Performance Monitoring of Extensive Green Roofs

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10,000 ft² Hydrotech Extensive Garden Roof Assembly.

- Drought tolerant plants including sedum varieties & dianthus
- Filter fabric
- Floradrain FD25
- 2 layers of 1 1/2” polystyrene insulation
- Roof protection course
- Primer

- 4” expanded shale blend planting medium
- Drip irrigation tubing used during initial 2 seasons of plant establishment
- Water retention layer
- Root barrier
- Waterproof roof membrane
- Roof deck - fire rated gypsum deck board - metal deck
Green Roof Performance

- Hydrologic response is diverse due to:
  - variation in the physical properties of the media
  - layered structure of the various proprietary systems
  - local climatic conditions
Hydrologic Monitoring Equipment

- Teledyne ISCO Avalanche Sampler
- Teledyne ISCO 730 Bubbler Flowmeter
- Teledyne ISCO 674 Rain Gauge
- 4" Palmer-Bowlus Flumes
Flow Monitoring Equipment
Normalized Hydrographs - June 10, 2008

Discharge (cfs) per 1000 sq ft roof

Time (hours)

0
2
4
6
8
10

Rainfall (ft)

Blackroof
Stoneroof
Greenroof
Rainfall

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Greenroof
Rainfall
Cumulative Runoff Depth (ft)
Water Quantity Summary

- **Volume Retention**
  - Green Roof Retained 68.25% (Apr – Aug = 83.79%)
  - Stone Roof 48.58% (Apr – Aug = 57.75%)

- **Run-off volume coefficient varies with event magnitude** – critical for design storm events.

- **Peak Discharge Reduction (Storm Size)**

- **Delay**
  - Green Roof mean 2.5 hours for small and medium events (high variability)
  - Stone Roof mean around 1.3 hours for all events (slightly less variable)
Summary

Green roof systems must be designed according to local climatic conditions.

Performance expectations must be based on green roof system and the climatic conditions for which published performance data was collected.

Essential to understand hydrologic response when designing a stormwater master plan or sizing for specific events.

Hydrotech Garden Roof is performing beyond design expectations.

Nearly identical experimental set-up has been installed at Brownstown Middle School for performance monitoring and education.
Thanks!

Questions?

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http://www.ltu.edu/stormwater/index.asp