Demonstration Storm Water Management Parking Area for Botanical Research Institute of Texas & Fort Worth Botanic Gardens

The Botanical Research Institute of Texas (BRIT is currently in the process of constructing its new headquarters adjacent to the Fort Worth Botanic Gardens at the corner of Harley and University Drive. As part of the project, BRIT has undertaken design and construction of a shared parking lot with the Fort Worth Botanic Gardens, which will replace the existing north lot at the Garden Center. The project (including the parking lot improvements) has been designed to achieve Leadership in Energy and Environmental Design (LEED) Platinum certification. The resulting program is a creatively designed parking lot which respects ecosystems and reduces the negative impact that site development can have on our environment by capturing surface water run-off. In essence, this means preserving and restoring the natural environmental functions and enhancing the health of the surrounding community in which we live.

The following practices are utilized in the parking area design and are described further below.

- Surface Runoff – Reduction of Erosion and Sediment Output
- Encourage Alternative Transportation
- Protect and Restore Habitat
- Reduce Development Footprint
- Stormwater Design – Quantity Reduction
- Stormwater Design – Quality Control
- Reduce Heat Island Effect
- Reduced Site Lighting
- Water Efficient Landscaping

Surface Runoff – Reduction of Erosion and Sediment Output
Hardscape surfaces, impervious areas such as asphalt or concrete paving that do not absorb rainwater, can negatively impact the watershed. Additionally urban development can contribute to pollution of rivers and streams, and in extreme cases, cause flooding. This project is designed to meet or exceed U.S. Environmental Protection Agency standards for erosion and sedimentation control. BRIT is using a combination of methods to prevent erosion by creating barriers to waterborne soil and debris.

The total area of pervious (absorbent) surface was optimized to keep most of the stormwater on site through various methods. Some of the site's paving material (sidewalks and other walk paths) is "porous paving," which allows rainwater to percolate through the surface of the paving and filter into the ground. Grass "bio-swales" provide control of runoff by retarding and impounding stormwater. Most of the water that flows to the stormwater collection pond also flows through BRIT's bioswales helping to clean the runoff. Over 50 percent of the stormwater on site flows to the collection pond. The pond has a storage volume of 58,478 gal – that is the amount of water available for irrigation from the pond. This storm runoff water replenishes the water used for irrigation. The pond also acts as a settling basin to allow solids to settle out prior to entering the storm sewer pipe. So as a result of these measures there is a reduction in the amount of storm water leaving the site meaning that existing storm water systems in the area will have expanded capacity.

Encourage Alternative Transportation
The project has scaled down the number of parking spaces which would be allowed under building code. BRIT has constructed the minimum 184 parking spaces as required by zoning ordinance for its use. Additional spaces are being provided for the Gardens to replace the same number of spaces in their current lot to create a joint campus.

The project is also designed to encourage bicycle riding by providing bike racks, showers and changing facilities for employees. To reduce passenger vehicle transportation impacts, BRIT has designed a ridesharing program in which carpools and vanpools have access to 6 preferred parking spaces. BRIT has also allotted 6 preferred parking spaces for alternative fuel (such as flex vehicles) and low-emissions vehicles (such as hybrids).

Protect or Restore Habitat
BRIT has preserved most of the trees on the property prior to development. BRIT has worked carefully to preserve trees in the parking lot and enhance other natural site elements. Native plants and plants which are climate appropriate are used to restore ecosystem functions. The project landscape was designed to promote biodiversity and enrich habitat for native species. The site is approximately 12 acres with over 76 percent developed to use native or adaptive planting.

Reduce Development Footprint
To minimize the impact of the building and associated paving materials, BRIT is utilizing additional land to preserve open space and minimize disturbance to the existing ecosystem. The project was designed to be pedestrian oriented and accessible to visitors. Open space provides a habitat for vegetation, which in turn provides habitat for local wildlife. Plants that specifically support local species such as insects and other pollinators help sustain populations up the food chain. Open space also helps reduce urban heat islands and reduces stormwater impacts.

Stormwater Design - Quantity Reduction
The intent of this effort is to limit the disruption of natural stormwater flows. Undeveloped land has capacity to absorb rainfall in the soil and vegetation. Clearing a site of its vegetation and replacing it with impervious roads, parking lots and buildings reduces the capacity of the land to absorb stormwater. The BRIT designed parking area addresses this impact by keeping most of its stormwater contained on site in basins and a collection pond. In addition, much of the stormwater is absorbed into the soils through the large expanse of vegetative surfaces and the use of permeable (porous) paving for sidewalks and other paths. The overall impact of these measures is to decrease the storm water runoff from the site to the public drainage system in an area where flooding has been a concern.

Stormwater Design - Quality Control
Areas that are constructed and urbanized increase hard surfaces utilizing parking lots, drives, walks and other “impermeable” surfaces. This results in increasing stormwater runoff volumes that negatively impact the urban infrastructure and pollute our waterways and watersheds. Stormwater runoff gathers sediment, oils, fertilizers, pesticides, herbicides and other pollutants. BRIT uses the natural capacity of plants and soils to clean the stormwater before it is released back into the watershed or reused on site to reduce the need for irrigation from the City Water system. The design specifically targets nutrients such a nitrogen and phosphorus.

Reduce Heat Island Effect
The parking area uses light color paving material to reduce the amount of solar radiation which is absorbed into surface materials such as paving. Additionally, BRIT has preserved existing trees for shade and added landscape plantings to further reduce the absorption and storage of heat.

Reduced Site Lighting
Site lighting is designed to prevent light pollution. Exterior light fixtures have light “cutoff” designs, so that no light is spilled onto the adjoining sites. Energy efficient fixtures are placed at the exterior to reduce glare and ambient light, but still ensuring security. Light reductions improve the “dark sky” quality of a city – especially attractive to star-gazers and astronomers. Reduced night lighting is also important to nocturnally active species. The BRIT team redesigned the site lighting during the pre-construction stage to include LED (light emitting diode) technologies. This technology has reduced the lighting load to roughly 30 percent of the equivalent next best

technology without sacrificing the quality of the light and actually improving light coverage and security. LED technology is the future of energy efficient lighting, not only because of its reduced energy requirements, but because the lamps last much longer and require much less maintenance.

Water Efficient Landscaping

The need for using potable water for irrigation is greatly reduced by using climate appropriate landscaping including indigenous grasses, shrubs, wildflowers and tree species. In addition, BRIT designed a stormwater collection system to capture rainwater from the roof and from the surfaces of the site. This rainwater is stored on site in a pond (over 58,000 gallon storage capacity) for use in watering the site's abundant plants. This is especially important in years that experience drought conditions. This water efficient reuse and conservation of rainwater and runoff reduces the demand on the capacity of the City Storm Water System and also reduces the demand on the need for potable water for irrigation purposes reducing the need for this additional capacity in the City Water System.