SUSTAINABLE SITES INITIATIVE CERTIFICATION IN TEXAS: OBSTACLES AND BENEFITS AFFECTING STAKEHOLDER PERCEPTION

by

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ABSTRACT

SUSTAINABLE SITES INITIATIVE CERTIFICATION IN TEXAS: OBSTACLES AND BENEFITS AFFECTING STAKEHOLDER PERCEPTION

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The purpose of this research is to examine perceptions of key stakeholders involved in three SITES®-certified pilot projects in Texas to determine the obstacles and benefits they experienced in certifying the projects. The Sustainable Sites Initiative (SITES®) is a sustainability-focused framework that guides landscape architects, engineers and others toward practices that protect ecosystems and enhance the mosaic of benefits they continuously provide our communities, such as climate regulation, carbon storage and flood mitigation. SITES® is the culmination of years of research and development by leading professionals in the fields of soil, water, vegetation, materials and human health (GBCI, 2017). A SITES® certification marks a project's commitment to sustainability.

This research examined the methods used by landscape architecture professionals, land owners, community developers, municipalities and other stakeholders in earning a SITES® certification by assessing the opinions of a group of key informants who were responsible for the certification of each of the SITES® projects below. In addition to their opinions about the financial investment and the time/expertise necessary to apply for and

receive the certification, the stakeholders were interviewed to determine their impressions of each project, the complications they encountered in the certification process, and their recommendations for certification of future projects.

SITES® can be applied to any landscape project, anywhere in the world, on sites with or without buildings. To represent a cross-section, the three SITES® certified projects for this study represent a variety of project types. The projects studied are listed below:

1. Blue Hole Regional Park—Wimberley, TX: An open space park owned and operated by a municipality.
2. Perot Museum of Nature and Science – Dallas, TX: A civic/institutional project located in an urban setting.
3. The Green at College Park– Arlington, TX: An education/institutional project located on a university campus.

The research used qualitative research methods which included in-depth telephone and face-to-face interviews (Taylor and Bogdan, 1984). By studying recordings of the interviews and other printed and verbal material, themes were identified and used to evaluate the SITES® certification from the perspective of the key informants studied. Thoughts and ideas shared by the participants during the interviews informed the collection and distillation of user/participant value. The results and implications of this evaluation are discussed within the study.

This research tests the SITES® v2 rating system, currently in use against the comments received from pilot projects using SITES® Guidelines and Performance Benchmarks in Texas. This study documents challenges the pilot projects encountered

when following the prerequisites and credits needed for SITES® certification, and how SITES® v2 responded.

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Chapter 1

Introduction

1.1 Introduction

The Sustainable SITES Initiative (SITES®) program was developed originally in 2006 through a collaborative, interdisciplinary effort of the American Society of Landscape Architects, The Lady Bird Johnson Wildflower Center, and the United States Botanic Garden. This diverse group of stakeholder organizations developed a series of criteria for sustainable landscape design, construction, operations and maintenance. In 2009 *The Sustainable Sites Initiative™: Guidelines and Performance Benchmarks* was published establishing a guideline and rating system for sustainable land development.

A total of 47 projects achieved SITES® pilot certification under the initial 2009 Rating System (or "v1") during the two-year Pilot Program (June 2010-June 2012), which tested the new national rating system. SITES® Pilot Projects were the first projects in the United States and abroad to demonstrate the application of Guidelines and Performance Benchmarks 2009, released on November 5, 2009, which included a four-star rating system working on a 250-point scale. Based on achieving all 15 of the prerequisites and at least 100 credit points, a pilot project earned certification.

"Testing the rating system is critical to ensuring the validity and breadth of these guidelines and performance benchmarks, which have undergone four years of rigorous development," said Holly H. Shimizu, executive director of the United States Botanic Garden (Center Staff, 2017).

Feedback from pilot program participants eventually led to a revision of the SITES® publication in 2013 entitled the *SITES® v2 Rating System.* (See Figure 1 SITES® Timeline below.)

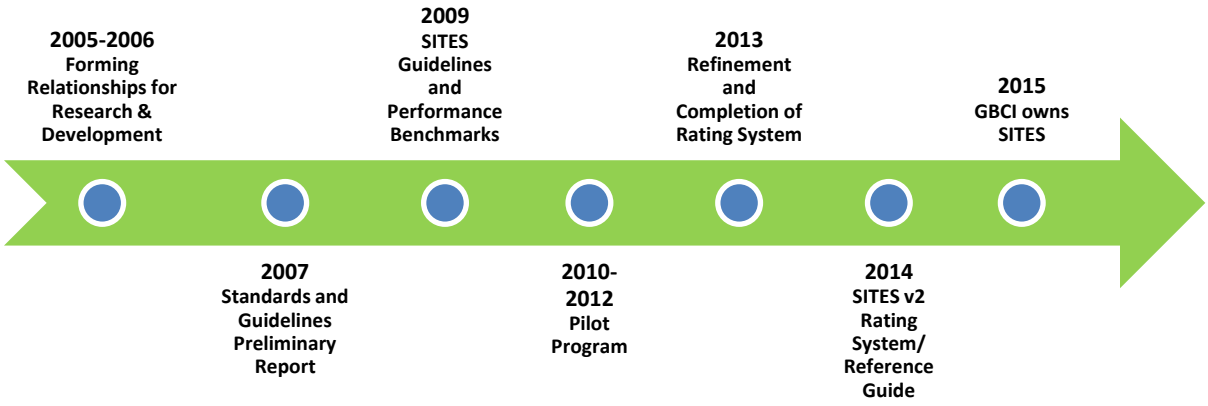

Figure 1: SITES® Timeline

In the *SITES® v2 Rating System*, a total of 200 potential points is allocated among 48 credits for a given project site. The rating system reflects each credit's impact on improving site sustainability, protecting and restoring ecosystem services, and enhancing human health and well-being. Projects receive SITES® certification by achieving the minimum requirements, by satisfying fourteen prerequisites and a certain specified number of credit points for various levels of performance. The value assigned to each credit is based on its potential effectiveness in meeting the four goals outlined above. A certification can be earned for new construction projects as well as existing sites that include major renovations. However the site must have been constructed within the preceding two years. There is no maximum size for a SITES® project, but the minimum is set at 2,000 square feet (GBCI, 2017). Previous efforts to address sustainable practices in the design and construction industry mostly focused on buildings. This standards

program is intended to raise awareness of the possibilities of sustainable landscapes in the same way that LEED® (Leadership in Energy and Environmental Design) boosted the profile of sustainable building. Some of the credits for sustainable landscape performance have been developed in alignment with similar credits in the U.S. Green Building Council's (USGBC) LEED® rating system, the world's most widely used green building program.

SITES®, originally modeled after LEED®, includes best practices in landscape architecture, ecological restoration and related fields, and knowledge gained through peer-reviewed literature, case-study precedents and projects registered in the SITES® pilot program.

LEED®, is the most widely used green building rating system in the world. Available for virtually all building, community and residential project types, LEED® provides a framework to create healthy, highly efficient, and economical green buildings. LEED® certification is a globally recognized symbol of sustainability achievement. Unlike LEED®, SITES® addresses only what is outside of the building envelope (Macdonagh, 2016). SITES® is a sustainability-focused framework that encourages landscape architects, engineers and others toward practices that enhance the mosaic of benefits the landscapes can provide, such as climate regulation, carbon storage, flood mitigation, human use, and walkability, among others.

> "Just [as] LEED® transformed the built environment and the buildings market, SITES® is intended to do the same thing for the landscapes and open spaces of the world we live in, in terms of driving sustainability in the design and

development process," explains Jamie Statter, Vice President, Strategic Relationships at USGBC (Nieminen, 2017).

Administered by Green Business Certification Inc. (GBCI), SITES® is the culmination of years of research and development by leading professionals in the fields of soil, water, vegetation, materials and human health. (GBCI 2017). SITES® guidelines and rating system encourage:

1. reduction in water demand,
2. filtration and reduction of stormwater runoff,
3. provision of wildlife habitat,
4. reduction of energy consumption,
5. improvement in air quality,
6. improvement in human health, and
7. increased outdoor recreation opportunities.

SITES® can be applied worldwide to a variety of projects types (with or without buildings) including;

1. open spaces such as local, state and national parks, botanic gardens and arboreta, streetscapes, and plazas;
2. commercial locations such as retail and office areas, and corporate campuses;
3. residential neighborhoods or individual homeowner landscapes; and,
4. educational/institutional venues, both public and private campuses such as museums and hospitals (GBCI 2017).

By collecting user responses from participants; those professionals involved in meeting the performance criteria and other stakeholders in the project, such as investors, owners, municipalities, private developers, landscape architects, and neighboring commercial or residential entities, the SITES® certification process and criteria can be updated as needed to facilitate adoption of this important innovation. To provide relevant feedback, this study seeks perceptions from stakeholders on the feasibility and ease of using the SITES® Guidelines and Performance Benchmarks to certify the selected projects.

1.2 Problem Statement

"Since its inception in 2006, the Sustainable Sites Initiative has been developing and refining a series of criteria for sustainable landscape design, construction, operations and maintenance" (Dzikowski, 2012). The most recent release of this criteria by GBCI, *SITES®v2 Rating System*, is composed of a series of goals;

1. create regenerative systems and foster resiliency,
2. ensure future resource supply and mitigate climate change,
3. transform the market through design, development and maintenance practices, and
4. enhance human well-being, and strengthen community.

During the pilot project phase, which lasted from June 2010 to June 2012 , SITES® registered one hundred fifty projects across the country to participate. As of 2011, only 80 of the initial 150 projects in the two-year pilot program indicated they

would continue to pursue certification. By the end of the pilot project phase, only forty-six of those projects registered actually earned the SITES® certification. Approximately two thirds of the initial pilot projects did not complete the SITES® certification process.

In response to the need for more information and guidance on gaining the certification, the owners of SITES® developed and released a new webinar series called "Principles of Successful Sustainable Landscapes: Specification, Installation, and Maintenance."

> The goal of this series is to train professionals and contractors in the "efficient and successful specification, installation, and maintenance of projects with sustainable features" (Green, 2017).

"Certifying your landscape project with the Sustainable Sites Initiative (SITES®) can seem like an expensive, onerous process. So why bother?" was the question posed to Jamie Statter, vice president at the U.S. Green Building Council (USGBC) in a web article written by ASLA's *The Dirt* (Green, 2017). The lack of certification infrastructure, training in meeting the criteria, or availability of SITES® credentialed professionals could have contributed to the failures. Feedback from the stakeholders involved in those attempted certification projects informed the certification process going forward.

Based on the experiences of the one hundred fifty pilot projects that field-tested the 2009 rating system, input from hundreds of organizations, and thousands of individuals, a refined set of guidelines and rating system was released in June 2014. Known as *SITES®v2 Rating System*, it was developed over seven years (2007-2014), and is now available for use by anyone who works in land design and development.

> "The effort and time these projects have spent to field test SITES® 2009 guidelines and ensure their site is sustainable is commendable and has been a tremendous resource for informing the development of the *SITES®v2 Rating System*…" said SITES® Director Danielle Pieranunzi (The Dirt Contributor, 2017).

For environmental designers, their clients, and the public, SITES® offers several significant benefits and values:

1. It advances best practices in landscape architecture and other environmental design professions through education and the rewards of certification acknowledgment.
2. Clients can be assured that their SITES®-certified project has achieved rigorous, field-tested standards for sustainability.
3. Clients can market the SITES® certification of their projects (as many do for the LEED® green building program).
4. It is ethically responsible, protects natural systems for present-day use and appreciation, and preserves ecosystems and their essential services for future generations (GBCI 2017).

1.3 Purpose of Research

As of September 2017, more than one hundred projects and more than seventy-six million gross square feet of space across thirty-one states and five countries have certified with SITES® (GBCI 2017). The present research examined three certified projects in Texas and assessed the opinions of key stakeholders on each project about obtaining the SITES® certification. By documenting their feedback about specific challenges, this

research then evaluated the refinements made to the SITES® v2 rating system determine what changes were ultimately made to the new system.

1.4 Research Questions

The research assessed the benefits and challenges of obtaining a SITES® certification under the 2009 version of the Guidelines and Performance Benchmarks from the viewpoint of key stakeholders involved in the process. The three certified projects in Texas were examined to determine their perceived benefits since certification. This research primarily addresses the following questions:

1. What major factors contributed to the project obtaining or not obtaining certification?
    a. What was it about the certification process that prevented, or interfered with certification for registered projects that did not achieve the certification goal?
2. Has SITES® addressed the issues with adequate training classes specific to these needs?
3. Would the SITES® AP credential for one or more professionals working on the certification have been useful?
4. What changes would the key stakeholders make in developing their next SITES® qualified project to increase the benefits and decrease the costs and/or difficulties?
5. What changes have been made to the *SITES®v2 Rating System* in response to the challenges encountered by the pilot projects?
6. Do these changes correlate with the research info from the Texas projects that achieved certification?

1.5 Definition of Key Terms

Environmental Sustainability: meeting the resource and services needs of current and future generations without compromising the health of the ecosystems that provide them within a [framework] of balance, resilience, and interconnectedness that allows human society to satisfy its needs while neither exceeding the capacity of its supporting ecosystems to continue to regenerate the services necessary to meet those needs nor by our actions diminishing biological diversity (Morelli, 2011).

Sustainable Sites Initiative™: An interdisciplinary effort by the American Society of Landscape Architects, the Lady Bird Johnson Wildflower Center and the U.S. Botanic Garden to create voluntary national guidelines and performance standards for sustainable land design, construction and maintenance practices (Landscape Online, 2017).

Regenerative Systems: processes that restore, renew or revitalize their own sources of energy and materials, creating sustainable systems that integrate the needs of society with the integrity of nature. Regenerative and sustainable are essentially the same thing except for one key point: in a sustainable system, lost ecological systems are not returned to existence. In a regenerative system, those lost systems can ultimately begin "regenerating" back into existence. Regeneration acknowledges the need to sustain, but also the necessity for continual improvement over generations (Zrhirsch, 2012). See

Figure 2 below:

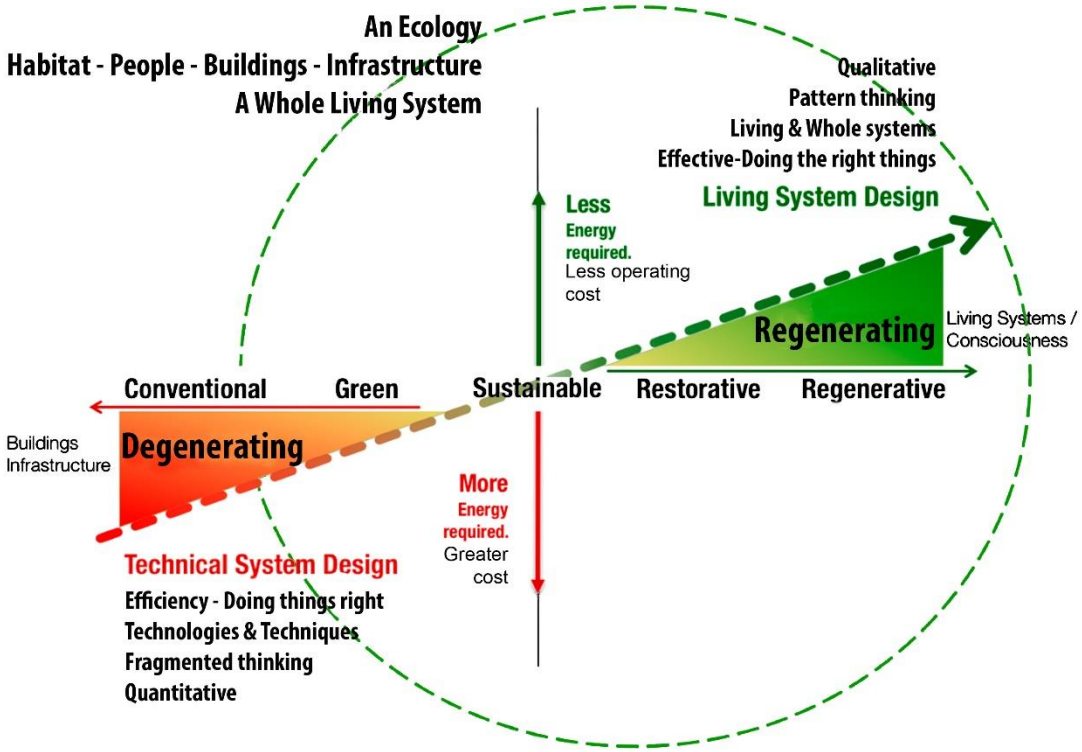

Figure 2: System design continuum—from conventional to sustainable to regenerative systems
Source: Regenesis 2000-2016

Resiliency: The ability of an ecosystem to maintain its normal patterns of nutrient cycling and biomass production after being subjected to damage caused by an ecological disturbance. The term *resilience* is a term that is sometimes used interchangeably with *robustness* to describe the ability of a system to continue functioning amid and recover from a disturbance (Levin, 2013).

Key Stakeholder: Key stakeholders [are] those who increase the credibility of your efforts; implement the interventions central to the effort; advocate for changes to

institutionalize the effort; and/or fund/authorize continuation or expansion of the effort (NCJP, 2017).

1.6 Research Methods

This research uses qualitative study and case study documentation methods to assess the obstacles and benefits affecting stakeholder perception of the SITES® certification (Taylor and Bogdan, 1984). The primary source of data collection was in-depth phone interviewing of a group of key informants; designers, planners, city and land use administrators, among others, who have participated in the SITES® certification process. The researcher made use of snowball sampling (Castillo 2009) by requesting assistance from each key informant in identifying other key informants who were involved with the three Texas projects referenced in this research, or who have participated in other SITES® certified projects. The data are analyzed using the grounded theory approach developed by the constant comparative method (Taylor and Bogdan 1984). As each informant responds to the questions the researcher starts to identify themes and patterns in the respondents' perceptions. In order to encourage a flow of information from the stakeholder, many of the interview questions are open-ended and allow for a full explanation of a thought or idea with the opportunity for the researcher to ask follow-up questions that may arise. The grounded theory approach is a method for discovering theories, concepts, hypotheses, and propositions directly from data (Taylor and Bogden 1984).

1.7 Limitations and Delimitations

The purpose of this research is to delve into the process used by the key stakeholders in their efforts to achieve SITES® certification success so that the findings of the research are informative for rating system updates and for bringing future stakeholder expectations closer to proven realities. However, there are limitations to this study. Three limitations involve the researcher as a student and one involves the stakeholders being interviewed:

1. Time allowed for this research was restricted, therefor limiting the number of participants in the sample group.
2. Access to the professionals needed for interviews was hampered by the fact that the researcher's credentials as a student was not seen as a priority.
3. The researcher is not a certified SITES® AP, so the perspectives inherent to professionals who understand the certification at that level may not necessarily be understood by the researcher.
4. The three projects chosen for this research were part of the pilot program for SITES® and were completed more than five years ago. The stakeholder perceptions were not as fresh as if the projects had been completed more recently.

The delimiting factors chosen by the researcher which affect this research involve the projects chosen:

1. Only SITES® certified projects were studied
2. The three projects chosen for this research are in Texas, with two of the three located in the Dallas-Fort Worth area of Texas.

3. Stakeholder perceptions of the above-mentioned projects were the only insights sought regarding the SITES® certification process.

1.8 Summary

This research demonstrates that changes made to the SITES® certification guidelines of 2009 when it was revised and updated to the SITES®v2 system, were based on user experiences in the pilot phase. It further addresses the complexities encountered by some of the pilot projects, the systems used by these teams to mediate the difficulties, and the resulting changes made by SITES® to facilitate the certification process.

Sustainable development, to be truly effective, must be participatory development achieved through informed choices on the part of both professionals and the public.

> "These efforts—grassroots awareness campaigns that challenge individual citizens to come together to champion good planning for their communities, the realignment of our regulatory structures to facilitate and encourage healthy patterns, the retooling and retraining of our construction and materials industry, and the development of planning and design methods that inform and guide professionals' design processes and ultimately the built environment—are all essential to reversing the destructive patterns of sprawl and the subsequent loss of nature and community that permeate contemporary development of our environment" (Dinep, 2010).

The need to capture multiple experience levels and the diversity of perspectives on sustainability requires combining scientific assessment tools with democratic participation methods. All stakeholders must monitor and evaluate progress in addition to negotiating a clear vision (Kasemir, 1999). By understanding the perceptions of key

stakeholders about achieving a SITES® certification, future project teams will be better informed about the process and make better decisions to facilitate its success.

The format of this thesis is organized into five major chapters:

1. Introduction—Identifies the problem, describes the research objectives and the significance of obtaining a SITES® certification
2. Literature Review—Focuses on key points in published information about the 2009 SITES® pilot certification process in general, and more specifically as it relates to the three selected SITES® certified projects in Texas.
3. Research Methods—Includes the qualitative methodology adopted to perform the research, as well as its significance and limitations and delimitations.
4. Analysis and Findings—Offers results from interviews with stakeholders regarding their perceptions of obtaining the SITES® certification during the pilot projects and concerns they would like to see addressed when SITES® v2 is implemented.
5. Conclusion—Discusses the significance of the findings and their relevance to the profession of landscape architecture, as well as offering suggestions for future research.

Chapter 2

Literature Review

2.1 Introduction

The literature review focuses on the SITES® certification process specifically as it relates to the key stakeholders involved and the practical challenges and rewards involved in applying SITES® to both new and existing projects. There are three major areas covered in this review.

First, this chapter provides a background for why sustainability matters to landscapes. Specifically, the SITES® system of guidelines and benchmarks is reviewed to determine how it benefits key stakeholders in achieving a sustainable landscape for their clients by allowing projects to benchmark against the performance criteria established by SITES®.

Second, is a brief introduction to three specific SITES® certified projects in Texas which were studied for this research. They represent a diverse cross-section of development projects, with and without buildings, with owners ranging from small rural municipalities to civic investors in a metropolitan area to the State of Texas.

The third section provides an examination, from the literature, of key stakeholder perceptions toward the SITES® registered and/or certified projects. Additionally, it is intended to offer some insight into the obstacles and benefits encountered and shared by the project team members as they sought certification, which can then be compared to this research in North Texas.

The final section of the chapter discusses the opinions of key informants received during the pilot program (initiated in 2009), which included a set of 15 prerequisites and 51 credits. Those experiences were used to develop the SITES® v2 rating system and reference guide by determining the "accuracy and fairness of the credits weights, their applicability to diverse project types, and how challenging or rewarding certification levels [were]" (Green, 2017). The SITES® v2 educational materials found online aid newly registered project teams on the methods used by previously certified project teams who achieved specific credits during the v1 pilot phase. Each SITES® certified project provides vital knowledge and creates incentives for the construction of future regenerative projects.

2.2 Background

When ASLA conducted a public opinion poll in 2009, participants said they were concerned about the environment, and took great care to live sustainably at home. However, when asked whether they knew what they could do to make their outdoor spaces more sustainable, the data indicated that their level of knowledge was much less. "The overall public has been completely unaware of what you want to be doing in the design and maintenance of the outdoor environment," said Nancy Somerville, ASLA's executive vice president. "But all that connective tissue from the building envelope out plays as great or a greater role [than the building itself] in the environmental sustainability and livability of our communities" (Laskow, 2012).

Launched in 2005 as a partnership between the American Society of Landscape Architects, the Lady Bird Johnson Wildflower Center and the U.S. Botanical Garden,

SITES® has established voluntary national guidelines and performance benchmarks for sustainable landscapes of all kinds – with or without buildings (Landscape Online, 2017). SITES®'s four-star rating system gives participating organizations credits for the sustainable use of water, the conservation of soils, wise choice of vegetation and materials, and design that supports human health and well-being in their landscapes. Based on achieving all fifteen of the program's prerequisites and at least one hundred credit points, the sustainable landscape project becomes certified. "Of the 66 prerequisites and credits, roughly 60 percent tie quantitative measures of performance to credit achievement, while the other 40 percent are primarily prescriptive in nature; all attempt to tie credit attainment with ecosystem services production" (Windhager, 2010).

2.2.1 Structure of prerequisites and credits

The prerequisites and credits of the Guidelines and Performance Benchmarks of 2009 included 15 prerequisites and 51 different credits covering areas such as the initial site selection, water, soil, vegetation, materials, human health and well-being, construction and maintenance – adding up to a 250-point scale. The rating system recognizes levels of achievement by obtaining 40, 50, 60 or 80 percent of available points with one through four stars, respectively. Organized into nine sections based on the process of site development, they guided an integrated design team through the project phases. (More detail is offered on each of the following sections in chapter 2.4.1)

1. Site Selection
2. Pre-Design Assessment and Planning
3. Site Design—Water

4. Site Design—Soil and Vegetation
5. Site Design—Materials Selection
6. Site Design—Human Health and Well-Being
7. Construction
8. Operations and Maintenance
9. Monitoring and Innovation

2.3 Case Studies

Locations of the three projects studied for this research are shown below in relation to each other. (Figure 3)

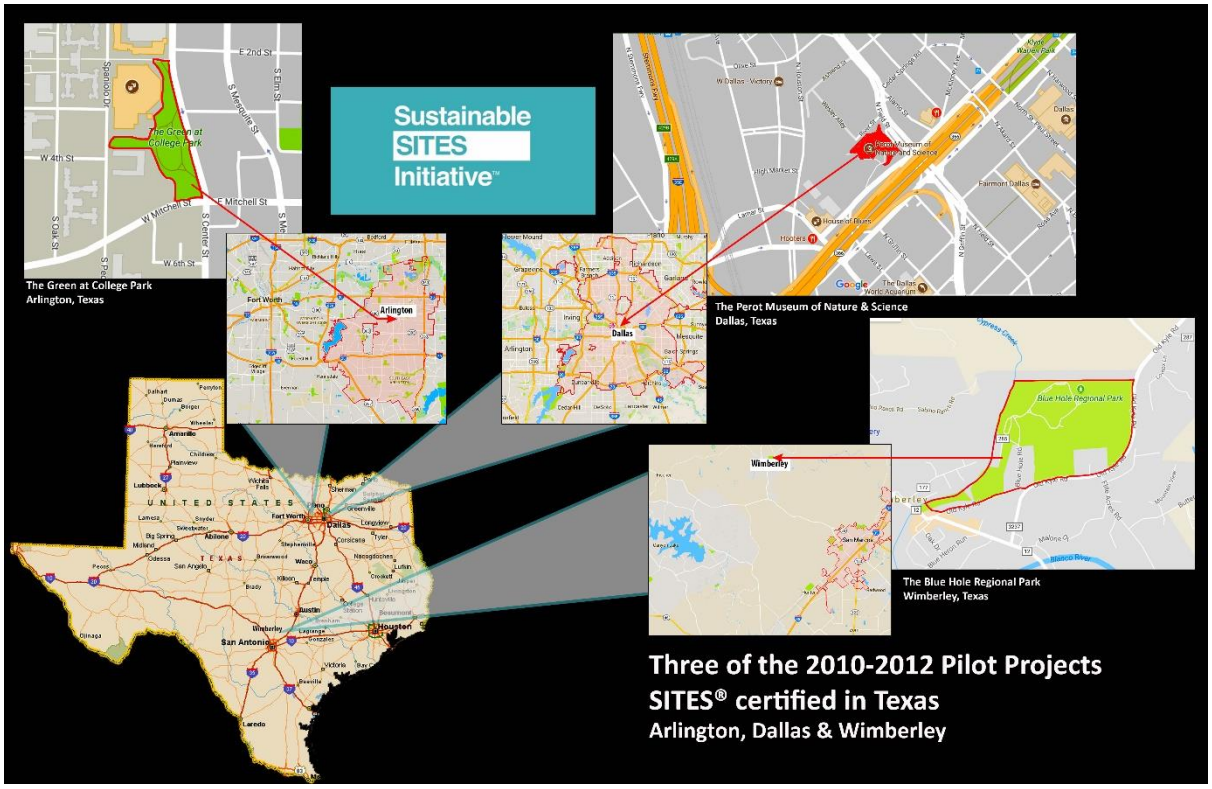

Figure 3: Arlington, Dallas and Wimberley are the locations of the case study projects.
Source: Author and blogspot.com (2017)

2.3.1 The Green at College Park—Arlington, Texas

Landscape architect, Janna Tidwell, R.L.A., ASLA, then Associate with Schrickel, Rollins & Associates, designed The Green at College Park in downtown Arlington and operated as project lead. She noted that "although there were numerous strategies addressed to achieve SITES® certification, the most significant for this project [was] the management of storm water and creation of habitat and plant biomass" (Meinhold, 2017). From the beginning of the project the landscape architect was focused on an eroded drainage channel at the western edge of the site. The three-acre parcel of dilapidated buildings, old parking lots and an eroding drainage channel were transformed by Jana Tidwell's design. (See figure 4 below).

Figure 4: The Green at College Park was the first of the College Park District projects to be completed. It consists of a variety of sustainable initiatives. Source: HKS Architects (2017)

Project engineers estimate that 1/3 of the stormwater on the UT Arlington Campus washed through this highly impervious area and contributed to the flooding problems of nearby Trading House and Johnson Creeks (Nelson, 2017). The project goals were to provide an identity to the Southwest corner of the campus while linking it to the City of Arlington's Center Street trail system, however the need for an ecological water detention system and large-scale rain garden was evident.

Integral to the project, David Hopman, ASLA, PLA Associate Professor and Landscape Architect from the University of Texas at Arlington, directed the application for SITES® certification. He noted that the team "worked the project 'backwards' by certifying a project that was already designed. The strength of the certification is proscriptive and will be very important on the design and construction process of future projects" (Meinhold, 2017). Professor Hopman worked closely with faculty research associate, Sonal Parmar, who documented how Schrickel Rollins' design of the park fulfilled the SITES® requirements.

The Green, now features a large gathering lawn that doubles as a detention basin, shade arbors, a curved stone wall that offers seating, efficient lighting, paving materials made from recycled bottles, called Filter Pave™, that allows water to permeate into drainage gardens, a large rain garden varying in depth from 2-3.5 feet, and a dry creek bed that manages the stormwater runoff which routinely drains into nearby Trading House and Johnson Creeks.

Figure 5: Three keys to the success of the stormwater design included a soil medium with high infiltration and growing characteristics, a plant palette that could withstand both dry and flooded conditions, and a ground cover material that was resistant to erosion. The horsetail reeds (Equisetum hyemale) in the bioswale along the western edge of the Green were used for their excellent filtering and cleansing properties. Source: Author (2017)

Since the 2.6-acre park was built, Arlington's first mixed-use development, the LEED® Gold-Certified College Park District, was constructed immediately to the north. College Park enjoys the benefits of the Green's water detention system using native and adapted plants in rain gardens. The rainwater and HVAC condensate flowing into this one-star certified project is used to irrigate the green space's vegetation. Sustainable strategies of the Green include:

1. A stormwater management plan to improve run-off quality by reducing total suspended solids 80% and by creating a reduction in storm water quantity by 25%

in volume from the two-year, 24-hour design storm. Additionally, this system processes one-third of the total runoff for the 480-acre campus (containing 160 acres of parking lots) for a 100-year flood, according to John Hall, Vice President of Operations at the University.

2. A stormwater management system designed to be a site amenity by creating a series of rain gardens to be enjoyed as a garden and teaching opportunity for the University. (See Figure 6, below.)

Figure 6: Outdoor classroom seating along the rain garden with native grasses. Source: Author (2017)

3. A re-sculpting of the land to function as a low impact development (LID) treatment train infiltrating storm water for on-site vegetation before overflowing off-site.
4. The use of recycled materials onsite including recycled glass pervious paving, concrete amended with fly ash, crushed concrete for base material and site amenities which contain post-consumer recycled metal.
5. The use of paving materials with an SRI value of 29 or greater and trees which collectively reduce the urban heat island effect.
6. A planting plan which creates a vegetated space, providing more than 50% wildlife habitat. A plant palette with more than 75% of species native to Texas.
7. The creation of a butterfly and hummingbird corridor / garden.
8. Participation in the Sustainable SITES® Pilot Program.
9. A pairing with the adjacent LEED® Gold Certified project, College Park Special Events Center.
10. Advanced irrigation technologies that include a smart controller, which relies on a weather station and evapo-transpiration rates to determine irrigation scheduling and times. As a direct result of this project the university decided to upgrade the entire campus with a recommended central control system, with the long-term goal of water conservation.
11. A reduction of potable water use at the site by 76% (University of Texas at Arlington, 2017).

Figure 7 (below) shows the stormwater treatment design for this site, highlighting key features.

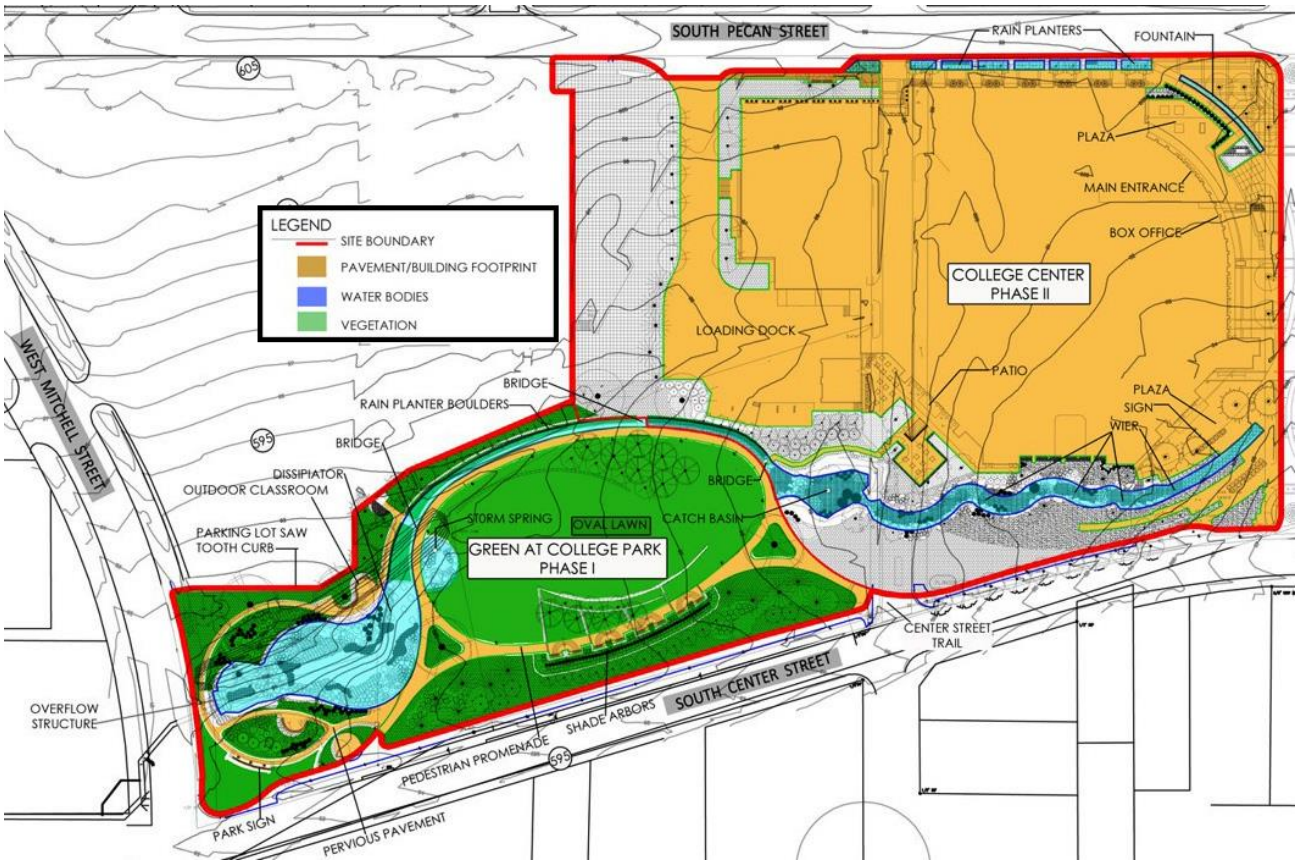

Figure 7: Rainwater/Stormwater feature plan for The Green at College Park
Source: Schrickel, Rollins & Associates

Due to the sustainability features of this project, The North Central Texas Council of Governments (NCTCOG) assisted with a majority of the funding by providing a grant of approximately $2,000,000. NCTCOG is a voluntary association of, by and for local governments, established to assist local governments in planning for common needs, cooperating for mutual benefit, and coordinating for sound regional development. It promotes Green Initiatives which include the planning and construction of green or sustainable infrastructure in the region to aid in the reduction of carbon emissions, Urban Heat Islands, and stormwater runoff. NCTCOG has funded a number of infrastructure

projects in the North Texas region, through the Sustainable Development Funding Program, that utilize green infrastructure components or strategies.

The site now defines the campus edge with gateway entrance treatments, an oval lawn for organized and informal events, a pedestrian promenade, animated LED lighting, recycled glass pervious paving, a drainage garden, bio filters, rain planters, outdoor classrooms and layers of seating. It exemplifies the University's commitment to sustainability.

2.3.2 Perot Museum of Nature and Science—Dallas, Texas

This 4.7-acre site on a former industrial brownfield, just north of downtown Dallas and west of the Arts District, was designed by Talley Associates, a Dallas, Texas-based firm offering services in landscape architecture, planning and urban design. Coy Talley is a co-founder of the Dallas firm, and designer of the Perot Museum's landscape. SITES®-certified with one star, the project dovetails with the museum's primary mission of working to "Inspire minds through nature and science" (Weeks, 2017). To achieve this, the site design was conceived as an abstraction of several native Texas landscape environments that are seamlessly integrated with the architecture of the building that covers much of the space. The forest-like grove of trees surrounding the building includes Pines, Cedar Elms, Burr Oaks, and Chinquapin Oaks which rise to the roof of the entrance plaza. In the area by the parking lots, Willow and Poplar trees are planted to signify the bottomland of this urban forest. At the southeast corner of the site, the podium structure of the building was planned to incorporate a vegetated roof system. An acre of rolling roofscape comprised of rock shards and native Texas drought-resistant

grasses reflects Texas' indigenous landscape with more than 60 types of grasses, shrubs and trees. The prairie grasslands form a sustainable roof that collects rainwater for irrigation. An underground cistern system with a capacity of 50,000 gallons collects air conditioning condensation as well as runoff from roof and parking surfaces. This water resource is recycled as the sole source of site irrigation and as a supplemental water source for the building's toilet and cooling tower function (Infotech, 2017). See site plan below. (Figure 8)

Figure 8: An abstract expression of the conditions found within a cross section of Texas. This urban site represents the following five major Texas ecologies: West Texas Desert Rock Cap, Upland Prairie Grassland, Blackland Prairie Grassland, East Texas Piney Woods, and East Texas Wetlands.
Source: Google Maps in 3D (2017)

Coy Talley describes the Perot Museum landscape as

> *"…a cross-section of the Texas landscape. From the west Texas desert area, it transitions into some of the grasslands and all the way over to the east Texas forest and then the wetlands. So it's very abstract in its*

representation but this is basically a large exhibit. It's a living, breathing exhibit" (Weeks, 2017).

After opening its doors on December 1, 2012, The Perot Museum of Nature and Science received over one million visitors in its first year of operation. A collaborative design team envisioned the creation of a building and site that would not only house exhibits, but also be equal active partners promoting the founders' goal to "remind us that the universe is grander than ourselves" (Talley Associates, 2017). The dynamic site design creates outdoor learning exhibits by exposing visitors to the interaction of local environmental systems with this urban structure.

The project's outdoor plaza spaces include an encircled entry plaza, bisected by a wide rill that cascades down a few steps and flows into a children's splash play area. (Figure 9) Additionally, a set of metal tubes hanging from the "plinth" visibly conveys rainwater collected during a rain event from the roof to storage tanks, or cisterns, below ground. (Figure 10)

Figure 9: Children are encouraged to take off their shoes and wade in the shallow "creek" among Bald Cypress Trees. Source: Landscape Architecture Daily (2017)

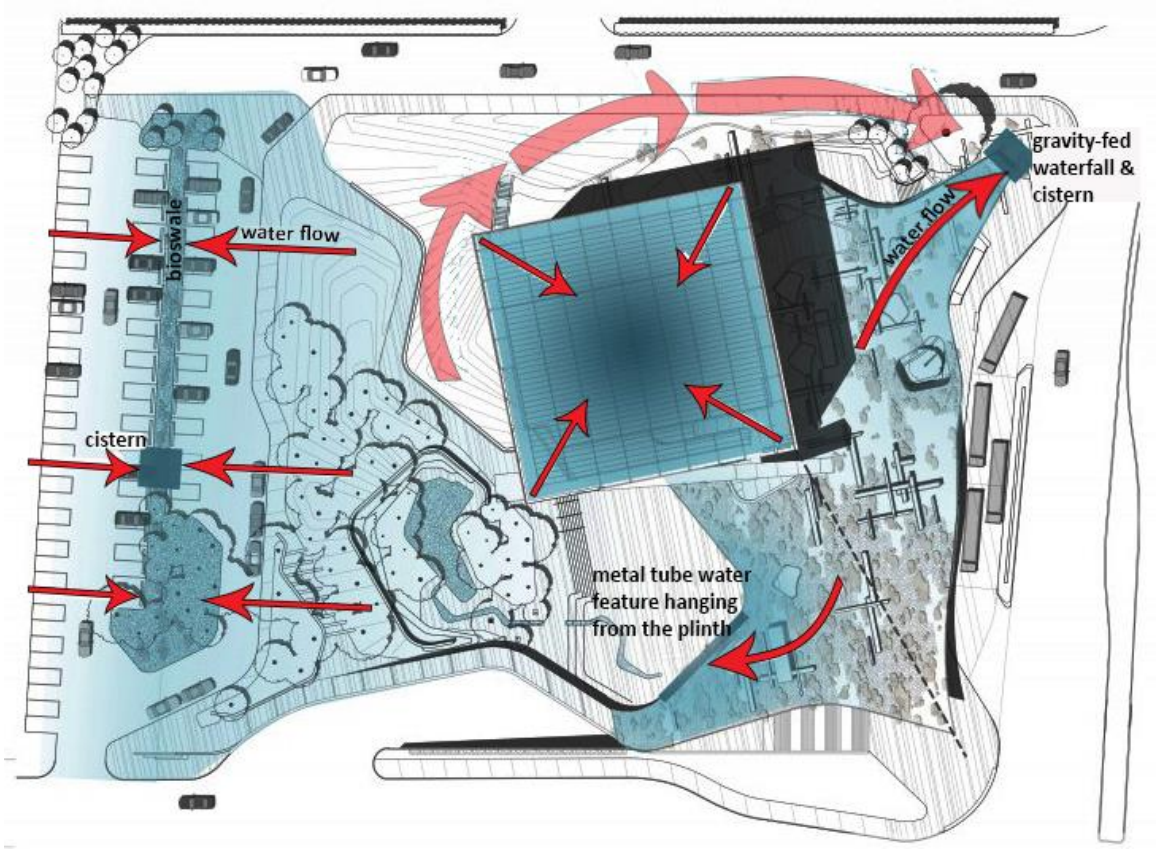

Figure 10: Rainwater capturing and recycling are integral components to the building and site design. An underground cistern system collects up to 50,000 gallons of air conditioning condensation in addition to roof and parking surface runoff.
Source: Texas Society of Architects

Several bioswales, which collect runoff from the parking lot are described for visitors using educational signage, as are many of the sustainable features of this tourist destination. (Figure 11).

Figure 11: Example of a sign offering visitors a learning experience about some of the sustainable features built into the project. The entire site and exterior experience was designed to be a learning experience for the visitor, and includes everything from sustainability and materials to the expression of landscape. Source: Author (2017)

Inside the museum's cube form, visitors are intermittently exposed to views of a green roof planted with ornamental grasses, covered with large slabs of Hackett stone and large concrete blocks. The plinth roof/greenroof represents the ecology of the West Texas Rock Cap and demonstrates the planting progression from upland prairie to higher elevation desert rock cap plantings. (see below)

Figure 12: A portion of the plinth roof has a 1-ft vertical: 1.5-ft horizontal grade, which is a focal point for the project. Source: Talley Associates (2017)

The soil depth for the plant material is 18” to support the native grasses, perennials, cactus, and Desert Willow trees. Keeping the soil on the steep slope in place was a challenge for landscape designer, Coy Talley. The soil is contained on the steep slope with a proprietary soil confinement system; a plastic grid with individual cells for the soil and plant material secured by steel cables.

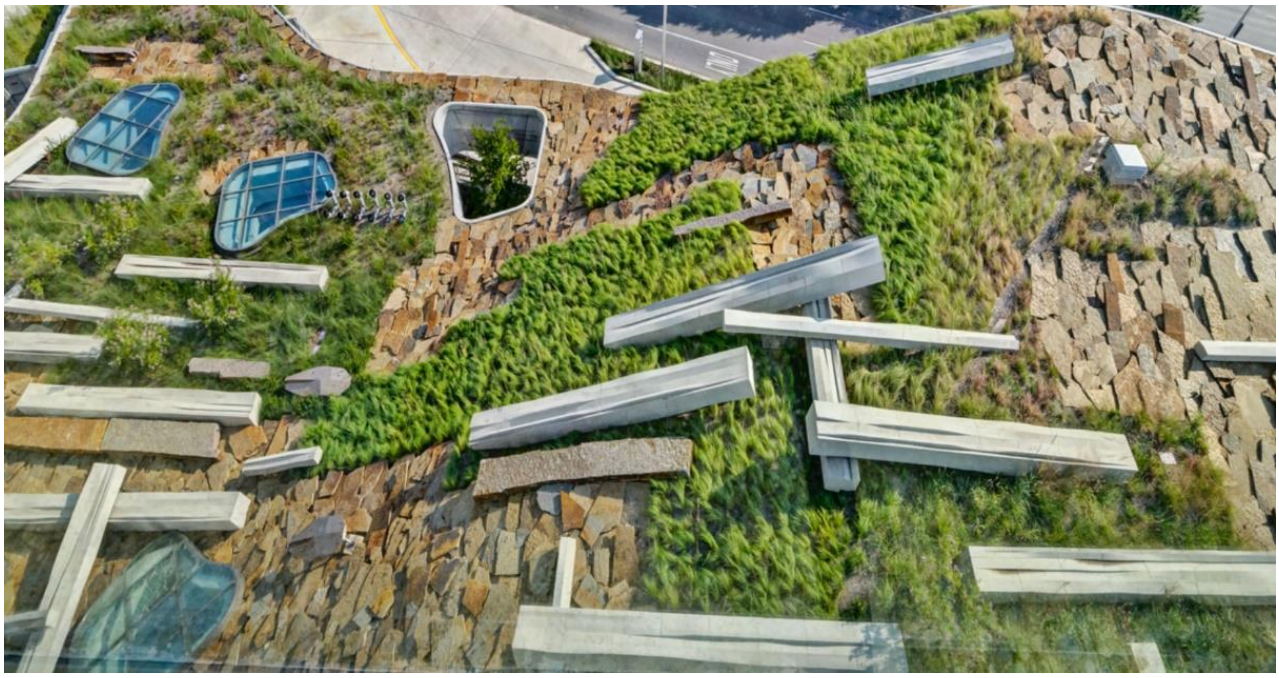

Figure 13: Plants specified for the one-acre greenroof deck are native to the region represented as part of the landscape design, and sited in a way that will give them the greatest chance of long-term viability in their urban condition. Source: Talley Associates

The slope was planted densely with a native grass species, then mulched, and secured with jute mesh netting over the top. Site construction and plant materials for the museum were sourced within a 500-mile radius of the project, as required by SITES® in order to earn points for credit. The landscape brings the project’s spirit of learning about the natural world to the project’s planting and cutting-edge hardscape design concept by

making a visible and sustainable expression of plant life and minerals (Talley Associates, 2017).

2.3.3 Blue Hole Regional Park--Wimberley, Texas

As a natural spring fed swimming hole along Cypress Creek, the Blue Hole is lined by old growth Bald Cypress trees (Taxodium distichum) that have survived floods and milling by settlers for building materials. An important resource to both wildlife and residents in the region for centuries, the Blue Hole balances the needs of the community while preserving and restoring the historic Blue Hole and surrounding ecosystems (The Dirt Contributor, 2017). In 2005, the town of Wimberley raised funds for its purchase and transformed it into an environmentally sustainable regional park in the Texas Hill Country in order to protect the site from future development (Annemarie, 2017).

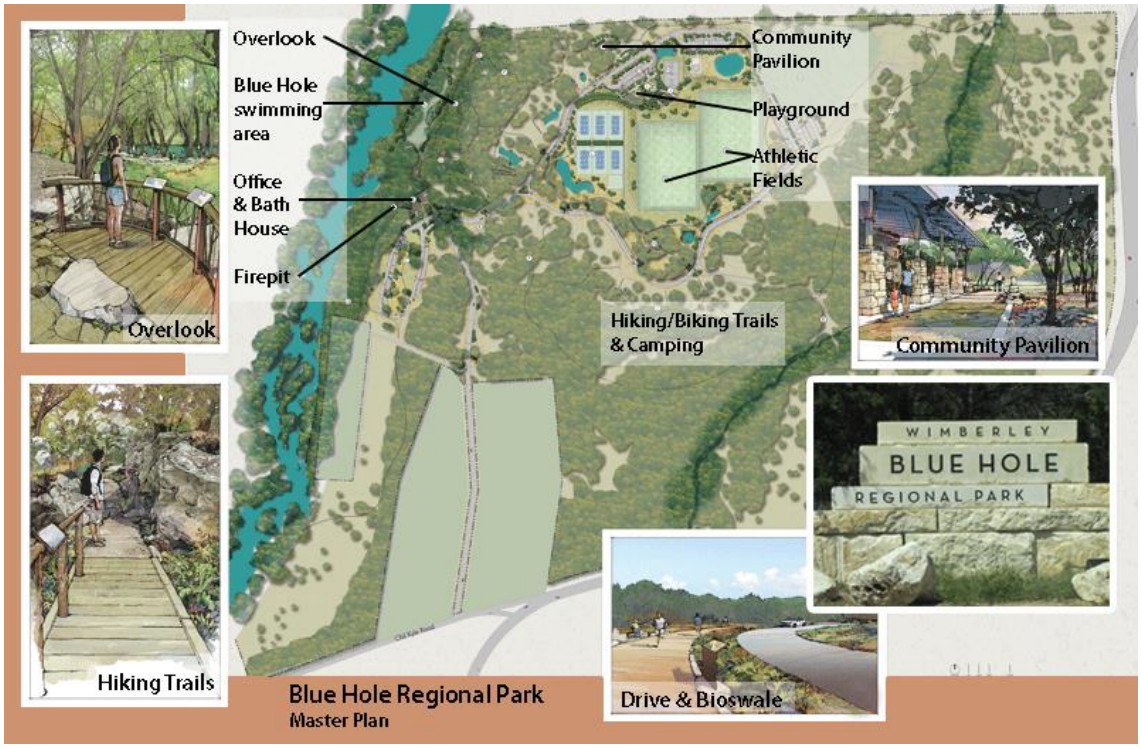

Figure 14: Blue Hole Regional Park Overall Site Plan Source: Design Workshop (2017)

Design Workshop, a landscape architecture firm with an office in Austin Texas, led the master plan refinement, design, and implementation of this one-star, SITES® certified project by operating as prime consultant and public outreach liaison, as well as landscape architect.

The project team primarily included:

1. The City of Wimberly, represented by City Manager Don Ferguson,
2. Design Workshop, represented by Emily Risinger and Steven Spears; Landscape Architects,
3. T.F. Harper & Associates; General Construction Contractor,
4. PBS&J; Environmental Assessment, and
5. The Ladybird Johnson Wildflower Center at UT Austin; Ecologist

The stakeholders held monthly meetings on the design process and included the community in a design charrette and open house in October 2009. This provided vital input for inclusion into the emerging design of the new 126-acre park.

SITES® awarded the project a 1-Star rating in 2012. Sustainable features included:

1. Using Eastern Red Cedar and limestone harvested from the park itself, which might otherwise have been sent to a landfill.
2. Increasing plant species richness by 17% with the addition of 31 ecologically valuable native hardwood, prairie grass, and forb species. (See Table 1 below)

	Existing species observed on-site	Planting Palette species	New species	**Total # of species on-site post-implementation**
Trees	26	15	3	**29**
Shrubs	31	6	1	**32**
Grasses	30	16	11	**41**
Forbs	84	23	16	**100**
Ferns	3	0	0	**3**
Vines	9	0	0	**9**
Cacti	3	1	0	**3**
Total	**186**	**61**	**31**	**217**

Table 1: Summary of pre-implementation and planted species on site and Design Workshop planting palette (Canfield, 2017). Source: Landscape Architecture Foundation

3. Maintaining or reducing stormwater runoff flow rates sitewide, despite the addition of 320,000 square feet of new park development (Canfield, 2017). The stormwater management system minimizes impervious surfaces, and redirects water runoff into rain gardens and numerous small detention ponds across the site. Cisterns collect stormwater from the bath house roof which is used to irrigate recreational fields. (See Figure 15)

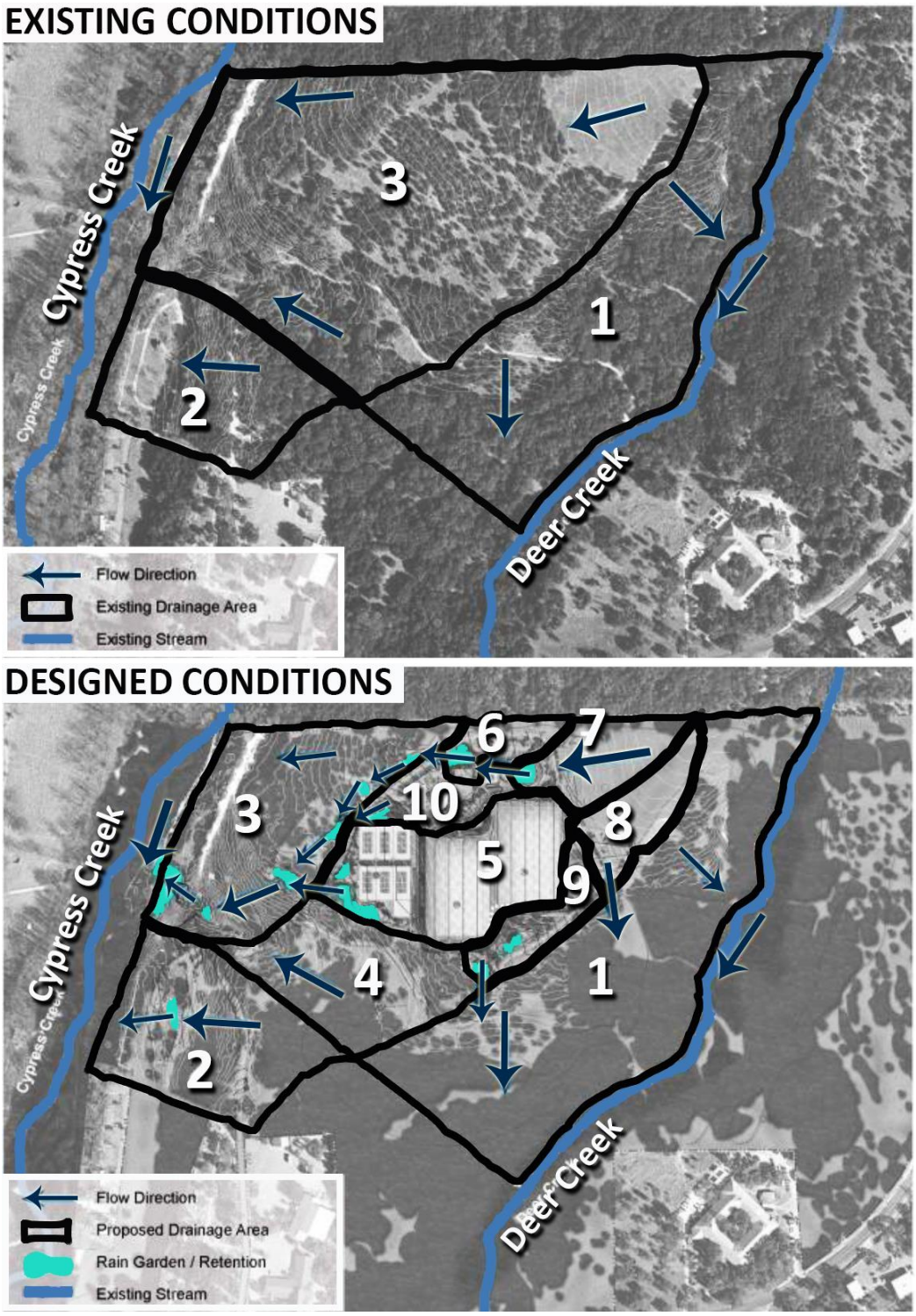

Figure 15: Pre-Implementation stormwater runoff conditions compared to designed stormwater runoff conditions. The numerals represent drainage areas. Source: Design Workshop, 2009

4. Four newly designated creek entry points (replacing the open banks which allowed users entering and exiting the water to degrade the roots and soil structure all along the water's edge) encouraging users to utilize the protected areas, serve not only to protect trees, but endangered species habitat as well. Ninety-three acres, or 96% of the undisturbed area of the site, which was identified as potential habitat for 19 different endangered, threatened, or species of concern were protected due to the park upgrades (Canfield, 2017). (See Table 2 and Figure 16 below)

		Species	
		Common Name	*Scientific Name*
Federal & State-listed Endangered	Birds	Golden-cheeked Warbler	*Dendroica chrysoparia*
State-listed Threatened	Birds	Zone-tailed Hawk	*Buteo albonotatus*
	Reptiles	Texas horned lizard	*Phrynosoma cornutum*
Species of Concern/Rare Species	Amphibians	Blanco River Springs Salamander	*Eurycea pterophila*
	Reptiles	Cagles' map turtle	*Graptemys caglei*
		Spot-tailed earless lizard	*Holbrookia lacerata*
		Texas garter snake	*Thamnophis sirtalis annectens*
	Birds	Western Burrowing Owl	*Athene cunicularia hypogaea*
	Mammals	Plains spotted skunk	*Spilogale putorius interrupta*
	Mollusks	Creeper (squawfoot)	*Strophitus undulatus*
		False spike mussel	*Quincuncina mitchelli*
		Golden orb	*Quadrula aurea*
		Pistolgrip	*Tritogonia verrucosa*
		Texas fatmucket	*Lampsilis bracteata*
		Texas pimpleback	*Quadrula petrina*
	Plants	Canyon mock-orange	*Philadelphus ernestii*
		Hill Country wild-mercury	*Argythamnia aphoroides*
		Warnock's coral root	*Hexalectris warnockii*
		Chatterbox orchid	*Epipactic gigantea*

Table 2: Endangered, Threatened, and Species of Concern with potential habitat on site (Canfield, 2017)
Source: Landscape Architecture Foundation

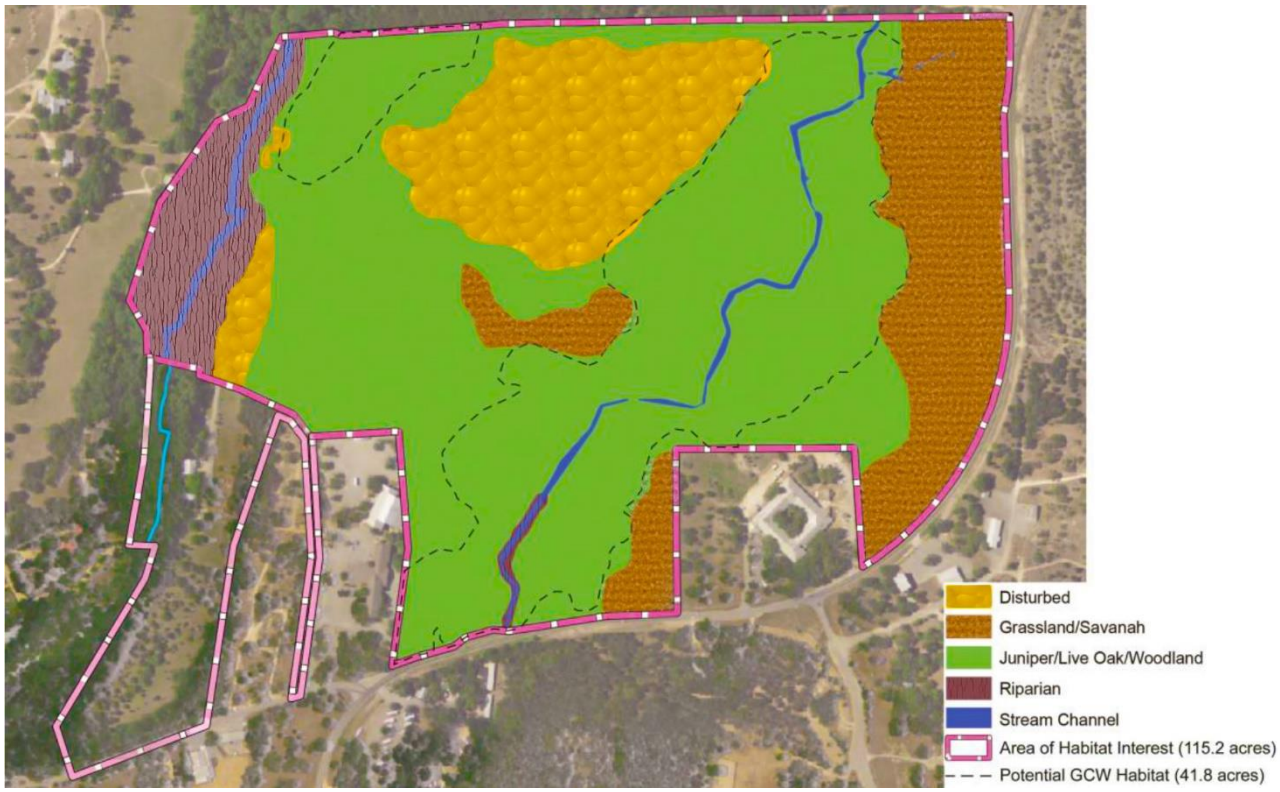

Figure 16: Site plan showing GIS-derived vegetative communities and habitat types for all potential endangered, threatened, and species of concern (see Table 1) (Canfield, 2017)
Source: Landscape Architecture Foundation

In addition to Planning and Landscape services, Design Workshop also designed a comprehensive site identification, wayfinding, interpretive and donor recognition program for the park. The interpretive signs provide visitors an in-depth overview of the importance of water conservation and stewardship for this historic family destination in the Texas Hill Country.

The park, owned and operated by the City of Wimberley, promotes physical activity through its soccer fields, basketball courts, sand volleyball court, playgrounds, camping sites, swimming areas and almost five miles of recreational trails (Stanley, 2017). The community pavilion and playscape feature many recycled materials including some Red Cedar trees that were cut down during the construction phase and turned

upside-down, similar to tee-pees without the covering material, for children to play under and around, (see figure 17). Picnic areas were constructed from large slabs of natural stone recycled from site excavation (Center for Active Design, 2017).

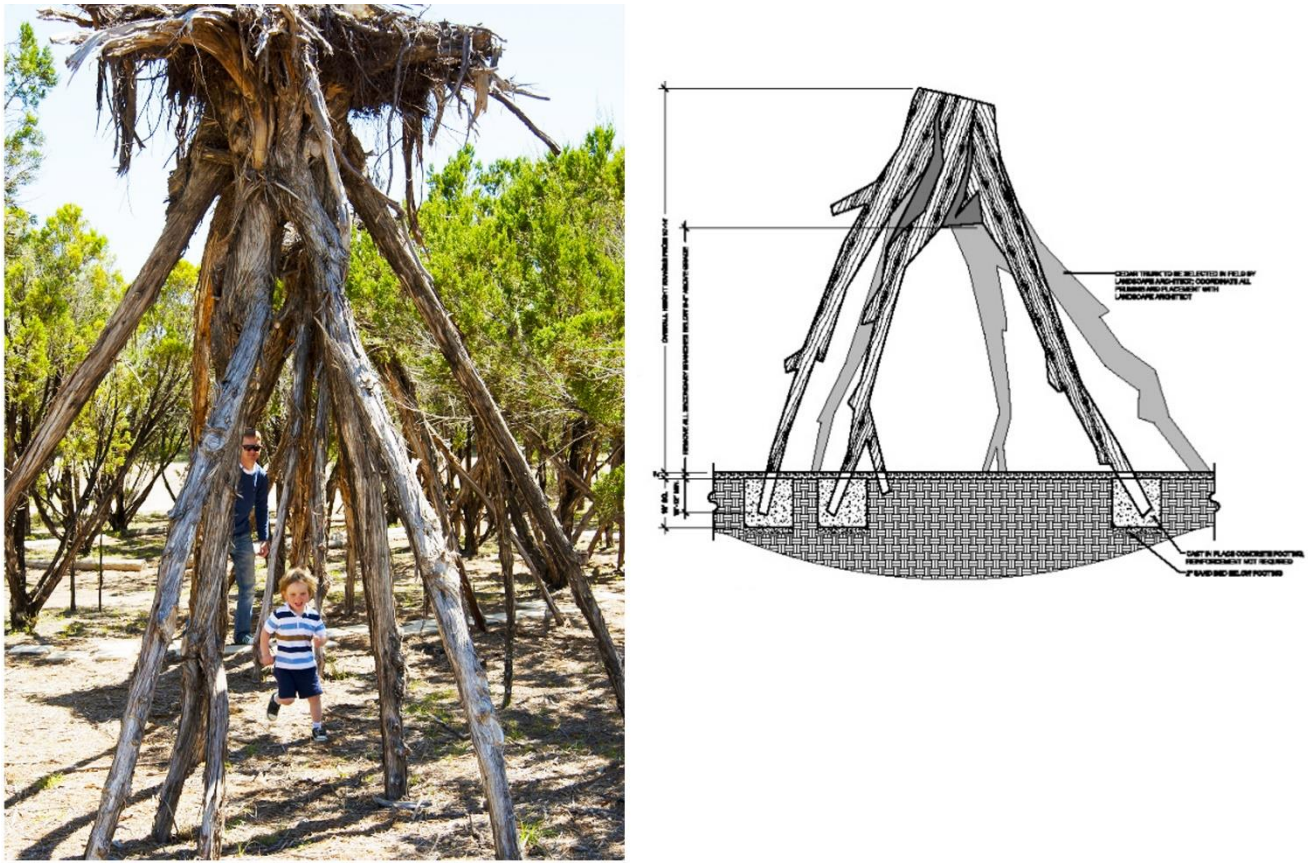

Figure 17: An interactive cedar "teepee" makes up one of the nature-based play features made from re-purposed materials found on-site.
Photo and Construction Document Source: Design Workshop (2017)

Other improvements include elaborate iron entrance gates, wide rock pathways from the parking lot, native plantings, and on-site composting. Results of the improvements are as follows:

1. Impervious surfaces are limited to 7.8% of the site by only paving the park road without paving the parking spaces themselves, and 70% tree coverage was

maintained despite an additional 320,000 square feet of park amenities and active programmed space. Only six hardwood trees were removed in the process.

2. Ten interpretive signs educate users about the sustainable design features, the geology of the Texas Hill Country (specifically Blue Hole), the history of the Blue Hole and the native vegetation. (Figures 18 and 19).

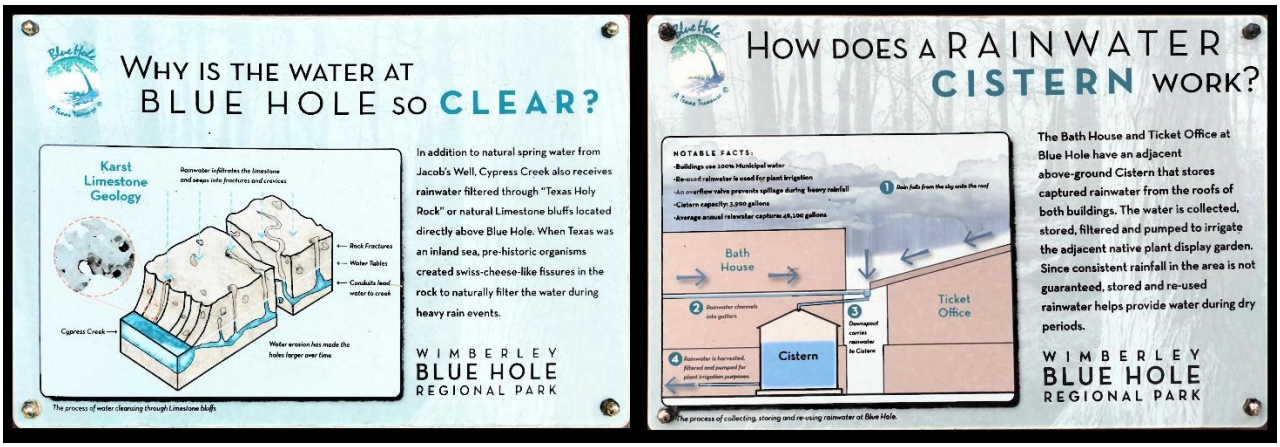

Figure 18: Interpretive signs at The Blue Hole Regional Park Source: Author (2017)

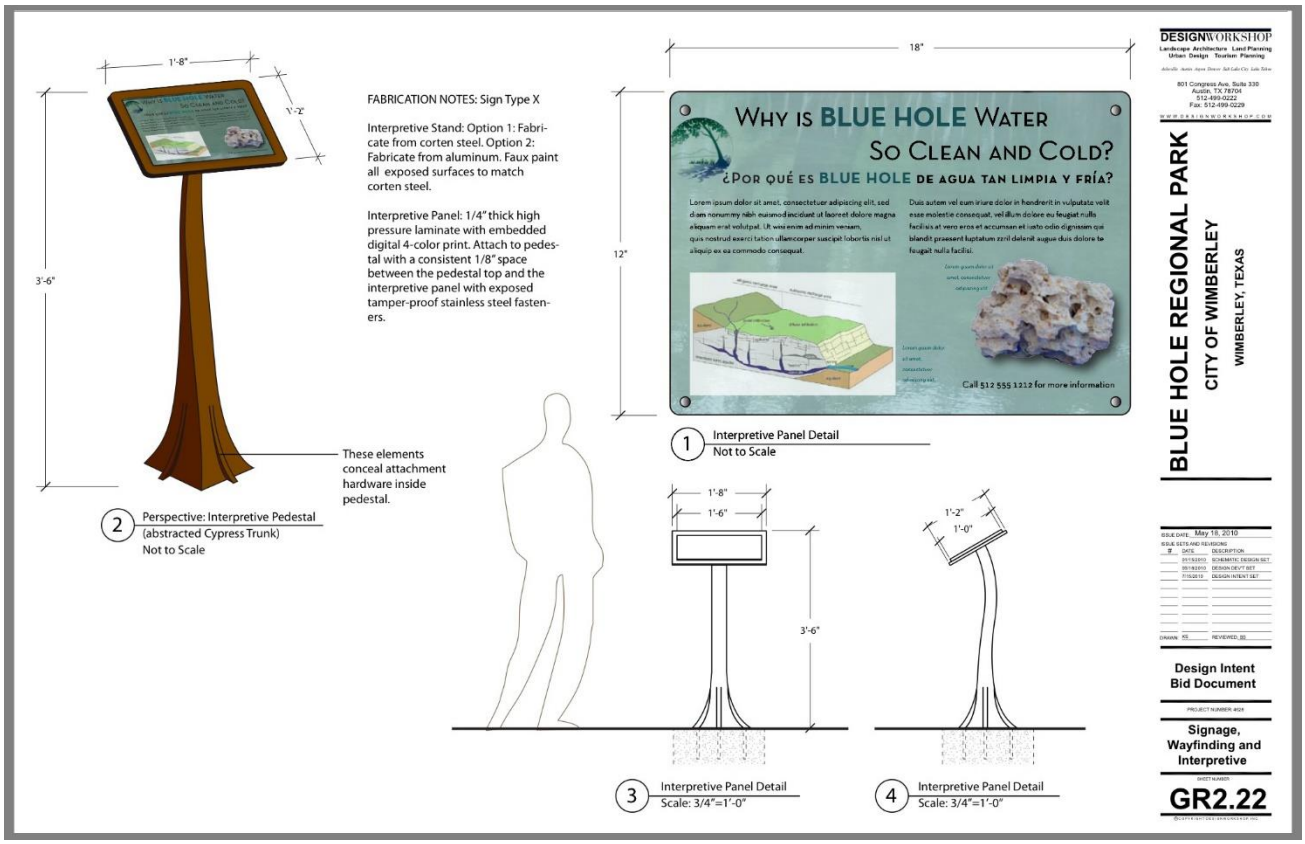

Figure 19: Construction documents referencing signage specifications at The Blue Hole Regional Park in Wimberley, Texas. Source: Design Workshop, 2017

3. Approximately $230,000 was saved in mulch costs by double-shredding the cedars removed from the site and using in all designed mulch areas.
4. 96% of the undisturbed area of the site was preserved (habitat for 19 different endangered, threatened, or species of concern)
5. Stormwater runoff flow rates were reduced site wide through low impact development, despite the addition of 320,000 square feet of new park development (Wimberley Valley Watershed Association, 2017)

The park balances preservation of the site, and recreational and educational opportunities for users.

2.4 Pilot Program Stakeholder Responses

The 2009 SITES® system was based on a maximum of 250 points. To achieve one-star certification, the project must have earned 100 points. To achieve 2-star status, projects needed to score 125-149 points, and 150 points earned a 3-star certification. Two hundred points were needed to achieve the "very challenging" SITES® 4-star status.

By collecting user responses from professionals involved in meeting the performance criteria and other stakeholders of SITES® certified pilot projects, the SITES® criteria was updated as needed and many new resources were developed to facilitate further adoption of this important innovation.

One of the new resources available for assistance with using with the SITES® v2 Rating System and Scorecard include the SITES® AP, which is the first credential specifically targeted to those who work and care for land and its resources and communities. The credential establishes a common framework to define the profession of sustainable landscape design and development, and provides landscape professionals with the opportunity to demonstrate their knowledge, expertise and commitment to the profession. The exam was built on the expertise of leading practitioners, academics, vendors, and regulators, and is intended to test a candidate's competency to perform the job functions of a SITES® AP.

Free and introductory courses for professionals initiating a project include *Introduction to the SITES® Program, Understanding the Core Concepts of SITES® v2 Rating System,* and *Getting Started with the Sustainable Sites Initiative* (GBCI, 2017). A 10-part series of courses which ushers users through the SITES® v2 rating system features an introductory course that covers broad concepts related to implementing

SITES®, and individual courses discussing each specific section in the rating system. For each SITES® section, details are provided on the prerequisite and credit requirements along with core concepts, terms, and strategies. Sustainability experts share insight on how to successfully implement the SITES®v2 rating system on a project. The SITES® Reference Guide is a 321-page handbook to accompany the rating system and scorecard. It provides comprehensive guidance including all calculations, documentation and resources required for achievement of SITES® certification, and costs $249. A free webinar series by SITES® provides more information about sustainable landscape design and development and why they matter, and tips to SITES® certification. The Landscape Architecture Foundation's Landscape Performance Series is home to over 100 case studies, many of which were submitted from SITES® certified projects seeking credit points.

The development of peer-reviewed methods of evaluating environmental impact has emerged, and as noted above, a number of case studies, toolkits, and resources are available to help better define how to achieve sustainability (Marino, 2017). The SITES® Rating System is intended to be a living product that will evolve over time as research and experience continue to generate knowledge in this area (GBCI, 2017). New metrics and guidelines are helping to better define the benefits of sustainable landscape design and ensure that projects perform to the quality the client expects, allowing designers to measure their methods, become better practitioners, and speak authoritatively about their experiences with sustainable landscapes for the benefit of the entire industry.

2.4.1 Challenges of Sustainable Sites Initiative™ Certification

As with LEED®, the Sustainable Sites Initiative™ program is voluntary and incentive-based. It identifies a range of steps that designers and SITES® managers can take to improve the sustainability of their landscape development projects (O'Connell, 2007). To test the new 2009 rating system, SITES® launched a two-year international pilot program in 2010 that included more than 150 projects in 34 states along with Canada, Iceland and Spain. The call for pilot projects opened November 5, 2009 and ended February 15, 2010. Fees for participation ranged from $500 to $5,000 depending on project size.

In the words of the CEO of ASLA, Nancy Somerville, "We're doing everything we can to learn from the first projects how to systematically use SITES® – what are the challenges in meeting the credits, how can we clarify requirements or streamline documentation, are there regional differences we need to account for, and so on. In addition, we're working with USGBC Technical Advisory Groups on increasing the collaboration between LEED® and SITES®" (Meinhold, 2017). When the pilot project phase concluded, SITES® made changes to the rating system based on what they learned, published a revised version of the guidelines, and opened certification to any project wanting to participate.

The pilot program allowed for critical testing of program metrics, as set forth in the 2009 SITES® Guidelines and Performance Benchmarks. These metrics were site selection, water management, soils and vegetation, and social/cultural connection. After the pilot, reaction from professionals and other stakeholders was used to adjust and refine

the SITES® v2 rating system and to create a reference guide that provides suggestions for how to improve scores in specific credit areas (Bramwell, 2013). The perceptions received from stakeholders of various projects are described below.

2.4.1.1 Site Selection: Section 1

Site context is most important and section one focuses on protecting the existing elements of the site, or limiting development on certain areas, such as: farmland, floodplains, aquatic ecosystems, and endangered species habitats.

2.4.1.2 Pre-Design Assessment and Planning: Section 2

This section focuses on using integrative design techniques to include all stakeholders and introduce potential issues early in the design phase through a collaborative design process. The climate for sustainable solutions has changed. Many commercial and residential clients still need to be sold on sustainability. However, many institutional clients are educated about SITES® and now demand the most sustainable options they can afford.

Constance Haydock is a LEED® accredited landscape architect, a chapter member of the U.S. Green Building Council, and an officer of the American Society of Landscape Architects' Sustainable Design and Development Professional Group working in New York state and surrounding areas. As project manager for a SITES® certified pilot project at Hempstead Plains in Long Island, New York, she noted that pre-requisite 2.1, which calls for a "pre-design site assessment", is a challenge, involving seven pages of paperwork. In her opinion, that process was critical because it "…forces designers,

engineers, and landscape architects to get together as a group in the beginning [of the project]. It's a powerful tool to get people thinking and anticipating future problems early on" (Green, 2017).

An integrative design process is a critical component of SITES® certification. It requires project team members of diverse disciplines in landscape architecture, urban planning, ecology, and engineering to engage with each other, the client or owner, and local stakeholders and experts (Steiner, 2013). The owner is the person or entity with the authority to hold and control the real and personal property associated with the project and to enter into the certification agreement. The SITES® administrator acts as a project manager, overseeing the SITES® project, as well as determining which team members are responsible for certain tasks, credits and prerequisites (Buente, 2017). In the pre-design assessment, the team meets prerequisite 2.3, "engaging users and other stakeholders in site design" when the team sets up regular meetings with user groups, a project steering committee, and clients, among other stakeholders.

According to Signe Nielsen - FASLA of Mathews Nielsen Landscape Architects, working with public authorities can mean limited opportunities for integrated site design teams, as many local governments do not incentivize such groups. Her project, Hunts Point Landing, is part of the South Bronx Greenway Master Plan. However, Royce believes institutional clients are presently on board with sustainability requirements and now demand the most sustainable options they can afford (Green, 2017).

Jose Alminana, FASLA, PLA, LEED® AP is a landscape architect, architect and principal with Andropogon, a landscape architecture firm committed to the principle of "designing with nature." As project manager for Shoemaker Green, a campus green and

plaza on the University of Pennsylvania campus in Philadelphia, Alminana said landscape architects testing out SITES® view the initiative as valuable because it "adds clarity and vigor to [the] technical content [of meeting the guidelines]" (Green, 2017).

In Shoemaker Green's pre-design assessment and planning phase, Alminana further stated that the team achieved credits for engaging users and other stakeholders in site design because they utilized regular meetings with user groups, a project steering committee, and clients. "We brought in a general contractor for pre-construction support…" to help organize the design review process (Green, 2017).

2.4.1.3 Site Design—Water: Section 3

Water covers areas of precipitation management, reductions in outdoor water use, creating stormwater controls and restoring aquatic ecosystems.

The National Brownfield Association, a non-profit, member-based organization dedicated to promoting the redevelopment of brownfields in a sustainable manner, held a national conference in 2011 at which James Royce, ASLA, senior associate landscape architect with Stephen Stimson Associates, noted that SITES® is a useful tool for understanding and quantifying a wide range of ecosystem services that landscapes provide. He also explained how SITES® can be used to answer the critical questions:

1. How can we measure the success of a landscape?
2. What do I (the owner) get out of it?

In response to these questions, Royce quantified a range of data-supported benefits, the first of which concerned the use of sustainable green infrastructure design techniques to mitigate onsite stormwater. As project Director for a new international headquarters for

the International Fund for Animal Welfare, Royce explained that runoff during rainfall now flows into an engineered vegetated swale, where measured cleansing and infiltration occurs. This project offers a model for progressive stormwater management in an area of Yarmouth Port, Massachusetts burdened by brownfields and sensitive water resources (Green, 2017).

2.4.1.4 Site Design—Soil and Vegetation: Section 4

This section focuses on a Soil Management Plan and control and management of invasive plants along with conservation of vegetation, biomass and reducing heat island effects. There are eight critical properties of soils, which soil biologists can test to determine if soils meet specifications. They include structure, texture, density, nutrients, pH, organic matter, and density, which are all related to each other. Using vegetation to minimize building energy use and mitigating the risk of wildfires also earned credits in this section.

The SITES® participation of the Yarmouth Port project (described above) saved Royce's client $250,000, by reusing soils onsite, thus avoiding the cost of trucking new soils in and old ones out (Green, 2017). However, in the Shoemaker Green project at the University of Pennsylvania, Alminana noted that meeting the Prerequisite 4.3-Create a Soil Management Plan, was challenging. The urban soils do not work with many of the sustainable vegetation and water systems. As a result, new soils must be trucked in, potentially adding to the project's carbon footprint. While sustainable soils, water, and plants are crucial to any restorative landscape, project estimates for changes in C02 emissions should be included in the mix of what is tracked in the future (Green, 2017).

In Nielsen's opinion, SITES® presented what she called "…an exercise in frustration." Nielsen noted there were categories of SITES® credits that deeply-urban brownfield sites like Hunts Point Landing were unable to utilize, resulting in the project's being able to only achieve two-star status. A major challenge to the project involved preserving existing soils and vegetation because of high levels of contamination (Green, 2017).

2.4.1.5 Site Design—Materials Selection: Section 5

The Materials section is concerned with protecting threatened tree species by noting that no products made from them can be used. It rewards the maintenance and reuse of existing structures, endorses regional and recycled materials, and supports product transparency and sustainable manufacturing.

In the opinion of Signe Nielsen there was "no structure to adaptively reuse," (credit 5.2-Maintain Onsite Structures, Hardscape, and Landscape Amenities) so points couldn't be earned from this criterion either. Nielsen also noted that the achievement of the credits related to recycled content materials (Credit 5.5) was seen as challenging due to the shortage of competitive vendors (Green, 2017).

According to Hunter Beckham, ASLA, of SWT Design, and certification project manager for the Novus International headquarters, a 9.5-acre site outside St. Louis, he was unable to identify local manufacturers or fabricators for many of the construction materials. In field operations, local steel and iron workers were used, but on some products, "we couldn't trace back the source of the iron ore," which is a requirement for SITES® points in Credit 5.7-Use Regional Materials (Green, 2017).

2.4.1.6 Site Design—Human Health and Well-Being: Section 6

This section has no prerequisites, but is important in creating a stronger human-nature connection. Credits in this section look at culture, site accessibility, physical activity, social connections, food production, reduced light pollution and more, which "helps ward off anxiety, depression, and improves mood," according to CeCe Haydock, who works primarily in the northeast.

Beyond water and soils, however, quantifying user health and well-being benefits at the landscape scale was noted as especially challenging by James Royce. He was unable to identify hard metrics on these criteria, and called instead for the use of pre- and post-occupancy user surveys to make these assessments. (Credit 6.1-Create Equitable Site Development)

2.4.1.7 Construction: Section 7

Construction deals with site waste, air quality, soil retention and restoration, reuse of existing vegetation and systems, and the use of sustainable construction practices.

Similarly, construction prerequisites, 7.1-Control and Retain Construction Pollutants, and 7.2-Restore Soils Disturbed during Construction, were seen as difficult for contractors in Midwestern states, many of whom are unfamiliar with SITES®, according to Hunter Beckham in reference to his Novus Headquarters project.

Alminana's SITES®-certified Salvation Army community center in central Philadelphia provides a good example of how SITES® construction credits work. To achieve zero-waste, Alminana recommended creating a plan to deal with materials at the

project outset by focusing on “material sorting, upcycling, and material placement in the site, and then backfill and grading and planting soil mixes (relating to Credits 7.4 and 7.5). This approach was successful, but Alminana noted it was “difficult to set a quantifiable number for this benefit”. The project calculated a $300,000 savings in truck hauling fees, though the avoidance of CO2 emissions from material transportation was not calculated (Green, 2017).

2.4.1.8 Operations and Maintenance: Section 8

The focus of Operations and Maintenance is for setting a plan for more sustainable use of pesticides and fertilizers, renewable energy for landscape electricity needs, collection of recyclables etc.

This is important for ensuring the site provides ecosystem services over the long-term and Beckham highlighted this requirement as well. His client wanted a comprehensive set of guidelines to cover maintaining the solar power and pump systems, as well as replacement of worn-out materials. In response, Beckham created an extensive manual for the client explaining what the maintenance contractor would need to do. In the same way, prerequisite 8.1, a “plan for sustainable site maintenance,” required Alminana to discuss with his client, very early in the process, the various site maintenance plans (Green, 2013).

2.4.1.9 Monitoring and Innovation: Section 9

This section promotes sustainability awareness and education, creation of a case study and plan to monitor and report site performance.

Jose Alminana discussed how to quantify the ecosystem services provided by sustainable landscapes using the SITES® prerequisites and credits. He mentioned using a case study that demonstrates how to apply SITES® to projects in the design and development phase, and quantify the value of ecosystem services. Alminana said "any landscape can provide ecosystem services. It's about putting a price tag on the value nature provides" (Green, 2017).

2.4.2 Rewards of SITES® Certification

Many teams thought that engaging stakeholders, and receiving points for this, was a very positive requirement. Nielsen believes SITES® has a potent impact, given "metrics are crucial" and SITES® requires landscape architects to collect data and measure the project elements against benchmarks. She said it helps "clients understand the value of our work" (Green, 2017).

2.5 Updates made in developing SITES® v2

Following the pilot phase, modifications were made to the rating process. The rating system for the Guidelines and Performance Benchmarks of 2009 was based on a 250-point scale with four certification levels from one star to four stars based on performance criteria. The 250 possible points that could be accrued were broken down into the following categories:

1. Site selection (21 points)
2. Pre-design assessment and planning (4 points)
3. Site Design: Water (44 points)

4. Site Design: Soils and Vegetation (51 points)
5. Site Design: Material Selection (36 points)
6. Site Design: Human Health and Wellbeing (32 points)
7. Construction (21 points)
8. Operations & Maintenance (23 points)
9. Monitoring & Evaluation (18 points).

During the pilot project phase, the Sustainable Sites Initiative™ recognized projects that achieved all the prerequisites and at least 40 percent of total points as achieving one-star status. Beyond this basic certification level, projects could implement practices to improve site sustainability by completing additional credits, thereby earning additional points toward achieving higher levels of pilot certification. Projects that achieved a level of certification by the end of the pilot program were recognized as certified pilot projects. (see table 3 for a breakdown of points).

SITES® 2009 Pilot Project Rating System

Certification Level	Points
One Star	100 points (40% of total points)
Two Stars	125 points (50% of total points)
Three Stars	150 points (60% of total points)
Four Stars	200 points (80% of total points)

Table 3: Rating System and Certification for Pilot Program
Source: www.coconino.az.gov/documentcenter/view/5469

The SITES® certification system, now in its second iteration known as v2, contains 10 discrete sections in which there are 18 prerequisites and 200 total points available to achieve certification. SITES® is still based on a points system. However, the point spreads are organized differently and the levels are no longer "stars." The number of credits a project earns determines if it is awarded Certified, Silver, Gold or Platinum status (see table for a breakdown of points).

SITES® v2 Certification Breakdown

Certification Level	Points
SITES® Certified	70 points (35% of total points)
SITES® Silver	85 points (42.5% of total points)
SITES® Gold	100 points (50% of total points)
SITES® Platinum	135+ points (67.5% of total points)

Table 4: Rating System and Certification Levels for SITES® v2
Source: www.sustainableSITES®.org/certification

The 18 prerequisites must be met by every project as a baseline and they are spread throughout seven sections required for all four certification levels. Each section also contains credit points which, unlike the prerequisites, are optional. These are the SITES® sections.

1. Sections 1 and 2, Site Context and Pre-Design Assessment + Planning, are for information gathering, analysis and pre-design with as much of the project team as can be included. It is important that all members of the multi-disciplinary team and stakeholders understand their part in the certification process. (up to 16 points available).

a. Section 1 of v2 provides more detail on specification of walking distances & basic services, and now awards points for either planned or existing connections to multi-modal transit networks.

b. Section 2 of v2 added a new prerequisite for designation and communication of vegetation and soil protection zones (VSPZ's).

2. Section 3, Site Design – Water, contains the areas of most relevance to soils, trees and water; (up to 23 points available)

a. In prerequisite p3.2 an option is now provided to design a project with no permanent irrigation, and several sections were condensed as follows:

b. Two sections from v1; c3.2 - *Reduce potable water use for landscape irrigation by 75% or more,* and c3.8 - *Maintain water features to conserve water and other resources* were combined. (The new credit in v2 is c3.4 - *Reduce outdoor water use*).

c. Two sections from v1; c3.3 and c3.4 *Protect & restore riparian, wetland & shoreline buffers* and *Rehabilitate lost streams, wetlands & shorelines* (which entailed complex calculations to determine point values based on initial vs. final average buffer widths) were combined into c3.6 - *Restore aquatic ecosystems* with simplified calculations.

d. C3.5 - *Manage stormwater on site* was a credit earning as many as 10 points in v1, but was reclassified as a prerequisite in v2, with no points offered.

3. Section 4 is Site Design – Soil + Vegetation highlights the importance of soil and plant management, with strategies that are specific to the project site and location (up to 40 points available)
    a. Prerequisites p4.1 and p4.3 in v1 did not address the use of invasive plants or the origin of topsoil used in the new design. In v2 invasive plants are prohibited and topsoil may not be mined from greenfields or prime farmland.
    b. Calculations for many of the credit sections are simplified.
    c. Three sections from v1were combined into two new ones: c4.7 - *Use native plants*, c4.8 - *Preserve plant communities native to ecoregion*, and c4.9 - *Restore plant communities native to ecoregion*. The new credits in v2 are c4.6 - *Conserve & use native plants*, and c4.7 - *Conserve & restore native plant communities*.
    d. Two sections concerning the use of plants to assist in heating and cooling requirements of the buildings on site; c4.10 - *Use vegetation to minimize building heating requirements*, and c4.11 - *Use vegetation to minimize building cooling requirements* were also combined in v2. The new credit is c4.10 - *Use vegetation to minimize building energy use*.
    e. In v2 the credits for reducing urban heat island effects are earned for any improvement, rather than based on a percentage as they were in v1.
    f. *Reduce the risk of catastrophic wildfire* (c4.13 in v1 and c4.11 in v2) expands the credit category to include other catastrophic natural occurrences if the project site is located in areas prone to those events.

4. Section 5 is Site Design – Materials in which attention is placed on understanding the materials that go into building a site. It rewards decreases in the amount of materials sent to landfills, preservation of natural resources, reductions in greenhouse gas emissions, and the use of sustainable building products. (up to 41 points available)
    a. Both v1 and v2 list prerequisite p5.1 as *Eliminate use of wood from threatened tree species*. The difference in v2 is that it extends beyond wood bought and installed, to now include wood used temporarily during construction as well.
    b. In v2 c5.2 - Maintain on-site structures & paving, occupied buildings are no longer eligible for credit and calculations CAN include below grade footings.
    c. C5.3, c5.4 and c5.5 all relate to the reuse or recycling of materials used on site. In v2, many materials previously counted for credit are excluded, such as rocks in c5.3 - *Design for adaptability and disassembly*, soils and new materials with recycled content in c5.4 - *Reuse salvaged materials & plants*, and plants and soils in c5.5 - *Use recycled content materials*.
    d. Credits c5.7, c5.8, c5.9 and c5.10 in v2 are the first areas where higher point values are offered rewarding proactive advocacy. This theme is repeated in section 5 several times and represents a call-for-action on the part of the project team to advocate for the use of sustainable building products.

5. Section 6 is Site Design – Human Health + Wellbeing. This section promotes outdoor opportunities for physical activity, restorative and aesthetic experiences, and social interaction. It also encourages projects to address social equity in their design and development choices. The intent is to build stronger communities and create or renew a sense of environmental stewardship (GBCI, 2017). (up to 30 points available)
    a. Most notable in this section is c6.2 - *Provide optimum site accessibility, safety & wayfinding*, because it reduces the requirement stated in v1 "…accessibility beyond required national and local ADA standards," to simply meeting those standards as required nationally and locally.
    b. Credits c6.4, c6.5 and c6.6 in v2 represent a much simpler process as compared to their counterparts in v1, with clearer language used for requirements and recommended strategies
    c. New credits added to v2 include c6.7 - *Provide on-site food production*, c6.9 - *Encourage fuel efficient & multimodal transportation*, and c6.10 - *Minimize exposure to environmental tobacco smoke.*
6. Section 7 is Construction; this section encourages projects to protect air quality through low-emitting equipment, strive for a net-zero waste site, ensure healthy vegetation through soil restoration strategies, and protect receiving waters from polluted runoff and sedimentation. (up to 17 points available)

7. Section 8 is Operations + Maintenance; it promotes maintenance strategies that maximize the site's long-term potential in providing ecosystem services. (up to 22 points available)
8. Sections 9 and 10 reward Education + Innovation used with the design and recognizes projects for efforts made to inform and educate the public about the project goals and sustainable practices implemented in site design, construction, and maintenance. It also awards bonus points to projects that demonstrate exemplary performance above and beyond the targets established by one or more of the credits (GBCI, 2017). (up to 20 points available)

2.6 Summary

Reviewing literature relating to the SITES® certification process as experienced by key stakeholders is important because it helps to understand the process of certification undertaken by pilot project participants and the challenges encountered during the certification process. The literature explains not only the problems encountered, but the measures undertaken by those participants to overcome the challenges. The literature also provides examples of the pilot projects that have been certified and how the SITES® certification might be revised to provide clearer guidelines for similar projects in the future.

Chapter 3

Methodology

3.1 Introduction

This chapter focuses on research design methods. The study primarily focuses on the use of SITES® Benchmarks and Guidelines by stakeholder groups involved in the 2-year pilot program, testing the program metrics on locations in Texas. Specifically, it discusses the literature review as the form of analysis for the perceptions from different stakeholders, the collection of secondary data, the use of case studies from three pilot projects located within Texas, and the final research design execution. The chapter concludes with the basic coverage regarding limitations, bias, errors, and or significance of the research.

3.2 Qualitative Approach

This research primarily uses qualitative method techniques to answer the questions set forth by the researcher, using in-depth interviews as the primary data collection technique while benefiting from the review of secondary data on the three case studies of SITES® certified projects. Qualitative research tends to be more exploratory in nature, seeking to provide insight into how individuals (or organizations, groups, etc.) understand aspects of their worlds (Taylor & Bogdan, 1984). While in-depth interviews were used as the primary data collection technique, the review of secondary data on three SITES® certified projects chosen as case studies in Arlington, Dallas and Wimberley, Texas informed the study further. The study uses snowball sampling techniques for

interviews, and evaluation techniques (Taylor & Bogdan, 1984) to appraise feasibility and adaptation of the SITES® v2 standards for sustainable projects.

The pilot program allowed for critical testing of the measures which were then adjusted and refined for the SITES® v2 program. The goal is to understand the difficulties encountered based on the informed opinions of these stakeholder groups. Using qualitative methods and case study documentation, the participants were interviewed about their experiences meeting the prescribed metrics.

3.3 Research Design

This research uses one approach for analyzing the content of the qualitative data received. It is based on the identification within the content of the data of key topics, referred to as domains, and the relationships between them. It describes the analysis of four in-depth interviews, one written questionnaire as well as collection of field data from three pilot projects in Texas.

The research design used for this study was a technique formulated by Taylor and Bogden (Taylor & Bogdan, 1984). It emphasizes five specific categories addressed by this study. The categories include:

1. Technique,
2. Access strategy to gain participants,
3. Anticipated number of participants,
4. Data and recording procedures, and
5. Analysis.

This research assesses the methods used by key stakeholders in earning a SITES® certification by evaluating the opinions of a group of key informants who were responsible for the certification of each of the SITES® projects studied. In addition to their opinions about the financial investment and the time/expertise necessary to apply for and receive the certification, the stakeholders were interviewed to determine their impressions of each project, the complications they encountered in the certification process, and their recommendations for the certification process of future projects.

3.3.1 Technique

The primary technique used for the research was qualitative in-depth phone interviews, designed to gather descriptive data from verbal responses (Sommer, 2001). The interviews conducted for this research consisted of informal conversations as well as interviews. The secondary and tertiary techniques used for this research were researcher field observation and review of secondary data per the literature review in Chapter 2. Each of the case study projects was observed by the researcher and field notes recorded. Secondary data discovered regarding other pilot projects which attained certification was reviewed and analyzed in Chapter 4.

3.3.2 Access strategy.

Participant selection involved seeking professionals that worked on one of the three chosen pilot projects in Texas in any capacity: design, construction, ownership, maintenance, or certification document preparation.

3.3.3 Participants.

Participants were chosen for their professional knowledge or exposure related to the SITES® certification obtained or pursued on their project in Texas. During the email recruitment for the interview process, a total of 5 key informants were identified from their participation on one of the project teams studied for this research. Although the informants had various professional backgrounds, all participants are considered experts in their field and an asset to the SITES® certification process by the projects in which they participated, and by the researcher. They have all been granted anonymity in order to encourage candid critiques. Identifiers were assigned to each which indicate their professional experience, such as "D" for an informant in the landscape architecture or urban design fields. The identifier "A" was used for respondents operating in an administrative role. (See table 5 below)

ID	Field of Expertise	Years Experience	Project Role	Project Name	
D1	Landscape Architecture	33 years experience	Project Lead	Perot Museum	
D2	Landscape Architecture	5 years experience	Metrics Documentation	Green at College Park	
D3	Urban Planner	5 years experience	Metrics Documentation	Blue Hole	
A1	University	13 years Experience	Finances & Oversight	Green at College Park	
A2	Municipal	13 years Experience	Oversight & Maintenance	Blue Hole	

Table 5: Breakdown of Participant Qualifications

3.3.4 Data collecting and strategy.

Interviews were digitally recorded using a TapMedia Voice Recorder application developed for smartphones. These digital files were sent via file transfer protocol (FTP) to a San Francisco, California based company called Rev.com for transcription. Employees of Rev.com transcribed the interviews and e-mailed them to the researcher in the form of Microsoft Office Word documents.

The researcher read the interviews, searching for indications of perceptions related to the SITES® process of certification. Associated perceptions from all respondents were grouped according to their related credits or prerequisites in the SITES® Benchmarks and Guidelines, and analyzed for recurring themes and pertinent details.

Field data in Section 3.3.1 was collected by utilizing a field observation survey prepared before visiting the location. (see table 7 below) Secondary data was informed by the literature review.

FIELD OBSERVATION SURVEY

_____ (SITE/DATE)

- SITE CONTEXT (location, views, proximity to other buildings/parks/cities, etc.). _____
- HYDROLOGY/WATER. _____
- SOIL & VEGETATION (key plants used, how?). _____
- ANY EXISTING PLANTS/TREES SAVED. _____
- MATERIALS USED/RECYCLED. _____
- OPPORTUNITIES FOR PHYSICAL/RECREATION/MEDITATION/SOCIAL ACTIVITY. _____
- MAINTENANCE. _____
- SIGNAGE/WAYFINDING/ACCESSIBILITY. _____
- NOTES. _____
- _____
  TAKE PHOTOS.

Table 1: Field Observation Survey
Source: Author

3.3.5 Analysis

Data was coded prior to analyzation using a three-step process:

1. Identifying the domains from the list of topics discussed in the interviews,
2. Constructing a taxonomy of sub-categories by grouping phrases together, and
3. Relating the domains to build up an overall picture from the data (Atkinson, 1996).

A code was assigned to each item within the transcript which offered insight from that respondent. The coding tool used for this research is an on-line service, DeDoose.com, a cross-platform application for analyzing qualitative and mixed methods research. Codes were categorized and themes were generated based on relationships between the codes, code frequencies, and underlying meanings across the codes. In this way, the narrative created by the categories creates a storyline that responds to the research questions in a meaningful way.

3.4 Document Review

Before the collection of data, SITES® Benchmarks and Guidelines (v1) was studied and compared to SITES® v2 to determine changes that had been made to the latter based on the shared experiences of key informants involved in SITES® certification using the former guidelines and benchmarks. Knowledge of this set of guidelines and how it was changed reflects the difficulties encountered by the pilot project participants.

3.5 Person to person interviews

Structured one-on-one interviews were used to collect information about the respondent's experiences relating to the design and implementation of the SITES® benchmarks and guidelines. Landscape architects, city officials and facilities managers were chosen for this sample because they were identified as key stakeholders on projects that were constructed in Texas. The one-on-one interviews allowed the respondents to offer their perspectives on the design and construction process as it related to a SITES® certification, and to share their experiences of meeting the prerequisites and credits needed to receive that certification. The questions that were asked were specifically and

purposefully designed in order to yield data that could be used for analysis. This analysis shows certain themes of commonalities and differences in the way that professionals design and implement projects for compliance with the various rigors of the certification standards in the future. (See interview questions below.)

1. What was your role in building the project?
2. What was your role in obtaining the SITES® certification for the project?
3. What is your area of specialization?
4. How was the SITES® certification funded?
5. What was your general impression of the certification process before beginning the project?
6. How have your thoughts about achieving the certification changed now that the project is completed?
7. Which of the SITES® credits were the most difficult to achieve?
    a. Why? (possible follow-up questions.)
8. What collaborative communication process did you/your team employ?
9. Who lead the certification process?
10. How difficult or easy was it to assemble the SITES® certification team?
11. Did team members communicate with each other and the Project Team Lead?
        i. Please explain that process.
12. Was there an opportunity for input and feedback from users and stakeholders?
13. How difficult was it getting the public encouraged to participate, or engaged in the planning phase?

a. Was their involvement beneficial?

14. What do you determine was the KEY to keeping the communication process viable between the SITES® Lead and the project team?
15. Have there been benefits from receiving the SITES® certification?
16. Has the SITES® certification affected the value of the project?
17. Would you change anything about the SITES® certification process?
18. Would you change anything about how you ***implemented*** the SITES® certification process if you participated in it again? (follow-up questions here.)
19. What helpful methodologies did you use with the SITES® certification process?
20. Did you ask for help on the SITES® certification project? From whom?
21. How long did it take you to get your project SITES® certified?
22. Have you been involved in projects that applied for the SITES® certification and did not receive it?
    a. What was the name of that project?
    b. What was the biggest deterrent to getting it certified?
23. Is there someone else I should talk to about their experiences with a SITES® project?

3.6 Significance and Limitations

In an effort to design more sustainably, many landscape architects seek the rigor of SITES® as a framework of performance measures. Once the pilot project phase was completed, SITES® changed many of the prerequisites and credits involved in obtaining that certification. The changes made were informed by the professionals using the first version of SITES®. Understanding the lessons from v1 and examining the changes made

to v2, shows how SITES® was informed, and why the changes were made. Landscape Architects will benefit in future from the changes because sustainable landscapes are easier to achieve and will provide the environmental functions intended.

The main limitation of this study is the small number of Pilot Projects certified in Texas. SITES® v2 is currently being used by many professionals, however the pilot projects finished their certifications over five years ago. Additionally, the short window of opportunity for the pilot project phase affects the availability of professionals in Texas design fields that have experience working with those SITES® projects. For instance, an attempt was made to contact three additional projects that registered during the pilot phase, but did not attain certification for their perspectives. However, the project managers were no longer available due to employment turnover, and no record of the pilot project team could be identified for further study and interview possibilities.

3.7 Conclusion

This study is an assessment of professional opinions and strategies utilized to meet the stringent criteria of the SITES® certification for sustainable landscapes in Texas. The experiences of these professionals while getting their projects certified informed the researcher. More importantly, their experiences helped to inform the SITES® certification process as GBCI made changes to SITES® v2. Through interviewing professionals and analyzing the data obtained using domain analysis, the researcher gained an understanding of the pilot process so that it could be compared to the changes made in v2 for a clearer understanding of how that certification process has evolved into

the tool it is today. It also shed light on how professionals deal with calculating the metrics and resolve issues relating to meeting standards of a certification by SITES®.

Chapter 4

Analysis and Findings

4.1 Introduction

The 2009 Benchmarks and Guidelines rating system requires in-depth study to understand fully the breadth of the system, its intricate subtleties, and the interconnection of prerequisites and credits. This study sought out the opinions of key stakeholders of sustainable developments who achieved SITES® certification during the pilot project phase in Texas. Interviews were conducted to gather their perceptions regarding the specific guidelines needed to measure the performance and the value of sustainable landscapes within this certification process. Transcripts of the interviews were examined by simultaneously coding and analyzing the data in order to develop concepts about the certification process as experienced by the key informants interviewed (Taylor & Bogdan, 1984). The data showed that the key stakeholders' overall perceptions of the SITES® certification standards were favorable regarding appropriateness for use in sustainable developments. However, concerns were raised regarding some of the prerequisites and credit areas as they pertained to the projects certified.

The stakeholders who took part in the interviews had a basic working knowledge of SITES® certification and the new direction sustainable landscapes are taking since they had all participated in a pilot project. They were chosen as interview participants based on their prior experience in those projects in this region. Several themes emerged as a result of the interview transcript analysis.

4.2 Domain Analysis of the Interviews

Research findings are organized according to themes that surfaced during the analysis from the main topic areas covered in the interviews. This organization format allowed for 8 domains, and 49 subdomains to emerge from the interview questions with 362 codes applied to those domains. (See table 7 and figure 20 below.)

DOMAIN	SUB.
Emotional Investment & ROI	buy-in
	learning
	discourage
	experience
	challenge
	need
	education
Traits/Skills/Beliefs Needed	awareness
	preserve
	decisions
	value
	experience
	understanding
	proud
	commitment
Future Recommendations	simplify
	change
	v2
Thoughts about Overall Concepts	sustainability
	SITES
Beneficiaries	community
	users
	impact

DOMAIN	SUB.
Process	"lots" of...
	LBJWC
	early
	process
	LEED
	documentation
	benefits
	detail
	email
	team
	tools
	design
	cost
	contractors
	stakeholder
Ratings/Points	credits
	rating
	stars
	prerequisites
	goals
	difficult
Sections of v1	water
	vegetation
	soil
	materials
	maintenance

Table 7: Domains and subdomains from interviews

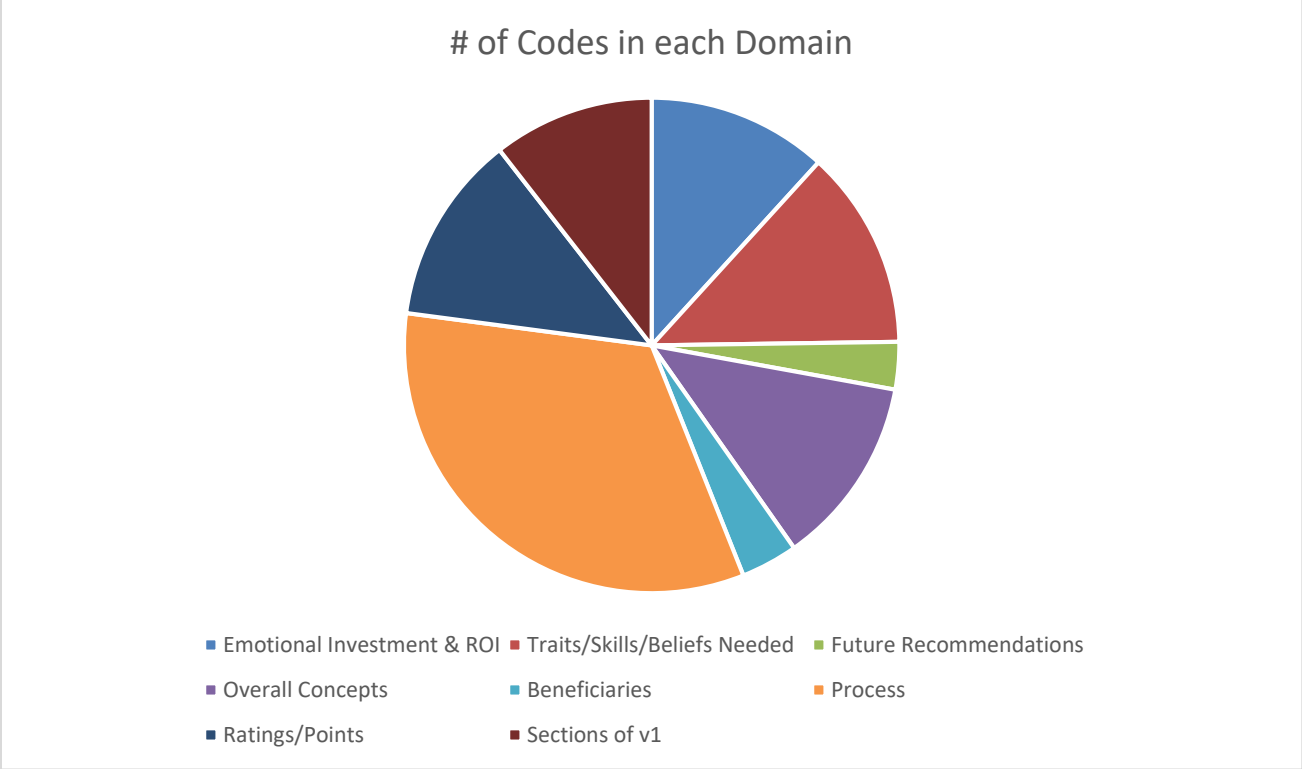

Figure 20: Number of Codes contributing to each of the 8 Domains

4.2.1 Interview Data

The following is a list of the domains gleaned from topics discussed with key informants that received the most commentary and the researcher's notes:

Overall Concepts of sustainability and the SITES® certification process were seen as a "canvas for showcasing our commitment to sustainable development." However, the financial sustainability of the project after its completion with regards to maintenance, and preserving it for future generations were mentioned by several respondents as well. Even though one of the informants admitted he did not have much knowledge about the SITES® certification process before his project began, after certification he felt the need

to share the benefits of his project experienced with others in his position, stating "the intent of SITES® is phenomenal."

The Process of certifying collected the most feedback from those interviewed because they all had suggestions for streamlining the methods they would use the next time. Suggestions ranged from "early dialogue with stakeholders," to being aware of the goals and metrics early in the process, to encouraging regular contact with GBCI and the Lady Bird Johnson Wildflower Center for assistance. None of these respondents had any precedent projects to study and all found the documentation needed to be time-consuming, "tedious" and "detailed." The informants which shared the most positive comments had engaged in a lengthy stakeholder engagement process, confirming the suggestions to start early and to be thorough with an engagement plan to move forward, making sure everyone is "on board." Communication among stakeholders was mainly handled through regular emails, and none of the projects reported having large project meetings with all of the stakeholders present after the initial assessments.

Contractors were mentioned many times. All agree that contractors need to be committed to, and understand the ultimate goals of the project.

Some tools that proved to be most helpful were charrettes, post-occupancy studies, and spreadsheets set up specially to calculate the metrics needed, with photographs and narratives in another file. They are also looking forward to becoming SITES® AP credentialed in order to deepen their understanding of the process.

When costs were mentioned the responses included "astronomical to do the analyzation," and "it has ultimately minimized my operating costs." The second response came from a city manager, who was responsible for that portion of the city budget

covering costs of maintaining the project area. He found that his costs were reduced by using the sustainability measures applied for achieving the SITES® certification.

Different sections of the guidelines proved to be challenging for each of the three projects studied. For one it was the soils and vegetation section. In that project five different soil types had to be resourced and brought in. The project manager said, "We imported those accordingly and we did suitable matrixes for those soil types," but they did not use soil scientists. He disagreed with the way the soil testing was implemented and admitted that "working with geotechnical engineers would have been beneficial" for that project. For another of the projects, it was reusing materials on-site that needed extra attention because locally resourced materials would not have been appropriate for the design. The third project struggled with water on the site stating, "75% was a difficult reduction in use of potable water," especially since the site also needed to control a large amount of stormwater flowing through the project during heavy rains.

Ratings and points awarded for the credit areas were mentioned frequently, as well. All of the projects studied received a 1-star rating, and every respondent mentioned how "difficult" it was to achieve just one star when they expected to be awarded more. Several suggested reducing the amount of prerequisites because "prerequisites do not earn points." Making sure all stakeholders understand the goals from the beginning and holding them to the required metrics was very important. They mentioned feeling "discouraged" after the 1-star certification, but felt certain their projects will score better in the future with v2.

Character traits, skills and beliefs needed from anyone seeking a SITES® certification were discussed during the interviews as well. Tough decisions needed to be made,

commitment to the costs and the extra calculations were necessary, and a strong desire to give back in the form of research and case studies was important to the professionals interviewed. SITES® is not a process that everyone fully understood at the time of the pilot projects, but the subjects interviewed wanted to "preserve and protect" the resources they were managing. They felt they were preserving something "for future generations" and put serious thought into every decision they made on their projects. Raising awareness about sensitive areas of their projects and creating a learning experience for future users helped them to maximize the ecological experience during the process.

When they were asked about the value of having their projects SITES® certified, one responded, "its value is to the future users," and "it is "something that we are very, very proud of." Another remarked that the value was in "going through the certification process." However, one project manager who encountered many rejections from SITES® during the process said, "at the end of the day, I do not know that it adds that much more value."

In the three pilot projects studied, an emotional investment was essential, and a corresponding desire for a return on that investment (ROI) was expected, according to comments made during the interviews. The metrics were complex and challenging, the need to "develop it right" was important, and the desire to share the sustainable measures undertaken with others was strong. The comments received all reflected a "buy-in" on the part of the project leaders interviewed. This characteristic is not required in the guidelines and benchmarks followed for this certification, yet each respondent indicated his or her commitment, caring, desire to learn more, and willingness to take on any challenge, seeing it as "a learning experience." All were "curious about the experiences

other pilot projects had" as well, and expressed a desire to see any research or case studies highlighting those experiences.

Looking forward, the beneficiaries of the three certified projects were mentioned in several interviews. (The term beneficiaries refers to the end users of the projects studied.) The respondents spoke about getting "a lot of new people interested" in sustainability and one (city manager) wanted to share the experience with his peers in hopes they would embrace it for their cities as well. The city manager also mentioned that the building codes had been updated in town to reflect many of the sustainable features used in his project, making "a positive impact on other projects."

The final domain derived from the interview responses involves future recommendations for changes to v2 made by the key informants based on their experiences. The overall recommendation was that it be simplified and streamlined. "They need to evolve this [v2] into a much more user-friendly, and still environmentally focused way to define and measure projects." Another recommendation was that more training and tools be made available to project teams going forward.

4.3 Case Study Field Analysis

In a concerted effort to fully review all the projects in this research, the author visited each of the case study SITES® certified projects to do a physical inspection. The 2009 version of the Guidelines and Performance Benchmarks was consulted to determine the effectiveness of the methods used at each in adherence to the prerequisites and credits used at the time of certification. In addition, online literature was gathered on each site to become familiar with the measures undertaken in order to examine them closely when on

site. The Field Observation Survey form (shown in Chapter 3) was used to record any findings.

From a purely aesthetic standpoint, the ongoing maintenance of each project seemed to be the most difficult to control after the project was completed. Only one of the projects appeared to be properly maintained; the other two had been neglected in some ways. All three projects endured a very rainy season in Texas about a year before this research began and each of them experienced damage from that.

The Green at College Park was inundated with stormwater and lost many of its naturalized grasses, especially the Weeping Lovegrass (Eragrostis curvula) which were never replaced. Once the large areas of soil were exposed, invasive grasses had begun to grow there and were not being removed. Beyond this:

1. The native grasses planted for the project which were still intact, were not being trimmed appropriately and made walking on some of the paths difficult.
2. The decomposed granite which had washed away from the paths with the flood waters has not been replaced or cleaned off other surfaces.
3. The signage used to educate users about the ecological functions of the site was obscured by overgrowth.
4. The lawn area was riddled with invasive grasses.
5. The roses near the shade structures were diseased and dying.
6. The vines climbing the shade structures were brown and dying.

When Professor David Hopman, SITES® Certification Manager for this project, was alerted to the poor maintenance practices observed, he indicated that he had been aware

of the problem for some time and had notified the appropriate individuals in campus maintenance. Unfortunately, budget cuts, and staff reduction or replacement is a frequent occurrence at university campuses and the detailed instructions left for the maintenance staff as part of the SITES® certification guidelines appear to have been largely ignored.

The Perot Museum of Nature and Science, having experienced the same flooding conditions, responded by turning off the irrigation to the massive greenroof structure. Coy Talley, the landscape architect who designed the greenroof, had left careful instructions to the maintenance crew for its care, but discovered the museum had

> "…changed maintenance contractors in this last year. They've cut a lot of it back. The results have not been good on the slopes… we had a rainy season, and they turned [the irrigation] off completely. From, really, May to the end of August, they didn't have it on. It performed quite well with no irrigation for two months with many, many days of over 100 degrees."

Replacements are to be made and the maintenance crews will need to be educated about the care required for the project on the roof once again. A critical focus needs to be on landscape maintenance since it makes the biggest sustainable impact over the long term. Talking to facilities is not always enough.

On a positive note, The Blue Hole Regional Park seems to be as healthy and lush as the day it was installed. Maintenance crews were trained and educated personally by the landscape architect who designed the park, Stephen Spears. The park experienced the same rainy weather conditions the other two projects had and the banks of Cypress Creek overflowed. The water level rose forty feet and inundated the swimming area of the park. However, the newly restored banks of the creek showed no damage and the plants placed

in that area during the project performed very well. Very few replacements were necessary and they were made by the maintenance crews as soon as it was safe to do so. This implies some follow-up instruction and training by the project lead even after the project has been completed.

Either a system is healthy and vibrant or it's not, and it is only as healthy as its weakest link. The main difference noted by this researcher in the performance of these three landscapes after SITES® certification is the resources of the maintenance crews responsible for upkeep. Don Ferguson, former city manager of Wimberley during the Blue Hole project, noted "On many occasions Stephen Spears came down and taught our maintenance guys how to trim the types of grasses we had planted. [The crew's dedication] really showed the results of the great stakeholder engagement process that we had during the whole effort of the park." The commitment of the maintenance crews to adhere to the sustainable features laid out during the project construction has continued and is visually apparent.

4.4 Findings in SITES® v1 vs. v2

As part of the interview process, a substantial amount of intricate data was collected concerning attitudes about particular topics. Site-visit data collected was explained in the previous section and interview data were evaluated in section 4.2.1. This section is a synopsis of the changes made to the 2009 version of the Guidelines and Performance Benchmarks followed by the pilot projects in certifying their sites when v2 was revised based on information provided to SITES® by those projects. A detailed analysis of the changes made is found in appendix A.

In many of the sections the wording used to describe the prerequisite or credit is slightly different and many point values offered for credits are different and those can be reviewed in closer detail by viewing the appendix. This brief analysis will cover the main highlights.

Section 1: C1.6 *Locate projects within existing developed areas*

V2 provides more detail on specification of walking distances & basic services

Section 1: C1.7 *Connect to multi-modal transit networks*

Points awarded for **planned or existing** features if planned features will be available within 2 years of project completion

Section 2: P2.3 *Designate and communicate vegetation and soil protection zones(VSPZ's)*

This is a **NEW PREREQUISITE** that has been added in v2

Section 3: P3.2 *Reduce water use for landscape irrigation*

An option is now provided to design landscape with **NO** permanent irrigation.

Section 3: C3.4 *Reduce outdoor water use*

Two sections from v1 were combined (c3.2 and c3.8).

Section 3: C3.6 *Restore aquatic ecosystems*

Two sections from v1 were combined (c3.3 and c3.4). Also, the calculations have been simplified.

Section 3: P3.1 *Manage precipitation on site*

This is now a **PREREQUISITE** (This was formerly a credit; C3.5 in v1)

Section 4: P4.2 *Control & manage invasive plants*

In v2 the use of invasive plants for project is now prohibited.

Section 4: P4.1 *Create & communicate a soil management plan*

v2 now limits where new topsoils may be mined.

Section 4: C4.6 *Conserve & use native plants,* and

Section 4: C4.7 *Conserve & restore native plant communities*

Three sections from v1 were combined (c4.7, c4.8, and c4.9).

Section 4: C4.10 *Use vegetation to minimize building energy use*

Two sections from v1 were combined (c4.10 and c4.11).

Section 4: C4.11 *Reduce the risk of catastrophic wildfire*

V2 requires that the project must be in a fire-prone zone to qualify, the O&M strategies must include fire protection techniques, and if the project is NOT in a fire-prone zone **innovation credits are offered for protection from other catastrophic natural events.**

Section 5: P5.1 *Eliminate use of wood from threatened tree species*

As in v1, this applies to wood bought and installed, v2 applies to **wood used temporarily during construction** as well.

Section 5: C5.4 *Reuse salvaged materials & plants,* and

Section 5: C5.5 *Use recycled content materials*

v2 now excludes **plants, soils and new materials with recycled content** from the calculations for both credits.

Section 5: C5.7 *Support responsible extraction of raw materials,*

Section 5: C5.8 *Support transparency & safer chemistry*

Section 5: C5.10 *Support sustainability in plant production*

Section 5: C5.9 *Support sustainability in materials manufacturing*

Higher points reward proactive advocacy in v2 for these 4 credits.

Section 6: C6.2 *Provide optimum site accessibility, safety & wayfinding*

In v1, accessibility **beyond required** national and local ADA standards was required. It has changed to reflect accessibility **as required** by those standards in v2.

The other credits in section 6 offer a more simplified process in v2, with clearer language used for requirements and recommended strategies. Additionally, three new credits were added:

Section 6: C6.7 *Provide on-site food production*

C6.9 *Encourage fuel efficient & multimodal transportation*

C6.10 *Minimize exposure to environmental tobacco smoke*

Section 6: C6.11 *Support local economy*

Simplifies the requirements for achieving this credit

Section 7: P7.1 *Communicate and verify sustainable construction practices*

This is a **NEW PREREQUISITE** added to v2.

Section 7: P7.2 *Restore soils disturbed during construction*

No longer requires that soils be reused, and v2 simplified process by requiring reference soils as a guide to performance.

Section 8: P8.1 *Plan for sustainable site maintenance*

The site maintenance plan makes 5 optional tasks from v1 **REQUIRED** in v2.

Section 8: C8.4 *Minimize pesticide and fertilizer use*

This is a **NEW CREDIT** added to v2.

Section 8: C8.6 *Minimize exposure to environmental tobacco smoke*

This v1 credit was **moved to v2 credit** -Section 6: C6.10

Section 8: C8.8 *Reduce emissions and promote the use of fuel-efficient vehicles*

This v1 credit was **DISCONTINUED** in v2.

Section 9: C9.2 *Develop and communicate a case study*

This is a **NEW CREDIT** added to v2.

Section 10: C10.1 *Innovation or exemplary performance*

The exemplary performance part is new in v2.

A change not mentioned in this synopsis has more to do with the wording of the new standards. In v1, the language used was prescriptive and seemingly harsh, sending the message to users that the v1 guidelines were more akin to mandates than benchmarks. However, the language adopted by the writers of the v2 rating system "softened" the language and began each section, credit and prerequisite with wording that suggested the user would want to adhere to the guidelines because it was the responsible thing to do. It was a difference of inclusivity, rather than exclusivity.

4.5 Summary

This chapter documented findings according to respondents' perceptions of achieving a SITES® certification during the 2010-2012 pilot project phase. Data collected from phone interviews, in-person interviews and field surveys revealed overall themes and patterns in response to the research questions which, in turn, revealed domains concerning the first projects certified by SITES®. Those domains were primarily concerned with Learning curve, Team approach, Preference and Values, Structure of Team, and Project Maintenance. The future success of the SITES®

certification owes much of its success to professionals like the ones participating in this study; the “guinea pigs” who embraced the new standards and who will more than likely do it again with another project and the new v2 rating system they helped create.

CHAPTER 5
CONCLUSIONS

5.1 Introduction

"There is nothing more difficult to plan, nor more dangerous to manage, than the creation of a new system. For the creator has the enmity of all who would profit by the preservation of the old system and merely lukewarm defenders in those who would gain by the new one."

— Niccolò Machiavelli

This chapter discusses and compares the literature review with the interview findings indicating respondents' perceptions to the 2009 Guidelines and Performance Benchmarks they used to certify their pilot projects with a SITES® certification. The research questions are reviewed in summary, next, questions that arose during the research are posed and suggestions are made for further research, and the chapter concludes with and examination of the study's relevance to the profession of landscape architecture.

5.2 Responses to Research Questions

In general, ecosystem services are the services which the Earth provides that support life on Earth, and they can be grouped into four broad categories; provisioning, such as the production of food and water, regulating, such as the control of climate and disease, supporting, that involves nutrient cycles and crop pollination, and cultural, such as spiritual and recreational benefits. Today's landscapes are asked to perform much more than functional or aesthetic services. As projects become more complex, and

clients aim higher to meet today's environmental challenges, the use of performance metrics that measure ecosystem services is becoming increasingly important. SITES® has established voluntary national guidelines and performance benchmarks for sustainable landscapes of all kinds – with or without buildings (Landscape Online, 2017).

This research primarily addresses and responds to the following questions:

1. *What major factors contributed to the project obtaining or not obtaining certification?*

   All three of the projects studied for this research were certified by SITES® with one star. Their challenges with certain portions of the certification process were documented in chapter 4.

2. *Has SITES® addressed the issues with adequate training classes specific to these needs?*

   The professionals interviewed indicated that the "webinars have been helpful," and the "client deck has been great." Those were tools available to the project managers during the pilot phase. Also mentioned were some tools that have been made available since the end of the pilot project phase; "tools, templates and references" in v2 that these professionals are looking forward to using in their next projects seeking SITES® certification.

3. *Would the SITES® AP credential for one or more professionals working on the certification have been useful?*

   The respondents indicated that they were "very excited about the SITES® AP," and two of them implied that they would be seeking the designation for themselves in early 2018.

4. *What changes would the key stakeholders make in developing their next SITES® qualified project to increase the benefits and decrease the costs and/or difficulties?*

   One respondent, whose project was built on a brownfield, noted that Credit 7.3 - Restore soils disturbed by previous development should be made a prerequisite. However, v2 retained this item as a credit. Two others interviewed sought a reduction in the number of prerequisites, since "prerequisites do not earn points," or to just make them easier to achieve. Clarification of the credits was also noted since the calculations needed to get points were noted as unclear in some instances.

   Although the number of prerequisites increased from 15 in v1 to 18 in v2, simplified and clearer language was used to describe the prerequisite and credit areas in order to assist with comprehension and, ultimately, compliance.

5. *What changes have been made to the SITES®v2 Rating System in response to the challenges encountered by the pilot projects?*

   Three specific areas of changes desired by the projects studied were noted in this research:

   The Blue Hole project desired changes to the recycled materials credit and v2 responded by basing points received for the credit on "a percentage of the cost or replacement value" as opposed to a "percentage of all materials used on site," in v1.

   The Perot Museum project, which struggled with the soils credits, wanted recycled soils to be included, and P4.3 was changed in v2 to P4.1. This change

included a best management practices strategy that was added to include subsoils being reused and amended to become functional topsoil.

In the case of The Green at College Park, reducing potable water use on site for landscape irrigation by 75% "was a difficult reduction." In v1 this was a credit, C3.2 that desired a 75% reduction in potable water use for landscape irrigation, and in v2 it became a prerequisite, P3.2, that required a reduction of only 50% in the use of potable water for irrigation.

6. *Do these changes correlate with the research info from the Texas projects that achieved certification?*

As detailed above, most of the difficult areas for the three projects studied in Texas were addressed in v2 (with the exception of one) and modified in accordance with the needs expressed in this study by each project.

The research performed through case study field analysis revealed a need for more stringent guidelines in the ongoing operations and maintenance procedures at two of the three projects studied, and v2 appears to have addressed this issue as well with its revision of P8.1. Specifically the required site maintenance plan makes 5 optional tasks from v1 **REQUIRED** in v2.

5.3 Research Findings

The data revealed eight domains, or areas of particular importance to the participants from the interview process:

1. Overall concepts,
2. Process,

3. Section issues,
4. Ratings/Points to be earned,
5. Character traits, skills and beliefs held by SITES certification participants,
6. Emotional investment and an expected return on that investment,
7. Beneficiaries, and
8. Future recommendations for SITES.

See figure 20 in chapter 4 for a graphic representation of the number of codes contributing to each of the 8 domains. A lengthy, but more thorough representation of all the coded phrases attributed to each of the sub-domains can be found in Appendix A.

Considering sustainability and how it has transformed the marketplace, one simply needs to study the LEED® rating system, or Leadership in Energy and Environmental Design. From 1994 to 2017, LEED® grew from one standard for new construction to a comprehensive system of standards covering design, construction, maintenance, and operation of buildings. People are willing to pay more for these benefits. There are millions of square feet of buildings being certified under LEED® each year. Considering that number, the potential landscapes and campuses that these buildings rest on are equal candidates for sustainable landscape transformations, as well. "The United States Green Building Council (USGBC) sees SITES® as complementing LEED®, and has strongly supported SITES® since its inception. SITES® has greatly benefited and learned from USGBC and the LEED® rating systems. Almost half of the prerequisites and credits in SITES® are based in part on credits in LEED® NC or LEED® ND" (Meinhold, 2017).

As the respondents in this study mentioned many times in their interviews, v1 of the SITES® guidelines could be improved to offer project teams a better understanding of the metrics involved in meeting sustainability standards. When the pilot projects replied to SITES®' inquiries about their experiences with the system, v2 was revised. Those changes were discussed in chapter 4. Furthermore, many of the issues reported by the respondents in this study were addressed with v2.

5.4 Questions for Future Research

This research has raised questions and issues for future research.

How has the enjoyment of these projects changed since certification? There are no post-occupancy studies being performed as part of the certification process and it would be useful to determine what users of these areas thought of the sustainability measures that have been taken there.

What are some of the most innovative methods devised by certification teams in the process of meeting the goals set out by SITES®? Case studies are now encouraged under v2, but a study of the most innovative responses would be instructive, and a resource for future project teams struggling with complex issues on their sites.

How have municipal governments incorporated SITES® standards into their communities? The city manager at the Blue Hole described several occasions when city officials with much larger populations came to see their project, specifically to discover how some of the more difficult credits were met for certification. This research suggests that municipalities are a relatively untapped customer base. Perhaps landscape architects

embracing the SITES® standards will exhibit enhanced qualifications to cities wanting to incorporate those standards in their own areas.

What building codes have changed in an effort to create more sustainable communities? A study of sustainable measures being incorporated into public and commercial buildings would be enlightening.

Since maintenance after the project was completed is an issue in this study, one final question arose. *Do project managers need to maintain communication with the decision makers, boards, facilities managers, and any new staff at the project post construction in order to fulfill the requirements for maintenance?* Findings in this research suggest that there is a need for some sort of follow-up in order to keep the project functioning as intended and enjoyable for users long into the future.

5.5 Importance to the Profession for Landscape Architects

As concerns grow over global warming and resource depletion, and population growth contributes to urban sprawl, landscape architects will be asked to solve these ever-growing problems in sustainable ways. This section examines the relevance of this research regarding its present and future applications. Analysis of the ways in which three pilot projects approached the SITES® certification in Texas has the ability to influence the way the SITES® certification is designed and implemented in the future.

The SITES® rating system, now owned and regulated by Green Business Certification Inc. (GBCI), is based on the understanding that land is a crucial part of our built environment and that by fostering its resiliency we elevate its economic, environmental and social benefits. SITES® advances best practices in landscape

architecture and ensures clients that their project has achieved field-tested standards for sustainability (Marino, 2017). However, even with the best intentions, v1 proved to be difficult for the pilot projects researched to understand, and even served to "discourage" some of the professionals involved.

In response to all the reviews of the v1 standards during the pilot project phase, SITES® made its most significant changes in the following areas of V2:

1. simplified the calculations and requirements,
2. used clearer, more concise language to describe the objectives,
3. added point values to promote proactive advocacy by the project managers for sustainability in the use of materials,
4. reduced two- and three-category areas into one more succinct category covering the pertinent details of the combined areas,
5. prohibited the use of invasive plants in designs, and the importation of topsoil from greenfields,
6. expanded options for compliance in many areas,
7. created new prerequisites in VSPZ's, managing precipitation on site, and communicating/verifying sustainable construction practices,
8. created new credits providing for on-site food production, limiting second-hand smoke, proximity to mass transit options, and developing and communicating a case study, and
9. rewarded innovation of new ideas in a more meaningful way.

SITES® has not published the results of the feedback it received from the pilot projects in 2012. The professionals interviewed for this research indicated a strong interest in reviewing those results but did not get that opportunity from SITES®. This research makes the issues encountered by three of the pilot projects certified by SITES® during that time available for review. Even though this is only a representative sample of the 46 projects certified during that time, these interview responses compared with feedback found in the literature reviewed show patterns of areas which proved to be most challenging for those projects. Once the patterns were compared with the changes made to v2, strong correlations were found and have been presented here.

Specifically, the relevance of this thesis research is to enhance the landscape architect's exposure to sustainable designs as they have been implemented in v1, and now revised based on feedback, how they relate to the standards currently set forth in SITES v2®. This exposure underscores the significance of using a trial-tested system for achieving truly sustainable landscapes and encourages an ongoing dialogue among those landscape architects undertaking the rigors of the SITES® v2 Ratings System.

It is ultimately up to the landscape architecture profession to use design examples, communicate strategies for achieving sustainability goals, and continue to educate its peers and the public by encouraging green infrastructure planning and sustainable, resilient design within the industry. SITES® v2 has been rewritten due to the input of the pilot projects and appears to be continuing that trend by encouraging innovation and case studies going forward.

Consumers will increasingly demand sustainable and resilient projects in order to make them viable into the future. The better educated and trained landscape architects are

on these measures, the more respected they will be within their own profession and among their client base. It is no longer a matter of **if, but when and how** these skills will be called upon.

APPENDIX A: Domains, subdomains and corresponding coded phrases shown in relation to each other.

	DOMAIN	SUB.	CODED PHRASE
1	Emotional Investment & ROI	buy-in	The staff there cares about the job they do there—it's a total buy-in on their part.
2			community buy in
3			Local neighborhood Assn. buy-in
4		learning	a learning experience
5			was a great learning process
6			we learned a lot
7		discourage	Only a 1-star rating was tough- discourage professionals to use SITES certification.
8			Complexity will discourage professionals
9			requires a lot of commitment on the behalf of the contractors
10			require a lot of coordination
11		experience	Hiring experienced professionals
12			a learning experience
13			curious about other firms' experience with it as well.
14			all about the user experience
15			we were trying to create an experience.
16			to maximize the environmental, the ecological experience
17			The visitor experience has been enhanced considerably
18			it is intended to make their experience more enjoyable
19		challenge	Long term maintenance challenges with soil stewardship
20			it would be challenging to do.
21			challenging to retroactively gather certain pieces of data
22			had some significant environmental challenges
23			biggest challenges we had was trying to meet our goal in impervious cover
24			my challenge has been managing the project now that it is done-the maintenance part.
25		need	Need to work more closely with Geotechnical Engineers
26			New contractors need to understand the goals
27			We need to develop it right.
28			we needed to protect
29			we had meetings on an as-needed basis.
30			Anyone taking this on will be scared of it at first b/c of the cost, but they need to understand it.
31			they will need to know what does it really mean?
32		education	we educated ourselves in the process
33			an educational theme throughout
34			signage is key, it sets the tone, it's the educational piece
35			in the spirit of trying to keep things environmental and educational
36			they are getting an education as well
37			being educated on it
38			it is definitely an educational process
39			Outreach education will be the key to this going forward, just like it was with LEED.
40			Needs more education on really what it's all about
41			
42	Traits/Skills/Beliefs Needed	awareness	raise awareness about some of the sensitive areas of the park
43			aware of the sustainability goals and metrics that early on
44			build awareness and excitement
45			raises awareness
46		preserve	wanted to preserve and protect
47			We wanted to preserve
48			we had some huge trees that we wanted to preserve
49			The design is absolutely sustainable—meaning it will be preserved for future generations because of what we were able to do there with the SITES guidelines
50		decisions	tough decisions

	DOMAIN	SUB.	CODED PHRASE
51			We made a pretty ballsy decision to go ahead with this project
52			this was not an easy decision
53		value	Value to users of the projects
54			Value of certified projects to others
55			more value in going through that process
56			At the end of the day I don't know that it adds that much more value.
57			a lot of thought went into- it just feels so natural like nothing was really disturbed
58		experience	Hiring experienced professionals
59			a learning experience
60			curious about other firms' experience with it as well.
61			all about the user experience
62			we were trying to create an experience.
63			to maximize the environmental, the ecological experience
64			it is intended to make their experience more enjoyable
65			The visitor experience has been enhanced considerably
66		understanding	Not all understood SITES
67			New contractors need to understand the goals
68			make sure everybody understands the goals
69			understand the after construction results
70			making sure they were understanding the documentation that needed to come back
71			"just understand, if we get into this, what's involved."
72			Anyone taking this on will be scared of it at first b/c of the cost, but they need to understand it.
73			people that see this, and understand what we're doing
74			understanding environmental responsibility and design
75		proud	something that we're very, very proud of
76			so I was proud
77			I'm proud
78		commited/ commitment	very committed to research and case studies
79			requires a lot of commitment on the behalf of the contractors
80			commitment all the way through from the entire team
81			has been a large credit and a canvas for showcasing our commitment to sustainable development
82			decided to make the commitment
83			we made a commitment
84			committed to the cause
85			we were committed
86	Future Recommendations	simplify	Simplify it
87			I would simplify it a bit
88		change	Change credit to a prerequisite
89			. It's changed the building code to require more sustainable designs.
90			I totally would change the SITES certification process
91		v2	things that could be streamlined
92			lot of tools and templates and references in v2
93			v2 much easier to apply to projects
94			they're evolving this into a much more user-friendly, and still environmentally focused way to define and measure projects
95			Needs more education on really what it's all about
96			Needs more recognition of the program at municipal conferences.
97			

	DOMAIN	SUB.	CODED PHRASE
98	Thoughts about Overall Concepts	sustainability	economic sustainability
99			sustainable materials
100			sustainability goals and metrics
101			sustainability and energy
102			thinking in terms of sustainability
103			the sustainable sites initiative was almost viewed as just kind of as a bonus at the end of it
104			sustainability principles
105			a lot of interest in Landscape Sustainability
106			a canvas for showcasing our commitment to sustainable development
107			guide sustainability principles that can be implemented on the project from the beginning.
108			knowledge about native plants and sustainability
109			it was all about sustainability
110			how far we wanted to go with sustainability.
111			make them durable, and make them sustainable
112			sustainable from a maintenance and operation standpoint....
113			sustainable financially
114			It's changed the building code to require more sustainable designs.
115			The design is absolutely sustainable—meaning it will be preserved for future generations because of what we were able to do there with the SITES guidelines
116		SITES	Not all understood SITES
117			we've seen the benefits of SITES there through some of these more extreme weather events
118			the SITES process ultimately really benefited the community
119			calls with the SITES staff
120			sharing the benefits of SITES
121			very excited about the SITES' AP
122			the sustainable sites initiative was almost viewed as just kind of as a bonus at the end of it
123			I didn't have that much knowledge about SITES
124			SITES has successfully followed the LEED rating system and is now equivalent to it.
125			Only a 1-star rating was tough- discourage professionals to use SITES certification.
126			every Friday to discuss the SITES certification and documentation progress, resolve queries and get the documentation together
127			reduce the number of prerequisites and to make them easier to achieve loose out on SITES certification due to the complexity in achieving just the prerequisites.
128			use the SITES certification Guidelines from the initial phase of a project so that we can document
129			worked on making an auto calculator of SITES credit points
130			Landscape Architect was very supportive and provided quality time in helping out with the SITES documentation
131			Director of SITES helped
132			when we first started, SITeS really wasn't part of the picture
133			they had to engage the principles of SITES, like vegetation and drainage, even if they couldn't meet the full objective of SITES.
134			The design is absolutely sustainable—meaning it will be preserved for future generations because of what we were able to do there with the SITES guidelines
135			surprised SITES didn't come before LEED.
136			the intent of SITES is phenomenal
137			capabilities and cost analysis reviews based on the criteria we were proposing to achieve SITES
138			SITES intentions were very, very good

	DOMAIN	SUB.	CODED PHRASE
139			I totally would change the SITES certification process
140			
141	Beneficiaries		a lot of new people interested
142			a lot of people that are interested in sustainability and energy using this certificatior
143			it's gotten a lot of attention from many organizations
144		community	designed for a certain community benefits
145			early community dialogues
146			community buy in
147			go out and talk with the community
148			the SITES process ultimately really benefited the community
149		users	Value to users of the projects
150			not much input from users and stake holders,
151			all about the user experience
152			they're evolving this into a much more user-friendly, and still environmentally focused way to define and measure projects
153		impact	a positive impact on other projects in town
154			leaves an impact
155	Process	"lots" of...	we weren't going to have a lot of precedents to look at.
156			There's a lot of detail
157		LBJWC	Assistance from the LBJ Wildflower Ctr.
158			LBJ is an amazing place and we leaned on them
159			We had a particularly hard time with Lady Bird Johnson Wildflower Center.
160			Lady Bird Johnson came up and proposed a design fee to change the planting design as well.
161			emails with the review people, and maybe the Lady Bird Johnson Wildflower Center
162			Lady Bird Johnson Wildflower Center, they're part of the review process
163		early	early community dialogues
164			a lot of conversations early on.
165			think about how you're going to achieve those credits early
166			aware of the sustainability goals and metrics that early
167		process	Stakeholder engagement process
168			Two year documentation process
169			was a pretty inspiring process
170			we had a three part stakeholder engagement process
171			was a great learning process
172			the SITES process ultimately really benefited the community
173			more value in going through that process
174			I'm a little more familiar with the process
175			additional hours for the design team to actually go through that application submittal process
176			certification process- it's quite a bit more time consuming and rather exhaustive
177			a stakeholder process that included a master plan
178			lengthy process
179			very active engagement process
180			it was a tedious process
181			they had to go thru the process of weeding out what they wanted on that property and what they didn't
182			thru the master plan process and developed a phenomenal "bible" for the development of that project
183			an amazing process
184			developed a stakeholder process to design
185			we engaged them; brought them in and faced off with them, and walked them thru the process
186			we educated ourselves in the process
187			You have to consider operations in the design process.

	DOMAIN	SUB.	CODED PHRASE
188			it is definitely an educational process
189			It took us a year and a half to get through the process
190			whatever communication it took to get it through the process
191			So it took a while to go through the process. Obviously, in construction.
192			I totally would change the SITES certification process
193			It was not an easy process
194			Lady Bird Johnson Wildflower Center, they're part of the review process
195		LEED	felt it was a significant departure from LEED certification
196			surprised SITES didn't come before LEED.
197			Outreach education will be the key to this going forward, just like it was with LEED.
198			no different than LEED criteria for buildings
199			SITES has successfully followed the LEED rating system and is now equivalent to it.
200			similar to the LEED certification for Buildings
201			all designed to achieve lead silver as a minimum with the USGBC
202		documentation	Two year documentation process
203			making sure they were understanding the documentation that needed to come back
204			was already designed and documentation required to achieve these points were not available.
205			every Friday to discuss the SITES certification and documentation progress, resolve queries and get the documentation together
206			use the SITES certification Guidelines from the initial phase of a project so that we can document
207			Landscape Architect was very supportive and provided quality time in helping out with the SITES documentation
208		benefits	designed for a certain community benefits
209			we've seen the benefits of SITES there through some of these more extreme weather events
210			the SITES process ultimately really benefited the community
211			sharing the benefits of SITES
212			working with geo-technical engineers would have been beneficial in terms of soil testing
213		detail	the level of detail that would be required
214			There's a lot of detail
215			a lot of details that go into getting those materials credits
216			an interesting detail
217		email	communication was done through emails and phones.
218			we had emails collectively from a team standpoint
219			emails with the review people, and maybe the Lady Bird Johnson Wildflower Center
220			Emails would remain dormant a lot of times, and we would call and propose go-to-meeting times.
221			a lot of e-mails
222			we e-mail GBCI quite regularly
223		team	commitment all the way through from the entire team
224			additional hours for the design team to actually go through that application submittal process
225			we had emails collectively from a team standpoint
226		tools	client deck has been great
227			we weren't going to have a lot of precedents to look at.
228			lot of tools and templates and references in v2
229			understand the after construction results
230			post-occupancy surveys for three summers
231			charrette
232			we do have a file structure setup now
233			having everything in one big spreadsheet file and one big report file
234			Calculations in one file. All of the photographs and narratives in another file
235			webinars have been helpful

	DOMAIN	SUB.	CODED PHRASE
236			very excited about the SITES' AP
237			We were very particular about timelines and progress of our research.
238			made work flow charts in excel
239			worked on making an auto calculator of SITES credit points
240		design	designed for a certain community benefits
241			all designed to achieve lead silver as a minimum with the USGBC
242			get recognition for the design efforts
243			additional hours for the design team to actually go through that application submittal process
244			was already designed and documentation required to achieve these points were not available.
245			developed a stakeholder process to design
246			I think the wrong contractor could have killed the design
247			It was designed so that the annual maintenance was low
248			It's changed the building code to require more sustainable designs.
249			it's received a lot of attention for its design
250			You have to consider operations in the design process.
251			The design is absolutely sustainable—meaning it will be preserved for future generations because of what we were able to do there with the SITES guidelines
252			raise consciousness about environmental design
253			understanding environmental responsibility and design
254		cost	cost savings
255			manage your costs.
256			Anyone taking this on will be scared of it at first b/c of the cost, but they need to understand it.
257			, it has ultimately minimized my operating costs
258			astronomical in cost to do the analyzation
259			capabilities and cost analysis reviews based on the criteria we were proposing to achieve SITES
260		contractors	New contractors need to understand the goals
261			requires a lot of commitment on the behalf of the contractors
262			I think the wrong contractor could have killed the design
263			They've changed maintenance contractors in this last year. They've cut a lot of it back. The results have not been good on the slopes
264			getting the contractor on board, getting their attention to focus on it.
265		stakeholder	Strong stakeholder involvement
266			Stakeholder engagement process
267			we had a three part stakeholder engagement process
268			results of the great stakeholder engagement process
269			a stakeholder process that included a master plan
270			developed a stakeholder process to design
271			wanted to pull in all the stakeholders
272			We talked to all the stakeholders
273			we met with each of the stakeholder groups one-on-one as opposed to big group meetings.
274			
275	Ratings/Points	credits	Difficult credits: Reusable materials
276			Change credit to a prerequisite-restore soils disturbed by development
277			Difficult credits: using regional materials, local materials, sustainable materials.
278			think about how you're going to achieve those credits early on
279			a lot of details that go into getting those materials credits
280			innovation and credits, we didn't realize we could do using their construction knowledge
281			clarification for how certain credits can be interpreted
282			worked on making an auto calculator of SITES credit points
283			credits that were most difficult to achieve, the soils

	DOMAIN	SUB.	CODED PHRASE
284			give us full credit
285		rating	Difficulty involved in getting a one-star rating
286			followed most of the sustainability principles it was able to only achieve a One Star rating.
287			Only a 1-star rating was tough- discourage professionals to use SITES certification.
288			if we would have been scored after the pilot program, we would have probably been a higher star rating
289			In version two, we should be higher
290			we should get the best star rating of any star ratings on site sustainabilities and stuff, just because of the story that we told, and how it works,
291			, I think our rating should have been higher
292		stars	Difficulty involved in getting a one-star rating
293			Only able to achieve 1-star
294			followed most of the sustainability principles it was able to only achieve a One Star rating.
295			Only a 1-star rating was tough- discourage professionals to use SITES certification.
296			if we would have been scored after the pilot program, we would have probably been a higher star rating
297			In version two, we should be higher
298			we should get the best star rating of any star ratings on site sustainabilities and stuff, just because of the story that we told, and how it works,
299			we thought we'd get a three star
300		prerequisites	A reduction in the prerequisites
301			Change credit to a prerequisite-restore soils disturbed by development
302			Prerequisites do not earn points
303			reduce the number of prerequisites and to make them easier to achieve loose out on SITES certification due to the complexity in achieving just the prerequisites
304		goals	biggest challenges we had was trying to meet our goal in impervious cover
305			aware of the sustainability goals and metrics that early on
306			make sure everybody understands the goals
307			New contractors need to understand the goals
308		difficult	Difficulty involved in getting a one-star rating
309			Difficult to get focused on the broader picture
310			75% was a difficult reduction in use of potable water
311			Difficult credits: Reusable materials
312			Difficult credits: using regional materials, local materials, sustainable materials.
313			It was very difficult
314			credits that were most difficult to achieve, the soils
315			
316	Sections of v1	water	75% was a difficult reduction in use of potable water
317			flood water, rain water, controlling.
318			needed to control the water coming off of the site
319			ethically we just couldn't plant them without having the water to keep them alive.
320			so you have positive flow for the irrigation
321			built a series of micro-detention ponds that were scattered around so you didn't need to have this giant pond
322		vegetation	Building impacts by vegetation
323			specify soil types and amounts based on vegetation used
324			they had to engage the principles of SITES, like vegetation and drainage, even if they couldn't meet the full objective of SITES.
325		soil	specify soil types and amounts based on vegetation used
326			Recycled soils are excluded
327			Change credit to a prerequisite-restore soils disturbed by development
328			Long term maintenance challenges with soil stewardship

	DOMAIN	SUB.	CODED PHRASE
329			from a soil structure analysis, the methods imposed were just astronomical in cost to do the analyzation
330			credits that were most difficult to achieve, the soils
331			we imported those accordingly and we did suitable matrixes for those soil types
332			We don't hire soil scientists for our projects. We try to identify the soil types based on the plant material we use
333			working with geo-technical engineers would have been beneficial in terms of soil testing
334			I would have implemented the soil testing differently
335			I would have allowed soils to permeate with regard to ecosystem typology
336		materials	Difficult credits: Reusable materials
337			Difficult credits: using regional materials, local materials, sustainable materials.
338			a lot of details that go into getting those materials credits
339			re-using so much of the material we had right there
340			when the project went away, we couldn't recycle the materials
341			We don't hire soil scientists for our projects. We try to identify the soil types based on the plant material we use
342			when they're recycling product and waste material, they're logging that in, too, from a construction standpoint.
343		maintenance	Long term maintenance challenges with soil stewardship
344			we were committed to making the park sustainable from a maintenance and operation standpoint....
345			It was designed so that the annual maintenance was low
346			my challenge has been managing the project now that it is done-the maintenance part.
347			taught our maintenance guys how to trim
348			he'd let us know if he felt the maintenance could use some better instruction and would tell us what to do
349			Our idea of it was, you can put it in and maintenance-wise, you pick up the trash and you leave it alone
350			They've changed maintenance contractors in this last year. They've cut a lot of it back. The results have not been good on the slopes.
351			If maintenance was proper, it wouldn't have had to be done on this
352			The earlier that everyone's talking about the O&Ms, the better.
353			blood, sweat and tears went into it and you don't want it to just fall by the wayside.

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