



GSA Public Buildings Service

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Information provided is a collaborative effort between EPA and GSA - 2007

## Public Buildings Service

Sustainable Features of the new regional EPA headquarters building

### Green Roof



#### **Overview:**

The EPA and the City of Portland demonstrated the effectiveness of “ecoroofs” as a means of removing pollutants and of reducing the rate of stormwater runoff to the Denver Department of Urban Drainage. As a result, the Department agreed to allow this green roof to serve as a sole stormwater management method from the roof portion of the building. They waived the standard detention tanks and filtration vaults in lieu of this system. The roof also serves in reducing the urban heat-island effect of the building and features 48 solar panels that are mounted on the south corner. The solar panels are expected to output 10kW at peak sun.

#### **Design statistics:**

- Vegetated roof covers approximately 20,000 square feet on three terrace levels
- Modular trays-2-feet by 4-feet hold 4” of engineered growth medium
- Plants exclusively from sedum species makes up plant community
- Approximately 40,000 plants were placed in trays
- The pallets are designed to retain about 60 percent of the water they catch. The rest is filtered through the pallets and piped through the building.
- Demonstration project to mitigation storm-water runoff
- First time application (local government) as Best Management Practice, addressing degradation to water quality in the local watershed-South Platte River.

#### **Results of green roofs:**

- Improve water quality runoff by retaining and filtering pollutants held in rainwater
- Reduce storm drainage systems loads
- Reduce heat island effect
- Filter air pollutants
- Mitigate smog formation
- Provide wildlife habitat
- Acts as insulator reducing heating and cooling consumption resulting in lowering building energy expenditures



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### **Economic benefits:**

- Longer service-lifespan than conventional roofs- vegetated roofs protect roof surface from UV rays
- Decrease costs associated with installation of a detention structure & related filtration reservoir
- Lifetime costs comparable
- Lower stormwater utility fees assessed by local utility
- Building- enhanced resale value of property

### **Green Housekeeping Measures**

- Green Seal Standards (GS-37 by EPA) applies to product selection for General Purpose, Bathroom, Glass, and Carpet Cleaners
- Green Seal Standards (GS-34) requirements- no heavy metals such as arsenic, lead, cadmium, cobalt, chromium, mercury, nickel, or selenium pertain to product selection
- Product-specific health and environmental requirements of Green Seal GS-34 Standard for Cleaning/Degreasing Agents, in that the product shall:
  - Be non-toxic to humans
  - Not contain any chemicals that are carcinogens or that are known to cause reproductive toxicity
  - Have pH of the degreasing agent concentrate less than 11.0 but greater than 2.5
  - Not be a skin or eye irritant
  - Not contain substances that can contribute significantly to the production of photochemical smog
  - Not contain any ozone-depleting substance
  - Not be toxic to aquatic life
  - Not contain phosphates in quantities above .5% by weight of total phosphorus
  - The manufacturer shall either take back unused or spent products for recycling or disposal or provide the user with specific recycling and disposal instructions
  - Not be ignitable (i.e., the flashpoint for compound is above 140° F)

### **Heating and Cooling**

HVAC system designed for energy and ventilation efficiency. Under-floor air distribution system delivers heated or cooled air to individual offices more efficiently using less electrical power. Cooling is provided by an efficient chilled water distribution system. Steam from a local utility is used for space heating and hot water.

The building design has a “double-L” floor plan, designed to address solar orientation and local wind patterns to optimize energy efficiency. Structural materials and concrete provide thermal mass. Other contributing elements:

- Low- emissivity glass-treatment acts as an insulator and offers energy efficiency of windows by reducing the transfer of heat or cold through glass.
- Air-side economizer captures the outside air to cool interior of building rather than cool existing inside air and capture heat generated from interiors mechanical systems to heat interior of building.
- Green (vegetated) roof added an insulator, thus reducing energy expenditures around heating & cooling.
- Waste-energy from the steam-power (waste heat from the steam condensation discharge) will heat domestic water for building



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### **Lighting**

Variations of a glazed curtain-wall system were designed for the different facades. The sunward façade was designed with horizontal exterior sunshades and a system of internal light shelves designed to cut glare and solar gain. The windward façade has a series of exterior vertical shades to cut glare from low-angle summer sun while simultaneously harvesting diffused light from the clear north sky.

Building design provides for natural light in 85% of floor space. Lighting fixtures meet stringent industry efficiency standards. Reflective surfaces, task lighting, daylighting dimmers and occupancy sensors reduce energy use. Also, computer-controlled blinds on SE & SW sides help control glare and mitigate solar heat gain and low solar angles. Lastly, the building design includes a large atrium that creates a light source.

### **Water Conservation**

Highly efficient and waterless plumbing fixtures are part of the entire building. An estimated 49% water savings is expected compared to baseline.

- Water free urinals: potential savings of 360,000 gallons per year (not currently approved for use in Denver)
- Dual flush toilets: potential savings of 270,000 gallons per year.
- Reduced irrigation
- Low flow sinks and showers
- Ultra low flow lavatory