Tremco Incorporated
Vegetated Roof & Rainwater Harvest System
Tremco North Building Renovation

- Vegetated roof and rainwater harvesting as part of a total renovation of the entire building
  - Built in 1969
  - High operating costs
  - Need for an active demonstration of the RPM ‘Building Solutions Group’ family of products
  - Desire to have a LEED certified building
● Retrofit Highlights:
  ● Vegetated roof
    ■ Approximately 9,000 sq ft
    ■ Engineered growing medium absorbs most of the water
    ■ Stormwater reuse for irrigating plants keeps it out of sewer system
  ● Insulating quality helps moderate building temperature
  ● 46 species of plants / 16,000 plants
Vegetated Roof Concept
Stormwater Reuse System Summary

Stormwater runoff from the vegetated and non-vegetated portions of the Tremco Headquarters roof is collected in a ground-level storage tank. The storage tank capacity is designed to retain 75% of a 20 year design storm event and provide 100% of the annual irrigation demand. A potable back-up supply will ensure that the landscape receives adequate water when the tank’s supply is depleted.
Plants, Irrigation & Stormwater Capture

Which Decision Came First
How Much Water

**Plant Palette**
- Urban Agriculture
- Native meadow
- Sedum groundcover areas
- Native shade concealment area
- Over 200’ linear ft of living walls

**Where and How to Capture**
- Parking lot surface!
- Available area for cisterns
- Available area for pumps, vault for initial capture and other equipment
Plant Palette Water Needs

- **Typical Transpiration Ratios**
  - Water processed for sufficient CO₂ uptake for photosynthesis
  - C3, C4 and CAM
  - ET Rate calculation
    - Irrigated area (sf) X ET Rate (inches) x 0.6233 = Water in gallons

- **The Challenge of Life on a Roof**
  - Shallow growing media
  - Aggregates to aid in drainage
    - Store water AND heat

- **Irrigation Challenges**
  - Sub-surface drip
Water Capture Design

- Asphalt pavement
  - 50,000 sf; 1” rain per hr. = 31,000 gph
  - Petroleum, salt and particulate issues
- 15,000 gal storage Vault in parking lot
  - 15 hp, 500 gpm pump
  - High and low level controllers tied to automated building management system
- Captured water moves to 6 cisterns
  - Rosedale particulate filter/strainer holds back particulates from cisterns
- 6 – 2,000 gal cisterns store water for use on the roof utilize gravity to move water from one to the other
Irrigation

- Cistern water moves to the roof via pump
  - 1.5 hp; 20 gpm; 60’ head
- Hunter Controllers
  - 9 zones
  - Multi zone run times
    - Avoids cycling pump on and off
  - Solar synch
- KISSS Lo Flo Subsurface irrigation system
  - 0.5 gpm emitters
  - Capillary mat helps move water into surrounding soil
- Water runs through 2 Pentek OAD 20BB filters
- All tied into the automated building management system
Captured stormwater moves from the parking lot storage vault through this particulate strainer/filter and into the cisterns.
Double Cartridge Filtration

Stormwater is pumped to the roof from the cisterns and flows through two Pentek OAC-20BB cartridges.

- Oil adsorbing cartridges
- Filters out 90% of total hydrocarbons
- Modified cellulose-based filter media
- 20” long
- High flow rate/low pressure drop
Used Oil Adsorbing Cartridge… typically replaced once a month during the summer.
Constant Monitoring

There is an ongoing effort to monitor the amount of available water in the cisterns. While alarms will sound if the water level is less than 10% of needed capacity, monitoring helps to alert the manager to the potential need for potable water.

<table>
<thead>
<tr>
<th>Day</th>
<th>Inches</th>
<th>1=28 gallons Gallons Per Cistern</th>
<th>Cell DX6 Total Gallons</th>
<th>Days of Rain</th>
<th>Solar Sych %</th>
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<tbody>
<tr>
<td>Week of 6/4</td>
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<tr>
<td>Monday</td>
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<tr>
<td>Wednesday</td>
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<td>10416</td>
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<td>53% (R) 51% (G)</td>
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<td>8904</td>
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<td>62% @ 70% (G)</td>
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The water coming into the irrigation system is tested yearly to monitor for petroleum, metals, ph. and other containments. The growing media is also tested on a yearly basis. This test allows the staff horticulturist to monitor air porosity, nutrients levels, ph., metals, contaminants and other valuable information leading to prescriptive and corrective maintenance protocols.
Original outlet pipe for stormwater cut to receive vault and fittings.
Completed installation of vault with 6 cisterns waiting for installation.
Six 2,000 gal cisterns installed.
The Idea of Saving Water

The daily effort to manage water from a limited resource has made a change in attitudes regarding water. No other effort could have affected such a change in habits.
The Team

J. William Jensen, PE, Consultant