4.0 SUSTAINABLE DESIGN

4.1 Introduction

The construction of sites and buildings have a significant impact on the natural environment. The operations of a site and a building, can also affect the air, land and soil of the Downtown. Sustainable Design measures seek to lessen the impact on the natural and built environment. Such design efforts also aim to increase the efficiency at which buildings operate, in regards to energy use and operating costs. The design process is comprehensive, beginning with site selection and orientation; through specification of sustainable materials to energy efficient operating systems.

Downtown Washington is a built environment of many historic buildings, modern buildings, public streets, parking lots, a few vacant lots and open space. Sustainable Design measures can be applied to both existing buildings and new buildings. The U. S. Green Building Council (USGBC) has become the leading organization in developing standards for sustainable design and operations of buildings. The U. S. Green Building Council's certification system is known as Leadership in Energy and Environmental Design (LEED). The majority of LEED designated buildings are new construction projects, however the USGBC has also developed standards for the upgrade of existing buildings.

Sustainable design is a broad and encompassing initiative which strives to create a built environment which is good for both man and nature. The following recommendations only introduce the basic fundamentals of sustainable design regarding Downtown buildings and environments. For additional information beyond these guidelines, numerous resources exists, such as the following:

- U. S. Green Building Council (USGBC) www.usgbc.org

- Whole Building Design Guide www.wbdg.org

- American Society for Testing and Materials International (ASTM)
  ASTM E2432— Standard Guide for General Principles of Sustainability Relative to Buildings www.astm.Standards.e2432.htm

Permeable pavers for parking area allow stormwater to percolate back into the soil and groundwater.

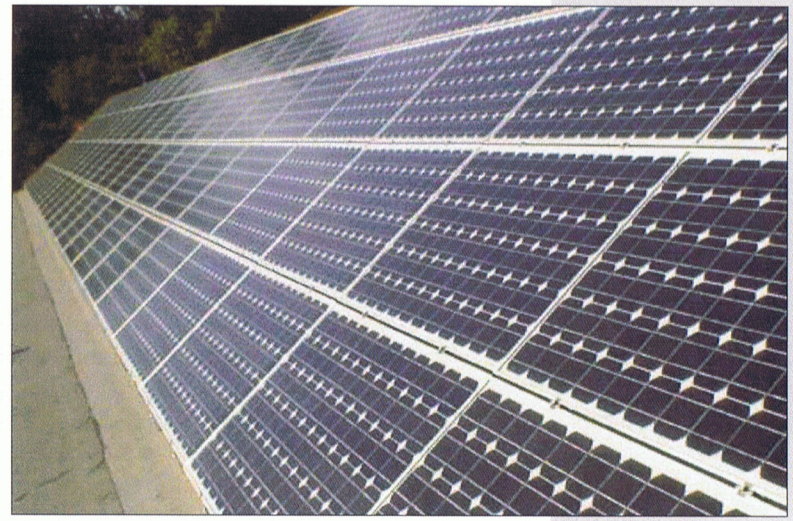
Interior flooring fabricated from bamboo, a rapidly renewable resource.

4.2 Fundamentals

Sustainable design measures are constantly changing, however there are six fundamental principles which constitute sustainability.

1) **Optimal Site Potential:** Consider site selection, building orientation and existing natural features of a site including topography, drainage, landscape and natural habitats. The rehabilitation and reuse of existing buildings should always be evaluated as an alternative to new building construction.
2) **Efficient Use of Water:** The design and use of water systems in a building maximize efficiency and recycle water for on-site use when feasible. Site design should seek to reduce stormwater run off from the site. Use best management practices (BMP) to limit stormwater run off, clean storm water and trap pollutants in the water before discharging into the sewer system.
3) **Environmental Materials and Resources:** Utilize building materials with a high percentage of recycled content or contain rapidly renewable materials such as cork flooring, bamboo cabinetry, wool carpeting, etc. Specify or use materials or items which are manufactured within proximity to the project site. Ideally, this proximity is no more than 500 miles.
4) **Optimal Energy Use:** The operation of a site and building identify methods for increased energy efficiency or use renewable resources such as solar or geo-thermal energy.
5) **Interior Environmental Quality:** Identify methods for creating a healthy environment, and increasing the comfort of building users. Proper ventilation, use of natural light, and moisture control are a few methods to ensure a quality interior space.
6) **Optimal Operations and Maintenance Methods:** Utilize building systems, furnishings and finishes which will have minimal operations and maintenance needs. Such systems will require less energy, less water and can be maintained with natural cleaners which are not toxic to the environment or occupants.

"Green Roofs" reduce stormwater runoff, reduce heat gain and provide aesthetics for viewing/ experiencing by building users.

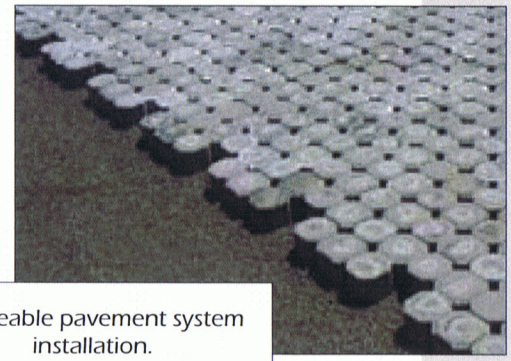


Solar panels provide an additional energy source for building power needs.

4.3 Elements

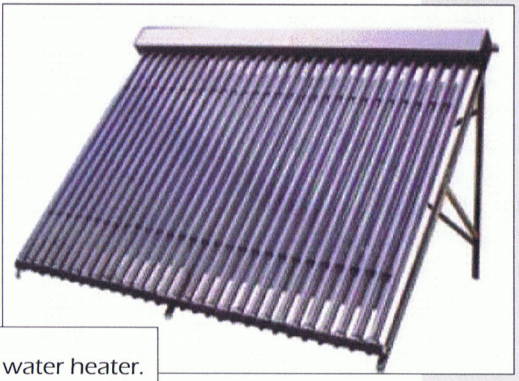
Sustainable design elements are extensive. The following list seeks to introduce only a few recommendations which are applicable to Downtown Washington.

1) **Parking and Service Areas:** Minimize stormwater runoff by using pervious pavement materials such as pervious paver systems or pervious concrete. Such systems will allow stormwater to percolate into the soil and not into the public stormwater sewer system.
2) **Building Materials:** Utilize materials which are composed of recycled materials or manufactured from rapidly renewable materials, which are made from plants that are typically harvested within a 10 year cycle. Examples include bamboo flooring, linoleum flooring (made of wheat flour and linseed oil) cotton batt insulation and wheatboard cabinetry. Recycled bricks from demolished buildings should also be used for new building construction or restoration projects.
3) **Alternative Transportation:** Promote by providing secure bicycle storage and changing/shower facilities for employees.
4) **Solar Energy Alternatives:** Install solar panels to supplement the power system for commercial and residential buildings. Utilize prefabricated solar water heaters to provide the majority of the hot water needs for buildings.
5) **Stewardship:** New wood products, including construction lumber, should be certified by the Forest Stewardship Council, which promotes responsible forest management.
6) **Lighting:** Develop a lighting plan for public spaces which minimizes excessive lighting, which affects night sky viewing and the migratory patterns of birds. Flags which require lighting should be lit from the top shining down on the flags instead of being lit from the ground, projecting light into the sky.
7) **Operations:** Use timers on public fountains and lights in non-essential areas to shut off lights after 1:00 a.m., in order to reduce energy consumption.
8) **Landscaping:** Plant native landscape materials which can survive on natural rainfall once established.
9) **Street Furnishings:** Specify site furnishings such as benches, waste receptacles, bollards, and planters which are made from recycled plastic materials.
10) **Water Conservation:** For building exteriors capture rain water runoff from roofs in rain barrels for irrigation use or direct to rain gardens on site. Consider waterless urinals or low flow water closets to limit potable water use inside buildings.



Permeable pavement system installation.

Rain garden with native landscape plants.



Solar water heater.