

EVALUATING SUSTAINABLE LANDSCAPES IN THE ARID SOUTHWEST

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Photo by: Bill Timmerman

INTRODUCTION

In the summer of 2014 a Case Study Investigation was conducted to highlight the achievements of two sustainably designed parks. The focus of each profile was to develop Performance Benefits that evaluate and quantify benefits of the sustainable features. Generated from a combination of data provided by the designers and data collected over the summer research project, each gives insight on how design translates to reality. A selection of benefits are provided here, the full case study profiles can be accessed online at: www.landscapeperformance.org



Civic Space Park is a 1.0-Hectare urban park, designed to provide a cool-island in the core of downtown Phoenix. Using a combination of shade trees and undulating shade structures, the park is intended to provide shade for 70% of the site at full maturity. The city partners with ASU and other community members to host events, activating the park even during the summer heat.

CIVIC SPACE PARK

PHOENIX, AZ



ENVIRONMENTAL

Collects and infiltrates up to 9,587cu ft of water per storm event in underground chambers located on-site. Water collected in the chambers is infiltrated into a permeable subgrade, replenishing the equivalent daily water use of 179 families each time the chambers are filled.

ENVIRONMENTAL

Temperatures in the park are an average of 1.8°F cooler when compared to a typical urban landscape.

ENVIRONMENTAL

Reduces mid-day hardscape surface temperatures by 23.4°F by providing shade with the use of broadleaf trees and shade structures.

ENVIRONMENTAL

Reduces surface temperatures by providing 30,200 sf of turf that is 37.4°F cooler than hardscape surfaces and 4.7°F cooler than typical landscape surfaces measured at mid-day. Turf also positively contributes to heat island mitigation reaching a temperature of only 67.2°F on summer evening.

SOCIAL

Provides a location for an average of 43 free community events from each year including movie screenings, concerts, art galleries, and wellness events such as community yoga.

SOCIAL

Attracts an average of 559 visitors on a weekday morning in the low summer season. Of these 63% engaged in optional activities and 12% of these were also engaged in social activities.

DOUBLES THE PRODUCTIVITY (RATE OF PHOTOSYNTHESIS) OF TREES PLANTED WITHIN HARDSCAPE AREAS BY UTILIZING STRUCTURAL SOIL TO EXPAND THE EFFECTIVE ROOT ZONE .

This project utilized structural soil for the many trees planted in hardscape plazas. When properly installed structured soil provides a stable base for paved materials as well improved conditions for tree root growth. The research team measured the net leaf gas exchange fluxes (net atmospheric carbon sequestration or photosynthesis) of trees planted within landscape, hardscape, and structural soil. The rate of photosynthesis was 6.4 $\mu\text{mol}/\text{m}^2/\text{s}$ for trees planted in landscape, 9.9 $\mu\text{mol}/\text{m}^2/\text{s}$ for trees planted in typical hardscape, 18.6 $\mu\text{mol}/\text{m}^2/\text{s}$ for trees in structural soil.



Cavalliere Park is a 13.8 ha city park located in north Scottsdale. Designers of the park intended to preserve open space and reduce the impact of development, while providing a park that can be easily maintained and enjoyed for years to come. The achievements of this park were previously recognized with a 3-star certification from the Sustainable Sites Initiative (SITES).



GEORGE 'DOC' CAVALLIERE PARK

SCOTTSDALE, AZ



ENVIRONMENTAL

Captures and infiltrates 100% of on-site stormwater generated from a 100-year/2-hr storm event. The park also manages runoff from several upstream developments, with the ability to store 49.5 ac ft.

ECONOMIC

Generates 24,000 kWh of on-site solar power reducing energy costs by approximately \$2,993 each year.

ENVIRONMENTAL

Manages stormwater run-on from the surrounding watershed, with the ability to infiltrate 49.5 ac ft stormwater in vegetated detention basins.

ENVIRONMENTAL

Saves 88% of potable water use for irrigation, when compared to an established baseline, by utilizing a native plant palette that does not require long-term irrigation.

ENVIRONMENTAL

Reduces energy consumption on-site by 97% by utilizing energy efficient fixtures when compared to the lowest cost alternative fixture.

ENVIRONMENTAL

Manages stormwater run-on from the surrounding watershed, with the ability to infiltrate 49.5 ac ft stormwater in vegetated detention basins.

ENVIRONMENTAL

Provides habitat with 16 species of arthropods observed in addition to rabbits, quail, lizards, snakes, and birds.

ENVIRONMENTAL

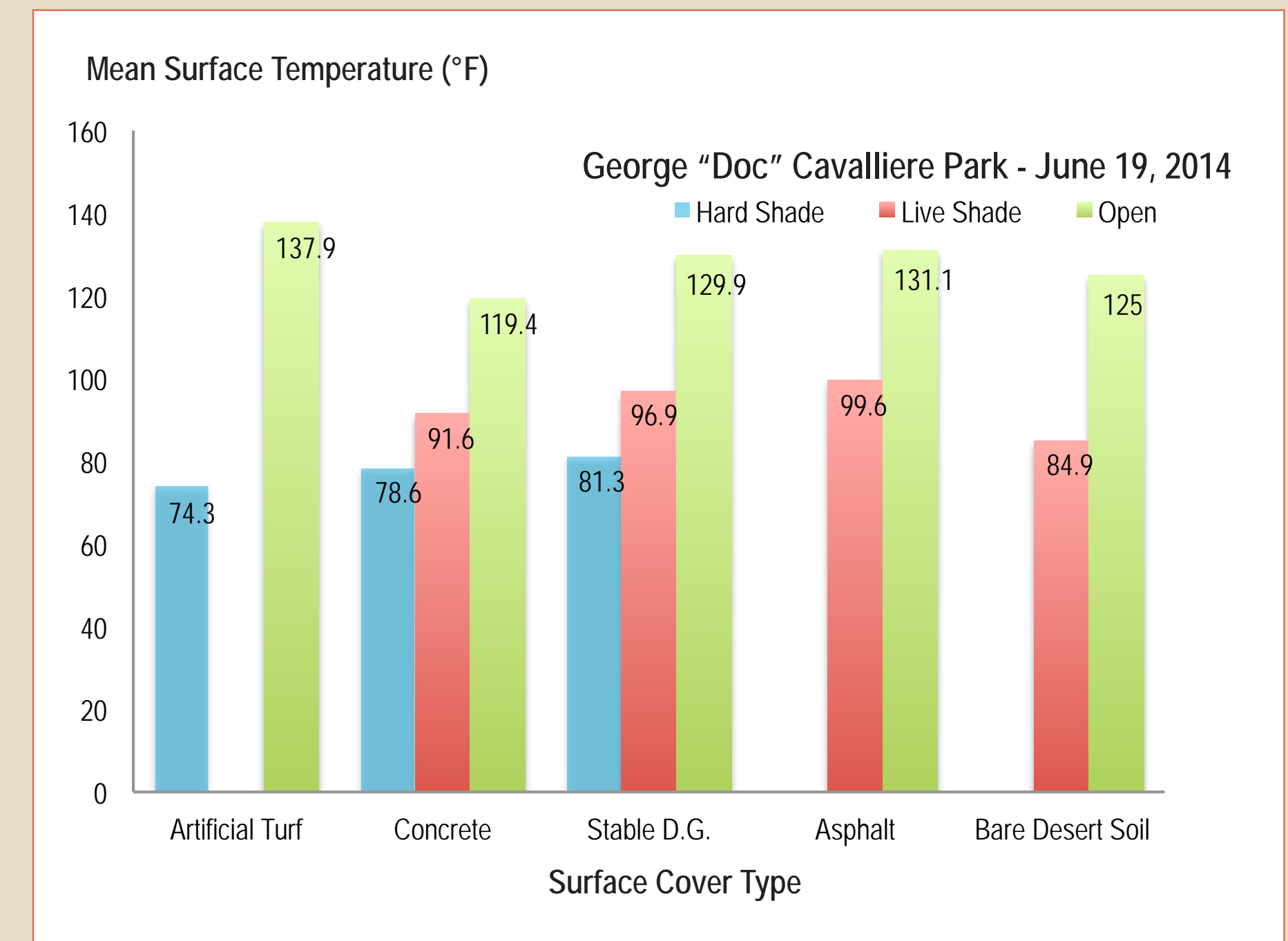
Reduces air temperatures on the natural turf field and the playground by 3.2°F and 2.3°F, respectively, when compared to air temperatures in the undisturbed desert areas.

SOCIAL

Attracts an average of 32 visitors on a weekend morning, in the low season of summer. Of these, an average of 91% engaged in optional activities and 72% of these were also engaged in social activities.

REDUCES HARDSCAPE SURFACE TEMPERATURES UNDER TREE SHADE AND STRUCTURED SHADE BY 30°F AND 45°F, RESPECTIVELY.

Temperatures of various surface types under live, hard, and no shade were measured mid-day in June with an infrared thermometer. Hardscape surfaces such as concrete, asphalt and stabilized decomposed granite had much lower temperatures when under the shade of a tree or structure. The large shade structure helped to keep temperatures on the playground below 82°F. Artificial turf was the hottest surface and is cooled with a timed sprinkler system.



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