. Rainier, WA
- Pantages Apartments, Seattle, WA
- Merrill Hall, University of Washington, WA
- Kitsap County Administration Center, Kitsap County, WA

City Hall / Civic Center, Seattle, WA

- Underground cistern
- 28,000 cubic feet storage capacity
- Six-foot depth on average
- Water uses include: irrigation and toilets
- Mechanics tied into fountain system

City Hall / Civic Center Drawing & Calculations

- Collection Area = 57,865 sf
- Water Demand = 138,129 cf/year
- Storage Volume = 28,092 cf
- 88% Water Reduction
**Growing Vine Street**
- Part of a multi-block planned green street
- Provides irrigation and water to Belltown P-Patch

**Camp Muir, Mt. Rainier, WA**
- Snow-harvesting system
- Snow melted on HPDE tray into potable water for toilets
- Water piped to cistern and filtrated

**Pantages Apartments, Seattle, WA**
- Low-income housing
- Conservation minded
- Roof-water runoff collection
- Single downspout
- Cistern is an eight-foot-tall corrugated pipe
- Shut-off valve for spring and summer irrigation

**Pantages Drawing & Calculations**
- Collection Area = 5,050 sf
- Water Demand = 1,564 c/y
- Storage Volume = 157 c
- 95% Water Reduction

**Kitsap County Administration Building**

**Initial Site Conditions**
- Project improves one city block
- 3-acre total area
- County Inspector’s office, parking lot and single family residences occupied site
- 54-foot elevation drop from south to north
Irrigation Water Supply

Typical Rainwater Harvest System

West Cistern Elevation Schematic

Rainwater Enters All Three Cisterns

Bottom Cistern Fills First

Cisterns Fill Sequentially
Design Criteria

- 39,250 sf (0.90 acres) roof area
  - 11,500 sf of green roof
  - 27,750 sf of conventional roof
- Mean annual rainfall is 54 inches
  - Generates 134,000 cf (1 million gallons) of annual runoff to fill the cisterns
- Total annual drip irrigation demand is 74,000 cf (553,500 gallons)
  - 11,500 sf of green roof landscape
  - 22,500 sf of on-grade landscape
- Total cistern capacity of 11,850 cf (88,500 gal)
  - 7,000 cf (52,500 gallons) capacity for cisterns 1, 2 & 3
  - 4,850 cf (36,250 gallons) capacity for cisterns 4 & 5
Benefits Summary

- 54% reduction of water use for irrigation
  - 39,750 cf (300,000 gallons) of rainwater used for irrigation
- Valves for RWH system supplied from cisterns 4 & 5 can be changed to redirect supply from green roof to on-grade irrigation main
  - Can supplement on-grade landscape irrigation after establishment of green roof vegetation
  - 100% reduction of water use for irrigation could then be achieved
- Cistern 1 and Cistern 5 have the same size and model pump
  - Simplifies maintenance and storage of parts for repair
- Dual use of cisterns as detention facility
  - Costs offset by deleting detention facility

Legal Issues

- House Bill 1735
- Rainwater Runoff & Use
  - New process to govern collections over 1,000 gallons
  - Removes permit requirements for collections less than 1,000 gallons
- Pilot projects will be required
- DOE restrictions will apply
- Second Substitution bill, revisit in 2007
- Advocacy needed
- For more information see: [http://apps.leg.wa.gov/billinfo](http://apps.leg.wa.gov/billinfo)