
SUSTAINABLE SITE DEVELOPMENT

Bruce A. Hendee, ASLA¹

INTRODUCTION

Two weeks ago I went for a trail run at Coyote Ridge. Located about five miles south of Fort Collins, the Coyote Ridge trail is about a seven mile round trip and takes runners up a geological hogback and then down into a pristine valley. Here I was in a system perfectly balanced but not static; one in which all systems were in a state of dynamic interaction but always shifting in a way that ensured continuity. Life was moving in a balanced system. There was enough food, water, and shelter produced, but there was no waste. Even I, standing in the valley, had an opportunity to add to the balance. This to me represents sustainability, that is, living in such a way as to produce no waste and use only what we need to survive. The concept is interesting because the living things we destroy in order to eat are only those necessary; the beverage we drink (water) is only that necessary to stay hydrated. The soil and stone we use are only that necessary to provide shelter from the wind, rain, and snow. In this system there is no medicine; life lasts as long as we live without significant disease or injury. When it is time to go, we give up the fight but even then we are in balance. Our bodies are reduced to the fundamentals from which we came and restored to the earth in a way that restores the earth for generations to come. Our spirits are hopefully reincarnated or we go wherever our death takes us on our spiritual travels.

Of course as humans we are a long way from the perfect balance of nature—true sustainability—but the definition provides a positive goal. The essence of the message is to reduce wastefulness by lessening our ecological footprint, and thereby giving the earth time and opportunity to restore itself. As my daughter so succinctly put it, we need to manage ourselves in a way that allows our species to continue to exist. Even better, through living our lives in the perfect way we would provide food as a byproduct of our existence to allow other species to exist. Today the

United States represents 4% of the earth's population, yet we consume 25% of the earth's natural resources. With the rise of China as a major economic power together with the G7 major economic powers of the world, the consumption of natural resources by humans is exploding, and is expected to increase geometrically. According to the Energy Information Administration of the Department of Energy, the United States has doubled its energy use in the last 24 years and is expected to continue to double its energy use in the next 24 years, unless our country and our neighbors on this planet decide to change. Given the current geopolitical climate and the recent threats in oil production created by hurricanes Katrina, Rita, and Wilma, our country is finally beginning to take note of energy consumption. Nothing wakes one up more quickly than being without energy for a week or two. The impetus and incentives for change are growing.

In 2004, for example, the LEED (Leadership in Energy and Design) program of the U.S. Green Building Council (USGBC) was one of the fastest growing building trends in the United States. LEED was established by the USGBC as a means of tracking resource reduction and environmental quality in building projects. The program has seen outstanding interest by the design community, as well as in many government and private institutions. The LEED process is a design approach which encourages reduction in use of natural resources and strives for improved quality of the built environment. The approach is an integrative one that encourages the design team to work together in a collaborative process to develop synergistic solutions. Working as a team, many disciplines overlap, and by taking an integrated approach, solutions are developed that would not be possible when working alone.

LEED projects can be certified at various levels, each of which represents differing levels of attain-

1. BHA Design Inc., www.bhadesign.com. Mr. Hendee may be reached at (970) 223-7577 or bhendee@bhadesign.com.

ment with respect to sustainability. Up to 69 points can potentially be achieved. A project achieving 69 points would be at the highest level of sustainability under this rating system and qualify as a platinum project. The current standards allow for the following levels of attainment:

- Certified: 26–32 points
- Silver: 33–38 points
- Gold: 39–51 points
- Platinum: 52 or more points

Of the points possible, 14 can be achieved in the Sustainable Sites category. The Water Efficiency category allows for up to 5 points, two of which relate to water conservation in the landscape.

SUSTAINABLE SITES

One important component of the LEED process relates to developing sustainable sites. A sustainable site is one in which land use densities, civil, planning, landscape, water use, and other issues are taken into consideration and planned for in a way that assists in reducing the ecological footprint of a new construc-

tion or renovation project. The Sustainable Sites section of LEED has one prerequisite and up to 14 points possible for other sustainable site development techniques. Before we delve into the specifics, let's consider one larger urban planning issue.

URBAN PLANNING

One of the first and most significant aspects of sustainable sites is to encourage more compact urban forms in order to reduce dependence on the automobile and lessen the amount of farmland being developed every year. Prior to the invention of the mass-manufactured and affordable automobile by Henry Ford, city form was much more compact. The primary mode of transportation was the wagon drawn by a horse. Given the limitations of distance a horse could travel in a day, cities were limited in overall size. Airplanes were not an option, so the only mode of travel was train or horseback. This defined our cities in a way that encouraged a compact form. To travel five miles to a meeting or to sell farm products or other goods would have taken one to two hours or more. Once the car was invented this changed. Now a five mile meeting or

Sustainable Sites

Credit	Description	Points
Prereq.	Erosion & Sedimentation Control	Required
Credit 1	Site Selection	1
Credit 2	Development Density	1
Credit 3	Brownfield Redevelopment	1
Credit 4.1	Alternative Transportation, Public Transportation Access	1
Credit 4.2	Alternative Transportation, Bicycle storage and changing rooms	1
Credit 4.3	Alternative Transportation, Alternative Refueling Stations	1
Credit 4.4	Alternative Transportation, Parking capacity	1
Credit 5.1	Reduced Site Disturbance, Protect or restore open space	1
Credit 5.2	Reduced Site Disturbance, Development Footprint	1
Credit 6.1	Stormwater Management, Rate and Quantity	1
Credit 6.2	Stormwater Management, Treatment	1
Credit 7.1	Heat Island Effect, Non-Roof	1
Credit 7.2	Heat Island Effect, Roof	1
Credit 8	Light Pollution Reduction	1
	Total Sustainable Sites	14
Water Efficiency—Site		
Credit 1.1	Water efficient landscaping, reduce by 50%	1
Credit 1.2	Water efficient landscaping, No potable use or no irrigation	1
	Total Water Efficiency	2

product delivery could be accommodated in less than 10 minutes. This meant businesses could be situated farther apart. Another impact of the automobile was that people could live farther from their workplace. This concept allowed individuals to live in the more desirable countryside, while still having a place of business in the heart of the City.

In the late 1930s Franklin Roosevelt and Congress began the national highway system by funding the first transcontinental highway. Dwight D. Eisenhower in 1956 formalized this by creating the National Defense Highway System. This act provided initial funding for what today is known as our interstate highway system. Interstate highways are what really began suburban sprawl and what is largely responsible for continuing sprawl today. With faster vehicles and more open, high speed roadways, living in the country and working in the city became even easier. Unfortunately, what happened is that others had the same idea and moved to the country as well. Ultimately roads became jammed and citizens found themselves mired in bumper-to-bumper congestion. This has led to an ever widening circle of development. After the primary interstates were filled to overflowing, the ring road came along to enable people to circle the mess created in the downtown area. What happened after this is that retailers quickly realized they had a massive captive audience. With hundreds of thousands of vehicles passing by on a freeway, merchants began to search for retail locations which capitalized on passing vehicles and in turn fueled commercial development on the city edge. The result has been a continuing expansion of our city form resulting in massive numbers of miles driven by Americans every day. Currently, Americans burn 165 billion gallons of gas every year, and 60% of our oil is imported. The miles have added to carbon dioxide emissions, fuel consumption, lower air quality, congestion, motorist irritation, and an expanding infrastructure with subsequent maintenance requirements. Increasing city size has also contributed to our country's dependence on oil and created the subsequent geopolitical issues associated with this dependence. Of all the things we can do as a country, reducing our continuing branching out into the countryside perhaps has the most potential benefit.

There have been several planning trends in recent years that are beginning to make inroads into the problem of suburbia. The New Urbanism which fo-

cuses on Traditional Neighborhood Developments (TND) and Transit Oriented Development (TOD) are two relatively recent trends that encourage a more compact form of development. Both TNDs and TODs encourage a highly compact form of development that accomplishes several important goals for reducing sprawl. Both of these approaches use less land and encourage a more mixed form of development. Another very recent and related trend became evident at this year's International Conference on Shopping Centers (ICSC). The trend this year clearly is leaning toward more mixed use communities integrated with retail development. Each of these trends has a common theme that relates to sustainable design. They each encourage higher density residential development, closer access to daily retail needs, and access to some form of mass transit for larger trips. A classic planning consideration for one of these projects is to plan for a five- to ten-minute walk distance from housing to some form of civic amenity such as retail or institutional uses. In essence they recreate the classic nineteenth-century urban form only in a modern context. The value lies in getting individuals out of their cars and into a more healthful walking environment while reducing overall energy consumption.

The LEED scoring system devotes two points to this aspect of sustainable site development. The first is to provide a point if development does not occur on prime farmland, and the second is for building on infill parcels already located within a developed city area. Of all the areas designers and planners can affect, reducing the size of cities through urban planning is perhaps the most significant.

THE SITE

After urban planning and suburban sprawl, sustainable site development becomes an issue of site planning, civil engineering, and sustainable landscapes. The LEED system breaks down 15 individual areas for the development of sustainable sites and one area that affects development of sites which is related to water use reduction.

EROSION CONTROL AND SEDIMENTATION

Erosion is a naturally occurring process. The long-range process that both wind and water have on soil profiles creates much of the topography of the land.

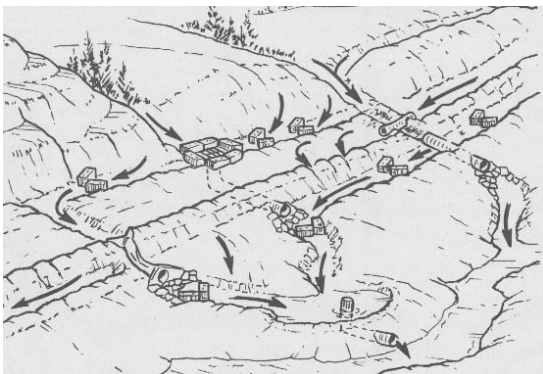
Without soil erosion we would not have the Grand Canyon, Arches National Park, or many of the other wonderful landforms that exist on our planet. Erosion is responsible for creating river valleys and in deposition of soils for valuable farming lands. Erosion, however, can become excessive with inappropriate development techniques and improper farming methods.

The Natural Resource Conservation Service within the United States Department of Agriculture provides information on soils throughout the United States, and the Environmental Protection Agency provides water quality regulation with accompanying erosion guidelines. At the state level many states and local governments regulate soil erosion and have specific laws in place to manage the development of property. These laws describe practices necessary for developments in order to minimize degradation of downstream water quality from excessive runoff and to minimize wind born erosion. The LEED process establishes this practice as a prerequisite for any development in order to qualify for any points within the overall Sustainable Sites category.

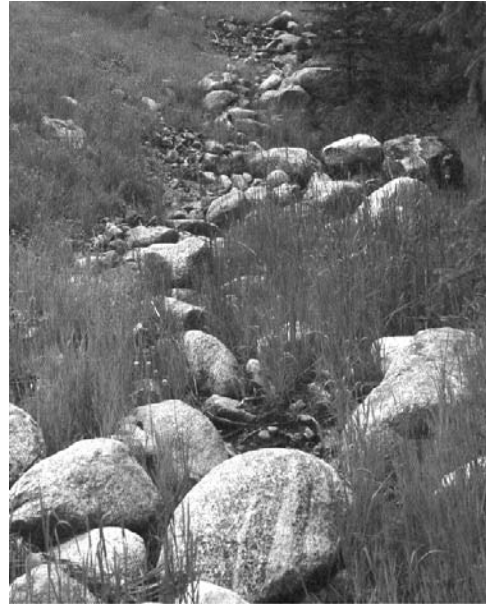
Erosion control measures must meet requirements of either the EPA or the local municipality, whichever is more stringent.

Techniques employed for erosion control include a variety of measures including sedimentation ponds, diversion ditches, cover crops, erosion control fabric, erosion fencing, watering trucks, strawbales, hydro-mulching, and crimping of straw into the soil—basically any technique that will arrest soil from running off with rainfall or through wind. Typically, an

Erosion Control. Image Courtesy Colorado Department of Transportation



Erosion control can add quality to site appearance



Erosion Control and Sedimentation plan will be required with any development proposal. The plan then guides the construction process and ensures minimal erosion.

SITE SELECTION

There are several criteria that a project must meet to qualify for credit under the LEED rating system. The first requirement encourages development to occur in land not considered to be prime land. The United States Department of Agriculture defines prime farmland as “land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops, and is also available for these uses (the land could be cropland, pastureland, rangeland, forest land, or other land, but not urban built-up land or water).” Millions of acres of prime cropland in the United States are lost each year to new development. The intent of this credit is to reduce the loss of valuable farms and to encourage development on lands not used for farming and to encourage infill development. The Natural Resources Conservation Service (NRCS) defines these lands additionally with prime agricultural land maps.

Another requirement to qualify for site selection credit is that land must be out of the floodplain.

- Do not develop on Prime Farmland.
- Do not develop on land whose elevation is lower than 5 feet above the 100 year floodplain.
- Do not develop on habitat for T & E species.
- Do not develop within 100 feet of any water or jurisdictional wetlands.
- Do not develop on public parkland unless traded for equal or better land by a public agency.

Specifically it must be a minimum of 5 feet above the floodplain and may not be within 100 feet of any jurisdictional wetlands as defined by the Environmental Protection Agency.

Lastly, the development may not be on any public parkland unless a trade is made for another site that is equal to or better in quality than the land being used.

DEVELOPMENT DENSITY

Development in outlying lands is often more inviting for development. There typically are fewer problems with neighborhood opposition, and raw land costs are often less expensive. There also are often fewer problems associated with traffic congestion, and the entitlement process flows more easily during the government approval process. There is, however, a significant price to pay in additional drive distances and commuter miles, more air and water pollution, and increased infrastructure costs.

The development density credit offered by the LEED rating system is specifically intended to encourage infill development. The requirement has two components that a project needs to meet in order to qualify for credit. The first requirement is that the project must meet a minimum development density of at least 60,000SF per acre. Secondly, the surrounding density of development must be at least as dense. This is roughly equivalent to a two-story downtown building.

BROWNFIELD REDEVELOPMENT

Perhaps one of the most difficult and yet one of the most important LEED credits is for the development

Density is encouraged to slow sprawl



or redevelopment of sites that have been contaminated during a prior use. It is quite difficult to get anyone interested in redeveloping a contaminated site because of the risk and cost associated with unearthing hazardous materials during construction. LEED provides credit for this effort in order to encourage cleaning up sites that would otherwise remain contaminated. Often these sites are also infill and thus a development has the potential of achieving multiple credits. Remediation benefits the community by cleaning up hazardous materials and returning land to a beneficial use.

To qualify for this credit a site must meet the requirements of an ASTM E1903-97 PHASE II Envi-

Brownfield redevelopment is some of the most difficult to tackle.



ronmental Assessment documenting the contamination. Once identified the project must remediate the hazardous contamination in order to qualify for the credit.

ALTERNATIVE TRANSPORTATION

One of the biggest and most significant issues facing the United States today is the amount of miles driven by citizens. According to the Energy Information Administration (EIA), Americans today drive over 192 billion miles per year. Since 1950 Americans' thirst for oil has continued to escalate. In 1950 our demand for oil was 3.5 million barrels per day. As of the year 2000 oil demand was at approximately 13 million barrels per day and is expected to continue increasing. With more countries such as China becoming urbanized the depletion will only accelerate. Estimates through the year 2025 by EIA predict that, although fuel efficiency will increase slightly, total demand will increase.

According to many sources the supply of oil in the world is at or near its peak and will in a short time begin a decline. According to predictions the decline will begin slowly and then start a much steeper decline. The impact on the world economy could be staggering.

The LEED Sustainable Sites section of the overall LEED rating system encourages people to get out of their single occupancy vehicles and begin to implement different strategies to reduce overall vehicle use. Up to four points can be attained toward LEED certification through the use of bus transit, alternative fuel vehicles, preferred parking for carpools, providing bicycle and shower facilities, and through limiting parking capacity on building sites.

Trains, cars, bicycles, and busses help reduce dependence on fossil fuels and improve air quality.



REDUCED SITE DISTURBANCE

The destruction of natural areas through the development of new facilities has a major impact on ecosystems. A typical construction project may completely clear a property of natural vegetation including trees, grasses, topsoil, and habitat. In an attempt to provide incentive for projects to be more sensitive to plant communities and environmental impacts during construction, the LEED system provides credit for using techniques that protect native landscapes during construction. In order to accomplish this credit, the distance that site disturbance can occur from various constructed elements is limited. For example, site disturbance can occur no farther than 40' from building footprints, 5' from primary roads and sidewalks, and 25' beyond constructed permeable surfaces of the site.

This is not always easy to accomplish or to decide if the protection limits are the best approach. In certain areas of the country, such as the western plains of Colorado for example, the trend is to over-plot grade an entire site in order to balance the cut and fill of soil. Typically, the high plains of Colorado do not have any trees, so over-plotting does not endanger trees. This is in contrast to the forested Eastern half of the United States where over-plotting a construction site could destroy many trees with hundreds of years of growth.

The normal process in Colorado is to strip topsoil from the site, stockpile it, and then redistribute it after development is complete. The following step would then be to revegetate with seeding or sodding. The purpose behind this technique is twofold. The first is to protect the existing topsoil and the second is to prevent energy-consuming and expensive trucks from hauling topsoil in or taking it off of a site. In this instance the decision can be based on which does the least damage to the environment: minimizing truck and topsoil hauling impacts or minimizing site disturbance. If there were trees on the site, the decision would be much easier since destroying valuable trees would be less likely given their value in the arid Colorado environment.

A second credit can be achieved through limiting the total development footprint including buildings, walkways, drives, and parking areas. In order to get credit a project must exceed the minimum open space requirement established by the governing en-

tity by at least 25%, or in the event there is no zoning, the open space must be equal to the development footprint.

STORMWATER MANAGEMENT

Development impacts downstream water quality and adds to the potential for flooding. As impermeable surfaces such as rooftops and parking lots are constructed, rain water runs off the site more quickly than prior to development. The hard and impervious surfaces such as asphalt and metal roofing increase the rapidity of runoff and have the potential to increase the quantity of runoff. As runoff quantity increases the flooding potential increases for downstream sites. In addition, the quality of storm water decreases with development. Motor oils, gasoline spills, soil, and other contaminants increase because of parked cars, people washing automobiles, and other chemicals associated with cars and other activities. Polluted runoff in storm drains eventually empties into rivers and has the potential to harm or kill fish, and impact animals and downstream municipalities that rely on stream water for their drinking supply.

The LEED system encourages the development of sites in a manner that protects downstream properties from being flooded during major rainstorms. It also protects the quality of stormwater runoff. Developing properties are required to have stormwater detention ponds that reduce the rate of runoff as well as

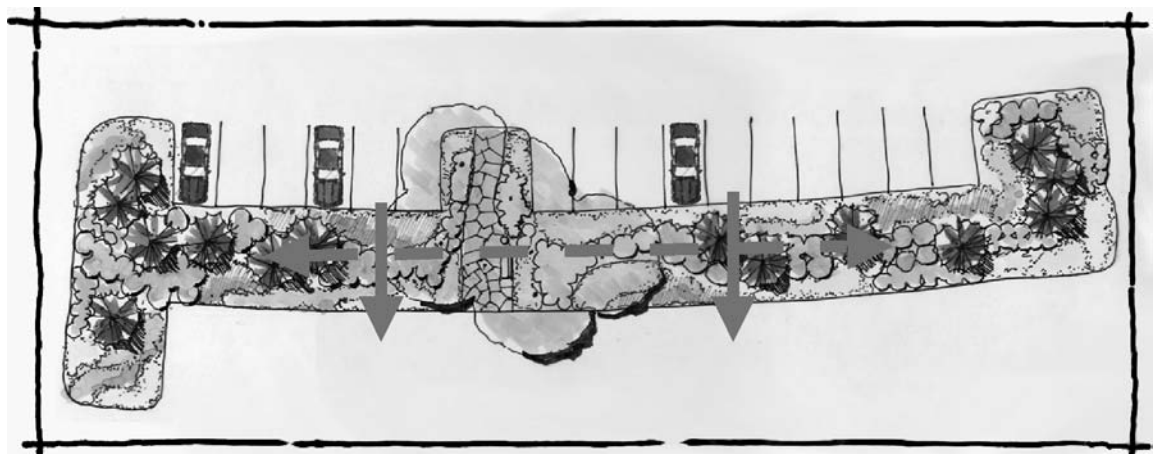
to reduce water-borne pollutants. Through use of techniques such as detention ponds, bioswales, sand filters, and infiltration basins, water polluted with runoff from parking lots and building downspouts can be treated before it leaves the site. Additionally, the rate of runoff, and in certain cases the quantity of runoff, can be reduced to minimize flood potential.

Currently, our office is working on a new hospital site called the Medical Center of the Rockies for Poudre Valley Health System (PVHS). As part of the effort PVHS is pursuing LEED certification through the U.S. Green Building Council. For the site development portion of the project, BHA Design was asked to provide a sustainable site. Working closely with HLM-Heery Architects and Martin & Martin Civil Engineers, the project team designed an overall site stormwater management system that reduced runoff and below grade stormwater piping, and used stormwater runoff to irrigate plants. As part of this effort, landscape islands were designed to capture parking lot runoff and reroute it to landscape islands. Additionally, runoff going into detention ponds was directed through planted swales to both irrigate the plants and to clarify polluted parking lot drainage.

HEAT ISLAND EFFECT

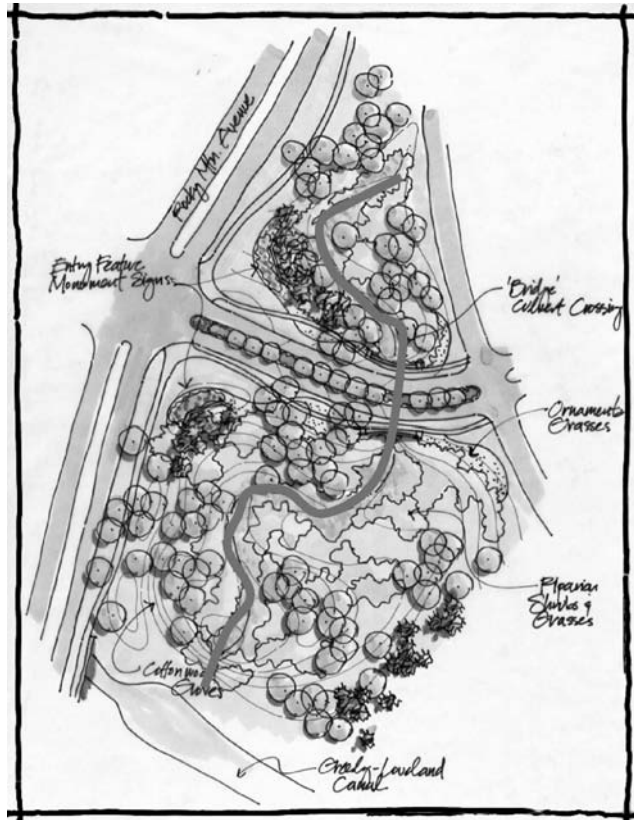
The creation of cities adds unnatural heat to the environment. With dark surfaced EPDM roofing and

Landscape island at Medical Center of the Rockies intercepts parking runoff to use for irrigation through submerged perforated pipe.





Detention filters parking lot and downspout runoff water through wetlands, and allows for groundwater recharge.



with the addition of parking lots associated with housing and commercial environments, areas within cities grow hotter than the surrounding countryside. In fact, the core of a city can be as much as 10 degrees higher than the land surrounding the city. The intent of LEED is to reduce the creation of heat sinks by providing credit for incorporating techniques that reduce the impacts of development and subsequent heat build up. To meet the standard, established developments must provide shade (5yr) and/or high albedo materials (e.g., concrete) and/or use open grid pavement for at least 30% of a site's non-roof impervious surfaces including parking lots, walkways, plazas, EVAs etc., or place a minimum of 50% of parking underground or in a structure or use 50% open-grid paving for parking lots.

A second point can be garnered from the LEED charts by using light colored, Energy Star compliant roof surfacing or by providing vegetated roofs. The light colored roofing must be Energy Star compliant and cover 75% of the roof surface or be a combination of a green roof and Energy Star compliant roof equivalent to 75% coverage.

LIGHT POLLUTION REDUCTION

Excessive light use has been shown to have negative effects on both humans and wildlife. According to the International Dark Sky Association (IDA), impacts of night lighting affect circadian rhythms, diurnal habits, and the production of melatonin. Humans and ani-

The United States at night. Photo courtesy NOAA.



mals need daylight and night-time for health and wellness. In fact, the need for darkness has been well established in a number of studies which demonstrate the impacts for wildlife and humans when deprived of darkness. Some of the effects include cancer in humans, declining insect populations, impacts on sea turtles and migrating birds, and stress impacts to nocturnal species (International Dark Sky Association, <http://www.darksky.org/>).

Light pollution also impacts the night sky with glare. According to the IDA, up to one third of night lighting is directed upward or escapes upward. The effect is a gradually diminished visibility of stars and a dark sky.

In addition, excessive lighting is wasteful, needlessly consuming enormous amounts of electricity. According to some estimates up to \$2 billion per year is wasted in unneeded night lighting (Building Green, September 1998 <http://www.buildinggreen.com/auth/article.cfm?fileName=070801a.xml>).

The most common reason given for night lighting is to reduce crime, and yet studies have shown that it is the perception of safety and not the reality of safety that drives higher lighting levels. Indeed, some studies show reduced crime with increased darkness. The San Antonio School District in 1973 implemented a lights-off policy with respect to lighting school sites at night. Not only did vandalism decrease, but the district recorded impressive reductions in energy use (Building Green, September 1998).

The LEED rating system encourages light pollution reduction through reduction in overall light levels. Through using full cutoff light fixtures for hi dis-

Use of grass paving reduces amount of heat gain in parking lots



charge lights of 3500 Initial Lamp Lumens, LEED requires full shielding for lamps with more than 1000 initial lumens. The requirement also mandates that maximum candela for interior lighting fall within the windows and that lighting not trespass onto adjacent property.

WATER EFFICIENCY

According to the Department of Energy, 65% of all water use in the United States is for irrigation, and over 340 billion gallons of fresh water are withdrawn from rivers, streams, and reservoirs to support development (USGBC). Much of this irrigation is used for the irrigation of constructed landscapes. The current practice in landscape design is to design and construct landscapes with a variety of water hungry turfs and non-native exotic plants. The result is the creation of emerald green landscapes that require not only supplemental water but also herbicides and mowing, both of which have detrimental impacts on the environment. Herbicides pollute downstream waterways when they run off and get into storm sewer systems which in turn dump into local streams and rivers. Mowing is an energy intensive process and uses petroleum products that create air pollution and increase America's dependence on oil. Lawn mowers produce several types of pollutants, including polycyclic aromatic hydrocarbons, ozone precursors, and carbon dioxide. When potable water is used, it further exacerbates energy use because the treatment of water for drinking purposes is an energy intensive process.

Central control systems allow for precise water application



The LEED rating system encourages a reduction in potable water use by providing two possible credit points for reduction in the use of potable water to irrigate landscapes. Typically the implications of this would be to provide a more native plant palette, since native plants are adapted to the water regimes of the particular climate in which they live. The down side of course, is that they may not be as beautiful for the entire year. The upside is that they are less susceptible to disease and usually provide a better wildlife habitat and have the potential to require less mowing. To achieve the first LEED credit the irrigation system must use 50% less treated water than the typical turf hungry landscape. To achieve the second point the landscape should not use any supplemental treated water for irrigation at all, although there is an allowance for up to two years of irrigation for establishment purposes only.

BHA Design worked together with Aqua Engineering, Inc. to create the Xeriscape Demonstration Garden for the City of Aurora, Colorado. The garden serves the population of Aurora and depicts a variety of plants, mulches, and irrigation techniques that can be used in Colorado to reduce water consumption and still create a beautiful environment. The garden incorporates drip irrigation, sub-surface irrigation, central control computer systems, and over 300 plant species on a three-acre site.

For the landscape architect this point should be relatively easy to accomplish in most office buildings, retail outlets, and similar type settings. Through incorporation of standard Xeriscape principles as well the use of sub-surface or drip-irrigation systems, it should be relatively easy to reduce the standard irrigation regime by 50% over a normal thirsty lawn

Xeriscape Principles

- Planning and Design
- Soil Improvements
- Efficient Irrigation
- Plant Zoning
- Mulches
- Turf Alternatives
- Proper Maintenance

Aurora Xeriscape Demonstration Garden.



Entry Shelter at Aurora Xeriscape Demonstration Garden.



type of installation. Recently BHA Design completed a project for the Northern Colorado Water Conservancy District (NCWCD) in Berthoud, Colorado. NCWCD is a governmental taxing district specifically charged with providing water to governments along the northern Front Range of Colorado. Additionally, one of NCWCD's missions is to demonstrate water conservation as a means of protecting the valuable water supply of the semi-arid landscape of the high plains of Colorado. As part of the planning of the 35-acre site, NCWCD wanted to make the project a model of water conservation. Their intent was to demonstrate to their users that an attractive landscape could be created that still used substantially less water than a traditional landscape.

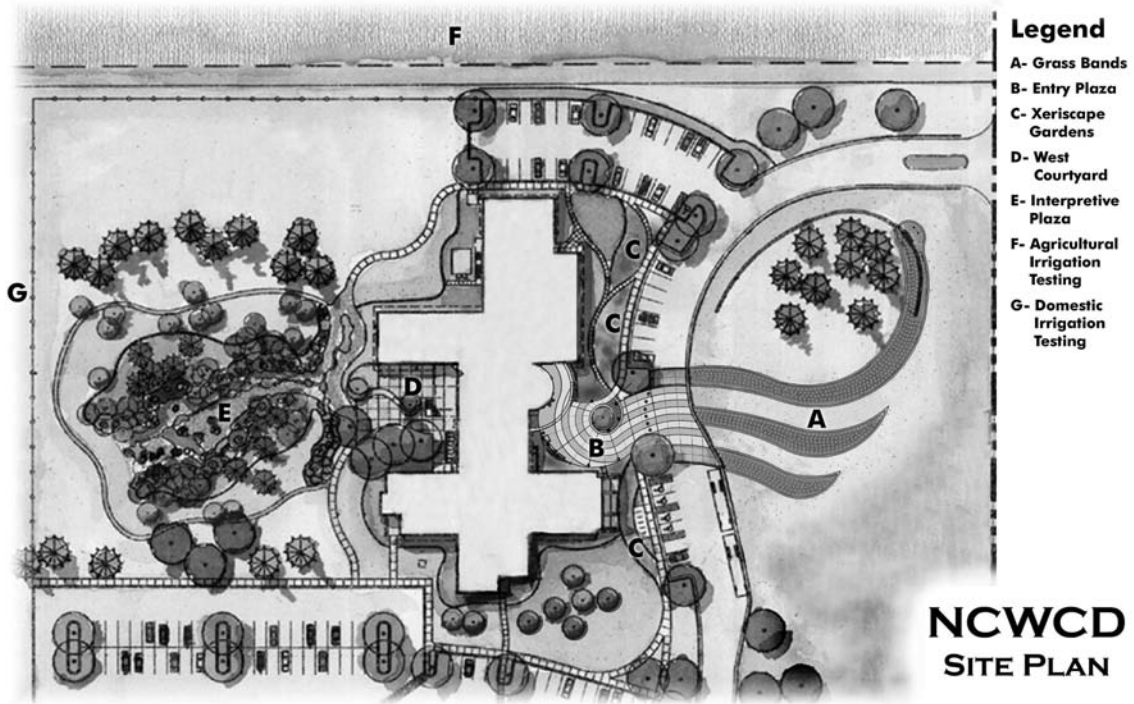
As part of BHA Design's efforts, Xeriscape principles were used incorporating numerous drought tolerant plant materials and installing a highly drought tolerant native of the plains of Colorado, Blue Grama, as a turf. In calculating the water savings on this project, a 70% savings over a traditional water-loving landscape was achieved.

CONCLUSION

The sustainable landscape should be considered in a variety of scales. The ideas are substantially more than just the plants we pick or how we irrigate. They are tied intrinsically to the way we plan our cities, the way we work with transportation, how we manage our stormwater and light our landscapes, and the



NCWCD—Xeriscape at building entrance



way in which we develop our sites. As a country, our demand for energy and treatment of the landscape has been to try to dominate the landscape. It isn't working. Our impacts are too great, and the environment is reacting. If we are to survive as a species, if we are to be able to stand and listen to the earth breathing, and if we want to provide for our future

generations, our approach to the land and the way in which we live on it needs to respect the earth's systems. Fortunately there is a rising awareness. The U.S. Green Building Council, with its outstanding LEED program, is one of the leading edge organizations to help reduce our dependence on energy and bring us closer to a sustainable way of life.