Agilent – Santa Clara
CO-3

Site Location:

5301 Stevens Creek Boulevard
Santa Clara, CA

Features:

- Roof garden
- Disconnected downspouts

Stormwater Benefits:

- Reduced impervious surface area
- Reduced volume and velocity of runoff

Large areas of vegetation are located on top of the second floor of the office building.

Photograph above courtesy of Scott Sidlow (Agilent).

The roof garden is located on the second floor of the Agilent building.

Trees are planted as part of the roof gardens.

Agilent – Santa Clara
CO-3 (cont.)

Rooftop runoff is directed to drain through the vegetation.

Exhaust vents for HVAC* systems are integrated into roof garden areas.

*HVAC = heating, venting, and air conditioning

Photograph above courtesy of Scott Sidlow (Agilent)

Another view of the roof garden shows a large shady tree that can reduce rainfall velocity and runoff.

Agilent – Santa Clara
CO-3 (cont.)

Lessons Learned:

- Leakage occurred due to roots penetrating the roof membranes, however after patching the barriers underneath the garden, leakage was prevented.
- The membrane integrity was also compromised by heavy vehicle traffic (for deliveries to the café on the roof garden level). The amount of deliveries was minimized to prevent more leaks.

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SGI/Google
CO-4

Site Location:

1600 Amphitheater Parkway
Mountain View, CA

Features:

- Green roof – entire ground level of complex including landscaped area is built above an underground parking lot
- Permeable pavement
- Native vegetation
- Multi-story buildings reduce building footprint
- Bike racks promote bicycle commuting

Stormwater Features:

- Reduced building footprint
- Natural treatment of runoff
- Transportation-related pollutant reduction
- Reduced velocity of runoff
- Reduced impervious surface area

The parking lot can be seen below the turf on the level above.

This tree in the parking lot grows up through an opening in the roof garden area. Trees and other vegetation help reduce the volume and velocity of rainwater.

This grassy rooftop area planted with trees reduces and provides some natural treatment of runoff.

SGI/Google
CO-4 (cont.)

Permeable pavement is used in this courtyard.

Permeable pavement and landscaped areas fill the courtyard on top of the parking structure.

Bike racks promote alternative transportation, perhaps providing easy access to other buildings on the campus.

Turf and gravel surrounds this pathway, providing an area for infiltration to occur.

SGI/Google
CO-4 (cont.)

Permeable pavement and native vegetation surround this multi-story complex.

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Site Contact:
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Stanford University Medical Center
CO-5

Site Location:

300 Pasteur Drive
Palo Alto, CA

Features:

- Roof garden above parking structure
- Street trees
- Native vegetation

Stormwater Benefits:

- Reduced impervious surfaces
- Natural treatment of runoff
- Reduces volume and velocity of runoff

Photograph courtesy of Joe Teresi (City of Palo Alto)

From this angle, it is possible to see the parking structure beneath the roof garden.

Photograph courtesy of Joe Teresi (City of Palo Alto)

This roof garden provides not only aesthetic benefits, but also a large area for stormwater infiltration to occur.

Photograph courtesy of Joe Teresi (City of Palo Alto)

At the end of the pathway, trees line the nearby street. The trees and the rooftop vegetation reduce the volume and velocity of stormwater runoff while providing for some natural treatment.

University Medical Center
CO-5 (cont.)

Photograph courtesy of Joe Teresi (City of Palo Alto)

The roof garden uses only one type of vegetation, which facilitates maintenance.

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Living Roof Design Specialist:
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Gap Corporate Headquarters
CO-6

Photograph courtesy of Paul Kephart (Rana Creek Habitat Restoration)

Aerial view of the building's roof garden shows the vegetative areas planted on top of the building made to appear like rolling hills.

Location:

901 Cherry Avenue
San Bruno, CA
Completed 1997
195,000 sq. ft.

Costs:

- Roof garden: approx. $24/sq.ft. ($1.6 million)[2]
- Total cost for building ~ $60 million

Stormwater Benefits:

- Reduced impervious surface area
- Natural treatment of runoff
- Reduced volume and velocity of runoff

Features:

- 69,000 sq. ft. green roof blends in with surrounding hillside grasslands
- Native grasses and wildflowers
- Natural day lighting
- Raised floor for individually-controlled air delivery
- Preserved grove of native oaks
- 2nd most energy-efficient building in California (exceeds requirements by 30%)
- Received a Green Roofs Award of Excellence in 2003.

[2] Paul Kephart estimates that the costs for green roofs have dropped to roughly $8-11 per square foot in the United States (pers. comm., November 12, 2003).

Gap Corporate Headquarters
CO-6 (cont.)

Project Details:

- It is estimated that the roof garden captures and stores about 70% of the rainfall. Other benefits include better insulation of the building, reducing the costs of heating and cooling, and mitigating the "heat island effect."
- The roof irrigation system and annual mowing help mitigate fire risks. The roof is irrigated once per year and mowed by 10 gardeners armed with "weed eaters" in early July. The clippings are left on the roof to provide nutrients for the vegetation.
- The roof membrane has a 40-year warranty against leakage.
- GIS is used to map and manage the roof garden, allowing the building owner to index plants and locate utilities, such as water and electrical lines for maintenance purposes.
- The roof was planted using live plugs of six (6) different types of grasses (as opposed to hydroseeding or hand broadcasting) in six (6) inches of soil. The vegetation has grown to form a 5-inch mat of fibrous roots.

Lessons Learned:

- Gap estimates that the cost of the roof, HVAC, lighting, and other environmental features will be repaid in cost savings from reduced energy and maintenance bills within eight (8) years.
- The roof provides an effective acoustic barrier from the nearby San Francisco Airport.
- Cost-benefit study shows annual maintenance costs are about 70% of the costs for a conventional roof.

For more information, go to: http://www.bayareacouncil.org/bp/bestpractices/bp185.html

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