

**Pacific Shores Center
CO-2**



Site Location:

1500 Seaport Boulevard
Redwood City, CA

Features:

- Multi-purpose detention basin and playing fields
- Second detention basin with cobble bottom
- Parking lot vegetated swales
- 3 miles of paved trails that are an extension of the Bay Trail

Stormwater Benefits:

- Reduced amount of impervious surface area
- Natural treatment of runoff
- Reduced volume and velocity of runoff
- Reduced directly-connected impervious area (DCIA)



This athletic field also serves as a detention basin. The basin is designed to fill up to a four-foot depth and drain within eight (8) hours.

**Pacific Shores Center
CO-2 (cont.)**



Photograph taken from: <http://www.pacificshores.com/>

This photograph offers an aerial view of baseball fields and detention basin.



Photograph taken from: <http://www.pacificshores.com/>

The multi-story buildings allow for vast landscaping that helps reduce the amount of runoff from the site.



Photograph taken from: <http://www.pacificshores.com/>

Aerial view of Pacific Shores Center shows an ideal area to enjoy the Bay Trail.



Parking lot dividers are used as infiltration areas with vegetated swales and trees. Boulders are used to prevent automobile encroachment across the swale.



The parking lot is graded to drain to these vegetated swales, planted with vegetation and trees. The swales were excavated and backfilled with imported sandy loam soil to increase porosity, and constructed with perforated sub-drains. The concrete strip protects the asphalt from water damage. This image was taken prior to grass establishment.

**Pacific Shores Center
CO-2 (cont.)**



Photograph courtesy of Bill Southard (DES, Architects and Engineers)

Cobbles along this detention basin run for several hundred feet to prevent channeling during high runoff.



Photograph courtesy of Bill Southard (DES, Architects and Engineers)

This photo shows the vegetated swale after the native vegetation has grown in.

Lessons Learned:

- Trees planted with only two (2) stakes for support in sandy loam soil within the vegetated swales blew over during a windstorm prior to root establishment. Using three (3) stakes per tree are now recommended.

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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.)**



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Site Contact:
Goldman Sachs Group, Inc.
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Permeable pavement and native vegetation surround this multi-story complex.

**Yahoo! Inc.
CO-7**

Site Location:

701 First Avenue
Sunnyvale, CA

Features:

- Rocky swales
- Multi-story buildings reduce building footprint
- Access to the Bay Trail open space area including parking available for visitors
- Permeable walkways

Stormwater Benefits:

- Natural treatment of runoff
- Reduced impervious surface area
- Reduced directly-connected impervious area (DCIA)



This rocky swale has a storm drain for excess flows.



Rocky swale with curb cuts allows for infiltration to occur.



Rectangular stones are used to create a rocky swale.

Yahoo! Inc.
CO-7 (cont.)



Pervious walkways used to minimize impervious surfaces.



On-site parking is provided for visitors to the Bay Trail (located behind the Yahoo! Campus).



This walkway slopes toward landscaped vegetation; with multi-story buildings in background.



Pervious walkways used between concrete sidewalks.

**Yahoo! Inc.
CO-7 (cont.)**



Curb cuts (see arrow) allow runoff to drain off parking lot into the vegetation.

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Site Contact:
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**Santa Clara University
CO-13**

Site Location:

500 El Camino Real
Santa Clara, CA

Features:

- Turf block fire lanes are used throughout the campus for fire access.
- A few streets have been diverted and replaced with landscaping. To maintain proper fire access, turf block fire lanes have been installed.
- Multi-story buildings reduce building footprint.

Stormwater Benefits:

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

Design Specifications:

- Turf block must withstand 76,000 pounds of gross weight and 20 feet in width for fire trucks (with risers)
- Maintenance performed by Santa Clara University (SCU)



Here the sidewalk and turf block with grass is used for fire access. The arrows point to concrete blocks that mark the extent of the turf block areas.



Concrete blocks mark the fire lanes throughout campus (also see photograph to left).

Santa Clara University
CO-13 (cont.)



This street used to extend directly through campus. Now the sidewalk and turf block is used for fire access while providing more areas for infiltration and aesthetic value.



The fire lane here uses both the sidewalk and turf block for access. Bollards can be removed for emergency access.



Concrete blocks mark the turf block fire lane so that fire trucks can drive along the proper area without sinking. "No Parking" signs and red curbs help denote the fire lanes. Note that the nearest tree will need to be relocated to maintain the necessary width.



Multi-story dormitories reduce the building footprint size and thereby decrease impervious surface area. Turf block allows emergency access to these dormitories.

Santa Clara University
CO-13 (cont.)



This street, which extended through the university, was redirected and replaced with turf block and sidewalks for fire access.



This sidewalk also provides emergency vehicle access. The fire lane continues on through the shrubs onto the turf block.

Lessons Learned:

- Periodic inspection of fire lanes and training is important to remind SCU staff not to place obstacles in fire lanes (e.g., trees, garbage bins, oversized shrubs).

Municipal Contact:

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The Crossings MU-1

Site Location:

2255 Showers Drive
Mountain View, CA

Features:

- High density (multi-story) housing with reduced building footprints integrated with commercial areas
- Located near mass transit including bus lines and CalTrain station
- Disconnected downspouts drain into landscaping
- Turf block fire lanes
- Landscaped center of driving circle

Stormwater Benefits:

- Transportation-related pollutant reduction
- Reduced impervious surface area
- Reduced velocity of runoff
- Reduced directly-connected impervious area (DCIA)
- Natural treatment of runoff



“The Crossings” is conveniently located across the street from the San Antonio CalTrain Rail Station.



Turf block fire lane provides access during emergencies. The bollards can be removed for emergency access.

**The Crossings
MU-1 (cont.)**



Multi-story housing reduces the building footprint and, thus, impervious surface area. Rooftop runoff drains into landscaping rather than directly to the storm drain system.



This rain gutter drains into landscaping reducing the amount of directly-connected impervious area (DCIA).



Drive around circle has a landscaped island, providing an area for infiltration.



The Crossings is located within walking distance to major commercial areas for groceries and other shopping needs, thereby reducing the need for auto use.

The Crossings MU-1 (cont.)



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Mixed use commercial businesses located within the Crossings encourage residents to walk to shops thereby reducing the reliance on motor vehicles.

Other Opportunities:

- To improve the site design from a stormwater quality perspective, the island could have been designed to accept runoff from the street through such features as concave landscaping with pavement protection, curb cuts, and grading the street to drain to the island.

**Santana Row
MU-2**

Site Location:

360 South Winchester Blvd.
San Jose, CA

Features:

- Mixed-use high-density housing and regional commercial
- Encourages pedestrian activity and public use of outdoor space
- Preserved mature trees in redevelopment areas
- Use of multi-story buildings reduces building footprints
- Street trees

Stormwater Benefits:

- Transportation-related pollutant reduction
- Reduce impervious surface area
- Reduce volume and velocity of runoff



Photograph courtesy of Jenny Nusbaum (City of San Jose)



Photograph courtesy of Jenny Nusbaum (City of San Jose)

Mixed-use, high-density multi-story housing combined with commercial areas, provide access to conveniences without the need to drive. Street trees have many benefits, including stormwater management.

Shops conveniently located below housing units promote pedestrian activity.

**Santana Row
MU-2 (cont.)**



Photograph courtesy of Jenny Nusbaum (City of San Jose)

Trees in place before redevelopment were maintained for the new residents to enjoy. Trees reduce the volume and velocity of rainwater.

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**North Park
MU-3**

Site Location:

155 & 175 River Oaks Parkway & 3491
Zanker Road
San Jose, CA

Features:

- High density housing near North First Street Light Rail Line
- Encourages pedestrian activity and public use of outdoor space
- Multi-story building reduces the building footprints

Stormwater Benefits:

- Reduced impervious surface area
- Transportation-related pollutant reduction



Photograph courtesy of Jenny Nusbaum (City of San Jose)

Commercial areas conveniently located below housing units promote pedestrian activity.



Photograph courtesy of Jenny Nusbaum (City of San Jose)

Open space surrounding high density housing for residents to enjoy also provides good drainage areas.



Photograph courtesy of Jenny Nusbaum (City of San Jose)

Multi-story buildings reduce the amount of impervious surface.

North Park MU-3 (cont.)



Photograph courtesy of Jenny Nusbaum (City of San Jose)

Light rail runs within walking distance, conveniently located behind the park and adjacent to housing.

Other Opportunities:

- Disconnected downspouts could have been drained to landscaping to break up directly connected impervious area.

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Saratoga Trails PA-9

Site Locations:
Saratoga, CA

Features:

- Pedestrian and bike access trails created as part of subdivisions

Stormwater Benefits:

- Reduces transportation-related pollutants (promotes alternative transportation)
- Reduced impervious surface area
- Open space benefits



Photograph courtesy of Ann Welsh (City of Saratoga)

This trail is located on Prospect Road between Beauchamp Lane and Parker Ranch Road and provides open areas for pedestrians to enjoy.



Photograph courtesy of Ann Welsh (City of Saratoga)

This pathway located on Villa Oaks land east of the intersection with Deer Trail Court, provides access for people to hike or bike into the hills beyond the houses.

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**San Tomas Aquino-Saratoga Creek Trail
PA-10**

Site Location:

Sterling Boulevard at Barnhart
Cupertino, CA

Features:

- Pedestrian and bike bridge allows access

Stormwater Benefit:

- Reduced transportation-related pollutants

Notes:

- This section of the creek trail will eventually connect to the regional trail system.



The San Tomas Aquino-Saratoga Creek Trail allows for people to go for a walk or run near the creek.



The pathway provides access for locals to take advantage of the creek trail in their neighborhood. The trail promotes alternative transportation by providing convenient access for pedestrians and bicyclists.



Pathway leads to bridge that crosses creek to the San Tomas Aquino-Saratoga Creek Trail.

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**Santa Cruz Avenue
PA-11**

Site Location:

Santa Cruz Avenue
Los Gatos, CA

Features:

- Pedestrian activity
- Bike activity
- Bulbouts at crosswalks
- Street trees

Stormwater Benefits:

- Reduced transportation-related pollutant
- Reduced volume and velocity of runoff

Lessons Learned:

- Pedestrian vehicle accident rate has dropped significantly since the road was narrowed.



Bulbouts at crosswalks encourage pedestrian activity by resulting in slower traffic speeds and by providing shorter distances across traffic lanes for improved pedestrian safety.



Among the many benefits of street trees are the reduction of the volume and velocity of stormwater runoff and aesthetic value.



Bike lanes on streets adjacent to Santa Cruz Avenue help promote alternative transportation to the downtown area.

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Basking Ridge SF-1

Site Location:

Basking Ridge Avenue
San Jose, CA

Features:

- Two detention ponds
- Wetland vegetation
- Parking pullouts and narrower streets

Stormwater Benefits:

- Natural treatment of runoff
- Reduced velocity of flows
- Reduced impervious surface area



Photograph courtesy of Sheila Tucker (BASMAA)

Parking pullouts allow narrower streets that require less land area and provide more space for trees and grass. These landscaped areas reduce the volume and velocity of rainwater and maximize infiltration. Properties on narrow streets with tree-lined landscapes typically have higher property values. The use of narrow streets also reduces construction costs.

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Photograph courtesy of Sheila Tucker (BASMAA)

Stormwater runoff is directed into the detention pond which temporarily holds the water, allowing for settling of sediments and pollutant removal to occur. The system releases runoff slowly to reduce downstream peak flows.



Photograph courtesy of Sheila Tucker (BASMAA)

Wetland vegetation helps to remove dissolved metals and nutrients. A walking trail bordering the pond on Dana Court demonstrates how a stormwater treatment device can benefit the environment and be attractive, thereby enhancing the neighborhood character.

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Note: Some text courtesy of Sheila Tucker (BASMAA)

**Tully Community Branch Library and Ball Fields
PA-14**

Site Location:

880 Tully Road
San Jose, CA

Features:

- Vegetated Bioswales
- Water-conserving Irrigation System
- Connects with Coyote Creek Trail, Allowing Bicycle and Pedestrian Access

Stormwater Benefits:

- Natural treatment of runoff
- Reduced Volume and Velocity of Runoff
- Reduced Directly-connected Impervious Area (DCIA)
- Reduced Dry Weather Flows



Runoff from surrounding impervious areas flows to vegetated bioswale.



Vegetated bioswale collects runoff from building



Walkway and roof runoff drain to vegetated bioswale



Runoff from parking lot drains to vegetated bioswale



Carex grasses in vegetated bioswale



Vegetated bioswale collects runoff from walkways (above and right)



Site plan of Tully Community Branch Library



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