Measuring Sustainability in Design for Hospitality

الضيافة تصميم في الاستدامة قياس

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Abstract

Mounting awareness of climate change in recent years has led the construction industry to initiate new approaches toward sustainable building design. The USGBC's LEED guideline programs are currently the most widely accepted green building guidelines in North America. As an increasing number of developers begin to incorporate sustainable design, stakeholders in hospitality development still hesitate to become involved. This reluctance is due to perceived high guest expectations of comfort levels and amenity access among these properties. Research was conducted to determine precisely which innovations present the most significant barriers to incorporating sustainability into design for hospitality. Average LEED credit implementation rates were calculated and compared with those employed among common commercial building projects. Project designers were also surveyed for opinion on which sustainable innovations were most commonly avoided in design for hospitality. The results indicate that certain credits do experience decreased popularity among hospitality projects, though guest comfort was not the only barrier identified. Conclusions are presented according to the data and recommendations made to support further growth and success in future applications of LEED sustainable design in hospitality development.

ملخص

ادى الوعي بالتغير المناخي في السنوات الأخيرة في مجال صناعة الى بناء وتشييد نهجا جديدا لتصميم المباني المستدامة. برامج USGBC حاليا المبادئ التوجيهية الأكثر قبولا من المباني الخضراء في أمريكا الشمالية. وهناك عدد متزايد من المطورين على دمج التصميم المستدام، ولكن أصحاب المصلحة في صناعة الضيافة لا تزال مترددة في المشاركة. هذا التردد يرجع إلى توقعات عالية من الراحة وراحة الضيوف من هذه الخصائص. الأبحاث التي أجريت تحدد الابتكارات التي هي أكبر العقبات من أجل إدماج الاستدامة في تصميم للضيافة. متوسط معدلات تنفيذ الاعتمادات مقارنة مع تلك المستخدمة عادت بين مشاريع البناء التجاري. مصممي المشروع شملهم الاستطلاع أيضا إلى إبداء الرأي حول الابتكارات الأكثر شيوعا تجنبها في التصميم المستدام للضيافة. وتشير النتائج إلى أن بعض أحكام تجربة انخفضت شعبية بين كرم الضيافة وراحة الضيوف ليست العائق الوحيد. والخلاصة المقدمة بناءا على النتائج والتوصيات لدعم المزيد من النمو والنجاح المستقبلي في تطبيقات برنامج LEED وقطاع تصميم الضيافة المستدامة.

Dedication

This work is lovingly dedicated to my Parents.
Through their endless consideration and support they have provided me with perpetually precise results in the sustainable design of love.

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TABLE OF CONTENTS

List of Tables

List of Figures

Definitions and Abbreviations

Abbreviation	Definition
USGBC	United States Green Building Council
USEPA	United States Environmental Protection Agency
ASHRAE	American Society of Heating, Refrigeration and Air Conditioning Engineers
LEED	Leadership in Energy and Environmental Design
LEED AP	LEED Accredited Professional
LEED NC	LEED for New Construction
LEED CI	LEED for Commercial Interiors
LEED CS	LEED for Core & Shell
LEED EBOM	LEED for Existing Buildings: Operations & Maintenance
SS	Sustainable Sites
WE	Water Efficiency
EA	Energy & Atmosphere
IEQ	Indoor Environmental Quality
MR	Materials & Resources
ID	Innovation in Design
ITP	International Tourism Partnership
IAQ	Indoor Air Quality

Common Terminology	Definition
Common Commercial Building	Stand-alone high-density office-type design
Sustainable / Green Building	Design conscious of energy efficiency, occupant health and environmental preservation
Stakeholder	Developer, Investor, Owner
Designer	Architect, Developer, Sustainability Consultant
Tourist / Guest	Subject requiring overnight accommodation for leisure or business travel

1. Introduction

"Sustainability is about fulfilling our guests' current dreams and desires without sacrificing the future generations' dreams and desires. The objective is to achieve sustainability without making it a sacrifice."

-Vito Lotta, Director of Design, Hilton Hotels

1.1 Introduction

As global awareness of climate change has brought forth an emphasis on more environmentally-conscious approaches to human consumption, many world industries have begun to transform their products and services to offer consumers more options to support increasingly sustainable lifestyles. The construction industry has perhaps faced some of the greatest pressure in order to conform to these rising expectations of sustainability. Many types of guidelines have become available in recent years to assist developers with the incorporation of sustainable design innovations into their projects, yet still not all developers have begun to make sustainability a priority. Certain types of buildings experience more complex challenges than others in accommodating sustainable design. Office buildings, hospitals, institutions and lodging properties are among the most energy-intensive types of building projects, often complicating the achievement of desired levels of energy efficiency. Building occupant demographics can also inhibit the degree and type of sustainable innovations that might be incorporated, such as the priority for patient comfort in health care projects or guest comfort experience in hospitality projects. Sustainable design for hospitality is particularly challenging, as though green building guidelines exist for almost every other building type, exceptionally few exist for this type of development. Today's travel and tourism sectors also face some of the most demanding pressure from environmental groups, emphasizing the need for further research and design development in order for sustainability to succeed in hospitality.

1.2 Background

The present appeal for sustainability in building design lies in the rising cost of energy, growing awareness of climate change contributions and priority for improved human comfort and well-being. However, little initiative has been taken in this direction by hospitality developers. Hotel and resort accommodations are one of the most energy-intensive types of building design, as the primary priority of leisure development is commonly to provide the best possible guest comfort conditions and access to amenities. This has made it virtually impossible to incorporate effective sustainable innovations into hospitality design in the past, as the most efficient energy systems are not capable of supporting the level of energy use typical of common hotel requirements. However, as both stakeholders and discerning travelers become increasingly conscious of the environmental impacts of tourism and hospitality activities, demand is rising for sustainable travel and accommodation options. Forward thinking developers have begun to pilot new hotel projects built according to more efficient standards.

The USGBC's LEED program is currently the most popular sustainable building design guideline available to the general construction and development industry, realizing widespread success with versions for residential, commercial, institutional, health care and renovation projects. Though the USGBC has yet to develop a version of LEED specifically for the design of hospitality projects, conscious developers have managed to incorporate certain versions of LEED guidelines commonly employed for other types of sustainable commercial development. Through the study of these applications, common methods by which sustainable design for hospitality has had previous success can be measured to identify best practices and areas of opportunity for future project developers.

1.3 Research Rationale

Though both academics and professionals emphasize the need for more verifiable research to advance the adoption of sustainability in common building design, few practical measures have been developed for consistent research methodology. Even less research has been encountered with regard to sustainable building design for hospitality. However, many researchers insist that in order to support sustainable built environment as a whole, new approaches and solutions in sustainable design for hospitality must be developed (Ko, 2005; Smerecnik & Andersen, 2011). The rationale for the present research is therefore to contribute to the current lack of information in such a significant yet under-researched field. Development for hospitality is perpetually expanding and it is important that designers are presented with adequate information to ensure the best possible opportunity to incorporate sustainable design. With technological advancements growing more innovative every day, in an industry focused on consumptive luxuries a new emphasis must be placed on hospitality designers to specify incorporation of quality sustainable innovations rather than expand access to new energy-intensive amenities. This is especially true for hotels and resorts situated in natural environments that depend on their surrounding environments for continued guest visitation, though urban accommodation properties catering to business travel can also significantly benefit from energy reduction initiatives.

In essence, if sustainable design is to succeed in hospitality, the barriers which prevent its success must first be identified if they are to be overcome. In order to accomplish this, existing hotels built according to sustainable specifications must be analyzed in order to determine the barriers and opportunities experienced by hospitality projects. The adoption of the USGBC's LEED program by a growing number of hospitality developers therefore forms the basis of this research. Identifying aspects of sustainable design that may have been specifically implemented or avoided through the program guidelines were able to identify precisely how sustainable hospitality design can be better achieved. This research will therefore provide valuable information to assist hospitality developers in selecting optimal sustainable innovations that are most consistent with maintaining the common priorities of hospitality design. Any future LEED guideline versions for hospitality will also benefit from final recommendations made.

1.4 Research Objectives

The purpose of this study is definitively to understand how sustainability can succeed in hospitality based project design. By understanding past applications, obstacles and opportunities can both be identified and develop information on how sustainability can best be incorporated in future. The aim of the research is to identify the need for increased initiative in sustainable hospitality project design and determine where areas requiring improvement currently exist. Under these premises, the research questions that aim to be addressed include:

1) Why is sustainable design for hospitality development a necessary endeavor?
2) Which credits for sustainable design are most often pursued by LEED-accredited hotels and which ones are most commonly avoided?
3) What barriers and opportunities are presented in sustainable design for hospitality and how might they be managed for future success?

The hypothesis that stems from these questions is that LEED credit point adoption in hospitality is primarily affected by developer-perceived high-level comfort expectations by guests. As design for hospitality projects is typically based upon profit potential sought through the provision of exceptional guest experiences, it would be no surprise that stakeholders would hesitate to potentially detract from guest comfort through limiting the availability of accustomed comfort and leisure amenities. This, combined with a lack of information and education on how sustainable design can succeed in hospitality projects, is presumed to be the primary reason why hospitality developers have been so disinclined to adopt sustainable design. In order to address these research questions, the three main objectives of the analysis are therefore:

1) To review current literature and statistics on the benefits of sustainable building design and identify the need for further involvement in design for hospitality.
2) To determine trends in LEED credit point adoption among existing certified hospitality projects and trends in developer rationale behind their adoption.
3) To identify barriers and opportunities toward the increased incorporation of sustainable design in hospitality development.

Through these objectives it is anticipated that useful information will be presented to assist the future of sustainable hospitality design and aid new ideas to evolve as to how future projects can become better involved. This will be derived through the analysis of sustainable innovations found frequently in hospitality projects by comparison analysis of the same sustainable innovations found frequently in typical commercial building projects. This comparison will be accomplished through the measurement of credit implementation rates for both types of building design under LEED for New Construction (NC) guidelines. Understanding how hospitality projects have employed LEED credits in the past will assist in improving their application in sustainable hospitality projects of the future.

1.5 Dissertation Structure and Methodology

In order to achieve the identified research objectives, a series of research measures were carried out. To understand the level of current involvement of sustainable design among hospitality projects, the initial chapters of this study consist of background research conducted through review of existing research and statistics. First, discussion of the expansion of the sustainable building industry is introduced to illustrate the current market for green construction practices. The continued growth of the industry, documented financial and health benefits and existing green building programs are all presented to identify the expanding potential of sustainable design. Next, growing demand for sustainability in the tourism and hospitality industry is explained. Levels of energy consumption in hotels, evolving guest expectations and opportunities for sustainable design among hospitality properties are discussed. The USGBC's LEED program guidelines are then outlined and LEED-specific benefits realized for common commercial building design are identified. The program is subsequently argued as the most advantageous form of design for sustainable hospitality projects.

The research methodology to support this rationale follows, beginning with a literature review of methodologies employed among existing studies with relevant objectives. Through the analysis of how past researchers have approached the measurement of sustainability in building design as well as in hospitality, a combination of architect surveys and LEED scoresheet collection was selected as the best approach to gather information for the purposes of this research. Once study participants were identified and selected, LEED project scoresheets were collected and statistical analysis conducted to measure the adoption frequency of credits by each project. Architect survey question responses were then analyzed for similarities in credit selection rationale. Once results were developed, the final chapters involve the analysis of which sustainable innovations were determined as most and least popularly implemented among hospitality projects. Opportunities are then discussed for credits found to experience implementation barriers in hospitality and conclusions and recommendations made for future applications of LEED in hospitality design.

1.6 Research Scope and Limitations

Due to the lack of previously existing research and statistical data on measuring sustainability in hospitality design, the information presented in this research is strictly exploratory in nature and seeks only to offer informative, yet not necessarily predictive, results and recommendations. Due to the distinct individuality of every building project, there is no single answer to universally determine which credits are most advantageous for all projects to pursue. Variations in climate, geography, target client market, stakeholder values, availability of materials and expertise of project consultants all affect each project's disposition for success. Findings and analyses in this study are therefore a valuable contribution to research in this field, but do not claim to be definitive or comprehensive.

The scope of this project is based upon hospitality projects found solely in the United States, as other countries typically design to accommodate their own climates, cultural values and building standards. Also, though the definition of hospitality typically encompasses any type of accommodation property, for the purpose of this research the definition is limited to typical stand-alone commercial hotel properties in order to maintain comparable consistency among selected study participants.

2. Literature Review

2.1 Background of Sustainable Building Design

2.1.1 Introduction

The concept of sustainability has many definitions. Interpretations made according to numerous world industries and organizations each have a differing basis, yet the one common recognition is that the world operates as a system. In other words, every action made affects another object or process. Sustainability is theoretically based on the premise that present generations must consume and operate in a manner which is supportive of the same level of consumption and operation by future generations. The emphasis of this theory is that when levels of present consumption or operation become excessive and levels for future consumption become threatened, preventative action should be taken.

Sustainable building design is accordingly defined by the Office of the US Federal Environmental Executive as "increasing the efficiency with which buildings and their sites use energy, water and materials and reducing building impacts on human health and the environment, through better siting, design, construction, operation, maintenance and removal - the complete building life cycle" (Cryer et. al, 2006). Effectively, sustainable building combines design, construction and environmental benefits in buildings that reduce consumption of natural resources, reduce construction impact on natural surroundings, offer occupants healthy and productive interior environments. This is all accomplished with the intent to prolong the building lifecycle while minimizing operating expenses and energy consumption and typically increases building value and investment returns in the process. The result is an improved quality of life for building occupants and preserved resources for future use, all at well-realized profits. Yet, though sustainable building design makes perfect sense in theory, many developers still hesitate to incorporate such a "newly developed" concept. The current climate for sustainable building practices in the United States is examined in the first half of this chapter, with the nature of this climate in terms of sustainable design for hospitality subsequently discussed.

2.1.2 Growth of the Global Sustainability Movement and Emergence of Green Building

Though current advancements in technology have developed many new innovations for efficient buildings, sustainable building design is not a new concept. Passive forms of building design have been in use for centuries by various cultures around the world. To control interior temperatures before modern day technology, cold underground chambers were built to cool air drawn in from below and then circulated the air upwards by stack effect of roof vents. Deep set window wells and manmade shading devices also helped to control indoor comfort conditions. The 1930s to 1960s saw the advancement of mechanical air conditioning, structural steel and reflective glass, which became the new popular materials for commercial building construction, resulting in massive greenhouse-type structures with enormous, inefficient fuel-dependent mechanical systems (Marble Institute of America, 2011). However, rising fuel costs due to the OPEC oil embargo in the 1970s sparked the environmental movement of the era and the initial inspiration for architects to rethink the efficiency of building design (Cryer et. al, 2006).

Since that time, continued research and development on improving energy efficiency and building systems has been ongoing. However, the difference in today's society is that sustainability is approached by many more types of organizations across a wide range of industries that seek results from buildings that are not based solely on the effects of higher fuel costs. The present appeal for sustainable building projects lies not only in the rising cost of energy, but also growing awareness of climate change, emissions output, destruction of ecosystems, decreasing space in landfills and priority for personal well-being (Da Silva & Ruwanpura, 2009). The built environment encompasses such a substantial area of controllable change it significantly increases the social responsibility to incorporate sustainable design. According to the United States Green Building Council (USGBC), all commercial and residential buildings in the United States are responsible for the current consumption of 72% electricity usage, 39% of available energy use, 38% of all carbon dioxide emissions and 13.6% of potable water use (2011a). These statistics greatly emphasize the reliance the population has upon the built environment, particularly the need for improved systems efficiency and indoor environmental quality. As it stands, Americans currently spend 90% of their time within these buildings between the home and workplace (Cryer et. al, 2006). Yet before a building is even functional, construction processes alone create tremendous amounts of waste. Landfills are beginning to close and waste trucks must travel greater distances at greater fuel emissions to relocate waste products. Levels of available freshwater also continue to decrease, yet few existing buildings were built under efficient plumbing standards and display little motivation to retrofit at their own expense. It is evident that the future of building design must begin with sustainable practices in place from the ground up if the population is to maintain a fraction of the comfort the earth provides today.

The building industry has, however, begun to take notice. In the last few years, corporations across the construction and development industries have launched sustainability initiatives to improve environmental impacts and address community, employee and customer concerns (Turner Construction, 2008). The market for green buildings and construction practices has also grown to account for a substantial portion of the development industry. According to the USGBC, the sustainable commercial construction market in 2010 consisted of 35% of all projects, an exponential rise from a mere 2% five years prior in 2005. This number presents a strong indication that developers have begun to prioritize for the conservation of essential resources for future consumption. Sustainable design is even further projected to form the basis of approximately 44% of all projects by 2015 (2011a). It is clear that a major repositioning of environmental design values has begun to occur in the way stakeholders approach the development of their projects and many reasons for this transformation exist.

2.1.3 Benefits of Sustainable Building Design

The benefits of sustainable building design have been well-documented and new information is continually becoming available. New innovations and methods of measuring the lifecycle outcomes of green buildings provides increasingly compounded evidence of the advantages associated with sustainable design. The most commonly documented benefits include better building quality, decreased operating costs, increased rental income and tenancy, increased worker productivity, increased positive publicity, marketable recognition of any third-party sustainability verification and a myriad of additional financial benefits (Cryer et. al, 2006; Fuerst, 2009; Johnston & Breech, 2010; USGBC, 2011a).

Advantages such as these are becoming much more recognized and developers are beginning to take notice. Construction costs for sustainable building design are particularly being found as much lower than originally perceived, making the additional benefits even greater (Cryer et.al, 2006; Fuerst, 2009). This is especially true in cases where the financial benefits of sustainable projects were often realized at over 10 times the average investment to construct (Kats, 2003). According to studies by the USEPA, buildings with at least 40% energy savings can typically pay out the expense of first costs in as little as 2.5 years. Sustainable buildings can even cost no more at all than typical building construction when costs and innovations are properly planned and integrated (Davis Langdon, 2004; Morris & Matthiessen, 2007; USGBC, 2011a). Not only are operating costs lowered due to the efficiency of sustainable building systems, but building value is increased due to attractive lower lifecycle maintenance and energy costs as well as the potential to receive higher rental rates from tenants who lease space for longer lengths of time (Fuerst, 2009). However, the most significant of these savings is not always garnered from decreased operating costs and increased building value, but is often found in a substantial increase in worker productivity among building occupants who benefit from significantly improved working conditions.

Reduced absenteeism and increased employee productivity are two benefits of sustainable building design that have been well recognized within the industry. Improved occupant health based on strategic siting, increased daylighting, improved thermal comfort and ventilation control, use of low-emitting building materials and interior finishes and use of non-toxic cleaning supplies all contribute substantially to the improved indoor environmental quality and health of occupants inside (Butler, 2008). Of these, increased daylight in office areas has been found to create the most significant satisfaction. Green buildings are resultantly more attractive to company tenant markets knowing that employees and clients will work in environments that foster both improved health and productivity. In turn, working for a company in a green building is more attractive to employees knowing that they will experience improved quality of life working in a healthy environment. Though actual levels of individual benefits can be difficult to quantify, one study has found that workers tend to be 61% more productive, produce 55% better quality output and take 12% less sick days in green building working environments (Drummer, 2011). These estimates are compounded by increasingly quantifiable values of employee productivity resulting from the level of improved indoor environmental quality, which has been estimated at between $20 and $160 billion USD per year and is further estimated to save between $17 and $48 billion USD in healthcare insurance claims every year - a measured average of $35 USD per employee (USGBC, 2011a). The fact that sustainable building design has documented evidence of financial gains from increased productivity rates proves sustainable design is an effective investment and should offer worthwhile attraction towards stakeholders.

Sustainable building design also typically enjoys the benefits of an expedited municipal approvals process and increased market share through a position at the forefront of tightening energy efficiency regulations (Bohdanowicz et. al, 2001; Fuerst, 2009). As local and federal governments have become further aware of the built environment's effects on global warming, there has been a call for reduced levels of energy consumption and fuel emissions. Tax and subsidy incentives have been offered in almost every US state to encourage developers to build green and should be taken advantage of while they are still available to be had. Yet any type of incentive is only offered as motivation to adopt a new innovation before it becomes a common product; once sustainable design is established as the common industry standard, these incentives will likely be phased out. This has already been the experience in Nevada, where tax incentives for green design were so successful that the state government would have faced almost $900 million USD in lost income if tax credits were not significantly reduced (Butler, 2008). Adapting to accommodate sustainable design during initial project planning stages is also far less expensive than having to retrofit a new building when government legislation enforces stricter building codes and energy efficiency regulations. With legislation such as California's recently adopted Global Warming Solutions Act (Assembly Bill 32), new buildings that neglect to incorporate design innovations proven to meet "1990 emission levels by 2020" will experience extreme costs in retrofitting to accommodate new efficiency standards in order to avoid license suspension or building closure (Butler, 2008).

In effect of increasing government legislation, newly constructed sustainable buildings can therefore be seen as a safeguard against obsolescence. Primary stakeholders and investors in an uncertain economy seek sounder investments with no hidden future costs, especially those associated with expensive retrofits to meet evolving environmental government legislation. If a sustainable building is designed efficiently enough, unused carbon credits can even be sold back to state governments at a profit (Butler, 2008).

2.1.4 Obstacles Facing Sustainable Building Design

Though the existing data on the quantifiable benefits of sustainable building should be enough to establish a convincing financial bottom line, developers are too often still hesitant to make the switch to sustainable design. The perceived high expense of first costs associated with sustainable building is the first and most significant obstacle, yet many other issues do present barriers. A lack of sustainable education by project designers, budget setbacks by project stakeholders with varying green priorities, the risk of obsolescence of new sustainable innovations, increased planning and schedule time, more thorough construction documentation, more complex design and integration, more lengthy payback periods are just to name a few issues that all present further barriers to the adoption of sustainable building design (Cryer et. al, 2006; Turner Construction, 2008). In order to make sustainable design more attractive to prudent developers, more information must be made available to every side of the construction industry for such barriers to be overcome amongst all project types.

Though each of these issues encompasses a differing level of significance for every project, high cost perceptions poses the most significant of these barriers. Sustainable design is often regarded as an “added feature”, leading to the perception of “added costs” (Morris & Matthiessen, 2007). According to the USGBC, it has been found that developers can overestimate these costs by over an alarming 300% (2011a). Misperceptions of inflated construction costs exist as stakeholders often forgo consideration that such “added benefits” will pay for themselves over time. Indeed, it was found that among receptive developers that did choose to integrate sustainable design that financial benefits of green buildings were found to be the biggest motivator, rather than increased first costs as the largest inhibitor (Durr, 2006). Yet it is also true that when the cost of sustainable design does appear only as a small percentage, it can still add up to hundreds of thousands more than what some developers can afford to outlay at the beginning of a project (Cidell, 2009). This results that even developers who intend to build green due to the added benefits may very well end up forgoing sustainable design and future payback potential simply because even minimal extra initial finances prove to be out of reach.

Yet the original skewed perception of added costs is clearly due to the substantial lack of quality available information. Institutional-level research and programs for education of sustainable building practices are emerging, yet are nowhere near popular (Da Silva & Muthulingam, 2006; Da Silva, 2008; Durr, 2006; Cryer et. al, 2006). In order to achieve the best success in a sustainable project, the education and awareness of all stakeholders and consultants must therefore be valued with utmost importance. The best prepared team of experienced individuals will maintain knowledge of the most innovative options and also offer the experience of how to see them best implemented. Beginning with an inexperienced team can result in expensive construction backtracking and often not reaching sustainability goals. Because of this, developers must realize the responsibility to educate their staff and not blame the "complexity" of sustainability when desired outcomes are unable to be achieved.

2.1.5 Sustainable Building Guidelines

Sustainability initiatives among many countries around the world have been developed and adopted for more efficient design, construction and renovation of the built environment. The development of green building and sustainability rating systems allows researchers to evaluate the rationale as to where, why and how sustainable buildings are constructed (Cryer et. al, 2006). A number of third-party sustainable design guidelines for buildings exist today, such as the Green Globes Design standard, BOMA Building Environmental Standards, the BuiltGreen program, IISBE's Sustainable Building Tool, the UK's Building Research Establishment Environmental Assessment Method

(BREEAM) and the USGBC's Leadership in Energy and Environmental Design (LEED) guideline program. As it stands, the USGBC's LEED program is the most widely accepted third-party sustainable design guideline system presently employed in the North American building industry, with the Green Globes system at a close second (Cryer et. al, 2006; Turner Construction, 2008).

Though the number of sustainable design guideline programs that exist should provide a number of opportunities and paths for developers to choose from to fit their projects, the wide availability of programs can create difficulty in cross-comparison of levels of sustainable innovations. It can also cause confusion among developers as to which guideline to choose. This often results in none being chosen at all, effectively defeating the encouragement of sustainable design altogether. There are also issues surrounding the "status" of association with a third-party verification system. As any innovation is adopted by an increasing number of people, it is regarded with increased legitimacy. Stakeholders may therefore choose to seek certification through achieving minimum requirements based on the associated good publicity rather than aiming for optimal environmental performance (Corbett & Muthulingam, 2007; Fuerst, 2009). In sustainable design, this is often termed "green-washing". In this sense, stakeholders that are more concerned with "making a statement" simply by selecting a level of certification to achieve (usually the most basic and inexpensive), rather than focusing on the most effective sustainable elements that could be incorporated within their means. Stakeholders that are more concerned with actual environmental benefits will instead base their design decisions on which sustainable elements will encompass the highest level of efficiency, have the least impact on the natural environment, or create the best quality indoor comfort conditions for occupants (Corbett & Muthulingam, 2007). Yet the incorporation of any sustainable guideline is better than none at all, as many developers do not know where to start, much less maximize their green potential through building strategies and options they may be unaware of. Even incorporating bare minimum standards sets an example for the competition to at least consider sustainable design.

2.1.6 Summary

It is clear that the climate for sustainable building design is growing and will continue to increasingly influence the development industry. Construction professionals and academic researchers both anticipate rapid expansion of sustainable design innovations in the building industry and developers now face the challenge of shifting towards greener priorities should they wish their projects to remain competitive. The multiple advantages of incorporating green design have been well-researched and documented, yet barriers still exist toward overall acceptance by the development industry. It is clear that in order to succeed, developers must get on board early in order to ensure that every incentive can be taken advantage of and all possible opportunities for innovation can be covered in a systematic fashion. However, information must be made better accessible to more sectors of the building industry to ensure proper consideration of the real costs and benefits of green building among all types of buildings. The adoption of a sustainable third-party verification system, particularly LEED in North America, provides the best approach for developers to incorporate sustainable innovations into their projects. However, the unique use and intent of every building can present challenges to the inclusion of sustainable design. Development in the hospitality sector is one of these particular building types and is arguably one of the most important styles of development that should be reinvented to incorporate sustainable initiatives. The current climate for green design among these properties is discussed in the following section.

2.2 Background of Sustainable Design in Tourism and Hospitality

2.2.1 Introduction

Today's tourism and hospitality industries are beginning to face pressure to "go green" along with most other sectors of the global economy. Adapted from the universal understanding of sustainability, sustainability in hospitality is subsequently defined as "hospitality development and management that meets the needs of today's guests, hoteliers and stakeholders without compromising the ability of future guests, hoteliers and stakeholders to enjoy the benefit from the same services, products and experience" (Legrand & Sloan, 2011). Though the integration of sustainable design into the development of common building projects already presents new challenges and learning curves for consultants and stakeholders, the integration of sustainable design into the development of hospitality projects presents an entirely different set of complex design dilemmas. While common sustainable building design typically seeks to develop an environment for the optimization of workplace efficiency and productivity, common hotel design typically seeks to ensure levels of comfort and amenity access are paramount to ensure quality guest experience. The high levels of energy use associated with luxury comfort and amenities are not easily accomplished under common sustainable recommendations. However, with careful consideration and proper planning, many builders in hospitality have successfully incorporated sustainable design into new projects. The USGBC's LEED program is currently the most widely accepted third-party verification system available in the sustainable development industry and a handful of innovative developers have successfully incorporated these guidelines into a growing number of new hospitality projects.

2.2.2 Tourism and Hospitality in the 21st Century

In recent decades, the tourism and hospitality sector has grown to be one of the world's most prominent industries. Currently supporting over 200 million employees worldwide with extended spinoff benefits into local social economic development, it is one of the most globally significant economic generators (Holjevac, 2003). According to the World Travel and Tourism Council, the direct contribution of travel and tourism to global GDP levels for 2011 is expected to reach $1.8 trillion USD, or 2.8% of the entire world GDP

(2011a). In the United States alone, $4 billion USD will contribute to 2.6% of the American GDP this year and is anticipated to contribute almost $6 billion USD by 2021. Tourism and hospitality clearly provide an essential support structure necessary to aid the currently struggling US economy. Presently supporting 5.5 million jobs in the United States, this number is also projected to rise by 1.5% over the next ten years (World Travel and Tourism Council, 2011b). It is estimated that by 2050 travel, tourism and hospitality will exclusively become the world's largest and most profitable industry (Holjevac, 2003). Statistics such as these create an even greater urgency to begin incorporating sustainable innovations into hotel and resort projects, as these promising economic projections do not come without a cost.

The influence of tourism development activities on both the natural and man-made environment are a very complex issue. Because of this, sustainable tourism is an emerging form of the industry that is slowly but surely taking hold in the market. Global awareness of climate change and the negative externalities caused by tourist activities such as long haul flights, ground transportation, luxury accommodation and exploration of new environments has begun to see new initiatives taken towards "greening" the travel, tourism and hospitality industries. The extensive contribution to greenhouse gas emissions and solid waste generated by these activities now sees these industries faced with pressure to reduce their consumption levels as the global priority shifts toward sustainability. Development for tourism and hospitality typically involves negative impacts on the very environment a tourism area depends on, such as the construction of roads, airports, hotels and other tourist facilities that cater to travelers (Beccali et. al, 2009). The direct environmental impacts of construction for these facilities and their operation include accelerated levels of fossil fuel emissions, electricity consumption, degradation of soil and water, noise pollution and excessive consumption of local and imported natural resources (Bohdanowicz et. al, 2001). Construction and maintenance of hotel and resort properties have been specifically identified as one of the leading contributors to these rising environmental difficulties in the tourism industry.

2.2.3 Sustainability in the Hospitality Industry

Hotels currently represent 5 billion square feet of built environment, 5 million guest rooms and over $4 billion USD per year in energy consumption in the United States alone (USGBC, 2011b). Over 400 million business trips are made every year supporting a conference industry directly related to hospitality worth $175 billion USD. As it stands, there is an extensive opportunity for hotels to increase the efficiency of guest rooms, meeting space and the general operation of each property. Sustainable design and operations can contribute to a healthy environment for both guests and hotel staff through the incorporation of improved indoor air quality innovations, better access to daylighting and views and new access to occupant-controlled lighting and thermal comfort levels that all provide healthier, more comfortable and productive indoor environments.

As a result of growing tourist awareness, the hospitality industry is under greater pressure to conform to environmental initiatives from consumers, government regulations and environmental organizations (US Department of Energy, 2007; Smerecnik & Andersen, 2011). Hotel properties situated in natural areas, such as winter ski accommodations and beachfront resorts, are most proactive in their efforts to “green up” because their success is directly related to their natural surroundings. Not only do owners wish to maintain the source of their profits, but incorporating sustainable innovations is also an important marketing initiative to show guests that their hotel cares about preserving its surrounding environment. Typical downtown overnight hotel accommodations are less attached to natural areas, but incorporating sustainable building strategies is beneficial for the wellness of building occupants and financial savings from energy efficiency nonetheless. A further difference exists between independent operations and hotel brands that are marketed as part of a franchise. Large hotel chains are often able to employ environmental policymakers and designers to assist in sustainable design directions for future projects, while independently owned accommodations are based solely on the values of the owner or operator. In order for sustainability in hospitality to fully succeed, information and opportunities must be better presented in order for sustainable initiatives to be taken by all members of the industry.

2.2.4 Energy Use in Hospitality

The difficulty in "greening" the hospitality sector lies in the task of pursuing environmental commitments while maintaining guest expectations and still earning a profit at the end of the day (Cooper, 2002; Holjevac, 2003). Hotel properties consume substantial amounts of energy often at incredibly low levels of efficiency in order to deliver comfort and services to guests who are willing to pay for top-quality amenities, spa treatments and entertainment. Because of this, the environmental impact of hotel properties is much greater than that of a typical commercial building of the same size (Bohdanowicz et. al, 2001). Common commercial construction is more likely to involve more efficient design for open work areas and office spaces that can be easily modified and require much less plumbing and mechanical systems to support large restaurants and swimming pools.

The standard design of a typical hotel property consists of three distinct building areas that serve specifically different purposes (Bohdanowicz et. al, 2001). Common public areas, such as bars, restaurants, convention facilities, pools and lobby areas all experience high rates of heat loss and high internal energy loads due to varying numbers of occupants in areas requiring complex building systems. Guest room areas utilize various levels of water and utilities in often extensively glazed individual spaces. Service areas including staff rooms, kitchens, laundry facilities, offices and mechanical rooms are all energy intensive areas that often require significant ventilation and air handling measures. With three separate zones consisting of drastically different water, energy and ventilation requirements, it is not surprising that the complexity involved in harmonizing design requirements of each area to meet sustainability goals is not always a popular direction for hospitality developers. The typical distribution of energy consumption in a common hotel is approximately 50% for mechanical ventilation and air conditioning, 25% for restaurants and food services, 15% for hot water heating and 12% for lighting. A further 5% consists of energy requirements for laundry facilities, elevators, escalators and other mechanical equipment. Hot water use has also been measured at an average of 120 litres per guest per day, resulting in an annual consumption of 1850 kWh per guestroom every year on energy use for hot water heating alone (Bohdanowicz et. al, 2001).

As many hotel operating costs are fixed and unable to be avoided, energy use is often the largest area of opportunity for reduction among controllable costs (Bohdanowicz et. al, 2001). According to the American Hotel and Lodging Association, the United States is currently home to over 51,000 hotel and resort properties among which energy is the single fastest growing cost (2011). According to the US Department of Energy, hotels spend almost $2,200 USD on energy costs for every guestroom each year (2007). By reducing energy consumption just 10 percent, full service hotels can expect to save between $4 and $7 USD in their average daily rates, or about $1,500 USD per guestroom every year. In other words, reducing energy consumption by just 10 percent can save the most efficient properties almost three-quarters of their annual energy costs, turning those savings directly into profit (Butler, 2008). This is compounded by further statistical assessments of energy audits that have shown for every $1 USD spent on energy efficient retrofits, hotel developers can expect to receive an eventual payback of $6.27 USD (Bohdanowicz et. al, 2001). These financial statistics also originate from information over a decade old, suggesting that potential savings and paybacks may be even more substantial under today's most current technological advancements. Regardless, the additional initial financial outlay to specify and purchase appropriately efficient building materials and systems equipment remains the most significant inhibitor to sustainable building projects in general. Though perpetually increasing energy costs, advancing technology and increased awareness have managed to bring down the costs of many green building innovations, the assumption that sustainable building is significantly more expensive still persists, reiterating the need for more widespread education among industry professionals.

2.2.5 Guest Needs, Perspectives and Tendencies

The demographic of guests served among different hotels and resorts plays perhaps the most significant role in determining design routes for new development. Members of the current workforce are not only travelling more for business meetings and conferences but are also gaining increased annual paid vacation time and more travel opportunities to relatively inexpensive destinations. The aging global population is also leading to a growing number of retirees that have more time and money reserved for travel. Therefore even in a lagging economy tourism still thrives, but it does experience increased competition for disposable income from other goods and services. Because of this, the hospitality industry must continue to improve itself in order to remain afloat during slow economic times and also plan ahead to support more guests in future for longer lengths of time. The industry must continue to evolve for the growing need for comfort satisfaction, leisure and relaxation amenities also required to sustain the wellness of aging guest demographics (Holjevac, 2003). Design for hospitality must now take into consideration the quality of life inside its walls, not just an adequate level of comfort.

Though not all of today's society makes consumption of sustainable goods a priority, environmentally conscious consumers are growing, typically engaging in one of two types of consumer behavior (Kahn & Vaughn, 2008). The first is a form of voluntary restraint, where a conscious effort is made to consume less of a product that causes negative environmental effects. The second behavior involves proactively making use of environmentally-friendly products, at voluntary cost premiums paid willingly to do so. Under these assumptions, consumers have a choice to either limit less-sustainable travel experiences, or pay more for travel experiences that are sustainably developed and operated. As opportunity grows for more people to take advantage of holiday time, it is unlikely that potential travelers will wish to sacrifice these opportunities. This helps to explain the current demand growth for sustainable development in hospitality. Two separate studies have revealed that 70% of travelers would actually prefer their travel accommodations to have implemented environmentally conscious strategies, would willingly participate in green initiatives offered such as in-room recycling and believe the hospitality industry should recognize its duty to set an environmental example (Butler, 2008; Dalton et. al, 2007). Further to these findings, it was found tourists would pay up to 7% more for such environmentally-sound hospitality programs and amenities (Dalton et. al, 2007). Business travelers especially are becoming more conscious of the output required to support conventions in hotel facilities and meeting organizers are beginning to seek green venues to host their conferences (Johnston & Breech, 2010). According to one recent study, it was found 65% of company CEOs plan to implement sustainable travel guidelines for their mobile employees (Environmental Leader, 2011). Yet though many guests do expect hotels to do their part, it can be under an unrealistic assumption that the high levels of luxury and comfort they may be accustomed to can be equally offered under quality sustainable circumstances. While green hotels have often been found to produce even better quality environments and even higher guest satisfaction, it is not achieved in the same manner of luxury and amenity availability as guests have commonly come to expect (Butler, 2008).

These expectations perhaps form the basis of research that has shown that many tourists are still not willing to pay extra for a sustainable hotel stay at all. The same study indicated that 52% of hotel guests would not be willing to pay any more for a more sustainable accommodation experience and that 58% believed environmentally conscious efforts among hotels would not actually create long-term environmental benefits (Dalton et. al, 2007). It was determined that tourists travelling for leisure favor opportunities for optimal comfort and full access to amenities in order to "escape the obligations of daily living"; this results in higher expectations by guests when paying to stay elsewhere than their own home. Hotel guests have therefore been found as less likely to concern themselves with recycling efforts and the environmental benefits of items like natural ventilation when access to air conditioning is customary and expected. This was also found to be especially true of American tourists, whose tendency to choose sustainable accommodation with limited products and services over unsustainable accommodation with access to all amenities was 30% lower than their Australian or European counterparts.

Though 52% of hotel guests were not found as willing to pay more, when put into perspective, this number also indicates that a promising 48% of guests would be. The most common level of cost increase that willing guests were prepared to pay was between an extra 5 and 10% for typical hotel accommodations and as much as an extra 20% in high-end hotel properties (Dalton et. al, 2007). Yet as these figures are from 2007, it is arguable that these statistics in favor of green venue selection have increased since that time, as sustainable guest expectations are growing. With guests willing to pay more and advanced technologies costing the building less in energy and electricity, there is a definite margin of profitability able to be gained in the development of sustainable hospitality projects. Developers should act as soon as possible, as consumer demand can shift rapidly as awareness and demand for sustainable innovations grow; guest loyalty may shift to hotel chains that have already "gone green" and can be permanently lost from a chain that has not yet made the effort (Butler, 2008).

2.2.6 Barriers and Opportunities

Though it is clear that energy efficiency increases financial bottom lines, performance of equipment, improves occupant comfort and demonstrates environmental commitment to guests, hospitality operators still hesitate to undertake energy reduction initiatives (US Department of Energy, 2007). This is due to assumptions by hotel operators that they may resultantly be regarded by guests as reducing available comfort conditions, amenity convenience, or expected hotel brand experience. However, it is clear that hotel developers typically underestimate the public acceptance of sustainable design and innovations in their properties. As it stands, business travelers and their companies are becoming especially more conscious of the output required to support employee travel and to host conventions in hotel facilities (Johnston & Breech, 2010; Environmental Leader, 2011). The existing opportunity for hospitality projects to incorporate sustainable building design into their projects' construction and daily operations therefore makes significant business sense and also displays environmental commitment to both guests and the general surrounding community (USGBC, 2011b). Developers must realize their chance to respond to this growing consumer preference before preference for sustainable accommodation becomes the norm. As it stands, consumer demand for more sustainable products and services will only increase as time goes on. Stakeholders must begin to understand that constructing according to unsustainable, baseline building standards may very well render a project obsolete within the market well before the end of its building cycle.

Success in tourism and hospitality is also often dependent upon well-maintained and scenic environments. Stakeholders are also beginning to realize that if the natural resources they depend on for tourism become depleted, so too will their profits (Lavy & Fernandez-Solis, 2011). Yet properly planned, designed and operated hospitality properties can create real environmental, social and cultural advantages as well as promising investment opportunities for environmental investors and vendors (Bohdanowicz et. al, 2001). It is predicted that in the next century, every new hotel developed will be designed in a mutual level of symbiosis with the environment, described as an “eco-hotel”. While the current status of sustainability in all areas of real estate development is catching on, its acceptance is still in the beginning stages. As it stands, the environment is still considered second to the needs of construction and development. In future, everything from site location, construction materials, building equipment and products and services in every hotel and commercial building will instead be considered second to the needs of the environment (Holjevac, 2003). Hospitality developers must reconsider their current position, as the sooner stakeholders respond to this impending shift change in the industry and prioritize for the preservation of the natural environment in construction and operations, the longer they will be able to profit from the natural areas hotels and resorts so often depend on.

Though only a small market currently exists for sustainable tourism, it is determined to be the fastest growing submarket. In other words, substantial potential for success exists in sustainable hospitality development. When properly planned and designed, it has been found that sustainable hotel projects actually provide better quality guest experiences than typical projects, all while using less energy and improving indoor environments (Bohdanowicz et. al, 2001). Better quality indoor environments not only promote the wellness and comfort of guests that visit but also improve the working conditions of employees that spend hours of work time there each day. Companies that ensure the wellbeing of their staff and clientele are not only well-admired but attract better qualified investors, improved guest loyalty and better employees (International Tourism Partnership, 2011). Better qualified investors translate into further spending on quality environments and employee salaries, which turns into better qualified and more satisfied workers, who are then happier to ensure guest satisfaction and maintain positive stay experiences in properties that may have been constructed with sustainable modifications that guests may not yet be accustomed to.

2.2.7 The USGBC and History of LEED

All of these factors considered, it is clear that a market for sustainable design is well-established for hospitality development. Yet improved support is required to assist such an energy intensive industry to shift its common design priorities and become involved.

With challenges to building design like these in mind, the United States Green Building Council (USGBC) was founded in 1993 with the intent to transform the future of the construction industry and built environment (USGBC, 2011c). A non-profit organization of currently over 15,000 industry members including development corporations, building owners, architecture firms, government agencies and other non-profit organizations, it was established in order to mitigate future effects of poor building design and inefficiency.

The USGBC first introduced the internationally-recognized Leadership in Energy and Environmental Design (LEED) green building program in 1998. The program was developed in order to offer concerned stakeholders and developers a list of practical innovations and methodologies to help implement sustainable design into their projects. Thirteen years later, LEED has become an internationally accepted benchmarking system for consistent verification of sustainable buildings in the United States and over 40 other countries. LEED is described as a voluntary and consensus-based rating system for building projects intending to be designed and operated in a manner that benefits the environment as well as the health of its working occupants (USGBC, 2011c). The program consists of a whole-building approach to design that emphasizes five fundamental aspects of sustainable development, including building siting, water, energy, building materials and the indoor environment. The popularity of the program has seen over 24,000 projects gain LEED certification in the United States to date, with a further 90,000 currently registered in the accreditation process (USGBC, 2011c). Many versions of LEED guidelines exist for new construction or renovation of residential, commercial and institutional buildings, each of which is constantly reviewed and adjusted in order to ensure optimal innovations and practices are suggested for designers of all types of building projects. Of these versions, LEED for New Construction (LEED-NC) is currently the most popular guideline in use for new projects.

Though no existing versions of LEED specifically address the unique building circumstances of hospitality, some hotels have been able to successfully implement LEED-NC guidelines with proper planning, time and design considerations. Very few LEED accredited hospitality projects currently exist because of the perceived risk to guest comfort conditions that could potentially affect profits, yet new recommendations are soon to be released by the USGBC specifically for hospitality as an extension of LEED-NC. As more informative data measurements are compiled and experiences are documented, more informed design decisions can be made in order to ensure successful sustainable design in hospitality.

2.2.8 LEED and Development for Hospitality

Although the number of LEED certified buildings in the United States currently amounts to over 24,000, the number of LEED certified hotel and resort buildings among these are virtually nonexistent. A total of only 96 hospitality projects had achieved LEED certification as of May 2011 (USGBC, 2011b). Though a further 1,100 projects are registered and still clearing the accreditation process, it is apparent that sustainable design among hospitality projects has taken much longer to gain acceptance. The fact that hospitality projects not only have to take into consideration the comfort expectations of guests and the investment returns for the stakeholder, the construction of hospitality projects themselves presents a unique challenge to sustainable building design. Aspects of typical hotel amenities such as restaurants and bars, pool areas, laundry rooms and convention centres along with the regular renovations and fluctuating guest populations that exemplify hospitality are all complex features that must be considered that are not always found in regular commercial building projects, nor provided for under existing LEED-NC guidelines. Because of these exceptions to typical standard commercial development it has been more difficult for hotels, especially national brand chains, to achieve LEED accreditation. Credit requirements have been seen as overly limiting for design and quality comfort levels associated among certain hotel brands and guest expectations have been viewed as difficult to meet under these limitations.

However, it does appear that acceptance by major hospitality developers has begun to gain momentum. Due to the recent successes of a small number of independent hospitality projects that took extra time, consideration and expenditure to implement LEED guidelines in a manner that could be accommodated within hotel design, other hospitality developers have begun to take notice and understand that sustainability and guest comfort can successfully coexist. Major hotel brands such as Starwood Hotels &

Resorts, developer of the renowned St. Regis, Le Meridien, Sheraton and Westin hotel chains have not altered the design standards of their main brand collection, but instead launched two new LEED-based sustainably-designed brands, Aloft and Element. Marriott Hotels & Resorts has also introduced its new Courtyard by Marriott brand as a LEED-based green option for its clientele rather than choosing to modify the accustomed design of its existing brands. Each of these new hotels was developed according to a standard common design consistent with new LEED Volume guidelines that plan new construction of the same building in different locations. In fact, Marriott plans to expand its current collection of LEED-rated properties by 1,000% under LEED Volume and expects that the benefits of a pre-certified design will save $100,000 USD in construction costs and eliminate six months of design and planning time from each project (Environmental Leader, 2009).

Though the financial appeal for design according to LEED Volume guidelines for branded chain designs is evident, LEED-NC and LEED-EBOM are currently the two most appropriate guideline systems available for new hospitality development and existing operations. As no version of LEED yet exists specifically for the design of hotel and resort projects, recommendations for sustainable design of hospitality are not specifically addressed, but with proper ingenuity these guidelines are able to be applied. Yet growing awareness of special provisions for hospitality have finally come to the forefront and the USGBC has formed a new committee, the Hospitality Adaptations Working Group, specifically to coordinate green guidelines designed for hospitality projects. Since its formation at the end of 2010, the group has emphasized new considerations for food and beverage operations and conference venue facilities in order to encourage hospitality developers to take an active role in sustainable development of their properties (PRLog, 2011). Additional guidelines and new credits are being considered for furniture, fixtures and equipment (FF&E) and sustainable food and beverage acquisition that were not available before and adjustments are being made to existing credit options for development density, community connectivity, light pollution reduction and outdoor air delivery monitoring (USGBC, 2011b). These new recommendations are not intended to be introduced as a new version of LEED for hospitality, but rather an extension for existing guidelines for LEED-NC.

Though according to the USGBC these new recommendations were to be released by mid-2011, by the time the present research was conducted they still had not been made available. However, additional resources on LEED and hospitality development are becoming much more accessible and are providing better information on how hospitality projects can succeed according to LEED design. Indeed, in order for the hospitality market to catch on better marketing of the successes of existing projects is required, especially in terms of financial advantages for stakeholders. Other major hospitality leaders including InterContinental, Hilton, Fairmont and others have also begun to launch new environmentally-conscious hotel brands and programs in their new product development, though have not yet gone so far as to incorporate the comprehensive design of LEED (Butler, 2008). Hesitancy among stakeholders is not surprising since the success of a hotel depends directly on the positive experience of guests and the possibility that those experiences be compromised because expected comfort conditions were not met after expensive modifications can often leave sustainable design perceived as too large a risk to take. However, as shown in the previous section, guests are much more receptive and even expectant of their hospitality providers to incorporate sustainability than is often perceived by stakeholders. A LEED-accredited sustainable identity is therefore much more likely to create a marketable public relations value than inhibit guest appeal due to desire for more luxurious accommodation (Johnston & Breech, 2010).

2.2.9 LEED-NC Sustainable Design Guidelines

LEED guidelines currently exist in a number of forms for various types of building projects, as indicated in Table 2.1. Each version of LEED is based upon attaining one of four different levels of accreditation - Certified, Silver, Gold, or Platinum - according to a number of credits points achieved, as shown in Table 2.2. LEED credits for the NC guideline are based upon five categories of emphasized areas of design, entitled Sustainable Sites, Water Efficiency, Energy & Atmosphere, Materials & Resources and Indoor Environmental Quality. Each category involves a small number of prerequisite credits and a wider number of optional credits available to be pursued at each developer's discretion. A sixth category, Innovation in Design, is an additional category made available for project designers who wish to gain credit for independently selected sustainable innovations that may not have been directly covered by credits in any of the five main categories.

Table 2.1 LEED Guideline Program Descriptions (USGBC, 2011c)

LEED Guideline	Description
LEED-NC	New Construction and Major Renovations
LEED-EBOM	Existing Buildings: Maintenance & Operation
LEED-CI	Commercial Interiors
LEED-CS	Core and Shell
LEED-H	Home Construction
LEED-ND	Neighborhood Development

Table 2.2 LEED-NC v2.2 Certification Levels by Point Range (USGBC, 2005)

Certification Level	Point Range
Certified	26 - 32
Silver	33 - 38
Gold	39 - 51
Platinum	52 - 69

The first category, Sustainable Sites, involves environmentally conscious considerations for initial site selection and earthworks in the beginning stages of development. Table 2.3 illustrates how credit points are emphasized for selecting a site that is not environmentally sensitive or vulnerable, can be accessed by public transportation and is properly designed with consideration for adequate stormwater runoff, urban heat island mitigation and light pollution reduction.

Table 2.3 Sustainable Sites Category Credits (USGBC, 2005)

Credit		Point Value
Prereq	*Construction Activity Pollution Prevention*	*N/A*
Prereq	*Site Selection*	*N/A*
1	**Site Selection**	1
2	**Development Density & Community Connectivity**	1
3	**Brownfield Redevelopment**	1
4.1	**Alternative Transportation**, Public Transportation Access	1
4.2	**Alternative Transportation**, Bicycle Storage & Changing Rooms	1
4.3	**Alternative Transportation**, Low-Emitting and Fuel-Efficient Vehicles	1
4.4	**Alternative Transportation**, Parking Capacity	1
5.1	**Site Development,** Protect or Restore Habitat	1
5.2	**Site Development,** Maximize Open Space	1
6.1	**Stormwater Design,** Quantity Control	1
6.2	**Stormwater Design,** Quality Control	1
7.1	**Heat Island Effect,** Non-Roof	1
7.2	**Heat Island Effect,** Roof	1
8	**Light Pollution Reduction**	1
	Total	14

The second category, Water Efficiency, is displayed in Table 2.4 and focuses on opportunities for potable water use reduction. Points are awarded depending on the extent of efficiency accomplished through innovations such as low-flow plumbing fixtures and water efficient landscaping, including drought-tolerant planting or the use of collected rainwater for irrigation. Points are also awarded for innovations such as onsite wastewater treatment and filtration that can be used for landscape fertilization and groundwater recharge.

Table 2.4 Water Efficiency Category Credits (USGBC, 2005)

Credit		Point Value
1.1	**Water Efficient Landscaping**, Reduce by 50%	1
1.2	**Water Efficient Landscaping**, No Potable Use or No Irrigation	1
2	**Innovative Wastewater Technologies**	1
3.1	**Water Use Reduction**, 20% Reduction	1
3.2	**Water Use Reduction**, 30% Reduction	1
	Total	5

The Energy & Atmosphere category emphasizes the efficiency of energy use within a building. Credits are based upon USEPA Energy Star standards that prove significantly measurable reductions in energy use as compared to a common commercial building of the same size. As indicated in Table 2.5, up to ten points can be awarded for the level of energy optimization achieved through energy efficient innovations, such as efficient lighting, fixtures and mechanical systems operation. Onsite renewable energy forms are eligible to gain up to three credits for implementing solar, geothermal, wind, or other onsite systems contributing to energy use by the building, or by purchasing grid power from green sources such as these located elsewhere rather than energy derived from fossil fuels.

Table 2.5 Energy & Atmosphere Category Credits (USGBC, 2005)

Credit		Point Value
Prereq	*Fundamental Commissioning of the Building Energy Systems*	*N/A*
Prereq	*Minimum Energy Performance*	*N/A*
Prereq	*Fundamental Refrigerant Management*	*N/A*
1	**Optimize Energy Performance**	1 to 10
2	**On-Site Renewable Energy**	1 to 3
3	**Enhanced Commissioning**	1
4	**Enhanced Refrigerant Management**	1
5	**Measurement & Verification**	1
6	**Green Power**	1
	Total	17

The following category, Materials & Resources, is based upon the sustainable sourcing and implementation of project materials. Table 2.6 illustrates emphasis on the reuse of buildings that may previously exist on development sites and employing recycled, locally sourced, or rapidly renewable building materials into the new project. Managing waste generated from the construction site is also an area for points to be earned through the proper sorting and distribution of reusable and recyclable materials that can be salvaged for other purposes.

Table 2.6 Materials & Resources Category Credits (USGBC, 2005)

Credit		Point Value
Prereq	*Storage & Collection of Recyclables*	*N/A*
1.1	**Building Reuse**, Maintain 75% of Existing Walls, Floors & Roof	1
1.2	**Building Reuse**, Maintain 100% of Existing Walls, Floors & Roof	1
1.3	**Building Reuse**, Maintain 50% of Interior Non-Structural Elements	1
2.1	**Construction Waste Management**, Divert 50% from Disposal	1
2.2	**Construction Waste Management**, Divert 75% from Disposal	1
3.1	**Materials Reuse**, 5%	1
3.2	**Materials Reuse**,10%	1
4.1	**Recycled Content**, 10% (post-consumer + ½ pre-consumer)	1
4.2	**Recycled Content**, 20% (post-consumer + ½ pre-consumer)	1
5.1	**Regional Materials**, 10% Extracted, Processed & Manufactured Regiona	1
5.2	**Regional Materials**, 20% Extracted, Processed & Manufactured Regiona	1
6	**Rapidly Renewable Materials**	1
7	**Certified Wood**	1
	Total	13

The Indoor Environmental Quality category involves ensuring proper ventilation, thermal comfort and lighting conditions for the occupants of the building, as shown in Table 2.7. Increased fresh air intake and natural ventilation support healthy interior air conditions and the use of building finishes with low emissions assist by reducing the amount of volatile organic compounds (VOCs) present in the indoor atmosphere. Providing increased daylighting, personal thermal comfort control and extra-efficient air filtration systems will allow developers to achieve the best results from their building and also maximize the number of credit points awarded.

Table 2.7 Indoor Environmental Quality Category Credits (USGBC, 2005)

Credit		Point Value
Prereq	*Minimum IAQ Performance*	*N/A*
Prereq	*Environmental Tobacco Smoke (ETS) Control*	*N/A*
1	**Outdoor Air Delivery Monitoring**	1
2	**Increased Ventilation**	1
3.1	**Construction IAQ Management Plan**, During Construction	1
3.2	**Construction IAQ Management Plan**, Before Occupancy	1
4.1	**Low-Emitting Materials**, Adhesives & Sealants	1
4.2	**Low-Emitting Materials**, Paints & Coatings	1
4.3	**Low-Emitting Materials**, Carpet Systems	1
4.4	**Low-Emitting Materials**, Composite Wood & Agrifiber Products	1
5	**Indoor Chemical & Pollutant Source Control**	1
6.1	**Controllability of Systems**, Lighting	1
6.2	**Controllability of Systems**, Thermal Comfort	1
7.1	**Thermal Comfort**, Design	1
7.2	**Thermal Comfort**, Verification	1
8.1	**Daylight & Views**, Daylight 75% of Spaces	1
8.2	**Daylight & Views**, Views for 90% of Spaces	1
	Total	15

Finally, as mentioned, the Innovation in Design category allows projects an additional opportunity to select and implement credits based upon what fits best in relation to each distinct project. Some geographic or climatic regions are unable to accommodate certain credits in some categories, or other environmental, governmental, or social conditions may prevent the implementation of others. As indicated in Table 2.8, Innovation in Design credits are specified according to the preferences of the project designers, though a further credit point can also be gained by employing a LEED Accredited Professional in order to ensure the most efficient streamlining and supervision of a project's LEED construction.

Table 2.8 Innovation in Design Category Credits (USGBC, 2005)

Credit		Point Value
1.1	**Innovation in Design**: Specific Title	1
1.2	**Innovation in Design**: Specific Title	1
1.3	**Innovation in Design**: Specific Title	1
1.4	**Innovation in Design**: Specific Title	1
2	**LEED® Accredited Professional**	1
	Total	5

Under the LEED accreditation process many opportunities are presented for developers to incorporate sustainability into their projects. The LEED system is evidently the most widely accepted sustainable guideline as it provides credit options that have been weighted accordingly against other types of innovations that would account for the same level of sustainable performance, allowing significant flexibility and ease of implementation for project designers.

2.2.10 Benefits and Costs of LEED Design

As discussed in the previous chapter, many advantages are associated with any type of sustainably designed building. Yet the widespread acceptance specifically associated with LEED third-party verification is directly related to the measurable added value created by its unique credit-point system. Because of this, LEED accredited buildings have been found to offer significantly improved benefits that other "environmental" buildings do not. Studies have found that the financial advantage of implementing LEED has resulted in returns of between $50 and $70 USD per square foot, a finding ten times that found for other non-LEED certified buildings employing independently implemented approaches to sustainability (Butler, 2008). Typical commercial building design according to LEED standards has been shown to provide an average of 30-50% energy consumption reduction, 35% carbon dioxide emissions reduction, 48% less potable water use and save 70% on solid waste expenses. This is all reportedly achieved at the minimal average development cost premium of 2% or less. This initial expense is often even recouped in less than two years and typically offers complete building lifecycle savings of over 20% - over ten times the initial investment (Butler, 2008; USGBC, 2011a). This is also only representative of savings due to energy efficiency. Current research shows that owners of LEED certified new buildings also enjoy market profits at an average increased rental rate of 6.1% higher income per square foot, 6.4% higher occupancy rates, 13.6% lower operating costs and 10.9% increase in building value, all equating to an overall 9.9% better return on investment than non-LEED accredited buildings (USGBC, 2011a). The simple "prestige factor" of owning a green building is also its own form of marketable asset (Turner Construction, 2008).

Not only are the direct financial benefits related to the conservation of energy, emissions and water substantially well-founded under LEED, the implementation of these along with productivity-improving indoor environments have also been found to significantly outweigh any extra expense associated with sustainable building design (Kats, 2003). Any additional construction costs have also been found as substantially lower than is perceived in the industry. When projects are properly planned and executed, a standard commercial building can typically achieve the basic level of LEED Certified for a mere 0.8% in overall additional stakeholder investment. Depending on budget constraints, stakeholders can expect to implement LEED Silver for an additional 3.1%, Gold for an additional 4.5%, or aim to achieve the highest level of Platinum for an additional 11.5% investment (Kats, 2003). These levels are all substantially lower than the additional 300% builders typically estimate, as previously discussed.

Understanding typical budgetary requirements in advance greatly assists development managers in deciding which level of certification can be projected for from the very beginning. Yet even if little budget restraints exist, one problem with the system is that many developers still only seek to achieve minimum certification requirements. Developers motivated simply to display a LEED certificate rather than ensure the best possible environmental performance are most likely to choose credit points based on simplicity, regulation compatibility and least cost impact (Cryer et. al, 2006). Some credit points present difficulties themselves as the implementation of certain credits can cancel out others and various other external factors including the nature of geographic and demographic location, local bidding culture, local building codes, environmental values of project stakeholders, project size and timeline integration all also present limitations that can influence the number of LEED credit points achievable by any project (Morris & Matthiessen, 2004). Though pre-existing conditions can limit the extent of applicability of certain credits, so long as budgetary requirements are projected to cover credits that can be realistically achieved, most projects should experience little difficulty in attaining the most basic LEED requirements.

2.2.11 Rationale for Selecting LEED as Research Benchmark

Though the USGBC has not yet released its LEED recommendations for hospitality, other sustainable design guidelines for lodging properties have existed for quite some time. The UK's International Tourism Partnership (ITP) released the world's first sustainable hospitality development guidelines in 1993 and has since continued to release publications on sustainable siting, design and construction through updated versions of their Hotel Environmental Charter. InterContinental Hotels Group (IHG) has also developed the Green Engage program according to LEED-based criteria, though does not yet endorse actual LEED certification. The Green Key eco-rating program is another hospitality-based program focusing on the side of sustainable hotel operations. However, each of these programs are based solely on general recommendations, rather than achieving a prescribed level of sustainability that can be measured and compared against projects designed according to similar standards.

In spite of its currently low implementation rate among hospitality projects, LEED-NC is the most appropriate guideline to work with in this study because the system is flexible, adjustable, verifiable and will likely become the most popular rating system among hotels as time goes on. Credits are awarded based on the measured results of its implementation, but it does not dictate the method of implementation by which each credit's results must be earned. This allows hotels with different environmental priorities, geographic limitations, or guest demographics to all still be measured according to the same scale. LEED is also based on a certified documentation process rather than physical inspection, ensuring consistent and verifiable implementation of each credit among every project (Cidell, 2009). Examining which innovations and credits are currently the most commonly implemented or avoided allows consistent analysis of which sustainability measures are prioritized for in hospitality development.

Though hotels under other versions of LEED, such as EBOM, CI and CS do exist, LEED for New Construction (NC) is the most appropriate benchmark for this research. Not only is the NC version the most commonly implemented LEED system among existing hotel projects, but credit measurements will maintain proper consistency by selecting a single guideline to measure from as not all existing versions of LEED are directly comparable.

2.2.12 Summary

In order to ensure the success of sustainability in hospitality, developers, stakeholders and guests must all recognize that existing standard hospitality design must be modified in order to address the environmental concerns of the consumer and also maintain market share. One of the primary challenges of this is proving to stakeholders and guests that modifications for sustainability are not necessarily achieved at the expense of guest comfort. Hotels that are built green have been found to provide better overall experiences for guests through attention to comfort detail through improving indoor environmental quality and reducing the amount of energy consumed to do so. Almost three-quarters of today's travelers also indicate they value sustainable initiatives in hotel properties and almost half would be willing to pay more to stay in hotels that do.

So many more considerations exist for hospitality design that they have also made it difficult for hotel developers to become thoroughly involved, yet LEED design is truly a viable option. The evidence that energy savings and financial benefits of LEED-NC third-party verification in common commercial construction markets is substantial and significant opportunity exists for hospitality development to realize similar benefits. Though no existing versions of LEED specifically address the unique building circumstances of hospitality, some hotels have been able to successfully implement LEED-NC guidelines with proper planning, time and design considerations. As more data measurements are compiled and experiences are documented, more informed design decisions can be made in order to ensure successful sustainable design in the future of hospitality. This research is intended to extend preliminary insight into the current level of sustainability in hospitality projects through the incorporation of LEED guidelines and provide an initial stepping stone towards more comprehensive future hotel and resort applications.

3. Methodology

3.1 Introduction

As awareness of the environmental and financial benefits of sustainable design expand within the construction industry, the value of published research on methods of sustainable development has become increasingly important. Research publications were sought with the primary intent to gather information on how past studies have measured sustainable design for hospitality, specifically any research pertaining to LEED guideline applications and credit implementation rates in the hotel industry. Yet, already very limited research exists on the implementation of sustainable design guidelines such as LEED and even more limited is the research available for any type of sustainable design guidelines studied in terms of tourism and hospitality development. It is evident that little practical methodology has been developed in terms of sustainable hospitality design, though many professionals argue that this specific area of research is particularly important in terms of overall sustainable development (Ko, 2005). The narrow stream of existing studies made proper research challenging, though some valuable studies were encountered. These have been collected and analyzed in terms of each author's approach to measuring sustainable design. Not every paper specifically measured LEED design and rates of credit implementation, but often had a valid approach to researching sustainable design primarily for tourism and hospitality development; likewise, not every paper specifically measured the tourism and hospitality industry, but measured applications of LEED design and credit implementation in other areas of building development. This section outlines the popular approaches to measurement found in these existing research publications.

3.2 Literature Review

3.2.1 Survey Analysis Method

Survey development, distribution and results analysis was found to be the most significant popular method of research undertaken for types of studies specifically measuring LEED credit implementation as well as sustainable design for hospitality. The most obvious reason for this is likely due to the lack of existing research. Surveys have also been argued to be the best form of data gathering and produce the most indicative results in situations where technical data is not always available (Ko, 2005). In order to obtain the study information, data is gathered directly from the source - in this case, typically industry professionals with prior experience in applications of LEED among their projects.

Depending on the direction of the author's research, different types of surveys were distributed. Lavy & Fernandez-Solis (2009) distributed a multiple-choice online questionnaire to LEED Accredited Professionals (APs) to determine design perceptions that may affect credit point selection and adoption. Multiple-choice was selected as the most appropriate method in order to maintain consistency among answer levels and for straightforward data measurement. The questionnaire also incorporated a small amount of open-ended questions on respondents' opinions of cost and complexity in regards to each credit's implementation. Da Silva (2008) also distributed an online survey specifically directed to LEED APs. The survey consisted solely of open-ended questions for inference on the most influential motives and deterrent barriers faced in credit point selection based on the geographical and climatic differences of LEED projects in Canada versus the United States. LEED APs responded on a total of 42 Canadian projects.

Other industry professionals that were not exclusively LEED APs were also consulted as survey participants in other studies. Corbett & Muthulingam (2007) surveyed architects, developers, environmental consultants and tradesmen at a workshop hosted for sustainable development research at UCLA. The aim of their study was to test survey results through statistical analysis in order to identify the most popular type of decision making in regards to LEED credit point adoption. Durr (2006) distributed an online survey by email solely to construction project managers in order to research the popular selection of LEED Water Efficiency credits and their methods of implementation specific to 35 projects in the Southeastern United States.

In terms of sustainable development for hospitality, the survey approach was not always directed towards construction and design professionals. Ko (2005) conducted a survey distributed among local residents, tourists and environmental professionals in order to determine the intrinsic importance of sustainable development indicators in hospitality projects. Responses were gathered according to a Likert-type scale of 1 to 10 and the results mapped on a "barometer" model to display value distribution over time. Beccali et. al (2009) and Smerecnik & Andersen (2011) directed their study surveys to hotel management staff rather than actual project designers. Beccali et. al surveyed hotels in Sicily aiming to define clusters of hotels with similar geographic and climatic environments and energy demands and subsequently identify which sustainable innovations by each property had the greatest impact on reducing energy consumption. Smerecnik & Andersen partnered with the California Hotel and Lodging Association to contact 49 California hotels via telephone, email and newsletters encouraging hotel management to complete an online survey in an effort to examine the most popular sustainable innovations adopted and the variables affecting the rate of their adoption.

3.2.2 Historical Data Collection

Though surveys proved to be the most popular method of information collection, researchers often chose to assess raw data in conjunction to survey studies or simply on its own. With regard to LEED guidelines and credit adoption, no public information is available from the USGBC for statistical records of credit-by-credit rates of implementation. However, contact information is publicly available on the USGBC website for managers of existing and registered LEED projects. Obtaining this contact information from the website was often employed as the first step to various researchers' approaches to data collection. Da Silva (2008; 2009) and Durr (2006) employed the USGBC contact list with email and telephone requests to project managers in order to gather individual LEED credit scorecards to compare credit adoption between the projects in each of their study samples. Individual scorecard analysis allowed raw data to be compared to determine popular credit identity, certification levels and sustainable innovations employed by 42 LEED projects (Da Silva 2008; 2009) and 35 LEED projects (Durr, 2006) respectively. A reversed scenario of data collection was employed by Lavy & Fernandez-Solis (2009) where blank LEED scorecards were sent to USGBC contacts for their completion and return rather than requesting the official completed copy from project managers. This method also resulted in a similar response rate.

Statistical data obtained directly from the USGBC was also employed, though the primary source of the data was not always plainly indicated. Cryer et. al (2006) reviewed information obtained from the USGBC, but did not specify precisely how it was acquired. The intent of the research was to analyze the adoption of LEED standards and identify patterns and trends in credit point adoption. Credit-by-credit analysis was conducted, yet the data obtained was simply cited as via the USGBC and not through any project contacts or existing research data. Similarly, Morris & Matthiessen (2007) conducted a study for Davis Langdon global construction consultants in order to analyze the relationship of cost influence on rates of LEED credit point adoption. Again, statistical information on credit implementation rates was cited to be acquired by the USGBC, but does not indicate how it was obtained.

3.2.3 Quantitative Analysis

Whether acquired via survey or historical data collection, a statistical analysis of the information collected on credits and their rates of implementation was most often conducted. Some researchers chose to undertake complex quantitative measurements and base their results upon the numbers, while others chose to perform more simple assessments purely to complement qualitative data.

Three sets of researchers focused mainly on the quantitative aspects and hard-number results of their studies in order to express their findings. Kahn & Vaughn (2008) measured data to study the diffusion of LEED buildings across California. Regression analysis was employed to develop cross-sectional measurements on the influence of neighborhood income, ethnicity and political values of an area that may affect the incorporation of LEED buildings in neighborhood development. Corbett & Muthulingam (2007) tested which type of decision-making frameworks was most common among LEED developers, intrinsic-based values for environmental benefit or bandwagon-based values for market gain. Probability distributions were developed to measure credit adoption patterns using Chi-Square models and Kolmogorov-Smirnoff tests done in Matlab. Smerecnik & Andersen (2011) examined the results of their surveys on popularly adopted sustainability initiatives of ski resorts and hotels through indices created in relation to Rogers' Diffusion of Innovations theory, a method of quantitatively expressing characteristics of qualitative information on why subjects are drawn to incorporate certain innovations over others.

Four studies performed more straightforward calculations simply to aid in expressing their qualitative findings. Statistical Package for the Social Sciences (SPSS) software and calculations in Microsoft Excel were popular methods of developing and analyzing percentages, means and standard deviations of LEED credit adoption. Lavy & Fernandez-Solis (2009) employed SPSS software to apply Pearson correlation values to their survey data on the influence of cost and complexity values in relation to individual credit adoption rates. Durr (2006) employed SPSS software to apply T-tests to interpret survey results on popularly employed LEED Water Efficiency category credits. However, the study sample was so small that formal statistical analysis produced limited meaningful results. Basic percentages calculated using Microsoft Excel were then performed as an alternative and were able to generate much better quality portrayal of actual implementation rates. A similar situation occurred in a study by Da Silva (2008), where SPSS software was also utilized to analyze quantitative data on project costs to interpret the relationship of barriers associated with increased costs of individual credit implementation. The resulting statistics were too broad to provide meaningful numbers and basic percentages entitled Credit Frequency Indicators (CFIs) were calculated instead. CFIs were also employed as the basis of another similar study by Da Silva & Ruwanpura (2009) comparing the geographic distribution of individual LEED credit adoption between Canada and the United States. CFIs are calculated as percentage rates, with credits ranked by their average implementation rate on a scale of Low (<20%) Medium-Low (<40%) Medium (<60%) Medium-High (<80%) and High (<100%). LEED credits falling into each scale level were then displayed utilizing tables and figures for ease of interpretation and discussion. Cryer et. al (2006) also utilized basic percentage representation in order to best portray data indices.

3.2.4 Case Study Analysis, Workshop Coordination, Geographic Distribution

Of course, survey analysis and historical data collection were not the only two methods of primary information gathering. Most studies each engaged a slightly different approach to collecting their study data. Ko (2005), Durr (2006) and Beccali et.al (2009) all chose to employ case study analysis as a main focus of their research. Ko (2005) examined 12 case studies of hotel properties on their assessment and process of determining sustainability in order to differentiate between best practices and unsubstantiated claims of environmental advantages among hospitality projects. Durr (2006) assessed one building as a base study model of good Water Efficiency category credit implementation in order to compare Water Efficiency credits employed by other buildings developed by the respondents to her survey. Beccali et. al (2009) chose to perform their survey first and subsequently identify clusters of hotels employing similar energy efficiency measures under similar degrees of environmental pressure. Each cluster was then examined as its own case study and energy audits conducted between each one in order to determine best practices between clusters and develop recommendations for clusters standing to improve on their energy savings.

Workshop coordination was another approach employed to gather primary information. Corbett & Muthulingam (2007) held a workshop in conjunction with the UCLA School of Management for local industry professionals experienced with at least one LEED project. Topics were discussed at the workshop and surveys distributed for hard data at the end of the seminar. Cryer et. al (2006) held a workshop for industry professionals, stakeholders and government officials to gather qualitative information by recording group discussions on the perceived and real benefits of green building. This was also performed in conjunction to historical data collection and statistical analysis.

Researchers also collected data in order to base research on geographical distribution of LEED buildings and potential regional and climatic influences on popular credit implementation. Kahn & Vaughn (2008) created maps shading political catchment areas of California based on the amount of LEED accredited buildings found within each catchment in order to visually express where LEED buildings are most popularly located within the state. Research conducted by Cryer et. al (2006) found that the majority of their survey and workshop results found that the geography of LEED buildings is not equally distributed throughout the United States. The results were mapped and the East and West coastal states were found to account for over 68% of all LEED buildings in the US. The remaining buildings were found primarily within states on the interior borders of the coastal states, with very few of the remaining LEED projects scattered within the central states. Research focused on the impact of region and climate on credit adoption by Da Silva & Ruwanpura (2009) compared the popular LEED credits adopted between projects in Canada versus the United States. Canadian projects were mapped opposite American projects and similar results were found to Cryer et. al (2006) in terms of the American distribution, with Canadian projects also clustering to the South of each province with the majority of projects located along coastal regions.

3.3 Selected Methods

In order to meet the research objective of the specific measurement of LEED credit adoption rates among hotel and resort property, the method of study determined to be most appropriate involved a combination of approaches that create the best-fit analysis. After the preceding literature review and assessment of existing methodologies on similar topics, it was determined that the means of LEED credit data collection by Da Silva (2008) and Durr (2006), the survey distribution approach by Durr (2006) and the straightforward method of statistical analysis conducted by Da Silva (2008; 2009) and Cryer et. al (2006) would comprise the most appropriate methodology for the purpose of this research.

Data collection therefore involved making contact with USGBC-listed project managers for direct access to completed LEED scoresheets. The USGBC was initially contacted to inquire for more direct information on LEED credit rate adoption statistics, yet this information was not available for public distribution. Therefore the individual collection of scoresheets was the resulting method undertaken to source the hard credit data required for analysis in this project. The credit data was then statistically analyzed through percent-average calculations in order to develop the best picture of credit rate adoption. This straightforward method of analysis does have limitations in terms of statistical depth; however, average percentages were found to demonstrate the most appropriate interpretation of the resulting study sample. The survey distribution then involved delivery of a survey via email to the same project managers responsible for scoresheet contribution for insight into the sustainable design objectives and decision rationales for credits implemented in each project. Though each project is unique and limited according to geography, climate and intrinsic environmental values of each designer's rationale, common design justifications were then identified for popularity and compared to hard scoresheet data for validation. The combination of hard data collection, quantitative analysis of the data and qualitative design specification attitudes are therefore justified to offer the most appropriate method of data collection and analysis for the scope and purpose of this research.

This research was thus conducted according to the following steps:

- Selection of participants
- Data collection
- Data analysis
- Discussion of results and conclusions

3.3.1 Selection of Participants

The information gathering for this particular research involved an extensive amount of personal communication with various informed participants, including developers, architects, sustainability consultants, the USGBC and staff at each individual hotel. The USGBC website was initially consulted in order to first compile a list of all presently accredited LEED hotel and resort properties. The USGBC was also contacted by telephone to ensure that the final list obtained from the website was consistent and up-to-date with online USGBC records. After compiling the initial list, it was found that many different types of properties could indeed be considered as "hospitality". As the USGBC does not currently maintain specific LEED guidelines for hospitality projects, properties including motels, youth hostels, country ranching outfits, YMCAs, bed-and-breakfast houses, rental and timeshare condominiums, military accommodation, university campus accommodation, hotel commercial towers and other high-occupancy dormitory-style buildings were all found to be included along with standard hotel property design. Hotels renovated according to LEED guidelines for Existing Buildings were also included in this list. However, for the purpose of this present research only those buildings encompassing the definitive stand-alone commercial hotel design and constructed as according to LEED for New Construction (NC) standard guidelines were considered as study candidates in order to maintain a consistent measurement of each subject from the ground up.

Inclusive of every property type listed under various forms of LEED, the initial subject list was amassed at over 200 properties. After filtering for property type and specific

LEED-NC design, 47 hotel properties encompassing the requisite criteria remained. Of these 47, a further nine were ruled out based upon various circumstances which rendered them unfit for inclusion, such as little or no website or contact information, projects indicated to be certified when not completely built, projects inadvertently listed under two names and so on. Therefore the final count of properties deemed satisfactory for measurement for the purpose of this research came to an end total of 38. The first goal for this portion of research was then to gather as many LEED scoresheets for these properties as possible in order to precisely identify how each hotel gained their LEED credits through category and criteria chosen.

3.3.2 Data Collection - LEED Scoresheet Acquisition

Connecting with USGBC listed project managers in order to acquire access to LEED scoresheets proved to be an arduous and time-consuming process. Contacts were typically either developers or architects, though developers were often much less prepared to release their information records. Architects were much more cooperative in releasing the information, likely as most of them owned the rights to most of the designs and were often contacted after unsuccessful communications with developer contacts. Sustainability consulting firms were also contacted on occasion where communications with architects were unsuccessful. This resulted in a prolonged data collection process, as at least three attempts by both telephone and email were made on behalf of each subject property once an appropriate contact was encountered. By the end of the 12-week information gathering process, 28 scoresheets of the 38 projects were acquired (see Scoresheet Appendix). This resulted in a response rate of 76%, an excellent value compared to rates experienced by previous study researchers (Da Silva, 2008; Durr, 2006; Cryer et. al, 2006).

3.3.3 Data Collection - Survey Distribution

Once each scoresheet was successfully acquired, the same consultants were then requested to answer a short single-question survey in regard to sustainable design for hospitality. A single question was chosen rather than multiple questions in order to maintain simplicity and consistency, as well as increase the odds of receiving a reply by keeping response involvement to a minimum. The survey question was presented to consultants as follows:

> "In terms of sustainable design for hospitality, in your opinion were any specific LEED criteria **specifically adopted** or **avoided** for your project out of discretion for anticipated comfort levels or amenities expected by guests?"

The question was posed in order to further investigate the intent from the designer's point of view which credits were more likely to be adopted or avoided out of discretion to maintain accustomed levels of comfort commonly expected by hotel guests, hypothesized to be a major role-player in LEED credit selection by hospitality developers. 15 of the 28 scoresheet respondents, or 54%, offered a further written response in regards to why certain credits were chosen to be incorporate or excluded.

3.3.4 Data Analysis

Upon acquisition of each LEED scoresheet, credit information was tabulated and incorporated into an expanded version of the original LEED-NC v2.2 scoresheet designed to compare the credit distribution between all projects at once (see Appendix A). This enabled an instant illustration of which credits and categories were most popularly employed and tables and bar graphs were created for further comparison. Averages were then calculated on which credit options were most and least commonly employed. Some scoresheets obtained were not final stamped copies by LEED, but were the final "working" copies owned by the consultant. "Working" scoresheets maintain columns for credits in progress and in some instances points were still indicated to remain in these columns. In these cases, these points were not counted towards the total; only points definitively achieved were selected as measurable data.

Once commentary on the survey question was received back from each consultant, the information was incorporated into a second spreadsheet designed to categorize statements made based on designer rationales. The responses were compiled and analyzed for differences, similarities and unique circumstances that may form common patterns among the sustainable intentions of each project.

3.4 Summary

Existing research on LEED credit adoption rates, sustainability in hospitality and methods for data analysis is still quite rare. The studies examined were often basic in nature, yet still provided valuable information on conducting research in an underdeveloped field. Not every paper focused specifically on LEED credit adoption or even the tourism and hospitality industry, but valid methods of research have been identified nonetheless and useful approaches have been identified for the purpose of this study. Methods chosen for the present research include historical data collection, statistical data analysis and survey distribution. These were accomplished by contacting the USGBC for project consultant information and contacting the developers and architects for LEED scoresheet acquisition and survey question distribution. The results of the scoresheet data were accumulated and credit implementation rates analyzed according to percent averages. Survey responses were compiled and sorted according to common credit implementation rationales. The following chapter confers the results of these research findings.

4. Results

4.1 Introduction

In total, 38 properties were identified as qualified research candidates. Each hotel or resort property ranged in size, type and cost and often attained a diverse number of credits. Credit number, type and certification level were all analyzed and compared to develop a clearer understanding of credit point selection and the level of sustainability currently experienced in hospitality under LEED guidelines. Since LEED was first introduced, evolving versions for New Construction (NC) have also been developed. Some of the projects studied were based upon LEED-NC v2.1 or v.3, but the majority are based upon v2.2. There are a few variations between the three versions yet each one is still based upon the majority of the same credits, therefore for the purpose of this research all projects have been harmonized for measurement according to version 2.2 (see Appendix B).

As discussed in the previous chapter, of the 38 qualified subject properties measurable data was obtained for a final participant total of 28. Figure 4.1 displays the geographic distribution of all 28 LEED accredited hotel and resort properties across the United States that chose to participate in the final study sample.

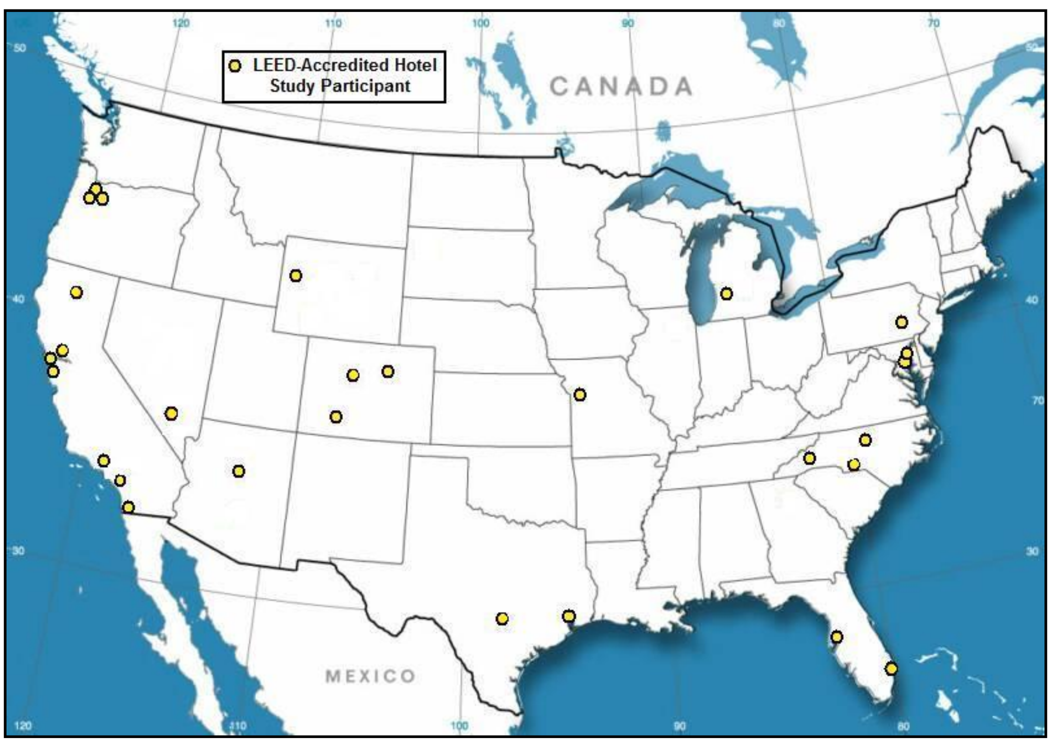

Figure 4.1 Distribution of LEED-Accredited Hospitality Project Participants

4.2 LEED Credit Implementation Rates

Out of the 69 LEED-NC credits available to be gained by each of the 28 subjects, most achieved a level rating of Silver (33-38 points) with a total of 13 accredited projects. Five subjects obtained the basic level rating of Certified (26-32 points), while nine subjects obtained a rating of Gold (39-51 points) and one subject alone obtained Platinum (51-69 points) (see Figure 4.2). The average credit score out of all 28 subjects was 53 points, resulting in an average rating of Gold level credit implementation by all qualified LEED-NC hotel and resort projects across the United States.

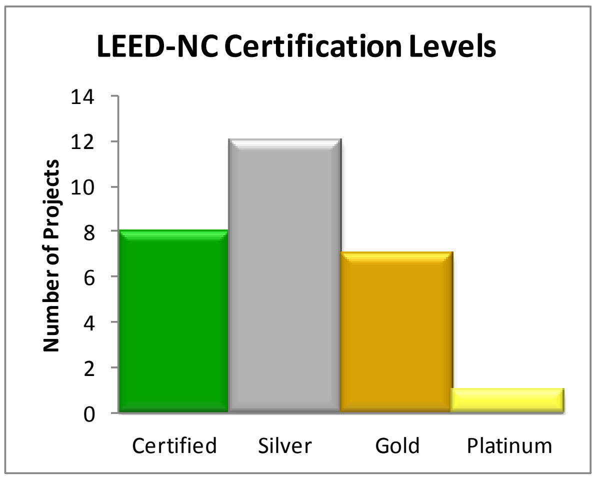

Figure 4.2 LEED Certification Levels Achieved Per Project

According to the credit information gathered from each scoresheet, it was clear that employment of certain credits were considerably more popular than others. Average percentage rates were calculated for the frequency of each credit and initially tested under formal statistics analysis, yet due to the small study sample these findings provided little meaningful results. Conventional analysis of average credit implementation rates was therefore determined as the most appropriate form of measurement for the purpose of this study. Results were tabulated for hard data analysis and then charted for visual comparison.

4.2.1 Sustainable Sites

The Sustainable Sites (SS) category encompasses eight voluntary credit types for a total of 14 possible points. Calculations performed and displayed in Table 4.1 indicate the actual number of times each credit was implemented among all projects and the average rate compared to others in the category. Figure 4.3 illustrates the category results in a visual graph. The most popular credit among hospitality projects in this category was found to be SS4.2 - Bicycle Storage and Changing Rooms, with 25 applications and an implement rate of 89%. SS1.1 - Site Selection came in close second with 24 applications at a rate of 86%. Subsequent popular credits were exclusive to the remainder of the Alternative Transportation credits, SS4.1, 4.3 and 4.4 - Parking Capacity, Low-Emitting and Fuel Efficient Vehicles and Public Transportation Access. The least applied credits in this category were found to be SS3.0 - Brownfield Redevelopment and 8.0 - Light Pollution Reduction, with only 8 applications and an implement rate of 29% each and 5.1 - Site Development to Protect and Restore Habitat, with only 7 applications and an implement rate of 25%.

Table 4.1 Sustainable Sites Credit Implementation Rates

Sustainable Sites		Implement Rate	
Credit	**Title**	**Actual**	**Percent**
1	**Site Selection**	24	86%
2	**Development Density & Community Connectivity**	16	57%
3	**Brownfield Redevelopment**	8	29%
4.1	**Alternative Transportation**, Public Transportation Access	19	68%
4.2	**Alternative Transportation**, Bicycle Storage & Changing Rooms	25	89%
4.3	**Alternative Transportation**, Low-Emitting and Fuel-Efficient Vehicles	23	82%
4.4	**Alternative Transportation**, Parking Capacity	21	75%
5.1	**Site Development,** Protect or Restore Habitat	7	25%
5.2	**Site Development,** Maximize Open Space	15	54%
6.1	**Stormwater Design,** Quantity Control	12	43%
6.2	**Stormwater Design,** Quality Control	15	54%
7.1	**Heat Island Effect,** Non-Roof	14	50%
7.2	**Heat Island Effect,** Roof	18	64%
8	**Light Pollution Reduction**	8	29%

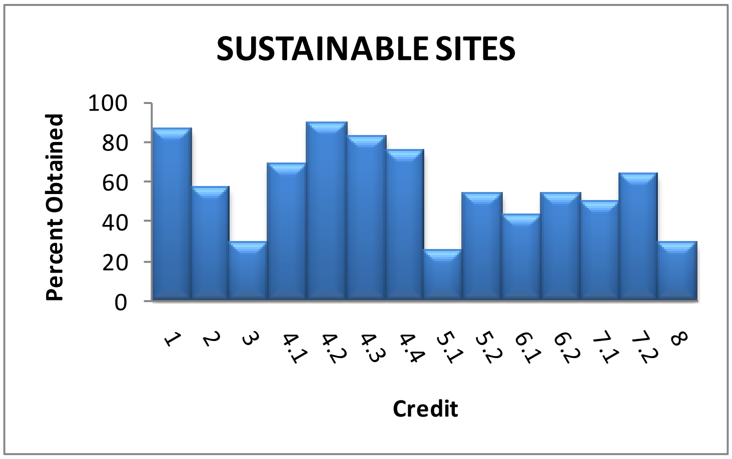

Figure 4.3 Popularity Levels of Sustainable Sites Credits

4.2.2 Water Efficiency

The Water Efficiency (WE) category encompasses three voluntary credit types for a total of 5 possible points. Calculations performed and displayed in Table 4.2 indicate the actual number of times each credit was implemented among all projects and the average rate compared to others in the category. Figure 4.4 illustrates the category results in a visual graph. The most popular credit among hospitality projects in this category was found to be WE1.1 - Water Efficient Landscaping, with 25 applications and an implement rate of 25%. WE3.1 - 20% Water Use Reduction, came in at a close second with 22 applications and an implement rate of 79%. The least popularly applied credit was WE2.0 - Innovative Wastewater Technology, with only 4 applications and an implement rate of only 14%.

Table 4.2 Water Efficiency Credit Implementation Rates

Water Efficiency		Implement Rate	
Credit	**Title**	**Actual**	**Percent**
1.1	**Water Efficient Landscaping**, Reduce by 50%	25	89%
1.2	**Water Efficient Landscaping**, No Potable Use or No Irrigation	11	39%
2	**Innovative Wastewater Technologies**	4	14%
3.1	**Water Use Reduction**, 20% Reduction	22	79%
3.2	**Water Use Reduction**, 30% Reduction	15	54%

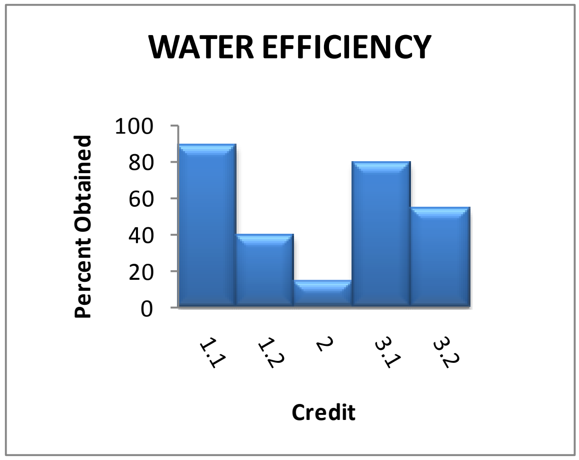

Figure 4.4 Popularity Levels of Water Efficiency Credits

4.2.3 Energy & Atmosphere

The Energy & Atmosphere (EA) category encompasses 6 voluntary credit types for a total of 17 possible points. Credit EA1.1, Optimize Energy Performance (OEP), allows for between 1 and 10 points to be achieved based on the intensity of energy efficiency innovation each project chooses to undertake. Similarly, Credit EA2.1, Onsite Renewable Energy, allows for between 1 and 3 points depending on the level of energy contributed by selected renewable technologies. Calculations performed and displayed in Table 4.3 indicate the actual number of times each credit was implemented among all projects and the average rate compared to others in the category. Figure 4.5 illustrates the category results in a visual graph. The most popular credit in this category was found to be EA 1.1 - the first level of the OEP credit, with a total of 26 applications and an implement rate of 93%. This credit involves reaching a total of 14% further energy efficiency on top of minimum standard requirements. The remaining points for this credit, EA1.2 - 1.10, predictably decline from there. The least popular point in the EA category was found to EA1.10 - the last level of the OEP credit, with only two projects reaching the required 42% energy efficiency threshold requirement for an implement rate of only 7%. In terms of points unrelated to the OEP credit type, the first Onsite Renewable Energy credit, EA2.1, would be identified as the least popular with a total of only 7 basic applications and an implement rate of 25%. Similar to OEP, the remaining two points for Onsite Renewable Energy also decline from there, with EA2.3 receiving only 3 applications and an implement rate of 11%. The remaining four credit types in the EA category all maintained reasonable mid-range implement rates.

Table 4.3 Energy & Atmosphere Credit Implementation Rates

Energy & Atmosphere		Implement Rate	
Credit	Title	Actual	Percent
1.1	**Optimize Energy Performance**, 10.5%	26	93%
1.2	Optimize Energy Performance, 14.0%	22	79%
1.3	Optimize Energy Performance, 17.5%	20	71%
1.4	Optimize Energy Performance, 21.0%	18	64%
1.5	Optimize Energy Performance, 24.5%	12	43%
1.6	Optimize Energy Performance, 28.0%	8	29%
1.7	Optimize Energy Performance, 31.5%	4	14%
1.8	Optimize Energy Performance, 35.0%	4	14%
1.9	Optimize Energy Performance, 38.5%	3	11%
1.10	Optimize Energy Performance, 42.0%	2	7%
2.1	**On-Site Renewable Energy,** 2.5%	7	25%
2.2	On-Site Renewable Energy, 7.5%	5	18%
2.3	On-Site Renewable Energy, 12.5%	3	11%
3	**Enhanced Commissioning**	14	50%
4	**Enhanced Refrigerant Management**	17	61%
5	**Measurement & Verification**	10	36%
6	**Green Power**	17	61%

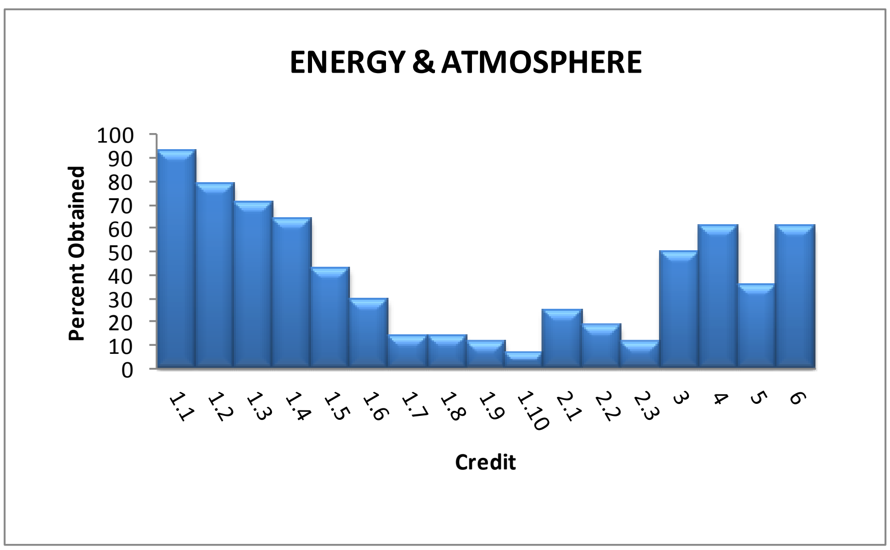

Figure 4.5 Popularity Levels of Energy & Atmosphere Credits

4.2.4 Materials & Resources

The Materials & Resources (MR) category encompasses 7 voluntary credit types for a total of 13 possible points. Calculations performed and displayed in Table 4.4 indicate the actual number of times each credit was implemented among all projects and the average rate compared to others in the category. Figure 4.4 illustrates the category results in a visual graph. The most popularly employed credit in this category was found to be MR2.1 - Diversion of 50% Construction Waste from Disposal, with 26 applications and an implement rate of 93%. This was followed by EA4.1 - 10% Recycled Content and 5.1 - 10% Regional Materials, with 22 applications each and an implement rate of 79%.

The least popularly employed of all LEED credits in terms of hospitality are found in the Materials & Resources category more than any other. 7 credits were implemented 8 times or less, with 6 of those credits employed only 3 times or less. Credit MR3.1 - 5% Materials Reuse was the only credit found out of all LEED categories to actually be implemented zero times. Credits MR3.2 - 10% Materials Reuse, 1.2 - 100% Building Reuse and 6.0 - Rapidly Renewable Materials were employed only one time each, for an implement rate of only 4%. Credits 1.3, 50% Building Reuse and 1.1, 75% Building Reuse were also scarcely employed, with only 2 and 3 applications each.

Table 4.4 Materials & Resources Credit Implementation Rates

Materials & Resources		Implement Rate	
Credit	**Title**	**Actual**	**Percent**
1.1	**Building Reuse**, Maintain 75% of Existing Walls, Floors & Roof	3	11%
1.2	**Building Reuse**, Maintain 100% of Existing Walls, Floors & Roof	1	4%
1.3	**Building Reuse**, Maintain 50% of Interior Non-Structural Elements	2	7%
2.1	**Construction Waste Management**, Divert 50% from Disposal	26	93%
2.2	**Construction Waste Management**, Divert 75% from Disposal	15	54%
3.1	**Materials Reuse**, 5%	0	0%
3.2	**Materials Reuse**,10%	1	4%
4.1	**Recycled Content**, 10% (post-consumer + ½ pre-consumer)	22	79%
4.2	**Recycled Content**, 20% (post-consumer + ½ pre-consumer)	13	46%
5.1	**Regional Materials**, 10% Extracted, Processed & Manufactured Regionally	22	79%
5.2	**Regional Materials**, 20% Extracted, Processed & Manufactured Regionally	15	54%
6	**Rapidly Renewable Materials**	1	4%
7	**Certified Wood**	8	29%

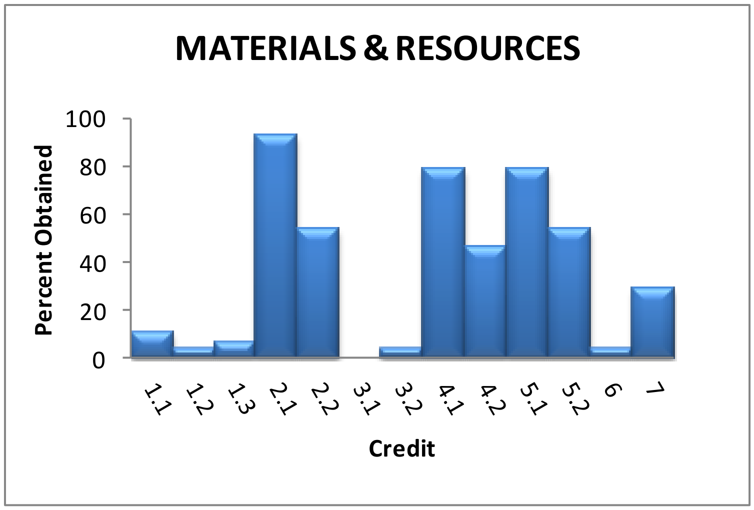

Figure 4.6 Popularity Levels of Materials & Resources Credits

4.2.5 Indoor Environmental Quality

The Indoor Environmental Quality (IEQ) category encompasses 8 voluntary credit types for a total of 15 possible points. Calculations performed and displayed in Table 4.5 indicate the actual number of times each credit was implemented among all projects and the average rate compared to others in the category. Figure 4.7 illustrates the category results in a visual graph. The IEQ category holds greatest amount of popular credit types. The most popular credit in the category is IEQ4.2 - Low-E Paints and Coatings with 27 applications and an implement rate of 96%, the highest rated and most commonly employed credit among all hospitality projects. Following is IEQ6.1 - Controllability of Lighting Systems and 7.1 - Thermal Comfort Design with 25 applications each and a total implement rate of 89%. Four other credits also experienced over 20 applications. The least popular credit in the IEQ category was IEQ4.4 - Low-Emitting Wood and Agrifibre Products, with only 4 applications and an implement rate of 14%. This was followed by IEQ3.2 - Pre-Occupancy Construction IAQ Plan, with only 5 applications and an implement rate of 18%. Two other credits also experienced less than 10 applications.

Table 4.5 Indoor Environmental Quality Credit Implementation Rates

Materials & Resources		Implement Rate	
Credit	**Title**	**Actual**	**Percent**
1.1	**Building Reuse**, Maintain 75% of Existing Walls, Floors & Roof	3	11%
1.2	**Building Reuse**, Maintain 100% of Existing Walls, Floors & Roof	1	4%
1.3	**Building Reuse**, Maintain 50% of Interior Non-Structural Elements	2	7%
2.1	**Construction Waste Management**, Divert 50% from Disposal	26	93%
2.2	**Construction Waste Management**, Divert 75% from Disposal	15	54%
3.1	**Materials Reuse**, 5%	0	0%
3.2	**Materials Reuse**,10%	1	4%
4.1	**Recycled Content**, 10% (post-consumer + ½ pre-consumer)	22	79%
4.2	**Recycled Content**, 20% (post-consumer + ½ pre-consumer)	13	46%
5.1	**Regional Materials**, 10% Extracted, Processed & Manufactured Regionally	22	79%
5.2	**Regional Materials**, 20% Extracted, Processed & Manufactured Regionally	15	54%
6	**Rapidly Renewable Materials**	1	4%
7	**Certified Wood**	8	29%

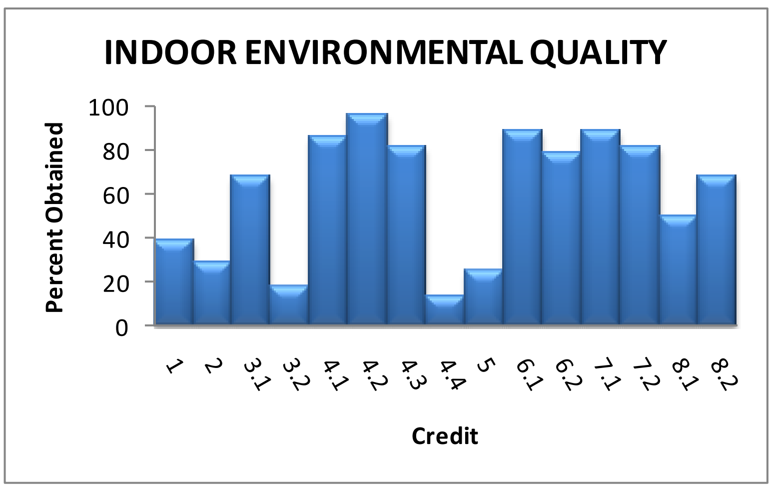

Figure 4.7 Popularity Levels of Indoor Environmental Quality Credits

4.2.6 Innovation in Design

The Innovation & Design category encompasses two voluntary credits for a total of five possible points. Calculations performed and displayed in Table 4.6 indicate the actual number of times each credit was implemented among all projects and the average rate compared to others in the category. Figure 4.8 illustrates the category results in a visual graph. Credits for ID1.1-1.5 involve five opportunities for project designers to employ credits devised at their discretion. Therefore the method of credit implementation differs between most projects, yet the ability to independently choose credit types has made the category highly popular. Credit ID1.1, one of four opportunities for chosen extra credits, was very popular with 26 applications and an implement rate of 93%. Credit ID2.1, the employment of a LEED Accredited Professional to oversee the project, is also very popular with 25 applications for an implement rate of 89%. A second independently chosen credit under ID1.2 was also popular with 22 applications and an implement rate of 79%. No credits were applied less than 10 times in this category.

Table 4.6 Innovation in Design Credit Implementation Rates

Indoor Environmental Quality		Implement Rate	
Credit	Title	Actual	Percent
1	**Outdoor Air Delivery Monitoring**	11	39%
2	**Increased Ventilation**	8	29%
3.1	**Construction IAQ Management Plan**, During Construction	19	68%
3.2	**Construction IAQ Management Plan**, Before Occupancy	5	18%
4.1	**Low-Emitting Materials**, Adhesives & Sealants	24	86%
4.2	**Low-Emitting Materials**, Paints & Coatings	27	96%
4.3	**Low-Emitting Materials**, Carpet Systems	23	82%
4.4	**Low-Emitting Materials**, Composite Wood & Agrifiber Products	4	14%
5	**Indoor Chemical & Pollutant Source Control**	7	25%
6.1	**Controllability of Systems**, Lighting	25	89%
6.2	**Controllability of Systems**, Thermal Comfort	22	79%
7.1	**Thermal Comfort**, Design	25	89%
7.2	**Thermal Comfort**, Verification	23	82%
8.1	**Daylight & Views**, Daylight 75% of Spaces	14	50%
8.2	**Daylight & Views**, Views for 90% of Spaces	19	68%

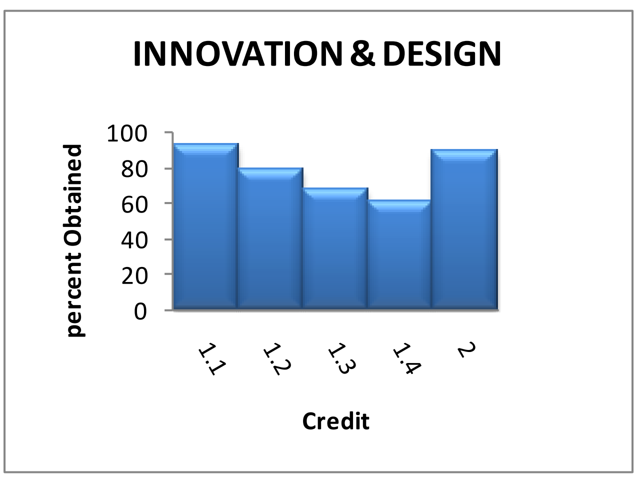

Figure 4.8 Popularity Levels of Innovation & Design Credits

4.2.7 Overall Credit Popularity

Comparison of credit implementation rates is best depicted through percent-average calculations and comparisons. Due to the reasonably narrow study sample, many credits were often found to be implemented at the same rate as others. Nine credits were identified as having the most popular implement rates of between 25 and 27 applications out of all 28 projects. No single credit was employed in 100 percent of projects. Nine further credits were then identified as having the least popular implement rates. These rates were experienced by credits with between zero and 3 applications out of all 28 projects.

Table 4.7 Most Popular LEED Credits Implemented Overall

Most Popular Credits Overall			Implement Rate	
Rank	Credit Number	Credit Name	Actual	Percent
1	IEQ 4.2	**Low-Emitting Materials**, Paints & Coatings	27	96%
2	EA 1.1	**Optimize Energy Performance**	26	93%
3	MR 2.1	**Construction Waste Management**, Divert 50% from Disposal	26	93%
4	ID 1.1	**Innovation in Design**: Specific Title	26	93%
5	IEQ 6.1	**Controllability of Systems**, Lighting	25	89%
6	IEQ 7.1	**Thermal Comfort**, Design	25	89%
7	ID 2.0	**LEED® Accredited Professional**	25	89%
8	SS 4.2	**Alternative Transportation**, Bicycle Storage & Changing Rooms	25	89%
9	WE 1.1	**Water Efficient Landscaping**, Reduce by 50%	25	89%

Table 4.7 shows the accumulated data on the most common credits implemented among all projects. The credit category under which most of the popular credits were gained is noted as the Indoor Environmental Quality category. Out of all six LEED categories, each category maintains at least one popular credit each. Though the most popular nine credits range only between 25 and 27 applications, many other credits also experienced high levels of implementation; a total of 11 more credits experienced rates between 20 and 24 applications.

Table 4.8 Least Popular LEED Credits Implemented Overall

Least Popular Credits Overall			Implement Rate	
Rank	Credit Number	Credit Name	Actual	Percent
1	MR 3.1	**Materials Reuse**, 5%	0	0%
2	MR 1.2	**Building Reuse**, Maintain 100% of Existing Walls, Floors & Roof	1	4%
3	MR 3.2	**Materials Reuse**,10%	1	4%
4	MR 6.0	**Rapidly Renewable Materials**	1	4%
5	MR 1.3	**Building Reuse**, Maintain 50% of Interior Non-Structural Elements	2	7%
6	EA1.10	**Optimize Energy Performance**, 42.0%	2	7%
7	MR 1.1	**Building Reuse**, Maintain 75% of Existing Walls, Floors & Roof	3	11%
8	EA1.9	**Optimize Energy Performance, 38.5%**	3	11%
9	EA2.3	**Onsite Renewable Energy, 12.5%**	3	11%

Accordingly, certain credit criteria were also found to be much less popular than others, as shown in Table 4.8. The least popular credits were determined as those applied by a maximum of 3 out of the 28 projects. The credit category under which most of the least-popular credits were gained is plainly apparent - the Materials & Resources category maintains the lowest six credit types selected by any project. Energy & Atmosphere maintains the remaining three lowest. Though the nine least popular credits listed range between zero and 3, a total of 17 further credits experienced rates of 10 or fewer applications.

4.3 Credit Popularity among Categories

Credit implementation rates based on percent averages relay straightforward interpretations of the accumulated credit rate data. Figure 4.9 depicts the combined credit point levels achieved by all projects within each category. The bar graph creates a visual understanding of precisely how often credits are implemented within each category on an average basis.

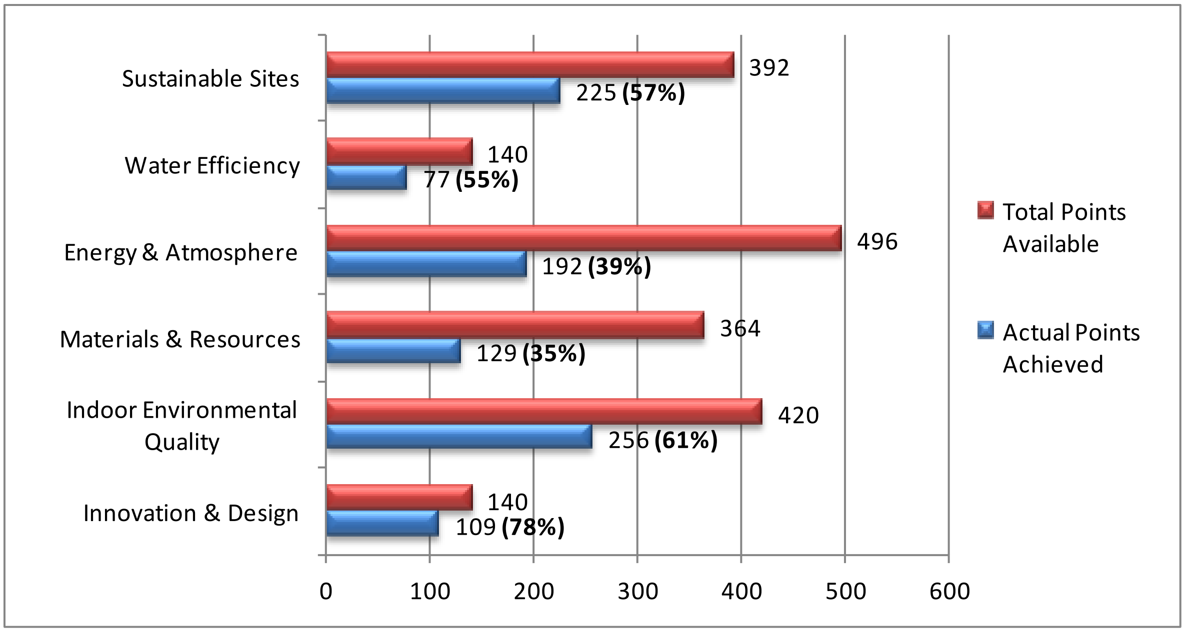

Figure 4.9 Average Points Gained by All Projects out of Total Points Possible

Overall percentage calculations indicate that the Innovation in Design category experiences the highest level of overall credit point popularity with a total average credit implementation rate of 78%. This is followed by Indoor Environmental Quality at 61%. Sustainable Sites and Water Efficiency categories received mid-range credit implementation scores of 57% and 55%, while Energy & Atmosphere and Materials & Resources categories trailed the calculations at rates of 39% and 35%, barely half the rate of credit popularity experienced by Innovation in Design. This approach develops an interesting illustration of the overall number of credits that are - or, more appropriately, are not - pursued. Percentage calculations in Figure 4.9 are easily able to show the disparity in the amount of credits available to LEED pursuant hospitality projects, proving that many more credits points were able to be sought.

4.4 Survey Results

Upon acquisition of each qualifying LEED scoresheet from participating project consultants, a short single-question survey was sent back to each contact with the intention of gathering information from the designers' point of view in terms of sustainable design for hospitality. The question was posed with the intent of acquiring information from project designers' perspectives on which credits were least implemented based upon anticipated comfort expectations maintained by hotel guests. Of the 28 projects that offered scoresheet data responses, a total of 15 responded with answers and opinions on which credits were avoided in the LEED design decision process. Table 4.12 lists all items specifically excluded, the corresponding credit and the reason given by each project designer for their exclusion.

Table 4.9 Design-Avoided Credit Types among Hospitality Projects

Number	Item Avoided	Corresponding Credit	Reason
1	Low Flow Showerheads	WE3.1 - Water Use Reduction	Guest Comfort
2	Low Flow Showerheads	WE3.1 - Water Use Reduction	Guest Comfort
3	Low Flow Showerheads	WE3.1 - Water Use Reduction	Guest Comfort
4	Low Flow Showerheads	WE3.1 - Water Use Reduction	Guest Comfort
5	Low Flow Showerheads	WE3.1 - Water Use Reduction	Guest Comfort
6	Natural Ventilation	IEQ2.0 - Increased Ventilation	Climate/Local Pollen Issues
7	Natural Ventilation	IEQ2.0 - Increased Ventilation	Climate
8	Natural Ventilation	IEQ2.0 - Increased Ventilation	Complicated Floorplan
9	Onsite Renewable Energy	EA2.0 - Onsite Renewable Energy	City Codes Restricted
10	Onsite Renewable Energy	EA2.0 - Onsite Renewable Energy	Too Expensive
11	Onsite Renewable Energy	EA2.0 - Onsite Renewable Energy	Too Expensive
12	Recycled Greywater	WE2.0 - Innovative Wastewater Technologies	Aesthetics Concern
13	Recycled Greywater	WE2.0 - Innovative Wastewater Technologies	Aesthetics Concern
14	Onsite Wastewater Treatment	WE2.0 - Innovative Wastewater Technologies	Too Expensive/Aesthetics Concern
15	IAQ Pollutant Control	IEQ5.0 - Indoor Chemical and Pollutant Source Control	System Setup Compromises Other Credits
16	Light Colored Asphalt	SS7.1 - Heat Island Effect, Non-roof	Squinting and Visual Discomfort
17	Low Flow Toilets	WE3.1 - Water Use Reduction	Potential Plumbing Issues/Aesthetics Concern
18	Certified Wood	MR7.0 - Certified Wood	Too Expensive

According to the information presented, a total of eighteen items were mentioned as avoided innovations. Out of these 18, seven different credit types were found to correspond. The results indicate that the most commonly avoided item was the option of low-flow showerheads, associated with the credit of WE3.1 - Water Use Reduction. Designers from five different projects specifically excluded them from implementation. The basis given for this from all five projects was identical; showers with quality pressure provide a significant level of comfort to guests in an area of hospitality where comfort is most expected and valued.

The next two items of Natural Ventilation and Onsite Renewable Energy were specifically excluded in a total of three instances each. Natural ventilation was avoided in terms of guest comfort for projects based in regions of less accommodating climates, where guests may become uncomfortably warm or cold without proper air conditioning systems in place. Yet, in one instance it was avoided based upon a project floorplan too restrictive to proper air flow. Onsite renewable energy was mainly avoided due to the high expenditure outlay associated with its implementation compared to lengthy payback periods, yet municipal development restrictions was another cause. Neither of these reasons was in regard to concerns of guest comfort. Innovative Wastewater Technologies including options for recycled greywater and onsite wastewater treatment were both based upon guest comfort concerns for project aesthetics, as association with these systems is often seen as uncleanly. The possibility of low-flow toilets was also associated with this concern. Light-colored asphalt for the prevention of heat-island effect was avoided in one instance to mitigate light pollution and the potential for reflected light to cause guests to squint. In another instance, IAQ pollutant control was avoided as its implementation would have compromised the application of other credits elsewhere.

Out of all credits avoided, six different items among four credit types were found to be directly avoided from a designer's perspective with regard to guest-related anticipated expectations of comfort. Low-flow showerheads and toilets, recycled greywater and onsite wastewater treatment, natural ventilation and light-colored asphalt were the six items indicated to potentially cause comfort issues that hotel project owners did not wish to contend with. The corresponding credit types were found substantially within the Water Efficiency category, followed by Indoor Environmental Quality and Sustainable Sites.

4.5 Summary

In total, 28 LEED scoresheets from the 38 qualified hospitality project candidates were received for data analysis. According to percent-average calculations, the most popular credits implemented were IEQ4.2, EA1.1, MR2.1, ID1.1, IEQ6.1, IEQ7.1, ID2.0, SS4.2 and WE1.1. At least one credit from each category was found among the top nine credit types. The least popular credits implemented were MR3.1, MR1.2, MR3.2, MR6.0, MR1.3, EA1.10, MR1.1, EA1.9 and EA2.3. Only two categories were found to maintain the bottom nine credit types, Materials and Resources and Energy and Atmosphere. The most popular category overall was found to be the Innovation in Design category, with a 78% total average credit implement rate. The least popular category overall was found to be the Materials & Resources category, with a 35% total average credit implement rate.

Out of the total 28 project consultants that provided LEED scoresheets for analysis, 15 chose to participate in responding to the survey question regarding designer rationale in credit selection for hospitality. Results from the consultant surveys indicate that the Water Efficiency category is the least popular credit category pursued in hospitality design, with low-flow items found to encompass the most aversion. Implications of each set of results are discussed and analyzed in the next chapter.

5. Data Analysis

5.1 Introduction

Of the 28 projects analyzed in this research, some interesting observations can be inferred in regard to sustainable design in hospitality development. Results drawn from LEED scoresheets indicate the overall popularity of LEED credits and their respective categories and present finite evidence of precisely which credits are most commonly implemented. Survey data from the 15 responding consultants was also categorized and evaluated for design rationales that may have affected the implementation rate of certain credits specifically among hospitality projects. Comparisons of these results to similar findings among common commercial building projects arguably show that the application of LEED credits truly are weighed differently for hospitality projects, indicating that concerns for guest comfort do play a role in the selection of credits in design for hospitality.

5.2 Credit Costs and Feasibility

According to Morris & Matthiessen, common commercial projects seeking LEED accreditation mainly pursue credits associated with lower costs (2007). This was also proven statistically in regression analysis performed by Da Silva (2008). Perceived credit complexity, however, may play an even larger role (Lavy & Fernandez-Solis, 2009; Smerecnik & Andersen, 2011). Though it is hypothesized in this research that sustainable design for hospitality is primarily influenced by concerns for guest comfort, an understanding of credit costs and complexity is also vital to the comprehension of why certain credits may or may not be implemented. Those credits found most and least popular are subsequently analyzed for external factors that may preclude their selection for incorporation.

5.2.1 Credits Most Popular

The nine credits found most popular amongst hospitality projects in this study were all found to have two things in common. Each of these credits were either the least expensive, easiest options to implement, or were items already mandated to be included in development by local governing ordinances. This was also verified in results for all other commercial projects in existing studies (Cryer et. al, 2006; Durr, 2006; Da Silva, 2008; Smerecnik & Andersen, 2011).

In terms of these popular nine credits, IEQ4.2 and IEQ7.1 have the least cost impact, costing almost nothing extra to implement. Low-e paints and coatings cost no more than regular paint supplies and printings for occupant surveys are minimal. Neither require any sort of major research or expert commissioning for design. IEQ6.1 and MR2.1 are also both very easy to achieve. Implementing individual controls for lighting and organization of separate waste and recycle bins for various construction materials are not difficult to implement. Installing extra lighting controls adds only a slight cost and organization of waste is often locally mandated and therefore already incorporated into the budget. ID1.1 is often achieved by exceeding thresholds of credits in other categories since it usually adds little extra to costs already being spent. However, it can also be implemented at very little cost in hospitality terms in the way of green housekeeping programs, sustainable furniture, fixtures and equipment (FF&E), environmental education programs for guests and so on.

ID2.0 does come at the expense of hiring a LEED accredited professional, yet often a member of the design team is previously certified, or the cost of outsourcing one may be recovered through eliminating costly setbacks through proper integration and streamlining of an efficient project schedule. SS4.2 and the implementation of bicycle racks and changerooms costs little to incorporate into the design and often saves money for the project by reducing the required amount of locally mandated parking spaces. The two credits with the most expense involved out of those most popular are thus EA1.1 and WE1.1. However, costs involved to meet them are still negligible if addressed in the initial design. Optimizing energy efficiency enough to gain a point requires only to incorporate envelope, glazing, or insulation upgrades or equipment upgrades to decrease a building’s energy load. Energy efficient measures are also able to save money over time, adding further attraction to building owners. Water efficient landscaping does not involve major costs, but does involve extra design considerations. Even so, many local ordinances already place severe restrictions on the amount of potable water used for landscape irrigation.

5.2.2 Credits Least Popular

Less popular credits appear to be less about cost, however and more about local applicability. The nine credits found to be least popular among hospitality projects in this study were all found to have this issue in common. Credits MR1.1, 1.2 and 1.3 all involve different levels of existing building reuse. This credit assumes that the project site actually involves an existing building. For projects considered under LEED for New Construction, this credit is often difficult to achieve as sites for new buildings are often previously undeveloped. Even if an existing building does occupy the site, the chances of its existing floors, walls, roof and interior non-structrual materials being consistent with new project design can be very slim, especially for the multiple-room layout of typical hospitality projects. Even if an existing building was able to be dismantled and portions redistributed within the new project, the condition of the existing materials may not be of acceptable quality for reuse. Choosing to implement these credits can also come at the expense of credits found in the Sustainable Sites category that are more readily achievable than these.

Credits MR3.1 and 3.2 involve the reuse of salvaged, refurbished, or reused materials into the building project. While the cost associated with reused materials is generally low, their availability is directly limited by the amount available locally at the time of construction. Most often the opportunity to reach the 5% threshold is not readily available and the cost to import materials from elsewhere can often exceed the cost of employing materials that are brand new. MR6.0 and the use of rapidly renewable materials, such as bamboo or corkboard, are not generally associated with cost issues, yet the amount necessary to incorporate to meet the credit requirements can turn costly and sourcing suitable materials can be difficult in some areas. Credits EA1.9, 1.10 and 2.3 appear to rank low simply due to not fulfilling a credit's complete range of threshold possibilities. EA1.9 and 1.10 involve the highest levels of energy efficiency optimization of 38.5% and 42.0%. It is not unusual that most projects would not pursue all ten levels of this credit, depending on the nature of each project's budget, schedule, or increasing complexity. Credits EA1.5-1.10 were ranked among the highest in terms of complexity by Da Silva (2008). EA2.3 is similar in this sense as it is the highest level of energy reduction in onsite renewable energy applications; credits EA2.0-2.3 were also found to rank among not only the most complex, but also the most expensive in the same study (Da Silva, 2008). According to Morris & Matthiessen, EA credits in general are not strongly pursued in buildings with higher energy efficiency needs as first costs are increased significantly (2007). This is then especially true for hospitality projects due to the substantial amount of energy required.

It is clear that if a credit can be gained with minimal impact to the budget or schedule, its likelihood of employment significantly increases. This is where the points system can be judged as controversial, as the same point weight is allotted for these credit types as is for more expensive and complex credit types that offer more energy efficient and environmentally sustainable results. The least popular credits implemented, however, actually appear to be less about cost but relate more to the local applicability and availability of resources, or are simply the tail end of credit thresholds that would not often be pursued due to the extra extent of cost and complexity. However, no circumstances involving either the most or least applied credits can be contended as unique to hospitality projects. The costs and benefits of either set can be argued as universally applicable to projects of all building types depending on the area and resources available. However, certain situations do exist where credit implementation can be found to more distinctively pertain to hospitality development.

5.3 Interpretation of Results

5.3.1 Credit Implementation in Hospitality versus Common Commercial Buildings

Of all most popular LEED credits identified among common commercial building projects in the United States, the top nine found for comparison can also described as “low-hanging fruit” - in other words, arguably the easiest or least expensive credits to implement (Cryer et. al, 2006). These credits were also found to incur very little cost, are required by code, or are already typical elements commonly included in building design. Three of the most popular credits as identified in studies by Da Silva (2008) and Cryer et. al (2006) among common commercial LEED building projects were also found among the top nine most popular credits specifically pertaining to hospitality projects in this study (see Appendix C). These three credits include SS4.2, WE1.1 and EA1.0. Credits ID1.1 and ID1.2 were also shared among the most popular found in the results by Da

Silva (2008) and credits IEQ 4.2 and MR2.1 shared among the most popular found by Cryer et. al (2006). This leaves only two credits ranked as most popular left unique to LEED applications in hospitality. These credits include:

- **IEQ6.1 - Controllability of Systems:** Lighting
- **IEQ 7.1 - Thermal Comfort:** Design

In contrast, the least popular LEED credits identified commonly involve a lack of project applicability and availability of resources, not just for hospitality but for all other projects as well. Five of the least popular credits as identified by both Da Silva (2008) and Cryer et. al (2006) among regular LEED building projects were also then found within the bottom nine least popular credits determined for the hospitality projects in this study. These five credits include MR1.1, MR1.2, MR1.3, MR3.2 and EA2.3. Credits MR3.1 and MR6.0 were also further shared among the least popular found in the results by Cryer et. al (2006), but not in results by Da Silva (2008). This also leaves only two credits ranked as least popular left unique to LEED applications in hospitality. These credits include:

- **EA1.9 - Optimize Energy Performance,** 38.5%
- **EA1.10 - Optimize Energy Performance,** 42.0%

This results in an extremely limited margin of only four credits found to be unique to hospitality between those found most and least popular. However, valid inference about which sustainable innovations are most suited to hospitality may lie in these four credits due to the fact they are *not* shared with those that ranked for common commercial buildings.

It is in these differences that data could potentially indicate why certain credits in hospitality projects are more or less popular than those found in common commercial LEED projects. Though the answers to why certain credits have different popularity rates between these types of projects do not likely lie exclusively among these four particular credits, they do provide an informed view of which factors may influence the results.

5.3.2 Credit Implementation Unique to Hospitality

The four credits found to be unique to hospitality development originate from only two categories, Indoor Environmental Quality and Energy & Atmosphere. As indicated by Credit Frequency Analysis earlier, the IEQ category is high-ranking in popular credit frequency for both regular and hospitality development. The points in the category are easily obtained, consist of little extra cost and are often already mandated by local design and development regulations (Cryer et. al, 2006; Da Silva, 2008; Morris & Matthiessen, 2007).

The top two credits unique to hospitality design, IEQ 6.1 and IEQ7.1, are credits of good choice for hospitality. Requirements for IEQ6.1 and the controllability of lighting systems are already commonplace among hotel design, as lightswitches are provided for guests for use at their leisure and can be controlled at all times. In some applications, a new key-card technology allows a guest to plug the room key into a control box next to the door in order for room lighting to receive power. When the the guest exits and the key-card is removed, the current is cut and all room lighting is automatically shut off. In other building projects, control of lighting in individual offices or other spaces by individual building occupants is not always incorporated. It may be that whole building floors, sections of those floors or even the entire building is controlled at the same time, meaning all lights may need to be on despite requiring light in only one small space.

Requirements for IEQ7.1 and thermal comfort verification are also much more feasible in terms of hospitality as the credit requires surveys to be distributed to occupants regarding the level of thermal comfort during their stay. This is relatively simple for hotels to include in customer satisfaction surveys often already found in customer care packages in guestrooms and at concierge desks. In contrast, the requirement of survey distribution is much less attractive to other building projects and the credit is much less popular (Morris & Matthiessen, 2007). This could potentially be due to the fact that one company oversees the operation of a hotel building, whereas multiple companies may occupy a large commercial building, making survey distribution and collection a more difficult and time-consuming task.

The two low-ranking credits that are also unique to hospitality are the two last points found in the EA category's credit for Optimize Energy Performance (OEP). Though OEP1.1 was found to rank among the second-most popular credits by implementation percentages, it is evident in the results that as energy efficiency requirements intensify as the credit goes on, application percentages decrease significantly. Credits 1.9 and 1.10 represent the highest threshold levels indicated for energy efficiency achievement, at levels of 38.5% and 42.0% savings above basic ASHRAE building performance ratings. The OEP credit involves amplifying energy efficiency through the enhancement of building envelope and mechanical system design. Though the OEP credit is popular in its basic form and relatively easy to implement, cost and complexity increase with higher levels of efficiency design. This would be especially true for hospitality design as the amount of energy consumed by these types of buildings is much greater than that of a typical commercial building. Much of the spending in hospitality development is also prioritized for items that observably enhance a guest's experience. In projects that seek only to be certified for publicity purposes rather than pursue higher levels of intrinsically-motivated environmental design, interest would likely dwindle in terms of pursuing an increasingly expensive credit that does not provide a "noticeable" improvement in guests' experience of the building (Corbett & Muthulingam, 2007). In regular building projects, it may be better justified for more advanced levels of this credit to be incorporated as spending would likely be prioritized to enhance occupant productivity, with less emphasis placed on "tangible" credits that guests can personally encounter that would be prioritized for in hospitality.

5.4 Credits Avoided in Design for Hospitaliy

5.4.1 Design-Avoided Credits versus Credits Least Implemented

Not surprisingly, only one credit was found to be least popular in this study by its actual implementation rate was found to match with the credits identified to be avoided by designers indicated by the survey data (see Table 5.2). Only credit WE2.0 and its related extension WE2.3 were found to coexist among both groups of the lowest points applied. While hard data results do play an important role in determining actual rates of implementation, the effects of external circumstances are arguably the true explanation behind the actual extent of credit achievement in hospitality design. Intrinsic-based design decisions express true rational opinions made by designers and therefore allow a step away from the effects of local mandates and other uncontrolled effects on credit implementation rates. The fact that so few of the credits found as least popularly implemented match with the credits found as least popularly selected is a sign that the research offers insightful information. No credits found to be least popular by Da Silva (2008) among regular building projects were found to match with credits least selected by design; only one credit, MR7.0 and the incorporation of 50% certified wood, was found to match with those identified by Cryer et. al (2006).

Table 5.1 Credits Most Avoided compared to Credits Least Implemented

Credits Most Avoided	Credits Least Implemented
WE3.1	MR3.1
IEQ2.0	MR1.2
EA2.1	MR3.2
WE2.0	MR6.0
IEQ5.0	MR1.3
SS7.1	EA1.10
MR7.0	MR1.1
	EA1.9
	EA2.3

While credits with the lowest implementation rates are shown to originate simply from MR and EA categories, credits with the lowest priority of selection from the hospitality design perspectives span every category with the exception of Innovation and Design. This is a good indication that no specific categories were found as particularly indisposed to hospitality design. Seven specific credit types, however, were found to be avoided on more than one occasion by more than one consultant.

Credit WE3.1 was found to be the credit designers most often avoid specifically for development of hospitality projects. This credit point is based upon a 20% water use reduction below standard limits. This is most often achieved through the specification of low-flow and motion-sensing faucet fixtures and other bath options such as dual-flush toilets and waterless urinals. This credit is very simple to implement as these types of fixtures add little or no extra costs to bath finishings and is therefore accordingly highly popular among regular commercial building projects (Da Silva, 2008). However, it is not surprising that such a credit would be highly avoided in design for hospitality. Guest comfort was the single most dominant reason stated by responding survey consultants in this case. The enormous level of water consumption experienced by hotels due to hundreds of sinks, toilets and bath facilities, as well as restaurant and housekeeping needs, makes the achievement of threshold requirements for some credits extremely difficult to meet without compromising the comfort of guest occupants. Guests often have the highest expectations when making use of bath facilities. Low-flow faucets in sinks and showers do not provide enough water at adequate pressure levels for guests to experience a full sense of cleanliness or comfort by the water. Motion sensors are also not suited for personal washroom use, as a constant stream may be required for drinking and housekeeping purposes. Dual-flush toilets can be incorporated, as high-end fixtures are now available for this purpose, yet many guests may be unfamiliar with how they are to be used and low-flow toilets can be seen as associated with plumbing issues. Not only are the fixtures a challenge in order to implement this credit, but buildings with exceptionally high potable water demands - such as hotels and hospitals - would often be unable to attain this credit regardless of the amount of low-flow fixtures incorporated (Morris & Matthiessen, 2007).

Credit IEQ2.0 is based upon increasing ventilation to a building, either through natural ventilation measures such as operable windows or increased outdoor air intake through mechanical building systems. The cost of incorporating either of these approaches is low, yet the credit was identified by survey consultants as one of the most undesirable for hospitality. While climate does play a role in the feasibility of implementing this credit, it is often successfully implemented in among other types of building projects. However, conditioning of extra air intake through mechanical systems can require significant extra lifelong expense and the incorporation of operable windows can often be misused by building occupants. In terms of design for hospitality, operable windows are not always feasible, especially in high-rise hotel towers where the possibility of falling or jumping could be a liability. Exterior temperature and weather conditions, as well as the entrance of exterior pollutants, insects and other airborne externalities such as pollen all travel and are therefore able to directly affect the air quality and comfort of all guests, not simply those accomodated in one particular room. Outdoor climate conditions and temperatures can also put undue pressure on existing building systems when compensation is necessary from having too many windows open in strenuous weather conditions. Complicated floorplan layouts in unique hotel buildings are also not conducive to streaming continuous airflows, making consistent temperature levels and guest comfort difficult to maintain.

Credit EA2.1 involves the construction and integration of onsite renewable energy (ORE) resources. This is perhaps the only credit mentioned in this study to involve substantial cost impact. As discussed, EA credits are not strongly pursued as buildings with higher energy efficiency needs significantly increase first costs (Morris & Matthiessen, 2007). Credit EA2.1 in particular has also been identified as the most expensive and complex credit to implement (Da Silva, 2008). Despite the potential for considerable long term energy cost savings, significant initial financial outlay is required for this credit and lengthy payback periods are typically deterrent for all types of projects. Though this credit is usually achieved at the most basic cost through the implementation of solar PV panels on roofs or exterior building envelopes, design concerns exist of negative visual aesthetics on buildings meant for inviting and visually appealing design. Though dated local ordinances also often prevent construction of renewable energy facilities onsite in the first place, even when permitted, noise pollution from other applications of ORE such as wind turbines and converters from low-impact hydro applications can be disturbing to guests. The large energy demands of hospitality buildings required for substantial water heating requirements, restaurant operation, mechanical systems and constant lighting and temperature regulation are not often able to be met solely by renewable energy resources. However, if incorporated properly, energy costs at least have the opportunity to be reduced. This also assumes that project sites and local climate and geography are even suitable to accommodate these types of infrastructure. Energy costs are often inexpensive enough in some areas that added ORE is not worth the expenditure; in terms of hospitality, applications of ORE are best suited to projects where energy needs are low and connecting to grid-based power comes at considerable expense, such as in small isolated resort accomodations (Morris & Matthiessen, 2007).

Credit WE2.0 is based upon innovative applications of onsite wastewater technology, both to reduce potable water consumption and decrease amounts of wastewater. The credit is achieved either through the implementation of low-flow fixtures, the incorporation of onsite equipment for greywater capture or recycling, or through the development of onsite wastewater treatment systems, including "packaged biological nutrient removal systems, constructed wetlands, [or] high-efficiency filtration systems" (USGBC, 2005). Each response gathered from surveyed consultants echoed the same rejection due to aesthetic concerns. Though low-flow fixtures are nominal in cost, explanation for their avoidance due to guest comfort is previously well-described by WE3.1. Greywater systems, ranging from bulky cisterns for rainwater capture to bioswales for greywater recycling and groundwater recharge can create unpleasant odors or visual obstructions, should they fit on the site in the first place. Though it is possible to utilize rainwater captured from these in certain interior plumbing fixtures such as toilets or fountains, these are generally not considered as aesthetically acceptable for the specific level of interior water quality expected for hospitality design. Onsite wastewater treatment is also well-avoided, as regardless of substantial expense and site space requirements involved, the stigma associated with treating human waste and blackwater onsite (regardless of high quarantine standards) was found more than enough to deter guests from staying and designers from incorporating.

Credit IEQ5.0 involves the control of indoor chemical and pollutant sources in order to minimize exposure of building occupants to hazardous airborne impurities. According to the survey response, this credit was not avoided out of concern for guest comfort, but was avoided for valid design purposes regardless. Though minimization of indoor airborne pollutants would no doubt benefit the comfort level of guests, yet in the context of hospitality, extensive mechanical systems are required to accommodate the ventilation requirements of a large hotel building. Filters compliant with a Minimum Efficiency Reporting Value (MERV) of 13 or greater were found to be too small to accommodate the necessary mechanical systems and refitting to accommodate them would have compromised credits achieved in other categories.

Credit SS7.1 is based upon decreasing heat-island effect from ground sources, such as dark asphalt paving or undeveloped brownfield that can absorb and magnify heat levels in microclimate areas. In order to gain the credit, high albedo materials such as light-colored asphalt paving, covered parking areas, or open-grid vegetated paving are to be incorporated. This credit was avoided in design for hospitality due to visual comfort concerns for guests, as highly reflective surfaces on or between building wings may create too much brightness and cause guests to squint. The aesthetics of open-grid vegetated paving were also found to be unsuitable for the building's purposes. Morris and Matthiesen also note the expense of developing separate covered parking in the form a parking garage to be more than what developers were willing to pay for simply to earn this credit (2007).

Credit MR7.0 involves the incorporation of at least 50% FSC-certified sustainably-managed wood products into a building. This includes any wood materials included for structural building needs or employed as permanent fixtures, such as doors and finishings. The cost of certified wood is dependent on project location and time of year it is required; it was only avoided by design in this study due to expense, not out of concern for guest comfort.

5.4.2 Design-Avoided Credits and Actual Rates of Implementation

Though these seven credits have been identified as most-often avoided from hospitality design perspectives, the next matter is to inquire as to how these credits compare to actual implement rates and whether or not design opinions are truly reflected in the number of times these credits were actually gained. As shown in Table 5.3, the credit with the greatest response from designers to be most-often avoided actually reflected a very high implement rate. Credit WE3.1, 20% Water Use Reduction, was specifically avoided on six separate occasions due specifically to guest comfort, yet claims a total implement rate of 79%. Out of 28 projects, this would mean that every one of the remaining 22 projects would have successfully implemented this credit. Either project designers that included the credit were more concerned about receiving a simple and low-cost point, or the reservations held by designers that avoided it due to guest comfort may not as reflective of guest expectations as previously thought.

SS7.1, Non-Roof Heat-Island Reduction, was only avoided once specifically due to guest comfort and claims a 50% implement rate among all other projects. This is a good example where actual architectural project design may have played a direct role in both the avoidance and inclusion of this credit; should the project have been designed to accommodate opportunities for more reflective surfaces, this credit could have been achieved in other areas of the property that would not reflect directly into guests' visual pathways.

The actual implement rates of the remaining five credits avoided by hospitality designers are much more consistent with credits that would have been considered as less practical. It is possible that this is reflective of credit choices that have been avoided out of concerns similar to those given by survey consultants. These remaining credits were implemented on average a total of only 24% of the time, or on average each employed in about seven out of 28 projects. Credits IEQ5.0 and MR7.0 were not specifically avoided due to guest comfort concerns, but were instead avoided out of cost concerns or implementing a credit at the expense of others. The remaining credits, IEQ2.0, EA2.1 and WE2.0, were all avoided due to valid guest-comfort concerns that are well-verified by their implement rates.

Table 5.2 Actual Implement Rates of Credits Most Avoided in Hospitality

Credits Avoided by Design	Actual Implement Rates
WE3.1	79%
IEQ2.0	29%
EA2.1	25%
WE2.0	14%
IEQ5.0	25%
SS7.1	50%
MR7.0	29%

It is clear from this analysis that credits least popularly implemented are often unachievable due to external circumstances, where credits least popular with designers are avoided for specific reasons. This proves that the survey portion of this study is a key element in determining the extent of sustainable design currently employed among existing hospitality projects. Even though not every credit avoided from a design perspective was based upon concern for guest comfort, most were, even though actual rates of implementation do not necessarily reflect the degree of apparent aversion. It is important for future guidelines developed for LEED that these particular credits are noted and solutions developed to increase their rate of adoption. Intrinsic-based opinions and design rationales clearly weigh significantly on the selection of LEED credits for hospitality development; hard data gathered from LEED scoresheets does not provide enough insight on this aspect of development on its own.

5.5 Summary

It is evident that many scenarios exist where LEED credits may experience reduced implementation in hospitality design. According to LEED scoresheet data, credits found to be most and least popularly implemented by hospitality projects were typically the same as those found most and least popularly implemented among common commercial building projects. However, two "most" and two "least" popular credits were found to be unique to implementations in LEED design for hospitality. These credits were IEQ6.1 and IEQ7.1, along with EA 1.9 and EA1.10. The IEQ credits were determined as most popular for hospitality applications because individual control of lighting and thermal comfort are already two standard design innovations customarily incorporated into hospitality projects. Implementing efficient new systems would be relatively simple in new projects. The EA credits were determined as least popular for hospitality applications as they encompass the highest achievement levels of energy efficiency. This would not only be difficult under normal project circumstances, but as design for hospitality requires more energy than common commercial development these credits would be especially difficult and expensive to achieve. It is likely that developers would prioritize spending for credits where innovations would be better noticed by guests.

While credits found to be specifically avoided by designers were indeed found to be most often avoided due to guest comfort considerations, it was not the only reason. Credits were also found to be avoided due to cost, local climate and geography, local building codes and even the potential preclusion of other credits. However, credits avoided by design were not found to coincide with credits least implemented. This signifies that successful implementations of each of these credits have been experienced by other projects elsewhere.

6. Discussion

6.1 Introduction

Analysis of the research results indicate that certain credits do experience potential barriers in sustainable design for hospitality. While some LEED credits are averted based on the same cost, complexity, or local design barriers as many common commercial projects, a significant percentage are avoided based upon concern for guest comfort and amenity access. It is among these credits where emphasis must be placed in order for sustainable design in hospitality to realize its full potential. Though a variety of innovations consistent with seven different credit types were found to be avoided, each of these credits did receive small yet significant implementation rates among certain projects in this study. The examination of these successful implementations will optimistically provide information on how these "unfavorable" credits can be incorporated without negatively affecting guest comfort. The more information that can be presented on these thriving applications, the better prepared the hospitality industry can be in planning future projects. By also offering immediate solutions to credits that could be seen as detrimental, better chances will develop for their consideration and implementation.

6.2 Existing Successful Implementations of LEED Credits Avoided in Hospitality

Though the USGBC does not currently offer LEED sustainable design guidelines developed specifically for the hospitality industry, a case study summary of successful credit applications under LEED-NC in existing hotel projects conducted by the USGBC does exist (USGBC, 2009). In their research, 15 specific credits from all six categories are summarized in their successful implementations. Intriguingly, four of these 15 credits summarized in their successes were identified in this present study as those most avoided by designers. These four credits include SS7.1, WE2.0, WE3.1, EA2.0. Though no previous research by the USGBC on credit popularity among hospitality projects exists for public use, it almost appears as though the organization is aware that these particular credits may present an issue for hospitality designers and have consciously included case studies of their successful applications in order to ensure good examples of their implementations do exist. Though every project's design involves its own limitations, the fact that these credits exist effectively among other applications in hospitality supports the notion that perhaps concerns for guest comfort in environmental design are less significant than previously thought.

In terms of SS7.1, non-roof heat island reduction, it was found in this study that concerns over light-colored reflective surfaces would cause guests to squint. The case study offered by the USGBC for this credit identifies an existing hotel's application of light-colored open-grid block pavers rather than a fluid blanket of dark paved asphalt. This effectively reflects, rather than absorbs, heat radiated onto the hotel's surrounding flat surfaces. Yet, grass planted into the open midsections of each paver significantly reduces the glare from the overall surface area while also increasing surface cooling even further due to biotranspiration. Though the pavers cost significantly more - almost twice that of regular asphalt paving - the savings experienced by the hotel through lighter building cooling loads will soon pay for the difference in cost. The visibility of the open-grid paving has also been noted by staff and guests to be a tangible green strategy that allows an easy connection to the hotel's sustainable LEED image. Should the concerns expressed by the designer in this study have considered open-grid paving with grass or moss planting in between, the issue of reflected brightness would have been easily addressed.

Credit EA2.0 and the incorporation of onsite renewable energy resources was found, as discussed, by not only this study to be regarded as one of the most expensive and complex innovations offered among options for LEED credits. As mentioned, hotels often only seek LEED certification out of market-share motivation rather than intrinsically-based environmental enthusiasm. This makes implementation of expensive credits that often encompass stigma of less reliability than typical energy sources difficult to encourage. However, with proper planning, hospitality projects have not only implemented this credit with relative simplicity according to case studies offered by the USGBC, but the initial expense associated with onsite resources has been well documented in immediate building energy savings. Rooftop photovoltaic panels are the best example of successfully gaining this credit; by implementing the use of about 100 panels, several projects have been able to experience significant cost savings especially in energy use for water heating. Cost savings are also found in government tax incentives and in some cases even in the sale of excess renewable energy credits. Ground-coupled heat pumps have also seen great success for hospitality projects in geographic areas where they are applicable. Payback periods of approximately 5 years are expected in all cases, with nothing but savings to be experienced in years after that. PV panels, when visible, also offer another visual affirmation to guests of a project's environmental priorities and according to hotel staff has rarely caused issues of aesthtetic discontent.

Credits WE2.0 and 3.1 for fixture upgrades and overall water use reduction were the two points found in this study to experience the highest combined adversity out of any of the designer-avoided innovations. Inadequate water pressure was cited as the main concern from nine of the 15 designers polled with regard to the sufficient provision of comfort levels expected by guests in their bath facilities. This type of comfort is even recognized as a prime concern by the USGBC (2009). However, reports in the USGBC case studies indicate that not only do hotel staff members believe that the high-efficiency fixtures often perform better than industry standard, but rarely have guests raised concerns that their shower experience had not met their expectations. In fact, many are often surprised when told that their bath fixtures have actually been providing them with less water. Low-flow toilets can also actually be less noisy and disturbing to guests due to shorter, lower-volume flushes. The fact that all of the remaining projects in this study had no problems or concerns with the implementation of these fixtures provides further credibility in outweighing the nine projects that specifically chose to avoid the implementation of water use reduction techniques.

6.3 Potential for the Successful Implementation of Remaining Credits Avoided in Hospitality

Of the remaining three credits identified as design-avoided, though case studies were not provided as direct evidence of their existing success, potential does exist for applications of IEQ2.0, IEQ5.0 and MR7.0 in sustainable hospitality design. IEQ5.0, indoor chemical and pollutant source control and MR7.0, the use of certified wood were both opted out of due to project-based rather than guest-comfort-based rationales.

The main issue surrounding IEQ5.0 is the incorporation of MERV-13 filters in mechanical ventilation systems, which is easily addressed in projects where systems have been properly designed and integrated to accommodate them. In this study, the credit was avoided because mechanical systems had already been specified and implemented before the realization occurred that MERV-13 filters would not be able to fit. Early planning and understanding of the credit and its requirements for mechanical systems to incorporate this level of filtration is therefore the most important aspect of realizing success for this point. The LEED-NC Version 2.2 project guideline handbook mentions other less-intensive aspects of the credit's requirements before discussing the requirement for the filters; it could have been easily overlooked in the planning process and not realized until it was too late. Better emphasis should be put upon the fact that mechanical systems that accommodate filters rated MERV-13 or higher must be specified first in order to ensure IEQ5.0 can be gained.

The issue surrounding MR7.0 and the use of certified wood was the fact that the only materials available locally and within budget were certified wood doors. The designers avoided the credit because no certified wood was available locally to employ in structural or finishing capacities and the cost of the available doors was prohibitive. In areas where certified wood is more readily available and better stocked throughout the year this credit should have little barriers to implementation provided funds are initially reserved within the budget. Building design could also ensure building materials specify certified wood in the built components of the project; certified wood floorboards and wall paneling have been successfully implemented in a few existing hotel projects. Researching the nearest supplier and familiarizing with seasonal availability can help project designers plan ahead to make special orders, purchase certified wood products in advance, or arrange for more economical shipping methods to ensure the products meet timing and budget requirements. Local vendors should all be consulted first, however, as even if the likelihood that they stock certified wood products is low, should they recognize that increasing demand exists it is possible vendors will stock them in future.

IEQ2.0 and the inclusion of natural ventilation systems does raise questions of guest comfort concerns, however. Natural ventilation can also pose a challenge due to local climate and average humidity levels, as these externalities may preclude the ability to successfully incorporate outside air without the risk of mold and mildew accumulation.

Swimming pool and restaurant areas also have very different requirements than the rest of the building. However, lobbies and other common areas of hotels often successfully incorporate natural ventilation and dual systems for natural and mechanical ventilation to ensure consistent comfort in hotel guest rooms have also been positively achieved. When heating is required, "energy recovery" technology can be used to temper the incoming outdoor air by warm air being exhausted to the outside. Eight out of 28 projects found in this study were able to successfully involve natural ventilation into their designs; however, each project that did received a certification level of Gold or Platinum. It is possible the complexity of the credit may deter projects seeking lower levels of certification, yet the credit itself is truly able to experience well-adapted applications in hospitality design. In fact, in the United Kingdom, where the humid and cold marine climate would seemingly preclude any notions of incorporating natural ventilation, Village Hotels and IBIS Hotels have successfully incorporated Passivent acoustic wall ventilators in every hotel room for individualized intake of fresh outdoor air (Passivent Natural Ventilation & Daylighting Solutions, 2011). A discreet box on the wall is operated by a simple pullcord to adjust draft-free exterior air intake and the acoustic insulation of the apparatus mutes any associated noise with changing rates of air flow. The boxes are designed specifically for hotel use and have eliminated the need for mechanical ventilation systems altogether.

6.4 Summary

According to the analysis, it is clear that a fair amount of emphasis is truly placed upon design concerns for the comfort of guests in hospitality development. In an industry dependent on comfortable and memorable guest experiences, these concerns are well-justified in their origin. These considerations evidently intensify in terms of developing hospitality with sustainable design. However, the analysis illustrates that perhaps the amount of weight placed upon these concerns may not necessarily be as vital as previously thought. As discussed, the seven credits most often avoided by designers are not reflected in the credits that are actually least often implemented. This indicates that enough applications of each credit presumed to negatively affect guest comfort exist to show that each one has been successfully applied among numerous other projects. Four of these specifically avoided credits are further addressed as exemplary models of credit implementation by case study research conducted by the USGBC (2009). The potential for the remaining three credits was also readily addressed by existing independent literature. Local mandates, climate and other external factors aside, it is clear that in order for sustainability to succeed in hospitality development the education of all stakeholders involved is paramount. It is clear that opportunities are being missed when concerns for comfort become unnecessarily prohibitive. A complete spectrum of each LEED credit's possibilities must be considered in order to realize full sustainable potential in an industry where guest comfort is considered top priority.

7. Conclusion & Recommendations

7.1 Review of Research Objectives

This research has revealed the value of sustainable design in the built environment of hospitality. Selecting this subject for study was found to be well-justified, as the existing need for improved research on this topic is significant. Hospitality design is not only one of the most energy-intensive forms of development, it is also one with some of the least available informative support for sustainable design. To reiterate the original objectives, the intent of this research was:

1) To review current literature and statistics on the benefits of sustainable building design and identify the need for further involvement in design for hospitality.
2) To determine trends in LEED credit point adoption among existing certified hospitality projects and trends in developer rationale behind their adoption.
3) To identify barriers and opportunities toward the increased incorporation of sustainable design in hospitality development.

In order to achieve these research objectives, the composition of this dissertation focused upon three approaches to research, including a review of existing literature, hard data collection and survey distribution. The literature review first discussed the background of sustainable building design, the existing status of sustainability in hospitality projects and the potential to improve this status through increased incorporation of LEED guidelines. Scoresheets were then collected on existing LEED-accredited hospitality projects for factual data on credit adoption trends. Surveys were also distributed to the design consultants of these projects for information on the rationales behind LEED credit selection in hospitality. Results were compiled and analyzed for trends and differences against information on credit popularity in common commercial building projects. Barriers and opportunities unique to sustainable design in hospitality were identified and recommendations made as to how future hospitality projects can better incorporate LEED design.

7.2 Summary of Research Findings

7.2.1 Literature Review

All pre-existing research indicates the demand for sustainable building design has increased significantly in the last decade. More evidence continues to become available on the environmental, financial and human benefits experienced by buildings designed for superior energy performance and conscious environmental innovations. The most commonly expressed benefits of sustainable buildings include better building quality, decreased operating costs, increased rental income and tenancy, increased worker productivity, increased positive publicity, marketable recognition of third-party verification and a multitude of additional benefits (Cryer et. al, 2006; Johnston & Breech, 2010; USGBC, 2011a). However, a misguided perception of excessive first costs associated with implementing efficient innovations is the most significant obstacle for universal acceptance of sustainable design. For those projects that have chosen to incorporate sustainability, the USGBC's LEED program is the most widely accepted third-party verification system. No existing versions of LEED currently address the unique building circumstances of hospitality. However, LEED for New Construction guidelines have been incorporated into hotel projects and have achieved success with proper planning, time and design considerations.

Development for hospitality is especially resistant to sustainability. Design considerations must take into account the comfort expectations of guests, the investment returns of the stakeholder and the unique design and energy needs required to support the various functions of accommodation properties. Developers are often hesitant to undertake energy reduction initiatives that may compromise guest comfort and potentially affect profit margins. However, it is clear that stakeholders typically underestimate the public acceptance of sustainable design in their projects. Hotels that are built green have been found to provide better overall experiences for guests through improved indoor environmental quality and showing concern for ecological responsibility. Almost three-quarters of guests further indicate they value sustainable initiatives in hospitality properties and almost half would be willing to pay more to stay in those that do. Sustainable identity among hotel properties is therefore more likely to increase market value than reduce guest appeal due to lack of common added luxuries.

7.2.2 LEED Scoresheet Data and Survey Results

For the data analysis, a total of 28 LEED scoresheets out of 38 qualified hospitality project candidates were received. Credit number, type and certification level were all analyzed to develop a better understanding of credit selection and associated level of sustainability in hospitality projects designed under LEED guidelines. According to percent-average calculations, the most popular credits implemented were IEQ4.2, EA1.1, MR2.1, ID1.1, IEQ6.1, IEQ7.1, ID2.0, SS4.2 and WE1.1. At least one credit from each category was found among the top nine credit types. The least popular credits implemented were MR3.1, MR1.2, MR3.2, MR6.0, MR1.3, EA1.10, MR1.1, EA1.9 and EA2.3. Only two categories were found among the bottom nine credit types. These categories were Materials and Resources and Energy and Atmosphere. The most popular category was found to be Innovation in Design with a 78% total average credit implement rate. The least popular category was found to be Materials & Resources with a 35% total average credit implement rate.

Many reasons could potentially explain why LEED credits could experience reduced implementation in hospitality design. The nine credits found most popular amongst hospitality projects were all commonly found to be the simplest and least expensive options to implement, or were items mandated to be included in development by local governing ordinances. The nine credits found to be least popular among hospitality projects were all found to be less about cost and more about local applicability.

According to LEED scoresheet data, credits found to be most and least popularly implemented by hospitality projects were typically the same as those found most and least popularly implemented among common commercial building projects. However, two “most” and two “least” popular credits were found to be unique to implementations in LEED design for hospitality. These credits were IEQ6.1 and IEQ7.1, along with EA 1.9 and EA1.10. The IEQ credits were determined as most popular in hospitality because individual controls of lighting and thermal comfort are two standard innovations already individually incorporated into hospitality projects. Implementing different systems would therefore be relatively simple. The EA credits were determined as least popular for hospitality applications as they involve achieving the highest levels of energy efficiency. As design for hospitality requires more energy than common commercial development these credits would be especially difficult and expensive to achieve.

Of the 28 project contacts that provided LEED scoresheets for analysis, 15 chose to respond to the survey question sent back regarding designer rationale in credit selection for hospitality. A total of eighteen items were mentioned to be avoided and seven different credit types were found to correspond. The Water Efficiency category, particularly credit WE3.1, was found to be the least popular credit category pursued by hospitality designers with low-flow items found to experience the greatest aversion. Credit WE2.0 was found to be the least popular credit in this study among both common scoresheet implementation rates as well as specifically design-avoided innovations.

7.2.3 Barriers and Opportunities

The combined analysis of the historical information and research data identified a number of existing barriers to general sustainable building design. Lack of institutional-quality information and pre-existing research, perception of excessive first costs, lack of consultant education and lack of experienced contractors were found to present the most significant obstacles. Other examples include competing guideline options for green building design, differing stakeholder values, local climate and geography, local building codes, LEED credits that preclude each other and general negative attitudes toward potential extra effort also present difficulties to the success of sustainable building design.

In terms of hospitality, sustainable design experiences even further barriers. Not only are the general design considerations for hospitality more extensive, but in order to accommodate efficient water and energy systems for guest rooms, restaurants and common lobby areas presents increased design complexity. Developers have therefore been known to seek the simplest, least expensive LEED credits simply to display the certificate rather than implement the most sustainable innovations within their means. Maintaining specified design of branded hotel chains is also difficult to alter when guests expect a certain level of comfort from a particular brand. In terms of LEED design, certain credits are avoided in hospitality projects specifically due to concern for guest comfort. While some LEED credits are averted based on the same cost, complexity, or local design barriers as many common commercial projects, a significant number are averted directly due to potentially compromised guest comfort and amenity access.

The results inferred from the scoresheets and surveys often indicate that credits least popularly implemented are often unachievable due to external circumstances, where credits least popular with designers are avoided for specific reasons. However, the fact that credits most often avoided do not correspond to those least actively implemented indicates that successful applications of design-avoided credits do exist among other projects in hospitality. Four design-avoided credits were even included as good examples of credit implementation specifically in hospitality projects in research conducted by the USGBC (2009). Remaining design-avoided credits were found to have experienced successful applications in other hotel projects through further independent research. External circumstances aside, the fact that avoided credits have been successfully implemented in other hospitality projects and have even been made examples of by the USGBC for hospitality design suggests that significant opportunity exists for these unfavored credits. Recommendations were subsequently addressed in the discussion section in terms of how these particular credits can be successfully incorporated.

7.3 Implications of Research Findings

Perspectives from the construction industry, hospitality development stakeholders and guests of hotel properties have each been analyzed and barriers and opportunities to sustainable design for hospitality identified in this dissertation. Today's tourism and construction industries are both under increasing pressure to adopt sustainable design and operations from hotel guests, employees, stakeholders, environmental groups and the general public. Sustainable building practices have been found to create better buildings all around, especially when designed according to LEED specifications. Operating costs are lower, occupant productivity and overall health are increased and construction costs to build are much lower than perceived. Through these findings, this study has identified some of the most significant areas of hospitality design that require further attention for improved incorporation of sustainability.

The emphasis placed upon optimizing guest comfort has been identified as the largest barrier to the process of adopting sustainable innovations in hospitality. Yet this study reveals that this emphasis is not necessarily justified, as increasingly sustainable lifestyles valued by guests sees growing demand for less energy-intensive options. The understanding of how LEED guidelines have succeeded in hospitality will aid future project teams to specify a broader spectrum of credit options for project designs that benefit from lower construction and operating costs, construction schedules with fewer delays and more straightforward implementation of sustainable innovations. Designers will therefore be able to make better-informed decisions in selecting which LEED credits to employ.

Though LEED scoresheet analysis was able to provide solid numerical evidence of how often each credit was actually employed, it is clear that the information gathered from consultant surveys provided much better insight into which innovations in sustainability may be deterred from in design for hospitality. Quantitative data is useful, yet it can be difficult to rely on in an industry where so many intrinsic human opinions contribute to each project's design (Ko, 2005). In the past, project certification levels have also been found to be directly related to the intrinsic environmental values of project designers and stakeholders (Lavy & Fernandez-Solis, 2009). This supports the conclusion that the survey results of this research were the most essential element in determining how sustainable design is currently approached among existing LEED hospitality projects, as the credits avoided by designers were hardly reflected in the credits that are actually least often implemented. Information from project designers is therefore determined to be more valuable than inference from data numbers to properly identify opportunities for sustainable design among hospitality projects in future.

A complete commitment to sustainable design and full understanding of the applicability of each credit is thus found to be the best approach for success in LEED design for hospitality. Undereducated designers and stakeholders that perceive green building simply as an "added cost" will be most likely to experience it in that respect. Yet it is clear that a market for sustainable design does exist for hospitality projects and improved support is required to assist the industry to become better involved. The substantial lack of pre-existing information, academic studies and programs specific to sustainable design for hospitality require substantial further input and improvement. No matter how it is ultimately achieved, adopting sustainable design has the potential to increase the financial bottom line, competitiveness and brand image of hotel projects around the world.

7.4 Reliability and Limitations of Research Findings

The scope of this project is based solely upon hospitality projects constructed under the sustainable building guideline LEED for New Construction (NC). Though more hotels designed or renovated according to other versions of LEED guidelines do exist, not all credits and categories are directly comparable from one version to the next. The study base was also limited to hospitality projects found solely in the United States, as other countries typically adapt LEED guidelines to accommodate their own climates and standards. Selected participants were limited to typical stand-alone commercial hotel buildings, excluding other forms of accommodation properties such as bed-and-breakfasts, dormitories, ranching outfits and timeshare condominiums where primary building designs often differ.

This research is also based upon a fairly small sample size due to the very limited number of LEED-accredited hotel properties in currently in existence. At the time this research was conducted only 38 projects were found to be publicly available for contact. Of these 38, only 28 scoresheets were provided for further analysis and only 15 survey responses were received from consultants. Since the initial information-gathering stage of this research, an increasing number of hotel projects have been listed as certified on the USGBC website project database. Database information is limited in itself as projects are able to opt out of publicly accessible records. Indeed, once the information gathering stage was complete, more LEED-certified hotels were stumbled upon that were not disclosed by the USGBC and were consequently not included in the study sample. LEED scoresheets that were collected from study participants were also occasionally "working" editions, meaning certain scoresheets were not necessarily an official record of the credits that were achieved toward final certification. Despite these limitations, the modest but influential sample of hotels allows for important insight into current trends and future opportunities for sustainable design in hospitality.

The lack of previously existing research on measuring sustainability in hospitality design was the most significant limitation to the information presented in this dissertation. This nature of this research is therefore purely exploratory and intends only to provide informative, not definitive, findings and inferences. Due to the individuality and distinctive nature of every building project, there is no universal answer to determine which LEED credits are best for each project to pursue. Variations in climate, geography, target client market, stakeholder values, availability of materials, knowledge level and experience of project consultants all contribute to each project's inimitability. Although the sample was geographically diverse and provides a broad demonstration of the current status of LEED design among hospitality projects, no assertion is made toward its overall representativeness. The findings and recommendations in this study therefore provide a valuable contribution to further research in sustainable design for hospitality, but do not claim to offer comprehensive results.

7.5 Recommendations for Future Research

Academics agree that further research is required for sustainable design among all types of the built environment. This project has provided insight into the field of sustainable design for hospitality, revealing important considerations for future design approaches that focus less on guest expectations and more on ways to achieve credits that pose the greatest perceived risk toward them. However, this research was subject to a variety of limitations. Future studies in this field have the potential to focus on a number of approaches to advance the adoption of sustainable design in hospitality.

First of all, in order to gather more comprehensive results, trends in credit point adoption among all LEED rating systems (not simply NC) could be analyzed separately under similar methods. Credit implementation rates could then be compared between guidelines to observe which existing program and related credits have experienced the highest participation rates among hospitality projects. A focus on the applications of LEED Volume for new hospitality projects could be specifically developed in order to analyze the success of hotel brands designed according to identical sustainable specifications. Potential methods as to how guidelines could be adjusted for LEED hospitality projects set in both urban and rural environments could also be explored, as depending on project location certain credits often end up inapplicable. Such research could then be advanced to account for geographic and climatic variations anywhere from winter ski developments to beachfront resorts. This could be even further expanded to analyze credit adoption among LEED-accredited hotels in other countries that could be cross-compared for variations in sustainable design values found in LEED hospitality projects around the world.

Once the recently developed LEED recommendations for hospitality are released for public access, future studies could focus on which areas of sustainable design have been emphasized and compare them to the information found in this dissertation. This could assist to verify results or infer additional conclusions as to which recommendations would be most relevant to pursue should the USGBC ever choose to release a LEED guideline version specific to hospitality. However, in order for any future researchers to compile the most advantageous study sample, the USGBC project database must be better organized for industry-specific building types. It should also provide at least the name of every accredited project, even if contact information is opted to be withheld. The wider the available project sample, the more accurate future research results will be.

Another very important aspect of future research would be to determine how government incentives could be implemented specifically for hotel and resort projects and identify methods of how best to market them to hospitality developers. Government incentives are currently the largest stimulus to encourage sustainable building, yet are rarely marketed to the construction industry at all (Cryer et. al, 2006). Overall increased marketing, especially to niche forms of development such as hospitality would be particularly important to encourage sustainable design, as even if hospitality stakeholders were aware of stimulus existence they may not assume that these incentives apply to hospitality-type projects.

Understanding how projects employ LEED credits in the past will assist future research in improving their application in sustainable building projects of the future. Therefore it may be argued the best approach to future LEED applications in hospitality is to ask "how can a credit point be included", not "how much will it cost" or "how will it negatively affect guests". Specifying LEED design from project inception, hiring a LEED Accredited Professional or working with LEED-experienced project teams will provide the best foundation for streamlined success and ensure design for quality guest experience is still maintained at every opportunity. The documented stakeholder and occupant benefits are excellent and the industry forecast calls for rapid future growth in sustainable building design. Research must now focus on the matter of identifying the best method to persuade all developers to embrace it.

7.6 Closing Remarks

Designing buildings for hospitality originates from a perspective of occupant priority that differs widely from typical approaches in the design of common commercial buildings. This is true for buildings in the contexts of both sustainable and common building design. Measurements of LEED credit implementation rates in this study have shown that there are definite aspects of sustainable design that are perceived as unattractive to hospitality developers. This research has identified some of these trends and the discussion has recommended solutions for stakeholders to draw new conclusions toward implementing sustainable innovations commonly avoided in hospitality. Though guest comfort will always maintain major priority in hospitality design, excessive concern for high guest expectations may not be so critical. The final endeavor of this analysis is to encourage consultants to consider a complete spectrum of sustainable possibilities rather than automatically dismiss certain options due to common concerns such as these.

The variable and fluctuating nature of the hospitality industry has not yet been directly addressed by any of the existing LEED programs, arguably a significant reason hospitality developers have been less likely to seek certification up until this point. Yet because of the recent USGBC committee efforts, hospitality developers will soon have proper LEED-based resources to assist them in design decision-making. As more projects are completed and achieve LEED certification, more information will increasingly become available on best practices for sustainable hospitality design. In the meantime, this dissertation offers the only existing academic research on measuring LEED applications in design for hospitality.

In the end, if the hospitality industry is to continue to succeed it must begin to accept sustainable design as a necessary adaptation, not an added feature. Yet at the same time, it must not solely be incorporated due to anticipated growth in guest demand. Hospitality developers must embrace sustainable design for its pervasive effects that benefit all aspects of construction and operations: good financial returns for stakeholders, improved indoor quality for guests and employees and the fundamental effort to preserve our natural environment.

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APPENDIX A

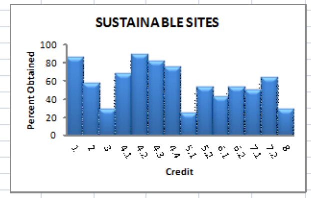
Sample spreadsheet document

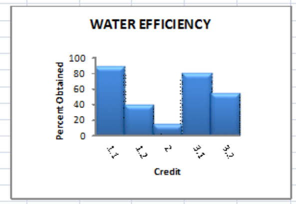
LEED-NC

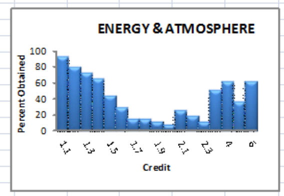
LEED-NC Version 2.2 Registered Project Checklist

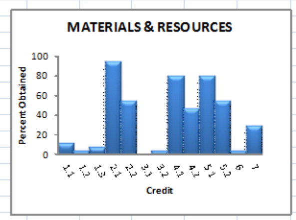
CREDIT	Certification Level	Points	TOTAL
Sustainable Sites		14 Points	225
Prereq 1	Construction Activity Pollution Prevention	Required	Y
1	Site Selection	1	24
2	Development Density & Community Connectivity	1	16
3	Brownfield Redevelopment	1	8
4.1	Alternative Transportation, Public Transportation A	1	19
4.2	Alternative Transportation, Bicycle Storage & Chan	1	25
4.3	Alternative Transportation, Low-Emitting and Fuel-E	1	23
4.4	Alternative Transportation, Parking Capacity	1	21
5.1	Site Development, Protect or Restore Habitat	1	7
5.2	Site Development, Maximize Open Space	1	15
6.1	Stormwater Design, Quantity Control	1	12
6.2	Stormwater Design, Quality Control	1	15
7.1	Heat Island Effect, Non-Roof	1	14
7.2	Heat Island Effect, Roof	1	18
8	Light Pollution Reduction	1	8
Water Efficiency		5 Points	77
1.1	Water Efficient Landscaping, Reduce by 50%	1	25
1.2	Water Efficient Landscaping, No Potable Use or No	1	11
2	Innovative Wastewater Technologies	1	4
3.1	Water Use Reduction, 20% Reduction	1	22
3.2	Water Use Reduction, 30% Reduction	1	15
Energy & Atmosphere		17 Points	192
Prereq 1	Fundamental Commissioning of the Building Ene	Required	Y
Prereq 2	Minimum Energy Performance	Required	Y
Prereq 3	Fundamental Refrigerant Management	Required	Y
1	Optimize Energy Performance	1 to 10	119
2	On-Site Renewable Energy	1 to 3	15
3	Enhanced Commissioning	1	14
4	Enhanced Refrigerant Management	1	17
5	Measurement & Verification	1	10
6	Green Power	1	17
Materials & Resources		13 Points	129
Prereq 1	Storage & Collection of Recyclables	Required	Y
1.1	Building Reuse, Maintain 75% of Existing Walls, Flo	1	3
1.2	Building Reuse, Maintain 100% of Existing Walls, Fl	1	1
1.3	Building Reuse, Maintain 50% of Interior Non-Structu	1	2
2.1	Construction Waste Management, Divert 50% from	1	26
2.2	Construction Waste Management, Divert 75% from	1	15
3.1	Materials Reuse, 5%	1	0
3.2	Materials Reuse,10%	1	1
4.1	Recycled Content, 10% (post-consumer + ½ pre-con	1	22
4.2	Recycled Content, 20% (post-consumer + ½ pre-con	1	13
5.1	Regional Materials, 10% Extracted, Processed & M	1	22
5.2	Regional Materials, 20% Extracted, Processed & M	1	15
6	Rapidly Renewable Materials	1	1
7	Certified Wood	1	8
Indoor Environmental Quality		15 Points	256
Prereq 1	Minimum IAQ Performance	Required	Y
Prereq 2	Environmental Tobacco Smoke (ETS) Control	Required	Y
1	Outdoor Air Delivery Monitoring	1	11
2	Increased Ventilation	1	8
3.1	Construction IAQ Management Plan, During Constr	1	19
3.2	Construction IAQ Management Plan, Before Occup	1	5
4.1	Low-Emitting Materials, Adhesives & Sealants	1	24
4.2	Low-Emitting Materials, Paints & Coatings	1	27
4.3	Low-Emitting Materials, Carpet Systems	1	23
4.4	Low-Emitting Materials, Composite Wood & Agrifibe	1	4
5	Indoor Chemical & Pollutant Source Control	1	7
6.1	Controllability of Systems, Lighting	1	25
6.2	Controllability of Systems, Thermal Comfort	1	22
7.1	Thermal Comfort, Design	1	25
7.2	Thermal Comfort, Verification	1	23
8.1	Daylight & Views, Daylight 75% of Spaces	1	14
8.2	Daylight & Views, Views for 90% of Spaces	1	19
Innovation & Design Process		5 Points	109
1.1	Innovation in Design: Provide Specific Title	1	26
1.2	Innovation in Design: Provide Specific Title	1	22
1.3	Innovation in Design: Provide Specific Title	1	19
1.4	Innovation in Design: Provide Specific Title	1	17
2	LEED® Accredited Professional	1	25
Project Totals (pre-certification estimates)		69 Points	988

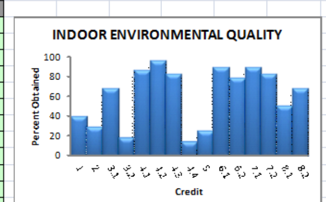
Certified 26-32 points Silver 33-38 points Gold 39-51 points Platinum 52-69 points

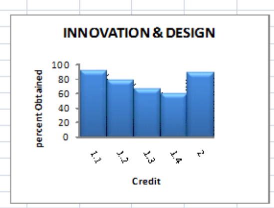












APPENDIX B

LEED-NC v2.2 Checklist

LEED-NC

LEED-NC Version 2.2 Registered Project Checklist

Sustainable Sites		14 Points
CREDIT		
Prereq 1	**Construction Activity Pollution Prevention**	Required
1	**Site Selection**	1
2	**Development Density & Community Connectivity**	1
3	**Brownfield Redevelopment**	1
4.1	**Alternative Transportation**, Public Transportation Access	1
4.2	**Alternative Transportation**, Bicycle Storage & Changing Rooms	1
4.3	**Alternative Transportation**, Low-Emitting and Fuel-Efficient Vehicles	1
4.4	**Alternative Transportation**, Parking Capacity	1
5.1	**Site Development,** Protect or Restore Habitat	1
5.2	**Site Development,** Maximize Open Space	1
6.1	**Stormwater Design,** Quantity Control	1
6.2	**Stormwater Design,** Quality Control	1
7.1	**Heat Island Effect,** Non-Roof	1
7.2	**Heat Island Effect,** Roof	1
8	**Light Pollution Reduction**	1

Water Efficiency		5 Points
CREDIT		
1.1	**Water Efficient Landscaping**, Reduce by 50%	1
1.2	**Water Efficient Landscaping**, No Potable Use or No Irrigation	1
2	**Innovative Wastewater Technologies**	1
3.1	**Water Use Reduction**, 20% Reduction	1
3.2	**Water Use Reduction**, 30% Reduction	1

Energy & Atmosphere		17 Points
CREDIT		
Prereq 1	**Fundamental Commissioning of the Building Energy Systems**	Required
Prereq 2	**Minimum Energy Performance**	Required
Prereq 3	**Fundamental Refrigerant Management**	Required
1	**Optimize Energy Performance**	1 to 10
2	**On-Site Renewable Energy**	1 to 3
3	**Enhanced Commissioning**	1
4	**Enhanced Refrigerant Management**	1
5	**Measurement & Verification**	1
6	**Green Power**	1

Materials & Resources		13 Points
CREDIT		
Prereq 1	**Storage & Collection of Recyclables**	Required
1.1	**Building Reuse**, Maintain 75% of Existing Walls, Floors & Roof	1
1.2	**Building Reuse**, Maintain 100% of Existing Walls, Floors & Roof	1
1.3	**Building Reuse**, Maintain 50% of Interior Non-Structural Elements	1
2.1	**Construction Waste Management**, Divert 50% from Disposal	1
2.2	**Construction Waste Management**, Divert 75% from Disposal	1
3.1	**Materials Reuse**, 5%	1
3.2	**Materials Reuse**,10%	1
4.1	**Recycled Content**, 10% (post-consumer + ½ pre-consumer)	1
4.2	**Recycled Content**, 20% (post-consumer + ½ pre-consumer)	1
5.1	**Regional Materials**, 10% Extracted, Processed & Manufactured Regionally	1
5.2	**Regional Materials**, 20% Extracted, Processed & Manufactured Regionally	1
6	**Rapidly Renewable Materials**	1
7	**Certified Wood**	1

Indoor Environmental Quality		15 Points
CREDIT		
Prereq 1	**Minimum IAQ Performance**	Required
Prereq 2	**Environmental Tobacco Smoke** (ETS) **Control**	Required
1	**Outdoor Air Delivery Monitoring**	1
2	**Increased Ventilation**	1
3.1	**Construction IAQ Management Plan**, During Construction	1
3.2	**Construction IAQ Management Plan**, Before Occupancy	1
4.1	**Low-Emitting Materials**, Adhesives & Sealants	1
4.2	**Low-Emitting Materials**, Paints & Coatings	1
4.3	**Low-Emitting Materials**, Carpet Systems	1
4.4	**Low-Emitting Materials**, Composite Wood & Agrifiber Products	1
5	**Indoor Chemical & Pollutant Source Control**	1
6.1	**Controllability of Systems**, Lighting	1
6.2	**Controllability of Systems**, Thermal Comfort	1
7.1	**Thermal Comfort**, Design	1
7.2	**Thermal Comfort**, Verification	1
8.1	**Daylight & Views**, Daylight 75% of Spaces	1
8.2	**Daylight & Views**, Views for 90% of Spaces	1

Innovation & Design Process		5 Points
CREDIT		
1.1	**Innovation in Design**: Provide Specific Title	1
1.2	**Innovation in Design**: Provide Specific Title	1
1.3	**Innovation in Design**: Provide Specific Title	1
1.4	**Innovation in Design**: Provide Specific Title	1
2	**LEED® Accredited Professional**	1

Project Totals (pre-certification estimates)	69 Points
Certified 26-32 points **Silver** 33-38 points **Gold** 39-51 points **Platinum** 52-69 points	

APPENDIX C

Credit Implementation Rates of Common Commercial Building Projects

Top LEED Point-Getters

N.	Element	Category	# of Projects	% of Projects
1	Local/Regional Materials, 20% Manufactured Locally	M&R 5.1	221	94.0%
2	Low-Emitting Materials, Carpet	IEQ 4.3	218	92.8%
3	Optimize Energy Performance, 20% New, 10% Existing	E&A 1.1	208	88.5%
4	Alternative Transportation, Bicycle Storage & Changing Rooms	SS 4.2	201	85.5%
5	Water Efficient Landscaping, Reduce by 50%	WE 1.1	200	85.1%
6	Recycled Content, Specify 25%	M&R 4.1	199	84.7%
7	Site Selection	SS 1.0	198	84.3%
8	Low-Emitting Materials, Adhesives & Sealants	IEQ 4.1	192	81.7%
9	Low-Emitting Materials, Paints	IEQ 4.2	191	81.3%
10	Construction Waste Management, Divert 50%	M&R 2.1	185	78.7%

Bottom LEED Point-Getters

N.	Element	Category	# of Projects	% of Projects
1	Building Reuse, Maintain 100% of Existing Shell & 50% of Non-Shell	M&R 1.3	4	1.7%
2	Resource Reuse, Specify 10%	M&R 3.2	11	4.7%
3	Building Reuse, Maintain 100% of Existing Shell	M&R 1.2	13	5.5%
4	Rapidly Renewable Materials	M&R 6.0	16	6.8%
5	Renewable Energy, 20%	E&A 2.3	20	8.5%
6	Renewable Energy, 10%	E&A 2.2	22	9.4%
7	Optimize Energy Performance, 60% New, 50% Existing	E&A 1.5	24	10.2%
8	Resource Reuse, Specify 5%	M&R 3.1	25	10.6%
9	Building Reuse, Maintain 75% of Existing Shell	M&R 1.1	28	11.9%
10	Brownfield Redevelopment	SS 3.0	31	13.2%

Source: Cryer et. al, (2006). p.38.

Table 7.1: Credit Use Summary

Rank	Credit	Frequency	% Earning	Rank	Credit	Frequency	% Earning
1	ID1.1	42	100%	34	EQ8.1	21	50%
2	ID2	42	100%	35	EA4	21	50%
3	WE3.1	41	98%	36	SS6.2	20	48%
4	MR5.1	41	98%	37	EA3	20	48%
5	SS4.2	41	98%	38	EQ3.2	19	45%
6	WE1.1	40	95%	39	EQ7.2	19	45%
7	ID1.2	40	95%	40	SS5.2	19	45%
8	WE3.2	39	93%	41	SS6.1	18	43%
9	EA1.1	39	93%	42	WE2	17	40%
10	EQ4.3	38	90%	43	EA6	17	40%
11	MR4.1	38	90%	44	SS7.2	15	36%
12	MR5.2	37	88%	45	EQ2	14	33%
13	MR2.1	37	88%	46	EA1.4	13	31%
14	SS1	37	88%	47	SS3	12	29%
15	EQ4.2	35	83%	48	SS5.1	12	29%
16	ID1.3	35	83%	49	EQ6.1	12	29%
17	EQ8.2	33	79%	50	EQ6.2	12	29%
18	EA1.2	33	79%	51	SS2	9	21%
19	EQ4.1	33	79%	52	SS4.3	9	21%
20	WE1.2	32	76%	53	MR3.1	6	14%
21	SS4.1	29	69%	54	EA1.5	6	14%
22	EQ7.1	29	69%	55	MR8	5	12%
23	MR2.2	29	69%	56	EA2.1	4	10%
24	EQ5	28	67%	57	EA5	4	10%
25	EQ3.1	28	67%	58	EA2.2	3	7%
26	MR4.2	27	64%	59	MR3.2	3	7%
27	SS4.4	27	64%	60	MR7	3	7%
28	SS8	26	62%	61	EA2.3	2	5%
29	EQ1	25	60%	62	MR1.1	2	5%
30	ID1.4	25	60%	63	MR6	2	5%
31	EA1.3	24	57%	64	MR1.2	1	2%
32	SS7.1	24	57%	65	MR1.3	0	0%
33	EQ4.4	22	52%				

Source: Da Silva, (2008). p.145.

SCORESHEET APPENDIX

THE ALLISON INN AND SPA
Newberg, Oregon

SUSTAINABLE DESIGN CASE STUDY

37% water use reduction

48% projected utility cost savings

78% reduction of potable water use for irrigation

The Allison Inn & Spa
Newberg, Oregon

Completion:	September 2009
Project Size:	32 acres, 150,000 sf, 85 Guest Rooms
Statistics:	Inn, Spa, Conference & Restaurant
Owner:	Springbrook Properties, Inc.
Architecture:	GGLO
Landscape Architecture:	GGLO
Interior Design:	GGLO
Contractor:	Lease Crutcher Lewis
Civil Engineer:	Cardno/WRG
Structure:	KGA
Enhanced Commissioning:	BEA Consulting
Electrical Engineer:	Glumac
Mechanical and Plumbing Engineer:	Glumac

LEED® Gold

LEED for New Construction
Certification awarded April 1, 2010

Total LEED® Points	49
Sustainable Sites	09 of 14
Water Efficiency	03 of 05
Energy & Atmosphere	15 of 17
Materials & Resources	07 of 13
Indoor Environmental Quality	10 of 15
Innovation & Design	05 of 05

SUSTAINABLE DESIGN CASE STUDY
The Allison Inn & Spa

LEED® POINT HIGHLIGHTS	
Sustainable Sites	
SS 4.2, 4.3, 4.4	Alternative transportation for guests & employees including bicycling, low-emitting vehicles, & carpooling are encouraged
SS 5.1, 5.2	Native & adaptive planting maximize open space & provide habitat
SS 6.1, 6.2	Vegetated roof, swales & permeable paving filter & mitigate stormwater
SSc7.2	Planted roof & low sloped roofing materials reject solar heat buildup to minimize the building's microclimate impact
Water Efficiency	
WE 1.1	Drought tolerant landscape utilizing high efficiency irrigation reduce potable water use by over 78%
WE 3.1, 3.2	High efficiency toilets, low-flow showerheads and faucet aerators reduce water use by 37%
Energy and Atmosphere	
EA 1.1 thru 1.10	Envelope improvements combined with digital controls, high efficiency mechanical systems, equipment and lighting provide a projected 48% energy costs savings
EA 2.1, 2.2, 2.3	55 kW photovoltaic array and 3,800 sf solar water heating reduce energy consumption
Materials & Resources	
MR 2.1, 2.2	90% of construction waste diverted from landfill
MR 4.1, 4.2	28% of total building materials contained recycled content
MR 5.1, 5.2	24% of materials regionally sourced & manufactured
MR 7.0	55% FSC certified wood products
Indoor Environmental Quality	
EQ 6.1, 6.2	Controllability of lighting and HVAC systems promote comfort and well-being for guests and staff
EQ 7.1, 7.2	Quality HVAC systems provide thermal comfort
EQ 8.1	Daylight is provided in 75% of the guest, public and staff areas

Background
The Allison reflects the bounty of Willamette Valley and demonstrates that luxury, comfort and quality do not have to be compromised for energy efficiency and sustainability.

Better Site Design:
- Vegetated swales, vegetated open-cell pavement, +10,000 sf of planted roof, and settling ponds slow down and remove potential pollutants from stormwater run-off
- Extensive native and adaptive vegetation used throughout and restored woodland along northern property boundary promote biodiversity

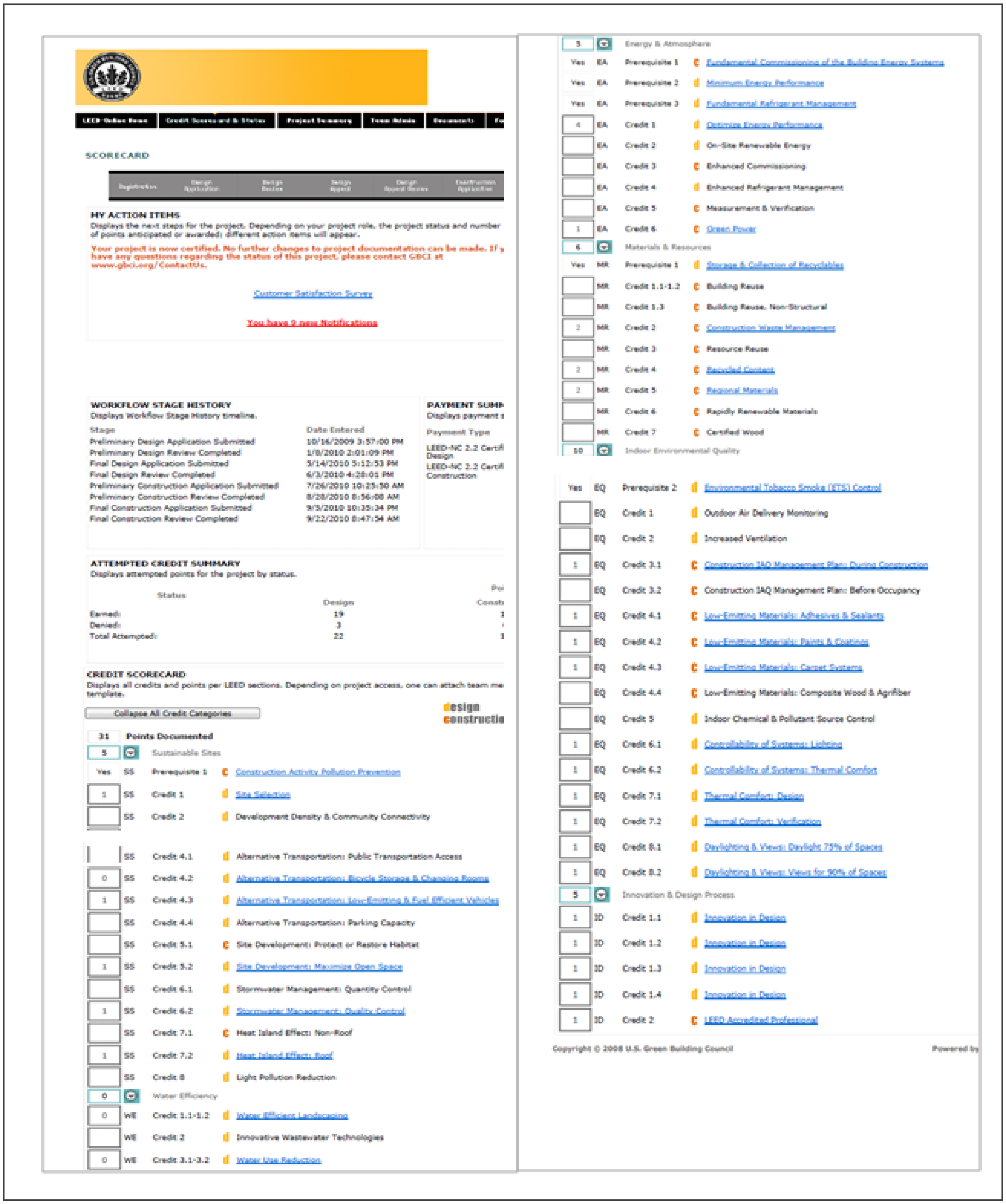
Conserving Water:
- Drought tolerant vegetation & high efficiency irrigation reduces potable water use
- Irrigation system will accept future City of Newberg reclaimed water supply which will eliminate potable water use for landscape irrigation in the near future
- Low-flow showerheads, faucets, urinals, and high efficiency toilets reduce water use in public areas and guest rooms
- High efficiency kitchen equipment reduces potable water & water heating demand

Conserving Energy:
The Allison consists of many uses which ordinarily would categorize this project as a high energy consuming property. However, incorporation of energy efficiency was a high priority throughout the design process. This focus resulted in an anticipated energy cost savings of almost 50% relative to a conventionally designed building:
- Solar Power: 55 kW photovoltaic array on southern rooftops produces electricity on-site to reduce the need for fossil fuels
- Solar Hot Water: rooftop collectors reduce the large need for heating water related to the kitchen, laundry, guest rooms, and spa
- Thermally broken, double-pane, low-e windows and south facing orientation reduce heating loads
- Variable Refrigerant Volume (VRV) heating and cooling provide superior efficiency in comparison to typical hospitality HVAC system
- Energy efficient lighting & controls reduce electricity usage

Better Materials and Indoor Environment:
Materials were selected for their durability, promotion of healthy indoor air quality, recycled content and location of harvest and manufacturing:
- Low emitting paints, sealants, carpeting, and cabinetry combined with natural daylighting contribute to the health of the indoor environment
- 55% of total wood based materials are harvested from FSC certified forests.
- Rapidly renewable aspen fiber flooring enriches the spa while reducing the demand on old growth timber

SCORESHEET APPENDIX

ALOFT HOTEL BALLANTYNE
Charlotte, North Carolina


SCORECARD

MY ACTION ITEMS
Displays the next steps for the project. Depending on your project role, the project status and number of points anticipated or awarded; different action items will appear.

Your project is now certified. No further changes to project documentation can be made. If y have any questions regarding the status of this project, please contact GBCI at www.gbci.org/ContactUs.

Customer Satisfaction Survey

You have 9 new Notifications

WORKFLOW STAGE HISTORY
Displays Workflow Stage History timeline.

Stage	Date Entered
Preliminary Design Application Submitted	10/16/2009 3:57:00 PM
Preliminary Design Review Completed	1/8/2010 2:01:09 PM
Final Design Application Submitted	5/14/2010 5:12:53 PM
Final Design Review Completed	6/3/2010 4:28:01 PM
Preliminary Construction Application Submitted	7/26/2010 10:25:50 AM
Preliminary Construction Review Completed	8/28/2010 8:56:08 AM
Final Construction Application Submitted	9/5/2010 10:35:34 PM
Final Construction Review Completed	9/22/2010 8:47:54 AM

ATTEMPTED CREDIT SUMMARY
Displays attempted points for the project by status.

Status	Design
Earned:	19
Denied:	3
Total Attempted:	22

CREDIT SCORECARD
Displays all credits and points per LEED sections. Depending on project access, one can attach team me template.

Collapse All Credit Categories

31 Points Documented

5			Sustainable Sites
Yes	SS	Prerequisite 1	Construction Activity Pollution Prevention
1	SS	Credit 1	Site Selection
	SS	Credit 2	Development Density & Community Connectivity
	SS	Credit 4.1	Alternative Transportation: Public Transportation Access
0	SS	Credit 4.2	Alternative Transportation: Bicycle Storage & Changing Rooms
1	SS	Credit 4.3	Alternative Transportation: Low-Emitting & Fuel Efficient Vehicles
	SS	Credit 4.4	Alternative Transportation: Parking Capacity
	SS	Credit 5.1	Site Development: Protect or Restore Habitat
1	SS	Credit 5.2	Site Development: Maximize Open Space
	SS	Credit 6.1	Stormwater Management: Quantity Control
1	SS	Credit 6.2	Stormwater Management: Quality Control
	SS	Credit 7.1	Heat Island Effect: Non-Roof
1	SS	Credit 7.2	Heat Island Effect: Roof
	SS	Credit 8	Light Pollution Reduction
0			Water Efficiency
0	WE	Credit 1.1-1.2	Water Efficient Landscaping
	WE	Credit 2	Innovative Wastewater Technologies
0	WE	Credit 3.1-3.2	Water Use Reduction
5			Energy & Atmosphere
Yes	EA	Prerequisite 1	Fundamental Commissioning of the Building Energy Systems
Yes	EA	Prerequisite 2	Minimum Energy Performance
Yes	EA	Prerequisite 3	Fundamental Refrigerant Management
4	EA	Credit 1	Optimize Energy Performance
	EA	Credit 2	On-Site Renewable Energy
	EA	Credit 3	Enhanced Commissioning
	EA	Credit 4	Enhanced Refrigerant Management
	EA	Credit 5	Measurement & Verification
1	EA	Credit 6	Green Power
6			Materials & Resources
Yes	MR	Prerequisite 1	Storage & Collection of Recyclables
	MR	Credit 1.1-1.2	Building Reuse
	MR	Credit 1.3	Building Reuse, Non-Structural
2	MR	Credit 2	Construction Waste Management
	MR	Credit 3	Resource Reuse
2	MR	Credit 4	Recycled Content
2	MR	Credit 5	Regional Materials
	MR	Credit 6	Rapidly Renewable Materials
	MR	Credit 7	Certified Wood
10			Indoor Environmental Quality
Yes	EQ	Prerequisite 2	Environmental Tobacco Smoke (ETS) Control
	EQ	Credit 1	Outdoor Air Delivery Monitoring
	EQ	Credit 2	Increased Ventilation
1	EQ	Credit 3.1	Construction IAQ Management Plan: During Construction
	EQ	Credit 3.2	Construction IAQ Management Plan: Before Occupancy
1	EQ	Credit 4.1	Low-Emitting Materials: Adhesives & Sealants
1	EQ	Credit 4.2	Low-Emitting Materials: Paints & Coatings
1	EQ	Credit 4.3	Low-Emitting Materials: Carpet Systems
	EQ	Credit 4.4	Low-Emitting Materials: Composite Wood & Agrifiber
	EQ	Credit 5	Indoor Chemical & Pollutant Source Control
1	EQ	Credit 6.1	Controllability of Systems: Lighting
1	EQ	Credit 6.2	Controllability of Systems: Thermal Comfort
1	EQ	Credit 7.1	Thermal Comfort: Design
1	EQ	Credit 7.2	Thermal Comfort: Verification
1	EQ	Credit 8.1	Daylighting & Views: Daylight 75% of Spaces
1	EQ	Credit 8.2	Daylighting & Views: Views for 90% of Spaces
5			Innovation & Design Process
1	ID	Credit 1.1	Innovation in Design
1	ID	Credit 1.2	Innovation in Design
1	ID	Credit 1.3	Innovation in Design
1	ID	Credit 1.4	Innovation in Design
1	ID	Credit 2	LEED Accredited Professional

SCORESHEET APPENDIX

CAVALLO POINT LODGE
Sausalito, California

LEED

Cavallo Point - The Lodge at the Golden Gate

Submitting for LEED-NC v2.2 GOLD
(Under Final Review by USGBC)
45 Total Points Attempted

		SUSTAINABLE SITES
REQ	SSp01	Erosion & Sedimentation Control (Required)
1	SSc01	Site Selection
1	SSc02	Development Density
1	SSc03	Brownfield Redevelopment
1	SSc04.1	Alternative Transportation: Public Transportation Access
1	SSc04.2	Alternative Transportation: Bicycle Storage & Changing Rooms
1	SSc04.3	Alternative Transportation: Alternative Fuel Vehicles
1	SSc04.4	Alternative Transportation: Parking Capacity
1	SSc05.1	Site Development: Protect or Restore Open Space
1	SSc05.2	Site Development: Development Footprint
1	SSc06.1	Stormwater Design: Rate and Quantity Reduction
1	SSc06.2	Stormwater Design: Treatment
x	SSc07.1	Heat Island Effect: Non-Roof
x	SSc07.2	Heat Island Effect: Roof
1	SSc08	Light Pollution Reduction
		WATER EFFICIENCY
1	WEc01.1	Water Efficient Landscaping: Reduce by 50%
x	WEc01.2	Water Efficient Landscaping: No Potable Water Use OR No Irrigation
x	WEc02	Innovative Wastewater Technologies
1	WEc03.1	Water Use Reduction: 20% Reduction
x	WEc03.2	Water Use Reduction: 30% Reduction
		ENERGY & ATMOSPHERE
REQ	EAp01	Fundamental Building Systems Commissioning (Required)
REQ	EAp02	Minimum Energy Performance (Required)
REQ	EAp03	CFC Reduction in HVAC&R Equipment (Required)
1		EAc01.01 Optimize Energy Performance: >= 10.5% new/3.5% existing
1		EAc01.02 Optimize Energy Performance: >= 14% new/7% existing
1		EAc01.03 Optimize Energy Performance: >= 17.5% new/10.5% existing
1		EAc01.04 Optimize Energy Performance: >= 21% new/14% existing
x		EAc01.05 Optimize Energy Performance: >= 24.5% new/17.5% existing
x		EAc01.06 Optimize Energy Performance: >= 28% new/21% existing
x		EAc01.07 Optimize Energy Performance: >= 31.5% new/34.5% existing
x		EAc01.08 Optimize Energy Performance: >= 35% new/28% existing
x		EAc01.09 Optimize Energy Performance: >= 38.5% new/31.5% existing
x		EAc01.10 Optimize Energy Performance: >= 42% new/35% existing
2	EAc02.1	On-Site Renewable Energy
x	EAc03	Enhanced Commissioning
1	EAc04	Enhanced Refrigerant Management
1	EAc05	Measurement and Verification
1	EAc06	Green Power

		MATERIALS & RESOURCES
REQ	MRp01	Storage & Collection of Recyclables (Required)
1	MRc01.1	Building Reuse: Maintain 75% Existing Walls, Floors and Roof
1	MRc01.2	Building Reuse: Maintain 95% Existing Walls: Roofs and Floors
1	MRc01.3	Building Reuse: Maintain 50% of Interior Non-Structural Elements
1	MRc02.1	Construction Waste Management: Divert 50% From Landfill
x	MRc02.2	Construction Waste Management: Divert 75% From Landfill
x	MRc03.1	Materials Reuse: 5%
x	MRc03.2	Materials Reuse: 10%
1	MRc04.1	Recycled Content: 10%
x	MRc04.2	Recycled Content: 20%
x	MRc05.1	Regional Materials: 10%
x	MRc05.2	Regional Materials: 20%
x	MRc06	Rapidly Renewable Materials
x	MRc07	Certified Wood
		INDOOR ENVIRONMENTAL QUALITY
REQ	EQp01	Minimum IAQ Performance (Required)
REQ	EQp02	Environmental Tobacco Smoke (ETS) Control (Required)
x	EQc01	Outdoor Air Delivery Monitoring
1	EQc02	Increased Ventilation
1	EQc03.1	Construction IAQ Management Plan: During Construction
1	EQc03.2	Construction IAQ Management Plan: Before Occupancy
1	EQc04.1	Low-Emitting Materials: Adhesives & Sealants
1	EQc04.2	Low-Emitting Materials: Paints and Coatings
1	EQc04.3	Low-Emitting Materials: Carpet
x	EQc04.4	Low-Emitting Materials: Composite Wood
1	EQc05	Indoor Chemical & Pollutant Source Control
1	EQc06.1	Controllability of Systems: Lighting
1	EQc06.2	Controllability of Systems: Thermal Control
1	EQc07.1	Thermal Comfort: Design
1	EQc07.2	Thermal Comfort: Verification
1	EQc08.1	Daylight and Views: Daylight 75% of Spaces
1	EQc08.2	Daylight and Views: Views for 90% of Spaces
		INNOVATION & DESIGN PROCESS
1	IDc01.1	Innovation in Design:Habitat Restoration
1	IDc01.2	Innovation in Design: Green Housekeeping
1	IDc01.3	Innovation in Design: Education
1	IDc01.4	Innovation in Design: Laundry Water Reclamation
1	IDc02	LEED Accredited Professional

LEGEND

1	attempted
x	not attmpted
REQ	required

SCORESHEET APPENDIX

CITYFLATS HOTEL AND CONFERENCE CENTRE
Holland, Michigan

LEED-NC

GMB ae ARCHITECTURE + ENGINEERING

LEED-NC Version 2.2 Final Project Checklist
Charter House Hotel
Holland, MI

Yes	?	No			
7		7		**Sustainable Sites**	14 Points
Y			Prereq 1	**Construction Activity Pollution Prevention**	Required
1			Credit 1	**Site Selection**	1
1			Credit 2	**Development Density & Community Connectivity**	1
		1	Credit 3	**Brownfield Redevelopment**	1
1			Credit 4.1	**Alternative Transportation**, Public Transportation Access	1
1			Credit 4.2	**Alternative Transportation**, Bicycle Storage & Changing Rooms	1
1			Credit 4.3	**Alternative Transportation**, Low-Emitting and Fuel-Efficient Vehicles	1
1			Credit 4.4	**Alternative Transportation**, Parking Capacity	1
		1	Credit 5.1	**Site Development,** Protect of Restore Habitat	1
		1	Credit 5.2	**Site Development,** Maximize Open Space	1
		1	Credit 6.1	**Stormwater Design,** Quantity Control	1
		1	Credit 6.2	**Stormwater Design,** Quality Control	1
		1	Credit 7.1	**Heat Island Effect,** Non-Roof	1
1			Credit 7.2	**Heat Island Effect,** Roof	1
		1	Credit 8	**Light Pollution Reduction**	1
3		2		**Water Efficiency**	5 Points
1			Credit 1.1	**Water Efficient Landscaping**, Reduce by 50%	1
		1	Credit 1.2	**Water Efficient Landscaping**, No Potable Use or No Irrigation	1
		1	Credit 2	**Innovative Wastewater Technologies**	1
1			Credit 3.1	**Water Use Reduction**, 20% Reduction	1
1			Credit 3.2	**Water Use Reduction**, 30% Reduction	1
6		4		**Energy & Atmosphere**	17 Points
Y			Prereq 1	**Fundamental Commissioning of the Building Energy Systems**	Required
Y			Prereq 2	**Minimum Energy Performance**	Required
Y			Prereq 3	**Fundamental Refrigerant Management**	Required
5			Credit 1	**Optimize Energy Performance**	1 to 10
		1	Credit 2	**On-Site Renewable Energy**	1 to 3
		1	Credit 3	**Enhanced Commissioning**	1
		1	Credit 4	**Enhanced Refrigerant Management**	1
1			Credit 5	**Measurement & Verification**	1
		1	Credit 6	**Green Power**	1
8		5		**Materials & Resources**	13 Points
Y			Prereq 1	**Storage & Collection of Recyclables**	Required
		1	Credit 1.1	**Building Reuse**, Maintain 75% of Existing Walls, Floors & Roof	1
		1	Credit 1.2	**Building Reuse**, Maintain 100% of Existing Walls, Floors & Roof	1
		1	Credit 1.3	**Building Reuse**, Maintain 50% of Interior Non-Structural Elements	1
1			Credit 2.1	**Construction Waste Management**, Divert 50% from Disposal	1
1			Credit 2.2	**Construction Waste Management**, Divert 75% from Disposal	1
		1	Credit 3.1	**Materials Reuse**, 5%	1
		1	Credit 3.2	**Materials Reuse**,10%	1
1			Credit 4.1	**Recycled Content**, 10% (post-consumer + ½ pre-consumer)	1
1			Credit 4.2	**Recycled Content**, 20% (post-consumer + ½ pre-consumer)	1
1			Credit 5.1	**Regional Materials**, 10% Extracted, Processed & Manufactured Regiona	1
1			Credit 5.2	**Regional Materials**, 20% Extracted, Processed & Manufactured Regiona	1
1			Credit 6	**Rapidly Renewable Materials**	1
1			Credit 7	**Certified Wood**	1
13		2		**Indoor Environmental Quality**	15 Points
Y			Prereq 1	**Minimum IAQ Performance**	Required
Y			Prereq 2	**Environmental Tobacco Smoke** (ETS) **Control**	Required
1			Credit 1	**Outdoor Air Delivery Monitoring**	1
1			Credit 2	**Increased Ventilation**	1
1			Credit 3.1	**Construction IAQ Management Plan**, During Construction	1
		1	Credit 3.2	**Construction IAQ Management Plan**, Before Occupancy	1
1			Credit 4.1	**Low-Emitting Materials**, Adhesives & Sealants	1
1			Credit 4.2	**Low-Emitting Materials**, Paints & Coatings	1
1			Credit 4.3	**Low-Emitting Materials**, Carpet Systems	1
1			Credit 4.4	**Low-Emitting Materials**, Composite Wood & Agrifiber Products	1
		1	Credit 5	**Indoor Chemical & Pollutant Source Control**	1
1			Credit 6.1	**Controllability of Systems**, Lighting	1
1			Credit 6.2	**Controllability of Systems**, Thermal Comfort	1
1			Credit 7.1	**Thermal Comfort**, Design	1
1			Credit 7.2	**Thermal Comfort**, Verification	1
1			Credit 8.1	**Daylight & Views**, Daylight 75% of Spaces	1
1			Credit 8.2	**Daylight & Views**, Views for 90% of Spaces	1
2		3		**Innovation & Design Process**	5 Points
1			Credit 1.1	**Innovation in Design**: Green Cleaning policy	1
		1	Credit 1.2	**Innovation in Design**:	1
		1	Credit 1.3	**Innovation in Design**:	1
		1	Credit 1.4	**Innovation in Design**:	1
1			Credit 2	**LEED® Accredited Professional**	1
39		23		**Project Totals (pre-certification estimates)**	69 Points

Certified 26-32 points **Silver** 33-38 points **Gold** 39-51 points **Platinum** 52-69 points

SCORESHEET APPENDIX

COURTYARD MARRIOTT CHEVY CHASE
Chevy Chase, Maryland

LEED for New Construction v 2.2
Registered Project Checklist

Project Name: Marriott Courtyard Chevy Chase

Project Address: 5520 Wisconsin Ave, Chevy Chase, MD.

Yes	?	No		
41	3	19	**Project Totals** (Pre-Certification Estimates)	69 Points
GOLD			**Certified:** 26-32 points **Silver:** 33-38 points **Gold:** 39-51 points **Platinum:** 52-69 points	

Yes	?	No			
6	0	8	**Sustainable Sites**		14 Points
Yes			Prereq 1	**Construction Activity Pollution Prevention**	Required
1			Credit 1	**Site Selection**	1
1			Credit 2	**Development Density & Community Connectivity**	1
		1	Credit 3	**Brownfield Redevelopment**	1
1			Credit 4.1	**Alternative Transportation**, Public Transportation	1
0	0	1	Credit 4.2	**Alternative Transportation**, Bicycle Storage & Changing Rooms	1
1		0	Credit 4.3	**Alternative Transportation**, Low-Emitting & Fuel Efficient Vehicles	1
1			Credit 4.4	**Alternative Transportation**, Parking Capacity	1
		1	Credit 5.1	**Site Development**, Protect or Restore Habitat	1
		1	Credit 5.2	**Site Development**, Maximize Open Space	1
	0	1	Credit 6.1	**Stormwater Design**, Quantity Control	1
	0	1	Credit 6.2	**Stormwater Design**, Quality Control	1
0		1	Credit 7.1	**Heat Island Effect**, Non-Roof	1
1			Credit 7.2	**Heat Island Effect**, Roof	1
	0	1	Credit 8	**Light Pollution Reduction**	1

Yes	?	No			
2	0	3	**Water Efficiency**		5 Points
0	0	1	Credit 1.1	**Water Efficient Landscaping**, Reduce by 50%	1
0	0	1	Credit 1.2	**Water Efficient Landscaping**, No Potable Use or No Irrigation	1
		1	Credit 2	**Innovative Wastewater Technologies**	1
1	0		Credit 3.1	**Water Use Reduction**, 20% Reduction	1
1	0		Credit 3.2	**Water Use Reduction**, 30% Reduction	1

Yes	?	No			
8	0	1	**Energy & Atmosphere**		17 Points
Yes			Prereq 1	**Fundamental Commissioning of the Building Energy Systems**	Required
Yes			Prereq 1	**Minimum Energy Performance**	Required
Yes			Prereq 1	**Fundamental Refrigerant Management**	Required

***Note for EAc1:** All LEED for New Construction projects registered after June 26, 2007 are required to achieve at least two (2) points.

Yes	?	No			
5	0		Credit 1	**Optimize Energy Performance**	1 to 10
				10.5% New Buildings or 3.5% Existing Building Renovations	1
				14% New Buildings or 7% Existing Building Renovations	2
				17.5% New Buildings or 10.5% Existing Building Renovations	3
				21% New Buildings or 14% Existing Building Renovations	4
			-->	24.5% New Buildings or 17.5% Existing Building Renovations	5
				28% New Buildings or 21% Existing Building Renovations	6
				31.5% New Buildings or 24.5% Existing Building Renovations	7
				35% New Buildings or 28% Existing Building Renovations	8
				38.5% New Buildings or 31.5% Existing Building Renovations	9
				42% New Buildings or 35% Existing Building Renovations	10
		1	Credit 2	**On-Site Renewable Energy**	1 to 3
				2.5% Renewable Energy	1
				7.5% Renewable Energy	2
				12.5% Renewable Energy	3
	0	1	Credit 3	**Enhanced Commissioning**	1
1			Credit 4	**Enhanced Refrigerant Management**	1
1	0		Credit 5	**Measurement & Verification**	1
1	0		Credit 6	**Green Power**	1

LEED for New Construction v 2.2
Registered Project Checklist

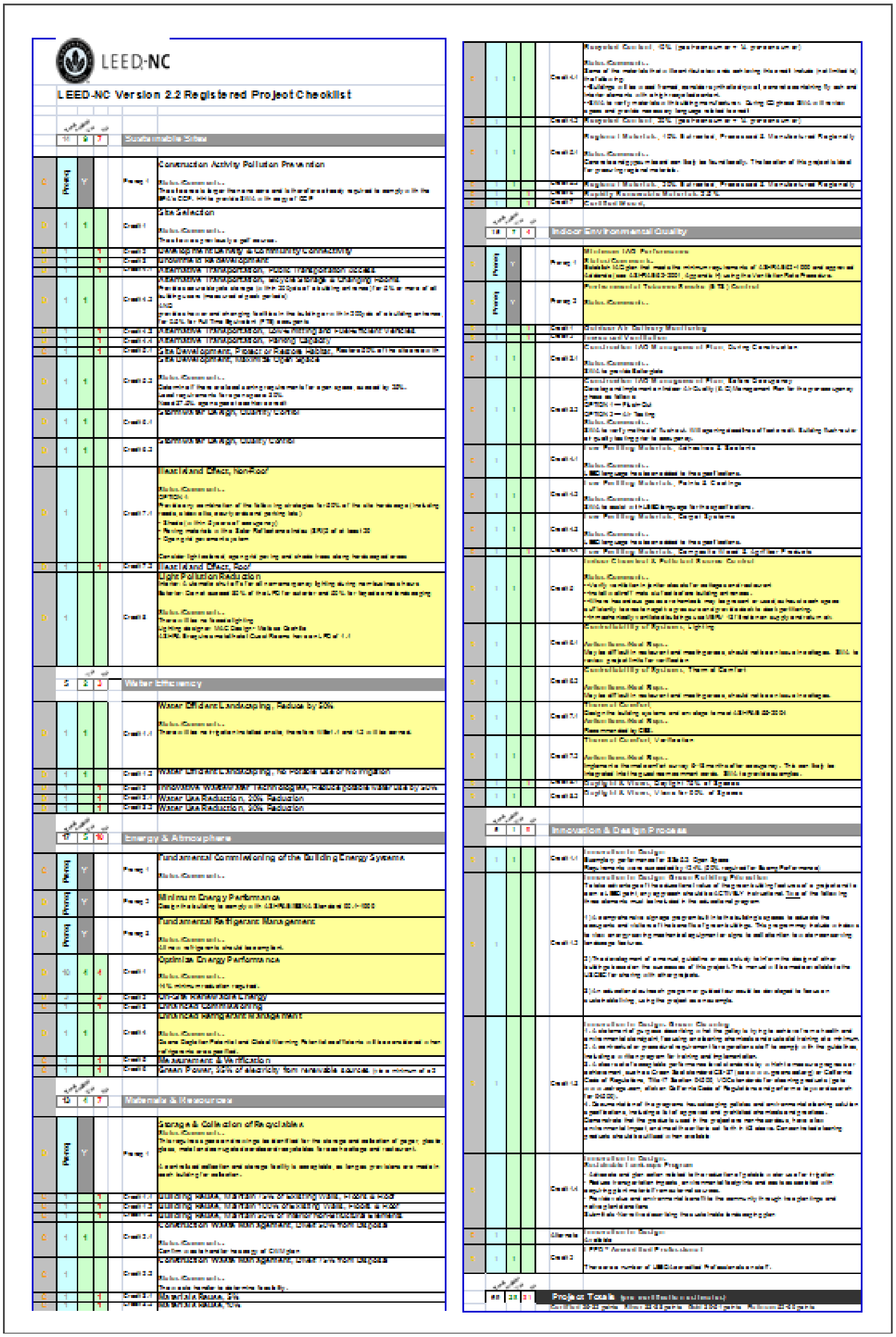
Yes	?	No			
9	3	3	**Materials & Resources**		13 Points
Yes			Prereq 1	**Storage & Collection of Recyclables**	Required
1			Credit 1.1	**Building Reuse,** Maintain 75% of Existing Walls, Floors & Roof	1
	1	0	Credit 1.2	**Building Reuse,** Maintain 95% of Existing Walls, Floors & Roof	1
1	0	0	Credit 1.3	**Building Reuse,** Maintain 50% of Interior Non-Structural Elements	1
1			Credit 2.1	**Construction Waste Management,** Divert 50% from Disposal	1
1	0		Credit 2.2	**Construction Waste Management,** Divert 75% from Disposal	1
	0	1	Credit 3.1	**Materials Reuse,** 5%	1
		1	Credit 3.2	**Materials Reuse,** 10%	1
1			Credit 4.1	**Recycled Content,** 10% (post-consumer + 1/2 pre-consumer)	1
1	1	0	Credit 4.2	**Recycled Content,** 20% (post-consumer + 1/2 pre-consumer)	1
1	0	0	Credit 5.1	**Regional Materials,** 10% Extracted, Processed & Manufactured	1
1	1	0	Credit 5.2	**Regional Materials,** 20% Extracted, Processed & Manufactured	1
		1	Credit 6	**Rapidly Renewable Materials**	1
1	0		Credit 7	**Certified Wood**	1

Yes	?	No			
11	0	4	**Indoor Environmental Quality**		14 Points
Yes			Prereq 1	**Minimum IAQ Performance**	Required
Yes			Prereq 2	**Environmental Tobacco Smoke (ETS) Control**	Required
1	0	0	Credit 1	**Outdoor Air Delivery Monitoring**	1
0	0	1	Credit 2	**Increased Ventilation**	1
1			Credit 3.1	**Construction IAQ Management Plan,** During Construction	1
0	0	1	Credit 3.2	**Construction IAQ Management Plan,** Before Occupancy	1
1			Credit 4.1	**Low-Emitting Materials,** Adhesives & Sealants	1
1			Credit 4.2	**Low-Emitting Materials,** Paints & Coatings	1
1			Credit 4.3	**Low-Emitting Materials,** Carpet Systems	1
1	0		Credit 4.4	**Low-Emitting Materials,** Composite Wood & Agrifiber Products	1
0		1	Credit 5	**Indoor Chemical & Pollutant Source Control**	1
1			Credit 6.1	**Controllability of Systems,** Lighting	1
1			Credit 6.2	**Controllability of Systems,** Thermal Comfort	1
1			Credit 7.1	**Thermal Comfort,** Design	1
1			Credit 7.2	**Thermal Comfort,** Verification	1
0		1	Credit 8.1	**Daylight & Views,** Daylight 75% of Spaces	1
1	0	0	Credit 8.2	**Daylight & Views,** Views for 90% of Spaces	1

Yes	?	No			
5	0		**Innovation & Design Process**		5 Points
1	0		Credit 1.1	**Innovation in Design:** Exemplary Performance EAc6 Green Power	1
1	0		Credit 1.2	**Innovation in Design:** Educational Outreach	1
1	0		Credit 1.3	**Innovation in Design:** Exemplary Performance WEc3 Water Efficiency	1
1			Credit 1.4	**Innovation in Design:** Exemplary Performance SSc4.1 Public Transportai	1
1			Credit 2	**LEED® Accredited Professional**	1

HOTEL HERSHEY

Hershey, Pennsylvania


LEED-NC

LEED-NC Version 2.2 Registered Project Checklist

Sustainable Sites

Construction Activity Pollution Prevention

Site Selection

Alternative Transportation, Public Transportation Access

Alternative Transportation, Bicycle Storage & Changing Rooms

Alternative Transportation, Parking Capacity

Site Development, Protect or Restore Habitat

Site Development, Maximize Open Space

Heat Island Effect, Non-Roof

Heat Island Effect, Roof

Light Pollution Reduction

Water Efficiency

Water Efficient Landscaping, Reduce by 50%

Water Efficient Landscaping, No Potable Use or No Irrigation

Water Use Reduction, 20% Reduction

Water Use Reduction, 30% Reduction

Energy & Atmosphere

Fundamental Commissioning of the Building Energy Systems

Minimum Energy Performance

Fundamental Refrigerant Management

Optimize Energy Performance

On-Site Renewable Energy

Enhanced Commissioning

Enhanced Refrigerant Management

Measurement & Verification

Green Power

Materials & Resources

Storage & Collection of Recyclables

Construction Waste Management

Materials Reuse

Regional Materials

Rapidly Renewable Materials

Certified Wood

Indoor Environmental Quality

Minimum IAQ Performance

Environmental Tobacco Smoke (ETS) Control

Outdoor Air Delivery Monitoring

Increased Ventilation

Construction IAQ Management Plan, During Construction

Construction IAQ Management Plan, Before Occupancy

Low-Emitting Materials, Adhesives & Sealants

Low-Emitting Materials, Paints & Coatings

Low-Emitting Materials, Carpet Systems

Indoor Chemical & Pollutant Source Control

Controllability of Systems, Lighting

Controllability of Systems, Thermal Comfort

Thermal Comfort, Design

Thermal Comfort, Verification

Daylight & Views

Innovation & Design Process

Innovation in Design

LEED® Accredited Professional

Project Totals

SCORESHEET APPENDIX

COURTYARD MARRIOTT - PORTLAND CITY CENTER
Portland, Oregon

LEED NC Scorecard

Courtyard by Marriott 4.16.09

BRIGHTWORKS

Yes	?Y	?N	No	
41	2	0	26	**Total Project Score**

Certified 26 to 32 points Silver 33 to 38 points Gold 39 to 51 points Platinum 52 or more points

Y	?Y	?N	N			
9	1	0	4			**Sustainable Sites**
Y				c	Prereq 1	Construction Activity Pollution Prevention
1				d	Credit 1	Site Selection
1				d	Credit 2	Development Density & Community Connectivity
1				d	Credit 3	Brownfield Redevelopment
1				d	Credit 4.1	Alternative Transportation, Public Transportation Access
1				d	Credit 4.2	Alternative Transportation, Bicycle Storage & Changing Rooms
	1			d	Credit 4.3	Alternative Transportation, Low Emitting & Fuel Efficient Vehicles
1				d	Credit 4.4	Alternative Transportation, Parking Capacity
			1	c	Credit 5.1	Site Development, Protect or Restore Habitat
			1	d	Credit 5.2	Site Development, Maximize Open Space
			1	d	Credit 6.1	Stormwater Design, Quantity Control
			1	d	Credit 6.2	Stormwater Design, Quality Control
1				c	Credit 7.1	Heat Island Effect, Non-Roof
1				d	Credit 7.2	Heat Island Effect, Roof
1				d	Credit 8	Light Pollution Reduction

Y	?Y	?N	N			
3	0	0	2			**Water Efficiency**
1				d	Credit 1.1	Water Efficient Landscaping, Reduce by 50%
1				d	Credit 1.2	Water Efficient Landscaping, No Potable Use or No Irrigation
			1	d	Credit 2	Innovative Wastewater Technologies
1				d	Credit 3.1	Water Use Reduction, 20% Reduction
			1	d	Credit 3.2	Water Use Reduction, 30% Reduction

Y	?Y	?N	N			
9	0	0	8			**Energy & Atmosphere**
Y				c	Prereq 1	Fundamental Commissioning of the Building Energy Systems
Y				d	Prereq 2	Minimum Energy Performance
Y				d	Prereq 3	Fundamental Refrigerant Management
2				d	Credit 1.1	Optimize Energy Performance, 14% New / 7% Existing
2				d	Credit 1.2	Optimize Energy Performance, 21% New / 14% Existing
2				d	Credit 1.3	Optimize Energy Performance, 28% New / 21% Existing
			2	d	Credit 1.4	Optimize Energy Performance, 35% New / 28% Existing
			2	d	Credit 1.5	Optimize Energy Performance, 42% New / 35% Existing
			1	d	Credit 2.1	On-Site Renewable Energy, 2.5%
			1	d	Credit 2.2	On-Site Renewable Energy, 7.5%
			1	d	Credit 2.3	On-Site Renewable Energy, 12.5%
1				c	Credit 3	Enhanced Commissioning
1				d	Credit 4	Enhanced Refrigerant Management
			1	c	Credit 5	Measurement & Verification
1				c	Credit 6	Green Power 35%

Y	?Y	?N	N			
4	1	0	8			**Materials & Resources**
Y				d	Prereq 1	Storage & Collection of Recyclables
			1	d	Credit 1.1	Building Reuse, Maintain 75% of Existing Walls, Floors & Roof
			1	d	Credit 1.2	Building Reuse, Maintain 95% of Existing Walls, Floors & Roof
			1	d	Credit 1.3	Building Reuse, Maintain 50% of Interior Non-Structural Elements
1				c	Credit 2.1	Construction Waste Management, Divert 50%
1				c	Credit 2.2	Construction Waste Management, Divert 75%
			1	d	Credit 3.1	Materials Reuse, Specify 5%
			1	d	Credit 3.2	Materials Reuse, Specify 10%
1				c	Credit 4.1	Recycled Content, 10% (POST-CONSUMER + 1/2 PRE-CONSUMER)
			1	c	Credit 4.2	Recycled Content, 20% (POST-CONSUMER + 1/2 PRE-CONSUMER)
1				c	Credit 5.1	Regional Materials, 10% Extracted, Processed & Manuf. Regionally
	1			c	Credit 5.2	Regional Materials, 20% Extracted, Processed & Manuf. Regionally
			1	c	Credit 6	Rapidly Renewable Materials 2.5%
			1	c	Credit 7	Certified Wood

Y	?Y	?N	N			
11	0	0	4			**Indoor Environmental Quality**
Y				d	Prereq 1	Minimum IAQ Performance
Y				d	Prereq 2	Environmental Tobacco Smoke (ETS) Control
1				d	Credit 1	Outdoor Air Delivery Monitoring
			1	d	Credit 2	Increased Ventilation
1				c	Credit 3.1	Construction IAQ Management Plan, During Construction
			1	c	Credit 3.2	Construction IAQ Management Plan, Before Occupancy
1				c	Credit 4.1	Low-Emitting Materials, Adhesives & Sealants
1				c	Credit 4.2	Low-Emitting Materials, Paints & Coatings
1				c	Credit 4.3	Low-Emitting Materials, Carpet Systems
			1	c	Credit 4.4	Low-Emitting Materials, Composite Wood & Agrifiber Products
			1	d	Credit 5	Indoor Chemical & Pollutant Source Control
1				d	Credit 6.1	Controllability of Systems, Lighting
1				d	Credit 6.2	Controllability of Systems, Thermal Comfort
1				d	Credit 7.1	Thermal Comfort, Design
1				d	Credit 7.2	Thermal Comfort, Verification
1				d	Credit 8.1	Daylight & Views, Daylight 75% of Spaces
1				d	Credit 8.2	Daylight & Views, Views for 90% of Spaces

Y	?Y	?N	N			
5	0	0	0			**Innovation & Design Process**
1				c	Credit 1.1	ID: Exemp Perf, Alt Transport, Public Access
1				c	Credit 1.2	ID: 70% Green Power
1				c	Credit 1.3	ID: Green Housekeeping
1				c	Credit 1.4	ID: 100% parking undercover
1				c	Credit 2	LEED™ Accredited Professional
1					Alternate	Guest Education

DRURY INN AND SUITES
Flagstaff, Arizona

LEED-NC

LEED-NC Version 2.2 Registered Project Checklist
Drury Inn and Suites
Flagstaff, AZ

Yes	?	No			
9	0	0	**Sustainable Sites**		14 Points
Y			Prereq 1	**Construction Activity Pollution Prevention**	Required
1			Credit 1	**Site Selection**	1
1			Credit 2	**Development Density & Community Connectivity**	1
			Credit 3	**Brownfield Redevelopment**	1
1			Credit 4.1	**Alternative Transportation**, Public Transportation Access	1
1			Credit 4.2	**Alternative Transportation**, Bicycle Storage & Changing Rooms	1
1			Credit 4.3	**Alternative Transportation**, Low-Emitting and Fuel-Efficient Vehicles	1
1			Credit 4.4	**Alternative Transportation**, Parking Capacity	1
			Credit 5.1	**Site Development,** Protect of Restore Habitat	1
			Credit 5.2	**Site Development,** Maximize Open Space	1
			Credit 6.1	**Stormwater Design,** Quantity Control	1
			Credit 6.2	**Stormwater Design,** Quality Control	1
1			Credit 7.1	**Heat Island Effect,** Non-Roof	1
1			Credit 7.2	**Heat Island Effect,** Roof	1
1			Credit 8	**Light Pollution Reduction**	1

Yes	?	No			
5	0	0	**Water Efficiency**		5 Points
1			Credit 1.1	**Water Efficient Landscaping**, Reduce by 50%	1
1			Credit 1.2	**Water Efficient Landscaping**, No Potable Use or No Irrigation	1
1			Credit 2	**Innovative Wastewater Technologies**	1
1			Credit 3.1	**Water Use Reduction**, 20% Reduction	1
1			Credit 3.2	**Water Use Reduction**, 30% Reduction	1

Yes	?	No			
4	0	0	**Energy & Atmosphere**		17 Points
Y			Prereq 1	**Fundamental Commissioning of the Building Energy Systems**	Required
Y			Prereq 2	**Minimum Energy Performance**	Required
Y			Prereq 3	**Fundamental Refrigerant Management**	Required
1			Credit 1	**Optimize Energy Performance**	1 to 10
1			Credit 2	**On-Site Renewable Energy**	1 to 3
1			Credit 3	**Enhanced Commissioning**	1
			Credit 4	**Enhanced Refrigerant Management**	1
1			Credit 5	**Measurement & Verification**	1
			Credit 6	**Green Power**	1

Yes	?	No			
1	0	0	**Materials & Resources**		13 Points
Y			Prereq 1	**Storage & Collection of Recyclables**	Required
			Credit 1.1	**Building Reuse**, Maintain 75% of Existing Walls, Floors & Roof	1
			Credit 1.2	**Building Reuse**, Maintain 100% of Existing Walls, Floors & Roof	1
			Credit 1.3	**Building Reuse**, Maintain 50% of Interior Non-Structural Elements	1
1			Credit 2.1	**Construction Waste Management**, Divert 50% from Disposal	1
			Credit 2.2	**Construction Waste Management**, Divert 75% from Disposal	1
			Credit 3.1	**Materials Reuse**, 5%	1
			Credit 3.2	**Materials Reuse**,10%	1
			Credit 4.1	**Recycled Content**, 10% (post-consumer + ½ pre-consumer)	1
			Credit 4.2	**Recycled Content**, 20% (post-consumer + ½ pre-consumer)	1
			Credit 5.1	**Regional Materials**, 10% Extracted, Processed & Manufactured Region	1
			Credit 5.2	**Regional Materials**, 20% Extracted, Processed & Manufactured Region	1
			Credit 6	**Rapidly Renewable Materials**	1
			Credit 7	**Certified Wood**	1

Yes	?	No			
6	0	0	**Indoor Environmental Quality**		15 Points
Y			Prereq 1	**Minimum IAQ Performance**	Required
Y			Prereq 2	**Environmental Tobacco Smoke** (ETS) **Control**	Required
			Credit 1	**Outdoor Air Delivery Monitoring**	1
1			Credit 2	**Increased Ventilation**	1
			Credit 3.1	**Construction IAQ Management Plan**, During Construction	1
			Credit 3.2	**Construction IAQ Management Plan**, Before Occupancy	1
			Credit 4.1	**Low-Emitting Materials**, Adhesives & Sealants	1
			Credit 4.2	**Low-Emitting Materials**, Paints & Coatings	1
			Credit 4.3	**Low-Emitting Materials**, Carpet Systems	1
			Credit 4.4	**Low-Emitting Materials**, Composite Wood & Agrifiber Products	1
			Credit 5	**Indoor Chemical & Pollutant Source Control**	1
1			Credit 6.1	**Controllability of Systems**, Lighting	1
1			Credit 6.2	**Controllability of Systems**, Thermal Comfort	1
1			Credit 7.1	**Thermal Comfort**, Design	1
1			Credit 7.2	**Thermal Comfort**, Verification	1
			Credit 8.1	**Daylight & Views**, Daylight 75% of Spaces	1
1			Credit 8.2	**Daylight & Views**, Views for 90% of Spaces	1

Yes	?	No			
2	0	0	**Innovation & Design Process**		5 Points
1			Credit 1.1	**Innovation in Design**: Provide Specific Title	1
1			Credit 1.2	**Innovation in Design**: Provide Specific Title	1
			Credit 1.3	**Innovation in Design**: Provide Specific Title	1
			Credit 1.4	**Innovation in Design**: Provide Specific Title	1
			Credit 2	**LEED® Accredited Professional**	1

Yes	?	No		
27	##		**Project Totals** (pre-certification estimates)	69 Points
			Certified 26-32 points **Silver** 33-38 points **Gold** 39-51 points **Platinum** 52-69 points	

SCORESHEET APPENDIX

ELEMENT HOTEL - HOUSTON
Houston, Texas

LEED-NC

LEED-NC Version 2.2 Registered Project Checklist
ELEMENT HOUSTON
HOUSTON TX

Yes	?	No			
6	0	0	**Sustainable Sites**		14 Points
Y			Prereq 1	**Construction Activity Pollution Prevention**	Required
			Credit 1	**Site Selection**	1
1			Credit 2	**Development Density & Community Connectivity**	1
			Credit 3	**Brownfield Redevelopment**	1
			Credit 4.1	**Alternative Transportation**, Public Transportation Access	1
1			Credit 4.2	**Alternative Transportation**, Bicycle Storage & Changing Rooms	1
1			Credit 4.3	**Alternative Transportation**, Low-Emitting and Fuel-Efficient Vehicles	1
			Credit 4.4	**Alternative Transportation**, Parking Capacity	1
			Credit 5.1	**Site Development,** Protect of Restore Habitat	1
1			Credit 5.2	**Site Development,** Maximize Open Space	1
			Credit 6.1	**Stormwater Design,** Quantity Control	1
			Credit 6.2	**Stormwater Design,** Quality Control	1
1			Credit 7.1	**Heat Island Effect,** Non-Roof	1
1			Credit 7.2	**Heat Island Effect,** Roof	1
			Credit 8	**Light Pollution Reduction**	1

1	?	No			
3	0	0	**Water Efficiency**		5 Points
1			Credit 1.1	**Water Efficient Landscaping**, Reduce by 50%	1
			Credit 1.2	**Water Efficient Landscaping**, No Potable Use or No Irrigation	1
			Credit 2	**Innovative Wastewater Technologies**	1
1			Credit 3.1	**Water Use Reduction**, 20% Reduction	1
1			Credit 3.2	**Water Use Reduction**, 30% Reduction	1

Yes	?	No			
5	0	0	**Energy & Atmosphere**		17 Points
Y			Prereq 1	**Fundamental Commissioning of the Building Energy Systems**	Required
Y			Prereq 2	**Minimum Energy Performance**	Required
Y			Prereq 3	**Fundamental Refrigerant Management**	Required
4			Credit 1	**Optimize Energy Performance**	1 to 10
			Credit 2	**On-Site Renewable Energy**	1 to 3
			Credit 3	**Enhanced Commissioning**	1
			Credit 4	**Enhanced Refrigerant Management**	1
			Credit 5	**Measurement & Verification**	1
1			Credit 6	**Green Power**	1

Yes	?	No			
4	0	0	**Materials & Resources**		13 Points
Y			Prereq 1	**Storage & Collection of Recyclables**	Required
			Credit 1.1	**Building Reuse**, Maintain 75% of Existing Walls, Floors & Roof	1
			Credit 1.2	**Building Reuse**, Maintain 100% of Existing Walls, Floors & Roof	1
			Credit 1.3	**Building Reuse**, Maintain 50% of Interior Non-Structural Elements	1
1			Credit 2.1	**Construction Waste Management**, Divert 50% from Disposal	1
			Credit 2.2	**Construction Waste Management**, Divert 75% from Disposal	1
			Credit 3.1	**Materials Reuse**, 5%	1
1			Credit 3.2	**Materials Reuse**,10%	1
			Credit 4.1	**Recycled Content**, 10% (post-consumer + ½ pre-consumer)	1
			Credit 4.2	**Recycled Content**, 20% (post-consumer + ½ pre-consumer)	1
1			Credit 5.1	**Regional Materials**, 10% Extracted, Processed & Manufactured Region	1
1			Credit 5.2	**Regional Materials**, 20% Extracted, Processed & Manufactured Region	1
			Credit 6	**Rapidly Renewable Materials**	1
			Credit 7	**Certified Wood**	1

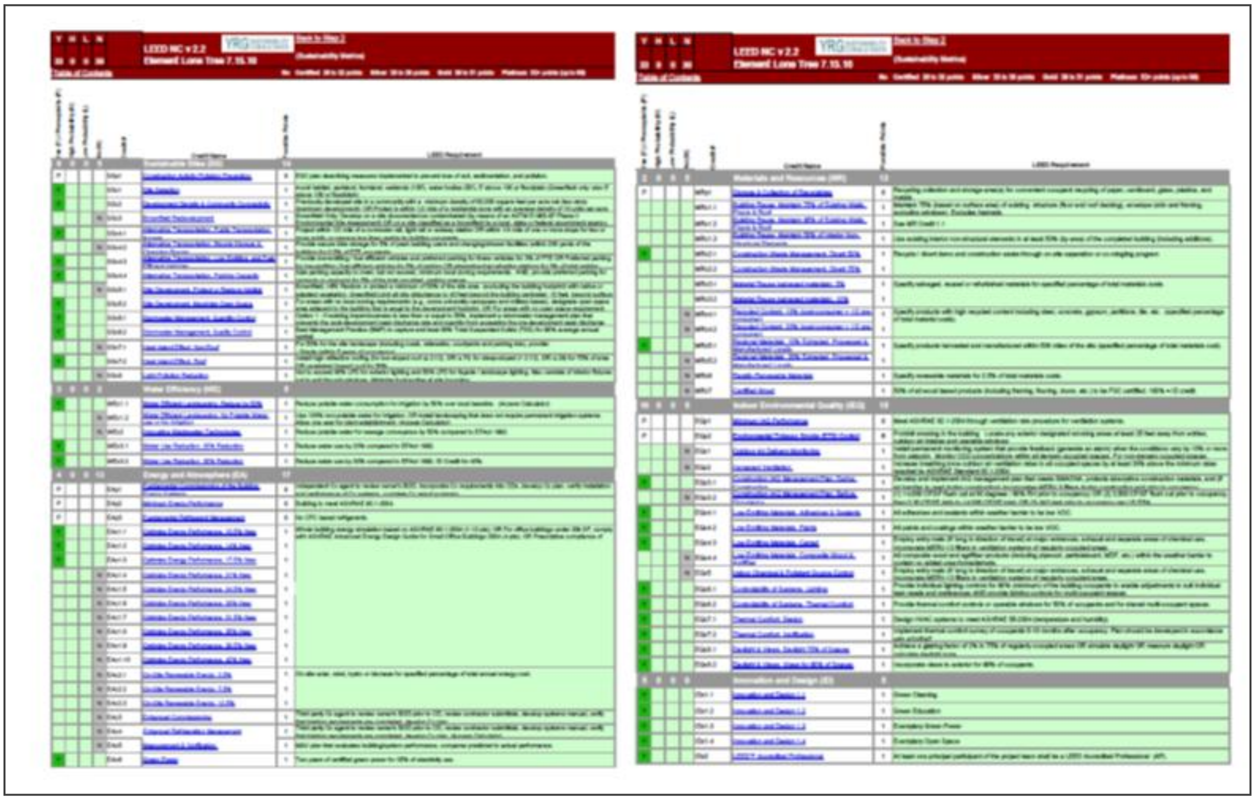
10	0	0	**Indoor Environmental Quality**		15 Points
Y			Prereq 1	**Minimum IAQ Performance**	Required
Y			Prereq 2	**Environmental Tobacco Smoke** (ETS) **Control**	Required
			Credit 1	**Outdoor Air Delivery Monitoring**	1
			Credit 2	**Increased Ventilation**	1
1			Credit 3.1	**Construction IAQ Management Plan**, During Construction	1
			Credit 3.2	**Construction IAQ Management Plan**, Before Occupancy	1
1			Credit 4.1	**Low-Emitting Materials**, Adhesives & Sealants	1
1			Credit 4.2	**Low-Emitting Materials**, Paints & Coatings	1
1			Credit 4.3	**Low-Emitting Materials**, Carpet Systems	1
			Credit 4.4	**Low-Emitting Materials**, Composite Wood & Agrifiber Products	1
			Credit 5	**Indoor Chemical & Pollutant Source Control**	1
1			Credit 6.1	**Controllability of Systems**, Lighting	1
1			Credit 6.2	**Controllability of Systems**, Thermal Comfort	1
1			Credit 7.1	**Thermal Comfort**, Design	1
1			Credit 7.2	**Thermal Comfort**, Verification	1
1			Credit 8.1	**Daylight & Views**, Daylight 75% of Spaces	1
1			Credit 8.2	**Daylight & Views**, Views for 90% of Spaces	1

Yes	?	No			
5	0	0	**Innovation & Design Process**		5 Points
1			Credit 1.1	**Innovation in Design**: Provide Specific Title	1
1			Credit 1.2	**Innovation in Design**: Provide Specific Title	1
1			Credit 1.3	**Innovation in Design**: Provide Specific Title	1
1			Credit 1.4	**Innovation in Design**: Provide Specific Title	1
1			Credit 2	**LEED® Accredited Professional**	1

Yes	?	No			
33	##		**Project Totals** (pre-certification estimates)		69 Points
			Certified 26-32 points **Silver** 33-38 points **Gold** 39-51 points **Platinum** 52-69 points		

SCORESHEET APPENDIX

ELEMENT HOTEL - LONETREE
Denver, Colorado



SCORESHEET APPENDIX

FAIRFIELD INN AND SUITES - BALTIMORE
Baltimore, Maryland

3/4/2010

LEED-NC Version 2.2 Registered Project Checklist

lorax PARTNERSHIPS LLC

Fairfield Inn and Suites

Possible	Yes	Y?	N?	No	Credit	Item	Owner	Supporting	Comments	LEED Submittal Phase	LO Credit Complete
14	**11**	**0**	**0**	**3**	**Sustainable Sites**		**Owner**	**Supporting**	**Comments**		
Required					Prereq 1	**Construction Activity Pollution Prevention**	PHRA	Conewago		Constr	Earned
1	1				Credit 1	**Site Selection**	PHRA			Design	Earned
1	1				Credit 2	**Development Density and Community Connectivity**	PHRA			Design	Earned
1	1				Credit 3	**Brownfield Redevelopment**	Summit			Design	Earned
1	1				Credit 4.1	**Alternative Transportation**, Public Transportation Access	Lorax			Design	Earned
1	1				Credit 4.2	**Alternative Transportation**, Bicycle Storage & Changing Rooms	Gordon & Grbg		5 bike racks and 1 unisex shower is provided - 38FTE/100 transient/159 hotel guests	Design	Earned
1	1				Credit 4.3	**Alternative Transportation**, Low emitting & Fuel Efficient Vehicles	PHRA		6 total and 1 LE/FE spot is provided	Design	Earned
1	1				Credit 4.4	**Alternative Transportation**, Parking Capacity	PHRA		6 total and 1 carpool/vanpool spot is provided	Design	Earned
1	1				Credit 5.2	**Site Development**, Maximize Open Space	PHRA		Vegetated open space is 20.8% of total site sq. ft.	Design	Earned
1	1				Credit 6.2	**Stormwater Design**, Quality Control (90% avg rainfall / 80% TSS)	PHRA		100% of stormwater is treated by structural controls for quality	Design	Earned
1	1				Credit 7.1	**Heat Islands Effect**, Non-Roof	PHRA			Constr	Earned
1	1				Credit 7.2	**Heat Islands Effect**, Roof	Gordon & Grbg	Conewago	86% of the roof is covered with vegetative or highly-reflective materials	Design	Earned
6	**3**	**0**	**0**	**2**	**Water Efficiency**						
1	1				Credit 1.1	**Water Efficient Landscaping**, Reduce by 50%	PHRA		100% of irrigation supplied from nonpotable source	Design	Earned
1	1				Credit 1.2	**Water Efficient Landscaping**, No Potable Use or No Irrigation	PHRA			Design	Earned
2	1			1	Credit 3.1-3.2	**Water Use Reduction:** 20% /30%	Summit	Lorax	21.3% Water savings compared to similar building	Design	Earned
17	**5**	**0**	**0**	**12**	**Energy & Atmosphere**						
Required					Prereq 1	**Fundamental Commissioning of Building Energy Systems**	Summit	Lorax		Constr	Earned
Required					Prereq 2	**Minimum Energy Performance**	EMO	Lorax		Design	Earned
Required					Prereq 3	**Fundamental refrigerant Management**	SAH	Lorax		Design	Earned
10	3			7	Credit 1	**Optimize Energy Performance**	EMO	Lorax	18.8% energy reduction over baseline performance	Design	Earned
1	1				Credit 4	**Enhanced Refrigerant Management**	SAH	Lorax		Design	Earned
1	1				Credit 6	**Green Power**, 35% w/ 2 year contract	Summit	Lorax	100% has been purchased	Constr	Earned
13	**6**	**0**	**0**	**7**	**Materials & Resources**						
Required					Prereq 1	**Storage & Collection of Recyclables**	Gordon & Grbg			Design	Earned
2	2				Credit 2	**Construction Waste Management**, Divert 50% / 75%	Conewago	Receiver	85% diverted from landfill	Constr	Earned
2	1			1	Credit 4.1-4.2	**Recycled Content**, 10%-20% (p.c. + 1/2 p.i.)	Conewago	Gordon & Grbg	11.56% materials (by cost) contain recycled content	Constr	Earned
2	2				Credit 5.1-5.2	**Local/Regional Materials**, 10%-20% manufactured, harvested regionally	Conewago	Gordon & Grbg	32.14% materials (by cost) are manufactured and harvested regionally	Constr	Earned
1	1				Credit 7	**Certified Wood - 50%**	Conewago	Gordon & Grbg	68.04% of the wood used is certified	Constr	Earned
15	**10**	**1**	**0**	**4**	**Indoor Environmental Quality**						
Required					Prereq 1	**Minimum IAQ Performance**	SAH			Design	Earned
Required					Prereq 2	**Environmental Tobacco Smoke** (ETS) **Control**	Summit			Design	Earned
1	1				Credit 2	**Increase Ventilation**	SAH		Ventilation has been increase 59% over ASHREA standard	Design	Earned
1	1				Credit 3.1	**Construction IAQ Management Plan**, During Construction	Conewago	Summit		Constr	Earned
1	1				Credit 4.1	**Low-Emitting Materials**, Adhesives & Sealants	Conewago			Constr	Earned
1	1				Credit 4.2	**Low-Emitting Materials**, Paints	Conewago			Constr	Earned
1	1				Credit 4.3	**Low-Emitting Materials**, Carpet	Conewago			Constr	Earned
1	1				Credit 6.1	**Controllability of Systems**, Lighting	SAH			Design	Earned
1	1				Credit 6.2	**Controllability of Systems**, Thermal Comfort	SAH			Design	Earned
1	1				Credit 7.1	**Thermal Comfort**, Design ASHRAE 55-2004	SAH			Design	Earned
1	1				Credit 7.2	**Thermal Comfort**, Verification	Summit			Design	Earned
1	1				Credit 8.2	**Daylight & Views**, views for 90% of Spaces	Gordon & Grbg		98.24% of regularly occupied spaces have views to outside	Design	Earned
5	**4**	**0**	**0**	**1**	**Innovation & Design Process**						
1	1				Credit 1.1	**Innovation in Design:** Green Housekeeping	Summit	Lorax		Constr	Earned
1	1				Credit 1.2	**Innovation in Design:** Public Education	Summit	Lorax		Design	Earned
1	1				Credit 1.4	**Innovation in Design:** Green Power	Team		100% has been purchased	Constr	Earned
1	1				Credit 2	**LEED™ Accredited Professional**	Gordon & Grbg			Design	Earned
68	**38**	**1**	**0**	**29**	26-32	LEED Certified for New Construction Buildings	Project Phase:	Complete			
					33-38	LEED Certified Silver for New Construction Buildings					
					39-51	LEED Certified Gold for New Construction Buildings					
					52-69	LEED Certified Platinum for New Construction Buildings					

SCORESHEET APPENDIX

GAIA HOTEL - NAPA VALLEY
American Canyon, California

LEED-NC

LEED-NC Version 2.2 Registered Project Checklist

Project Name: Gaia Napa Valley

Project Address: American Canyon, CA

Yes	?	No			
9	0	0	**Sustainable Sites**		14 Points
Y			Prereq 1	**Construction Activity Pollution Prevention**	Required
1			Credit 1	**Site Selection**	1
			Credit 2	**Development Density & Community Connectivity**	1
			Credit 3	**Brownfield Redevelopment**	1
			Credit 4.1	**Alternative Transportation**, Public Transportation Access	1
1			Credit 4.2	**Alternative Transportation**, Bicycle Storage & Changing Rooms	1
1			Credit 4.3	**Alternative Transportation**, Low-Emitting and Fuel-Efficient Vehicles	1
1			Credit 4.4	**Alternative Transportation**, Parking Capacity	1
			Credit 5.1	**Site Development,** Protect of Restore Habitat	1
			Credit 5.2	**Site Development,** Maximize Open Space	1
1			Credit 6.1	**Stormwater Design,** Quantity Control	1
1			Credit 6.2	**Stormwater Design,** Quality Control	1
1			Credit 7.1	**Heat Island Effect,** Non-Roof	1
1			Credit 7.2	**Heat Island Effect,** Roof	1
1			Credit 8	**Light Pollution Reduction**	1

Yes	?	No			
4	0	0	**Water Efficiency**		5 Points
1			Credit 1.1	**Water Efficient Landscaping**, Reduce by 50%	1
			Credit 1.2	**Water Efficient Landscaping**, No Potable Use or No Irrigation	1
1			Credit 2	**Innovative Wastewater Technologies**	1
1			Credit 3.1	**Water Use Reduction**, 20% Reduction	1
1			Credit 3.2	**Water Use Reduction**, 30% Reduction	1

Yes	?	No			
10	0	0	**Energy & Atmosphere**		17 Points
Y			Prereq 1	**Fundamental Commissioning of the Building Energy Systems**	Required
Y			Prereq 2	**Minimum Energy Performance**	Required
Y			Prereq 3	**Fundamental Refrigerant Management**	Required
6			Credit 1	**Optimize Energy Performance**	1 to 10
2			Credit 2	**On-Site Renewable Energy**	1 to 3
1			Credit 3	**Enhanced Commissioning**	1
			Credit 4	**Enhanced Refrigerant Management**	1
			Credit 5	**Measurement & Verification**	1
1			Credit 6	**Green Power**	1

Yes	?	No			
5	0	0	**Materials & Resources**		13 Points
Y			Prereq 1	**Storage & Collection of Recyclables**	Required
			Credit 1.1	**Building Reuse**, Maintain 75% of Existing Walls, Floors & Roof	1
			Credit 1.2	**Building Reuse**, Maintain 100% of Existing Walls, Floors & Roof	1
			Credit 1.3	**Building Reuse**, Maintain 50% of Interior Non-Structural Elements	1
1			Credit 2.1	**Construction Waste Management**, Divert 50% from Disposal	1
			Credit 2.2	**Construction Waste Management**, Divert 75% from Disposal	1
			Credit 3.1	**Materials Reuse**, 5%	1
			Credit 3.2	**Materials Reuse**,10%	1
1			Credit 4.1	**Recycled Content**, 10% (post-consumer + ½ pre-consumer)	1
			Credit 4.2	**Recycled Content**, 20% (post-consumer + ½ pre-consumer)	1
1			Credit 5.1	**Regional Materials**, 10% Extracted, Processed & Manufactured Region	1
1			Credit 5.2	**Regional Materials**, 20% Extracted, Processed & Manufactured Region	1
			Credit 6	**Rapidly Renewable Materials**	1
1			Credit 7	**Certified Wood**	1

Yes	?	No			
10	0	0	**Indoor Environmental Quality**		15 Points
Y			Prereq 1	**Minimum IAQ Performance**	Required
Y			Prereq 2	**Environmental Tobacco Smoke** (ETS) **Control**	Required
			Credit 1	**Outdoor Air Delivery Monitoring**	1
			Credit 2	**Increased Ventilation**	1
			Credit 3.1	**Construction IAQ Management Plan**, During Construction	1
			Credit 3.2	**Construction IAQ Management Plan**, Before Occupancy	1
1			Credit 4.1	**Low-Emitting Materials**, Adhesives & Sealants	1
1			Credit 4.2	**Low-Emitting Materials**, Paints & Coatings	1
1			Credit 4.3	**Low-Emitting Materials**, Carpet Systems	1
1			Credit 4.4	**Low-Emitting Materials**, Composite Wood & Agrifiber Products	1
1			Credit 5	**Indoor Chemical & Pollutant Source Control**	1
1			Credit 6.1	**Controllability of Systems**, Lighting	1
1			Credit 6.2	**Controllability of Systems**, Thermal Comfort	1
1			Credit 7.1	**Thermal Comfort**, Design	1
1			Credit 7.2	**Thermal Comfort**, Verification	1
			Credit 8.1	**Daylight & Views**, Daylight 75% of Spaces	1
1			Credit 8.2	**Daylight & Views**, Views for 90% of Spaces	1

Yes	?	No			
5	0	0	**Innovation & Design Process**		5 Points
1			Credit 1.1	**Innovation in Design**: Provide Specific Title	1
1			Credit 1.2	**Innovation in Design**: Provide Specific Title	1
1			Credit 1.3	**Innovation in Design**: Provide Specific Title	1
1			Credit 1.4	**Innovation in Design**: Provide Specific Title	1
1			Credit 2	**LEED® Accredited Professional**	1

Yes	?	No			
43	##		**Project Totals** (pre-certification estimates)		69 Points

Certified 26-32 points **Silver** 33-38 points **Gold** 39-51 points **Platinum** 52-69 points

SCORESHEET APPENDIX

GAIA HOTEL - SHASTA

Anderson, California

LEED-NC

LEED-NC Version 2.2 Registered Project Checklist

Project Name: Gaia Shasta

Project Address: Anderson, CA

Yes	?	No			
8	0	0	**Sustainable Sites**		14 Points
Y			Prereq 1	**Construction Activity Pollution Prevention**	Required
1			Credit 1	**Site Selection**	1
			Credit 2	**Development Density & Community Connectivity**	1
			Credit 3	**Brownfield Redevelopment**	1
			Credit 4.1	**Alternative Transportation**, Public Transportation Access	1
1			Credit 4.2	**Alternative Transportation**, Bicycle Storage & Changing Rooms	1
1			Credit 4.3	**Alternative Transportation**, Low-Emitting and Fuel-Efficient Vehicles	1
1			Credit 4.4	**Alternative Transportation**, Parking Capacity	1
			Credit 5.1	**Site Development,** Protect of Restore Habitat	1
1			Credit 5.2	**Site Development,** Maximize Open Space	1
1			Credit 6.1	**Stormwater Design,** Quantity Control	1
1			Credit 6.2	**Stormwater Design,** Quality Control	1
1			Credit 7.1	**Heat Island Effect,** Non-Roof	1
			Credit 7.2	**Heat Island Effect,** Roof	1
			Credit 8	**Light Pollution Reduction**	1

Yes	?	No			
4	0	0	**Water Efficiency**		5 Points
1			Credit 1.1	**Water Efficient Landscaping**, Reduce by 50%	1
			Credit 1.2	**Water Efficient Landscaping**, No Potable Use or No Irrigation	1
1			Credit 2	**Innovative Wastewater Technologies**	1
1			Credit 3.1	**Water Use Reduction**, 20% Reduction	1
1			Credit 3.2	**Water Use Reduction**, 30% Reduction	1

Yes	?	No			
6	0	0	**Energy & Atmosphere**		17 Points
Y			Prereq 1	**Fundamental Commissioning of the Building Energy Systems**	Required
Y			Prereq 2	**Minimum Energy Performance**	Required
Y			Prereq 3	**Fundamental Refrigerant Management**	Required
4			Credit 1	**Optimize Energy Performance**	1 to 10
			Credit 2	**On-Site Renewable Energy**	1 to 3
1			Credit 3	**Enhanced Commissioning**	1
			Credit 4	**Enhanced Refrigerant Management**	1
			Credit 5	**Measurement & Verification**	1
1			Credit 6	**Green Power**	1

Yes	?	No			
5	0	0	**Materials & Resources**		13 Points
Y			Prereq 1	**Storage & Collection of Recyclables**	Required
			Credit 1.1	**Building Reuse**, Maintain 75% of Existing Walls, Floors & Roof	1
			Credit 1.2	**Building Reuse**, Maintain 100% of Existing Walls, Floors & Roof	1
			Credit 1.3	**Building Reuse**, Maintain 50% of Interior Non-Structural Elements	1
1			Credit 2.1	**Construction Waste Management**, Divert 50% from Disposal	1
1			Credit 2.2	**Construction Waste Management**, Divert 75% from Disposal	1
			Credit 3.1	**Materials Reuse**, 5%	1
			Credit 3.2	**Materials Reuse**,10%	1
1			Credit 4.1	**Recycled Content**, 10% (post-consumer + ½ pre-consumer)	1
			Credit 4.2	**Recycled Content**, 20% (post-consumer + ½ pre-consumer)	1
1			Credit 5.1	**Regional Materials**, 10% Extracted, Processed & Manufactured Region	1
			Credit 5.2	**Regional Materials**, 20% Extracted, Processed & Manufactured Region	1
			Credit 6	**Rapidly Renewable Materials**	1
1			Credit 7	**Certified Wood**	1

Yes	?	No			
10	0	0	**Indoor Environmental Quality**		15 Points
Y			Prereq 1	**Minimum IAQ Performance**	Required
Y			Prereq 2	**Environmental Tobacco Smoke** (ETS) **Control**	Required
			Credit 1	**Outdoor Air Delivery Monitoring**	1
			Credit 2	**Increased Ventilation**	1
			Credit 3.1	**Construction IAQ Management Plan**, During Construction	1
			Credit 3.2	**Construction IAQ Management Plan**, Before Occupancy	1
1			Credit 4.1	**Low-Emitting Materials**, Adhesives & Sealants	1
1			Credit 4.2	**Low-Emitting Materials**, Paints & Coatings	1
1			Credit 4.3	**Low-Emitting Materials**, Carpet Systems	1
1			Credit 4.4	**Low-Emitting Materials**, Composite Wood & Agrifiber Products	1
1			Credit 5	**Indoor Chemical & Pollutant Source Control**	1
1			Credit 6.1	**Controllability of Systems**, Lighting	1
1			Credit 6.2	**Controllability of Systems**, Thermal Comfort	1
1			Credit 7.1	**Thermal Comfort**, Design	1
1			Credit 7.2	**Thermal Comfort**, Verification	1
			Credit 8.1	**Daylight & Views**, Daylight 75% of Spaces	1
1			Credit 8.2	**Daylight & Views**, Views for 90% of Spaces	1

Yes	?	No			
5	0	0	**Innovation & Design Process**		5 Points
1			Credit 1.1	**Innovation in Design**: Provide Specific Title	1
1			Credit 1.2	**Innovation in Design**: Provide Specific Title	1
1			Credit 1.3	**Innovation in Design**: Provide Specific Title	1
1			Credit 1.4	**Innovation in Design**: Provide Specific Title	1
1			Credit 2	**LEED® Accredited Professional**	1

Yes	?	No		
38	##		**Project Totals** (pre-certification estimates)	69 Points

Certified 26-32 points **Silver** 33-38 points **Gold** 39-51 points **Platinum** 52-69 points

SCORESHEET APPENDIX

HILTON BILTMORE PARK TOWN SQUARE HOTEL

Asheville, North Carolina

LEED for New Construction (Version 2.2)

Project Name: Hilton
Project Address: 43 Town Square Blvd

Yes	?	No					Notes
4	0	0			**Sustainable Sites**	14 Points	
Y			Prereq 1		**Construction Activity Pollution Prevention**	Required	Erosion and Sedimentation prevention plan was implemented for construction site
1		0	Credit 1		**Site Selection**	1	Site was not: Prime Farmland, below 100 yrs floodplain, endangered species habitat, wetlands, within 50' of water body or public park land
	0		Credit 2		**Development Density & Community Connectivity**	1	
		0	Credit 3		**Brownfield Redevelopment**	1	
	0		Credit 4.1		**Alternative Transportation**, Public Transportation Access	1	
1			Credit 4.2		**Alternative Transportation**, Bicycle Storage & Changing Rooms	1	Secure bike racks and showers for 5% of FTE's within 200 yards of building entrance
1			Credit 4.3		**Alternative Transportation**, Low-Emitting & Fuel-Efficient Vehicles	1	Provided preferred parking for low-emitting and fuel-efficient vehicles for 5% of the total vehicle parking capacity
		0	Credit 4.4		**Alternative Transportation**, Parking Capacity	1	
0			Credit 5.1		**Site Development,** Protect or Restore Habitat	1	
0			Credit 5.2		**Site Development,** Maximize Open Space	1	
0			Credit 6.1		**Stormwater Design,** Quantity Control	1	
		0	Credit 6.2		**Stormwater Design,** Quality Control	1	
		0	Credit 7.1		**Heat Island Effect,** Non-Roof	1	
1	0		Credit 7.2		**Heat Island Effect,** Roof	1	Used roofing materials with a Solar Reflectance Index (SRI) greater than 78 (out of 100 possible) on 100% of roof.
	0		Credit 8		**Light Pollution Reduction**	1	
Yes	?	No					
4	0	0			**Water Efficiency**	5 Points	
1	0		Credit 1.1		**Water Efficient Landscaping**, Reduce by 50%	1	No irrigation used - installed all native and adaptive plants
1		0	Credit 1.2		**Water Efficient Landscaping**, No Potable Use or No Irrigation	1	No irrigation used - installed all native and adaptive plants
	0		Credit 2		**Innovative Wastewater Technologies**	1	
1			Credit 3.1		**Water Use Reduction**, 20% Reduction	1	All plumbing fixtures use 30% less water than standard low flow fixtures
1			Credit 3.2		**Water Use Reduction**, 30% Reduction	1	All plumbing fixtures use 30% less water than standard low flow fixtures
9	0	0			**Energy & Atmosphere**	17 Points	
Y			Prereq 1		**Fundamental Commissioning of the Building Energy Systems**	Required	Must have a designated Commissioning Authority to conduct all commissioning of HVAC, water use and energy use systems. Must include a detailed report of proper operation.
Y			Prereq 2		**Minimum Energy Performance**	Required	Building must meet mandatory energy requirements of ASHRAE 90.1 2004
Y			Prereq 3		**Fundamental Refrigerant Management**	Required	Building systems can not use any CFC-based refrigerants. Refrigerants used include R-22, R-410a which do not include any CFCs.
*Note for EAc1: All LEED for New Construction projects registered after June 26th, 2007 are required to achieve at least two (2) points under EAc1.							
5	0	0	Credit 1		**Optimize Energy Performance**	1 to 10	
					10.5% New Buildings or 3.5% Existing Building Renovations	1	
					14% New Buildings or 7% Existing Building Renovations	2	
					17.5% New Buildings or 10.5% Existing Building Renovations	3	
					21% New Buildings or 14% Existing Building Renovations	4	
				5	24.5% New Buildings or 17.5% Existing Building Renovations	5	Building is 25.1% more efficient than the building baseline energy model using ASHRAE 90.1 minimum standards - Achieved through- better building envelope, better window glazing, ERV Wheels, lighting controls, CFLs, more efficient HVAC equipment, more efficient Domestic Hot water boilers and Pool heaters, and solar hot water pre-heating.
					28% New Buildings or 21% Existing Building Renovations	6	
					31.5% New Buildings or 24.5% Existing Building Renovations	7	
					35% New Buildings or 28% Existing Building Renovations	8	
					38.5% New Buildings or 31.5% Existing Building Renovations	9	
					42% New Buildings or 35% Existing Building Renovations	10	
1	0	0	Credit 2		**On-Site Renewable Energy**	1 to 3	
				1	2.5% Renewable Energy	1	Solar hot water system will generate the equivalent of 3.09% of the buildings energy needs (gas and electrical)
					7.5% Renewable Energy	2	
					12.5% Renewable Energy	3	
1			Credit 3		**Enhanced Commissioning**	1	
	0		Credit 4		**Enhanced Refrigerant Management**	1	
1		0	Credit 5		**Measurement & Verification**	1	Provide for the ongoing accountability of building energy consumption by metering it and reviewing every year.
1	0		Credit 6		**Green Power**	1	Provide at 35% of building's electricity consumption from renewable sources - We purchased RECs for 2B that equal 35% of estimated energy use for 2 years.
						continued...	
Yes	?	No					
6	0	0			**Materials & Resources**	13 Points	
Y			Prereq 1		**Storage & Collection of Recyclables**	Required	The building has a designated recycling areas in common areas and in-room recycling facilities; staff is trained and educated on how to recycle properly.
	0		Credit 1.1		**Building Reuse**, Maintain 75% of Existing Walls, Floors & Roof	1	
0			Credit 1.2		**Building Reuse**, Maintain 100% of Existing Walls, Floors & Roof	1	
0			Credit 1.3		**Building Reuse**, Maintain 50% of Interior Non-Structural Elements	1	
1		0	Credit 2.1		**Construction Waste Management**, Divert 50% from Disposal	1	Recycled or salvaged 51% or 718 tons of material during construction of 2B
0		0	Credit 2.2		**Construction Waste Management**, Divert 75% from Disposal	1	
0			Credit 3.1		**Materials Reuse**, 5%	1	
0			Credit 3.2		**Materials Reuse**,10%	1	
1		0	Credit 4.1		**Recycled Content**, 10% (post-consumer + ½ pre-consumer)	1	21.4% of all materials (by value) comes from post consumer + 1/2 pre-consumer content
1	0		Credit 4.2		**Recycled Content**, 20% (post-consumer + ½ pre-consumer)	1	21.4% of all materials (by value) comes from post consumer + 1/2 pre-consumer content
1	0		Credit 5.1		**Regional Materials**, 10% Extracted, Processed & Manufactured Regi	1	37.7% of all materials (by value) were extracted, processed and manufactured within 500 miles
1			Credit 5.2		**Regional Materials**, 20% Extracted, Processed & Manufactured Regi	1	37.7% of all materials (by value) were extracted, processed and manufactured within 500 miles
		0	Credit 6		**Rapidly Renewable Materials**	1	
1			Credit 7		**Certified Wood**	1	75.7% of all wood based materials and products come from Forest Stewardship Council's (FSC) certified forests.
Yes	?	No					
6	0	0			**Indoor Environmental Quality**	15 Points	
Y			Prereq 1		**Minimum IAQ Performance**	Required	Building must provide enough fresh air that I meets the minimum requirements of ASHRAE 62.1 (this standard sets requirements for fresh air delivery and change over of air per hour)
Y			Prereq 2		**Environmental Tobacco Smoke** (ETS) **Control**	Required	Prohibit smoking in the building and all smoking areas must be 25' from building entrances and fresh air intakes.
0			Credit 1		**Outdoor Air Delivery Monitoring**	1	
		0	Credit 2		**Increased Ventilation**	1	
	0		Credit 3.1		**Construction IAQ Management Plan**, During Construction	1	
0	0		Credit 3.2		**Construction IAQ Management Plan**, Before Occupancy	1	
0			Credit 4.1		**Low-Emitting Materials**, Adhesives & Sealants	1	
1		0	Credit 4.2		**Low-Emitting Materials**, Paints & Coatings	1	All adhesives and sealants must contain low VOCs - goal is to reduce the qty of indoor air contaminants
1	0		Credit 4.3		**Low-Emitting Materials**, Carpet Systems	1	All adhesives and sealants must contain low VOCs - goal is to reduce the qty of indoor air contaminants
0	0		Credit 4.4		**Low-Emitting Materials**, Composite Wood & Agrifiber Products	1	
0			Credit 5		**Indoor Chemical & Pollutant Source Control**	1	
1		0	Credit 6.1		**Controllability of Systems**, Lighting	1	90% of occupants have lighting controls that enable adjustments - includes meeting rooms/ spaces
1	0		Credit 6.2		**Controllability of Systems**, Thermal Comfort	1	50% or more of occupants have controls that enable HVAC temperature adjustments
1	0		Credit 7.1		**Thermal Comfort**, Design	1	HVAC and building envelope are designed in a manner that ensures thermal comfort for occupants (+/-72 degrees); must meet ASHRAE 55-2004
1			Credit 7.2		**Thermal Comfort**, Verification	1	Hotel will survey full time occupants at 12 month intervals to confirm satisfaction with thermal comfort; corrective action plan will be implemented if needed
		0	Credit 8.1		**Daylight & Views**, Daylight 75% of Spaces	1	
	0		Credit 8.2		**Daylight & Views**, Views for 90% of Spaces	1	
Yes	?	No					
4	0	0			**Innovation & Design Process**	5 Points	
1			Credit 1.1		**Innovation in Design**: Green Cleaning Program	1	Hotel has Green Cleaning program that uses Green Seal Certified products
1		0	Credit 1.2		**Innovation in Design**: Green Education Program	1	Hotel utilizes guided tours and collateral to educate guests on "green" aspects of property
1	0		Credit 1.3		**Innovation in Design**: Battery Reduction Program	1	water fixtures do not use batteries in electronic flush valves, they are self powered by the turning of a wheel to recharge the battery
0	0		Credit 1.4		**Innovation in Design**:	1	
1			Credit 2		**LEED® Accredited Professional**	1	Had a LEED AP participate on project
Yes	?	No					
33	0	0			**Project Totals** (pre-certification estimates)	69 Points	
					Certified: 26-32 points, **Silver:** 33-38 points, **Gold:** 39-51 points, **Platinum:** 52-69 points		

SCORESHEET APPENDIX

HOTEL INDIGO - SAN DIEGO
San Diego, California

Hotel Indigo - San Diego
LEED for New Construction Version 2.2 Certified
28 Points Achieved

28 Total Points — **Possible Points: 69**

Certified 26-32 points **Silver** 33-38 points **Gold** 39-51 points **Platinum** 52-69 points

10	Sustainable Sites		Possible Points: 14
Y	Prereq 1	**Construction Activity Pollution Prevention**	
1	Credit 1	**Site Selection**	1
1	Credit 2	**Development Density & Community Connectivity**	1
1	Credit 3	**Brownfield Redevelopment**	1
1	Credit 4.1	**Alternative Transportation**, Public Transportation Access	1
1	Credit 4.2	**Alternative Transportation**, Bicycle Storage & Changing Rooms	1
1	Credit 4.3	**Alternative Transportation**, Low-Emitting & Fuel Efficient Vehicles	1
1	Credit 4.4	**Alternative Transportation**, Parking Capacity	1
1	Credit 5.1	**Site Development**, Protect or Restore Habitat	1
1	Credit 5.2	**Site Development**, Maximize Open Space	1
	Credit 6.1	**Stormwater Design**, Quantity Control	1
	Credit 6.2	**Stormwater Design**, Quality Control	1
1	Credit 7.1	**Heat Island Effect**, Non-Roof	1
	Credit 7.2	**Heat Island Effect**, Roof	1
	Credit 8	**Light Pollution Reduction**	1

	Water Efficiency		Possible Points: 5
	Credit 1.1	**Water Efficient Landscaping**, Reduce by 50%	1
	Credit 1.2	**Water Efficient Landscaping**, No Potable Use or No Irrigation	1
	Credit 2	**Innovative Wastewater Technologies**	1
	Credit 3.1	**Water Use Reduction**, 20% Reduction	1
	Credit 3.2	**Water Use Reduction**, 30% Reduction	1

4	Energy & Atmosphere		Possible Points: 17
Y	Prereq 1	**Fundamental Commissioning of the Building Energy Systems**	
Y	Prereq 2	**Minimum Energy Performance**	
Y	Prereq 3	**Fundamental Refrigerant Management**	
1	Credit 1.1	**Optimize Energy Performance**, 10.5% better than Title 24	10
1		14% Better than Title 24	
1		17.5% Better than Title 24	
1		21% Better than Title 24	
	Credit 2.1	**Renewable Energy**, 2.5%	1
	Credit 2.2	**Renewable Energy**, 7.5%	1
	Credit 2.3	**Renewable Energy**, 15.5%	1
	Credit 3	**Enhanced Commissioning**	1
	Credit 4	**Enhanced Refrigerant Management**	1
	Credit 5	**Measurement & Verification**	1
	Credit 6	**Green Power**	1

4	Materials & Resources		Possible Points: 13
Y	Prereq 1	**Storage & Collection of Recyclables**	
	Credit 1.1	**Building Reuse**, Maintain 75% of Existing Walls, Floors, & Roof	1
	Credit 1.2	**Building Reuse**, Maintain 95% of Existing Walls, Floors, & Roof	1
	Credit 1.3	**Building Reuse**, Maintain 50% of Interior Non-Structural Elements	1
1	Credit 2.1	**Construction Waste Management**, Divert 50% from Disposal	1
1	Credit 2.2	**Construction Waste Management**, Divert 75% from Disposal	1
	Credit 3.1	**Materials Reuse**, Specify 5%	1
	Credit 3.2	**Materials Reuse**, Specify 10%	1
1	Credit 4.1	**Recycled Content**, 10% (post-consumer + ½ post-industrial)	1
1	Credit 4.2	**Recycled Content**, 20% (post-consumer + ½ post-industrial)	1
	Credit 5.1	**Regional Materials**, 10% Extracted, Processed & Manufactured Regionally	1
	Credit 5.2	**Regional Materials**, 20% Extracted, Processed & Manufactured Regionally	1
	Credit 6	**Rapidly Renewable Materials**	1
	Credit 7	**Certified Wood**	1

7	Indoor Environmental Quality		Possible Points: 15
Y	Prereq 1	**Minimum IAQ Performance**	
Y	Prereq 2	**Environmental Tobacco Smoke** (ETS) **Control**	
	Credit 1	**Outdoor Air Delivery Monitoring**	1
1	Credit 2	**Increased Ventilation**	1
	Credit 3.1	**Construction IAQ Management Plan**, During Construction	1
	Credit 3.2	**Construction IAQ Management Plan**, Before Occupancy	1
1	Credit 4.1	**Low-Emitting Materials**, Adhesives & Sealants	1
1	Credit 4.2	**Low-Emitting Materials**, Paints	1
1	Credit 4.3	**Low-Emitting Materials**, Carpet	1
	Credit 4.4	**Low-Emitting Materials**, Composite Wood & Agrifiber	1
	Credit 5	**Indoor Chemical & Pollutant Source Control**	1
1	Credit 6.1	**Controllability of Systems**, Lighting	1
	Credit 6.2	**Controllability of Systems**, Thermal Comfort	1
	Credit 7.1	**Thermal Comfort**, Design	1
	Credit 7.2	**Thermal Comfort**, Verification	1
1	Credit 8.1	**Daylight & Views**, Daylight 75% of Spaces	1
1	Credit 8.2	**Daylight & Views**, Views for 90% of Spaces	1

3	Innovation & Design Process		Possible Points: 5
1	Credit 1.1	**Innovation in Design**: SSc7.2 Exemplary Performance - Underground Parking 100%	1
1	Credit 1.2	**Innovation in Design**: SSc4.1 Exemplary Performance - Public Transportation Access	1
1	Credit 2	**LEED™ Accredited Professional**	1

* Prepared by Drew George & Partners *

SCORESHEET APPENDIX

HOTEL TERRA
Teton Village, Wyoming

LEED-NC

LEED-NC Version 2.2 Registered Project Checklist
HOTEL TERRA
TETON VILLAGE WY

Yes	?	No			
9	0	0	**Sustainable Sites**		14 Points
Y			Prereq 1	**Construction Activity Pollution Prevention**	Required
1			Credit 1	**Site Selection**	1
			Credit 2	**Development Density & Community Connectivity**	1
			Credit 3	**Brownfield Redevelopment**	1
1			Credit 4.1	**Alternative Transportation**, Public Transportation Access	1
1			Credit 4.2	**Alternative Transportation**, Bicycle Storage & Changing Rooms	1
1			Credit 4.3	**Alternative Transportation**, Low-Emitting and Fuel-Efficient Vehicles	1
1			Credit 4.4	**Alternative Transportation**, Parking Capacity	1
1			Credit 5.1	**Site Development,** Protect of Restore Habitat	1
			Credit 5.2	**Site Development,** Maximize Open Space	1
1			Credit 6.1	**Stormwater Design,** Quantity Control	1
1			Credit 6.2	**Stormwater Design,** Quality Control	1
			Credit 7.1	**Heat Island Effect,** Non-Roof	1
			Credit 7.2	**Heat Island Effect,** Roof	1
1			Credit 8	**Light Pollution Reduction**	1

Yes	?	No			
3	0	0	**Water Efficiency**		5 Points
1			Credit 1.1	**Water Efficient Landscaping**, Reduce by 50%	1
1			Credit 1.2	**Water Efficient Landscaping**, No Potable Use or No Irrigation	1
			Credit 2	**Innovative Wastewater Technologies**	1
1			Credit 3.1	**Water Use Reduction**, 20% Reduction	1
			Credit 3.2	**Water Use Reduction**, 30% Reduction	1

Yes	?	No			
2	0	0	**Energy & Atmosphere**		17 Points
Y			Prereq 1	**Fundamental Commissioning of the Building Energy Systems**	Required
Y			Prereq 2	**Minimum Energy Performance**	Required
Y			Prereq 3	**Fundamental Refrigerant Management**	Required
0			Credit 1	**Optimize Energy Performance**	1 to 10
			Credit 2	**On-Site Renewable Energy**	1 to 3
			Credit 3	**Enhanced Commissioning**	1
1			Credit 4	**Enhanced Refrigerant Management**	1
			Credit 5	**Measurement & Verification**	1
1			Credit 6	**Green Power**	1

Yes	?	No			
4	0	0	**Materials & Resources**		13 Points
Y			Prereq 1	**Storage & Collection of Recyclables**	Required
			Credit 1.1	**Building Reuse**, Maintain 75% of Existing Walls, Floors & Roof	1
			Credit 1.2	**Building Reuse**, Maintain 100% of Existing Walls, Floors & Roof	1
			Credit 1.3	**Building Reuse**, Maintain 50% of Interior Non-Structural Elements	1
1			Credit 2.1	**Construction Waste Management**, Divert 50% from Disposal	1
			Credit 2.2	**Construction Waste Management**, Divert 75% from Disposal	1
			Credit 3.1	**Materials Reuse**, 5%	1
			Credit 3.2	**Materials Reuse**,10%	1
1			Credit 4.1	**Recycled Content**, 10% (post-consumer + ½ pre-consumer)	1
1			Credit 4.2	**Recycled Content**, 20% (post-consumer + ½ pre-consumer)	1
1			Credit 5.1	**Regional Materials**, 10% Extracted, Processed & Manufactured Region	1
			Credit 5.2	**Regional Materials**, 20% Extracted, Processed & Manufactured Region	1
			Credit 6	**Rapidly Renewable Materials**	1
			Credit 7	**Certified Wood**	1

Yes	?	No			
10	0	0	**Indoor Environmental Quality**		15 Points
Y			Prereq 1	**Minimum IAQ Performance**	Required
Y			Prereq 2	**Environmental Tobacco Smoke** (ETS) **Control**	Required
1			Credit 1	**Outdoor Air Delivery Monitoring**	1
			Credit 2	**Increased Ventilation**	1
1			Credit 3.1	**Construction IAQ Management Plan**, During Construction	1
			Credit 3.2	**Construction IAQ Management Plan**, Before Occupancy	1
1			Credit 4.1	**Low-Emitting Materials**, Adhesives & Sealants	1
1			Credit 4.2	**Low-Emitting Materials**, Paints & Coatings	1
			Credit 4.3	**Low-Emitting Materials**, Carpet Systems	1
			Credit 4.4	**Low-Emitting Materials**, Composite Wood & Agrifiber Products	1
			Credit 5	**Indoor Chemical & Pollutant Source Control**	1
1			Credit 6.1	**Controllability of Systems**, Lighting	1
1			Credit 6.2	**Controllability of Systems**, Thermal Comfort	1
1			Credit 7.1	**Thermal Comfort**, Design	1
1			Credit 7.2	**Thermal Comfort**, Verification	1
1			Credit 8.1	**Daylight & Views**, Daylight 75% of Spaces	1
1			Credit 8.2	**Daylight & Views**, Views for 90% of Spaces	1

Yes	?	No			
5	0	0	**Innovation & Design Process**		5 Points
1			Credit 1.1	**Innovation in Design**: Provide Specific Title	1
1			Credit 1.2	**Innovation in Design**: Provide Specific Title	1
1			Credit 1.3	**Innovation in Design**: Provide Specific Title	1
1			Credit 1.4	**Innovation in Design**: Provide Specific Title	1
1			Credit 2	**LEED® Accredited Professional**	1

Yes	?	No			
33	##		**Project Totals** (pre-certification estimates)		69 Points

Certified 26-32 points **Silver** 33-38 points **Gold** 39-51 points **Platinum** 52-69 points

SCORESHEET APPENDIX

JW MARRIOTT - SAN ANTONIO RESORT AND SPA
San Antonio, Texas

LEED-NC - Multiple Buildings & Campuses - LEED Responsibilities
J.W. Marriott Hill Country Resort & Spa

Category		Available Pts.	Confirmed Pts.	Uncertain Pts.	Very Unlikely pts.	Responsible Party	Current Strategies & Notes for Implementation	Design Submittal	Construction Submittal
SS PreReq. 1	Construction Activity Pollution Prevention	Required				Page-Dawson	Earned		X
SS Credit 4.2	Alternative Transportation Bicycle Use	1	1			SPG	Earned	X	
SS Credit 4.3	Alternative Transportation Low-Emitting & Fuel-Efficient Vehicles	1	1			Page-Dawson	Earned	X	
SS Credit 5.2	Site Development Maximize Open Space	1	1			Page-Dawson	Earned	X	
SS Credit 6.1	Stormwater Design Quantity Control	1	1			Page-Dawson	Earned	X	
SS Credit 6.2	Stormwater Design Quality Control	1	1			Page-Dawson	Earned	X	
SS Credit 7.2	Heat Island Effect Roof	1	1			HKS / SPG	Earned	X	
Sustainable Sites Total		**14**	**6**	**0**	**0**				
WE Credit 1.1	Water Efficient Landscaping	1	1			TBG	Earned	X	
WE Credit 3	Water Use Reduction 20%	2	1			TBG	Earned	X	
Water Efficiency Total		**6**	**2**	**0**	**0**				
EA PreReq. 1	Commissioning of the Building Energy Systems	Required				Jim Shoop	Earned		X
EA PreReq. 2	Minimum Energy Performance	Required				EMO	Earned	X	
EA PreReq. 3	Fundamental Refrigerant Management	Required				Blum	Earned	X	
EA Credit 1	Optimize Energy Performance (2 pts. Mandatory)	10	3			EMO	Earned	X	
EA Credit 3	Enhanced Commissioning	1	1			Jim Shoop	Earned		X
EA Credit 4	Enhanced Refrigerant Management	1	1			Blum	Earned	X	
EA Credit 5	Measurement & Verification	1	1			EMO	Earned		X
EA Credit 6	Green Power	1	1			Owner	Earned		X
Energy & Atmosphere Total		**17**	**7**	**0**	**0**				
MR PreReq. 1	Storage & Collection of Recyclables	Required				HKS	Earned	X	
MR Credits 4.1 & 4.2	Recycled Content	2	1			Austin / SPG	Earned		X
MR Credits 5.1 & 5.2	Regional Materials	2	2			Austin / SPG	Earned		X
Materials & Resources Total		**13**	**3**	**0**	**0**				
EQ PreReq. 1	Minimum IAQ Performance	Required				Blum	Earned	X	
EQ PreReq. 2	Environmental Tobacco Smoke (ETS) Control	Required				HKS	Earned	X	
EQ Credit 1	Outdoor Air Delivery Monitoring	1	1			Jim Shoop	Earned	X	
EQ Credit 3.1	Construction IAQ Management Plan During Construction	1	1			Austin / SPG	Earned		X

LEED-NC for Multiple Buildings - JW Marriott Hill Country Spa Resort, San Antonio, TX
(Updates as of 9/28/2010) 1 of 2

LEED-NC - Multiple Buildings & Campuses - LEED Responsibilities
J.W. Marriott Hill Country Resort & Spa

Category		Available Pts.	Confirmed Pts.	Uncertain Pts.	Very Unlikely pts.	Responsible Party	Current Strategies & Notes for Implementation	Design Submittal	Construction Submittal
EQ Credit 3.2	Construction IAQ Management Plan Before Occupancy	1	1			Austin / Jim Shoop	Earned		X
EQ Credit 4.1	Low-Emitting Materials: Adhesives & Sealants	1	1			Austin / SPG	Earned		X
EQ Credit 4.2	Low-Emitting Materials: Paints & Coatings	1	1			Austin / SPG	Earned		X
EQ Credit 6.1	Controllability of System: Lighting	1	1			Blum	Earned	X	
EQ Credit 7.1	Thermal Comfort: Design	1	1			Blum	Earned	X	
EQ Credit 7.2	Thermal Comfort: Verification	1	1			Blum	Earned	X	
Indoor Environmental Quality Total		**16**	**8**	**0**	**0**				
ID Credit 1.1	Innovation in Design - Green Cleaning Policy	1	1			SPG / ECOLogic	Earned	X	
ID Credit 1.2	Exemplary Performance - Integrated Pest Management Plan	1	1			Owner	Earned	X	
ID Credit 1.3	Exemplary Performance for Green Power for 70% of electric power	1	1			SPG	Earned	X	
ID Credit 2	LEED Accredited Professional	1	1			SPG	Earned		X
Innovation in Design Total		**6**	**4**	**0**	**0**				

Category	Available Points	Confirmed Points	Uncertain Points	Very Unlikely pts.
Sustainable Sites	14	6	0	0
Water Efficiency	5	2	0	0
Energy & Atmosphere	17	7	0	0
Materials & Resources	13	3	0	0
Indoor Environmental Quality	15	8	0	0
Innovation in Design	5	4	0	0

Total Achieved Points	30
Uncertain Points	0
Confirmed + Uncertain Points	30
Total Available Points	69

Design Confirmed Points	19
Design Uncertain Points	0
Construction Confirmed Points	11
Construction Uncertain Points	0

LEED Certified: 26 to 32
LEED Silver: 33 to 38
LEED Gold 39 to 51
LEED Platinum 52 to 69

LEED-NC for Multiple Buildings - JW Marriott Hill Country Spa Resort, San Antonio, TX
(Updates as of 9/28/2010) 2 of 2

SCORESHEET APPENDIX

MIYAKO HYBRID HOTEL
Torrance, California

LEED-NC™ Scorecard Version 2.2

Owner: M. Okamoto & Associates
Project: Miyako Hotel
Location: 21381 Western Ave., Torrance, CA
Date: 9/22/2009

10	0	0	4	Sustainable Sites		Possible Points 14
Y	?Y	?N	N			
Y				Prereq 1	Construction Activity Pollution Prevention	
1				Credit 1	Site Selection	1
1				Credit 2	Development Density & Community Connectivity	1
1				Credit 3	Brownfield Redevelopment	1
1				Credit 4.1	Alternative Transportation, Public Transportation Access (ID)	1
1				Credit 4.2	Alternative Transportation, Bicycle Storage & Changing Rooms (ID)	1
1				Credit 4.3	Alternative Transportation, Low-Emitting and Fuel-Efficient Vehicles (ID)	1
1				Credit 4.4	Alternative Transportation, Parking Capacity (5%) (ID)	1
			1	Credit 5.1	Site Development, Protect and Restore Habitat 50% (75%)	1
			1	Credit 5.2	Site Development, Maximize Open Space 25% (50%)	1
1				Credit 6.1	Stormwater Design, Quantity Control	1
1				Credit 6.2	Stormwater Design, Quality Control	1
			1	Credit 7.1	Heat Island Effect, Non-Roof 50% (100%)	1
1				Credit 7.2	Heat Island Effect, Green Roof 50% (100%) Cool Roof 75%	1
			1	Credit 8	Light Pollution Reduction	1

2	0	0	3	Water Efficiency		Possible Points 5
Y	?Y	?N	N			
1				Credit 1.1	Water Efficient Landscaping, Reduce by 50%	1
			1	Credit 1.2	Water Efficient Landscaping, No Potable Use or No Irrigation	1
			1	Credit 2	Innovative Wastewater Technologies, 50% (100%)	1
1				Credit 3.1	Water Use Reduction, 20% Reduction (Process Load 10%)	1
			1	Credit 3.2	Water Use Reduction, 30% Reduction (40%)	1

5	2	0	8	Energy & Atmosphere		Possible Points 17
Y	?Y	?N	N			
Y				Prereq 1	Fundamental Commissioning of the Building Energy Systems	
Y				Prereq 2	Minimum Energy Performance	
Y				Prereq 3	Fundamental Refrigerant Management	
2	2		4	Credit 1	Optimize Energy Performance 10.5% - 42.5% (45.5%)	1 to 10
			3	Credit 2	On-site Renewable Energy 2.5%, 7.5%, 12.5%, (17.5%)	1 to 3
			1	Credit 3	Enhanced Commissioning	1
1				Credit 4	Enhanced Refrigerant Management	1
1				Credit 5	Measurement & Verification	1
1				Credit 6	Green Power 35% (70%)	1

GAIA DEVELOPMENT

4	2	0	7	Materials & Resources		Possible Points 13
Y	?Y	?N	N			
Y				Prereq 1	Storage & Collection of Recyclables	
			1	Credit 1.1	Building Reuse, Maintain 75% of Existing Walls, Floors and Roof	1
			1	Credit 1.2	Building Reuse, Maintain 95% of Existing Walls, Floors and Roof	1
			1	Credit 1.3	Building Reuse, Maintain 50% of Interior Non-Structural Elements	1
1				Credit 2.1	Construction Waste Management, Divert 50% from Disposal	1
1				Credit 2.2	Construction Waste Management, Divert 75% from Disposal (95%)	1
			1	Credit 3.1	Materials Reuse, 5%	1
			1	Credit 3.2	Materials Reuse, 10% (15%)	1
1				Credit 4.1	Recycled Content, 10% (post-consumer + 1/2 pre-consumer)	1
	1			Credit 4.2	Recycled Content, 20% (post-consumer + 1/2 pre-consumer) (30%)	1
1				Credit 5.1	Regional Materials, 10% Extracted, Processed & Manufactured Regionally	1
	1			Credit 5.2	Regional Materials, 20% Extracted, Processed & Manufactured Regionally (40%)	1
			1	Credit 6	Rapidly Renewable Materials, 2.5% (10%)	1
			1	Credit 7	Certified Wood, FSC 50% of all wood used (95%)	1

9	1	1	4	Indoor Environmental Quality		Possible Points 15
Y	?Y	?N	N			
Y				Prereq 1	Minimum IAQ Performance	
Y				Prereq 2	Environmental Tobacco Smoke (ETS) Control	
			1	Credit 1	Outdoor Air Delivery Monitoring	1
			1	Credit 2	Increased Ventilation	1
1				Credit 3.1	Construction IAQ Management Plan, During Construction	1
		1		Credit 3.2	Construction IAQ Management Plan, Before Occupancy	1
1				Credit 4.1	Low-Emitting Materials, Adhesives & Sealants	1
1				Credit 4.2	Low-Emitting Materials, Paints and Coatings	1
1				Credit 4.3	Low-Emitting Materials, Carpet Systems	1
			1	Credit 4.4	Low-Emitting Materials, Composite Wood & Agrifiber Products	1
			1	Credit 5	Indoor Chemical & Pollutant Source Control	1
1				Credit 6.1	Controllability of Systems, Lighting	1
1				Credit 6.2	Controllability of Systems, Thermal Comfort	1
1				Credit 7.1	Thermal Comfort, Design	1
1				Credit 7.2	Thermal Comfort, Verification	1
1				Credit 8.1	Daylight & Views, Daylight 75% of Spaces (95%)	1
	1			Credit 8.2	Daylight & Views, Views for 90% of Spaces (ID)	1

3	2	0	0	Innovation & Design Process		Possible Points 5
Y	?Y	?N	N			
1				Credit 1.1	Innovation in Design: Model room mock-up	1
	1			Credit 1.2	Innovation in Design: Room Card utility shut down or Ozone sanitizing laundry equipment	1
	1			Credit 1.3	Innovation in Design: energy-star appliances or preventive maintenance	1
1				Credit 1.4	Innovation in Design: Green Power or education touch screen	1
1				Credit 2	LEED™ Accredited Professional	1

33	7	1	26	Project Totals (pre-certification estimates)	Possible Points 69

Certified 26 to 32 points Silver 33 to 38 points Gold 39 to 51 points Platinum 52 to 69 points

SCORESHEET APPENDIX

MONTAGE BEVERLY HILLS
Beverley Hills, California

LEED for New Construction v2.2
Registered Project Checklist

Project Name: Montage Beverly Hills
Project Address:

Yes	?	No			
8		6		**Sustainable Sites**	14 Points
Y			Prereq 1	**Construction Activity Pollution Prevention**	Required
1			Credit 1	**Site Selection**	1
1			Credit 2	**Development Density & Community Connectivity**	1
1			Credit 3	**Brownfield Redevelopment**	1
1			Credit 4.1	**Alternative Transportation**, Public Transportation Access	1
1			Credit 4.2	**Alternative Transportation**, Bicycle Storage & Changing Rooms	1
		1	Credit 4.3	**Alternative Transportation**, Low-Emitting & Fuel-Efficient Vehicles	1
1			Credit 4.4	**Alternative Transportation**, Parking Capacity	1
		1	Credit 5.1	**Site Development**, Protect or Restore Habitat	1
		1	Credit 5.2	**Site Development**, Maximize Open Space	1
		1	Credit 6.1	**Stormwater Design**, Quantity Control	1
		1	Credit 6.2	**Stormwater Design**, Quality Control	1
1			Credit 7.1	**Heat Island Effect**, Non-Roof	1
1			Credit 7.2	**Heat Island Effect**, Roof	1
		1	Credit 8	**Light Pollution Reduction**	1
1		4		**Water Efficiency**	5 Points
1			Credit 1.1	**Water Efficient Landscaping**, Reduce by 50%	1
		1	Credit 1.2	**Water Efficient Landscaping**, No Potable Use or No Irrigation	1
		1	Credit 2	**Innovative Wastewater Technologies**	1
		1	Credit 3.1	**Water Use Reduction**, 20% Reduction	1
		1	Credit 3.2	**Water Use Reduction**, 30% Reduction	1
12		3		**Energy & Atmosphere**	17 Points
Y			Prereq 1	**Fundamental Commissioning of the Building Energy Systems**	Required
Y			Prereq 2	**Minimum Energy Performance**	Required
Y			Prereq 3	**Fundamental Refrigerant Management**	Required
				*Note for EAc1: All LEED for New Construction projects registered after June 26th, 2007 are required to achieve at least two (2) points under EAc1.	
10			Credit 1	**Optimize Energy Performance**	1 to 10
				10.5% New Buildings or 3.5% Existing Building Renovations	1
				14% New Buildings or 7% Existing Building Renovations	2
				17.5% New Buildings or 10.5% Existing Building Renovations	3
				21% New Buildings or 14% Existing Building Renovations	4
				24.5% New Buildings or 17.5% Existing Building Renovations	5
				28% New Buildings or 21% Existing Building Renovations	6
				31.5% New Buildings or 24.5% Existing Building Renovations	7
				35% New Buildings or 28% Existing Building Renovations	8
				38.5% New Buildings or 31.5% Existing Building Renovations	9
			10	42% New Buildings or 35% Existing Building Renovations	10
		1	Credit 2	**On-Site Renewable Energy**	1 to 3
				2.5% Renewable Energy	1
				7.5% Renewable Energy	2
				12.5% Renewable Energy	3
		1	Credit 3	**Enhanced Commissioning**	1
1			Credit 4	**Enhanced Refrigerant Management**	1
1			Credit 5	**Measurement & Verification**	1
		1	Credit 6	**Green Power**	1
					continued...
5		8		**Materials & Resources**	13 Points
Y			Prereq 1	**Storage & Collection of Recyclables**	Required
		1	Credit 1.1	**Building Reuse**, Maintain 75% of Existing Walls, Floors & Roof	1
		1	Credit 1.2	**Building Reuse**, Maintain 100% of Existing Walls, Floors & Roof	1
		1	Credit 1.3	**Building Reuse**, Maintain 50% of Interior Non-Structural Elements	1
1			Credit 2.1	**Construction Waste Management**, Divert 50% from Disposal	1
1			Credit 2.2	**Construction Waste Management**, Divert 75% from Disposal	1
		1	Credit 3.1	**Materials Reuse**, 5%	1
		1	Credit 3.2	**Materials Reuse**,10%	1
1			Credit 4.1	**Recycled Content**, 10% (post-consumer + ½ pre-consumer)	1
		1	Credit 4.2	**Recycled Content**, 20% (post-consumer + ½ pre-consumer)	1
1			Credit 5.1	**Regional Materials**, 10% Extracted, Processed & Manufactured Regior	1
1			Credit 5.2	**Regional Materials**, 20% Extracted, Processed & Manufactured Regior	1
		1	Credit 6	**Rapidly Renewable Materials**	1
		1	Credit 7	**Certified Wood**	1
8		7		**Indoor Environmental Quality**	15 Points
Y			Prereq 1	**Minimum IAQ Performance**	Required
Y			Prereq 2	**Environmental Tobacco Smoke** (ETS) **Control**	Required
1			Credit 1	**Outdoor Air Delivery Monitoring**	1
		1	Credit 2	**Increased Ventilation**	1
1			Credit 3.1	**Construction IAQ Management Plan**, During Construction	1
		1	Credit 3.2	**Construction IAQ Management Plan**, Before Occupancy	1
1			Credit 4.1	**Low-Emitting Materials**, Adhesives & Sealants	1
1			Credit 4.2	**Low-Emitting Materials**, Paints & Coatings	1
		1	Credit 4.3	**Low-Emitting Materials**, Carpet Systems	1
		1	Credit 4.4	**Low-Emitting Materials**, Composite Wood & Agrifiber Products	1
		1	Credit 5	**Indoor Chemical & Pollutant Source Control**	1
1			Credit 6.1	**Controllability of Systems**, Lighting	1
1			Credit 6.2	**Controllability of Systems**, Thermal Comfort	1
1			Credit 7.1	**Thermal Comfort**, Design	1
1			Credit 7.2	**Thermal Comfort**, Verification	1
		1	Credit 8.1	**Daylight & Views**, Daylight 75% of Spaces	1
		1	Credit 8.2	**Daylight & Views**, Views for 90% of Spaces	1
5				**Innovation & Design Process**	5 Points
1			Credit 1.1	**Innovation in Design:** Environmentally Preferred Purchasing Plan	1
1			Credit 1.2	**Innovation in Design:**Exemplary Performance SS Cr 7.1	1
1			Credit 1.3	**Innovation in Design:** Integrated Landscape Plan	1
1			Credit 1.4	**Innovation in Design:** Green Housekeeping Plan	1
1			Credit 2	**LEED® Accredited Professional**	1
39		28		**Project Totals (pre-certification estimates)**	69 Points

Certified: 26-32 points, Silver: 33-38 points, Gold: 39-51 points, Platinum: 52-69 poi

SCORESHEET APPENDIX

ORCHARD GARDEN HOTEL
San Francisco, California

Orchard Garden Hotel

Total Points Attempted 28

LEED Section		Yes or No?	Points
Sustainable Sites			
Credit		Y or N	points
Prereq 1	Erosion & Sedimentation Control	Y	
Credit 1	Site Selection	Y	1
Credit 2	Urban Redevelopment	Y	1
Credit 3	Brownfield Redevelopment	N	0
Credit 4.1	Alternative Transportation, Public Transportation Access	Y	1
Credit 4.2	Alternative Transportation, Bicycle Storage & Changing Rooms	Y	1
Credit 4.3	Alternative Transportation, Alternative Fuel Refueling Stations	N	0
Credit 4.4	Alternative Transportation, Parking Capacity	Y	1
Credit 5.1	Reduced Site Disturbance, Protect or Restore Open Space	N	0
Credit 5.2	Reduced Site Disturbance, Development Footprint	N	0
Credit 6.1	Stormwater Management, Rate and Quantity	N	0
Credit 6.2	Stormwater Management, Treatment	N	0
Credit 7.1	Landscape & Exterior Design to Reduce Heat Islands, Non-Roof	N	0
Credit 7.2	Landscape & Exterior Design to Reduce Heat Islands, Roof	Y	1
Credit 8	Light Pollution Reduction	N	0
Water Efficiency			
Credit		Y or N	points
Credit 1.1	Water Efficient Landscaping, Reduce by 50%	Y	1
Credit 1.2	Water Efficient Landscaping, No Potable Use or No Irrigation	Y	1
Credit 2	Innovative Wastewater Technologies	N	0
Credit 3.1	Water Use Reduction, 20% Reduction	N	0
Credit 3.2	Water Use Reduction, 30% Reduction	N	0
Energy & Atmosphere			
Credit		Y or N	points
Prereq 1	Fundamental Building Systems Commissioning	Y	0
Prereq 2	Minimum Energy Performance	Y	0
Prereq 3	CFC Reduction in HVAC&R Equipment	Y	0
Credit 1.1	Optimize Energy Performance, 20% New / 10% Existing	N	0
Credit 1.2	Optimize Energy Performance, 30% New / 20% Existing	N	0
Credit 1.3	Optimize Energy Performance, 40% New / 30% Existing	N	0
Credit 1.4	Optimize Energy Performance, 50% New / 40% Existing	N	0
Credit 1.5	Optimize Energy Performance, 60% New / 50% Existing	N	0
Credit 2.1	Renewable Energy, 5%	N	0
Credit 2.2	Renewable Energy, 10%	N	0
Credit 2.3	Renewable Energy, 20%	N	0
Credit 3	Additional Commissioning	N	0
Credit 4	Ozone Depletion	Y	1
Credit 5	Measurement & Verification	N	0
Credit 6	Green Power	N	0

Orchard Garden Hotel

Materials & Resources			
Credit		Y or N	points
Prereq 1	Storage & Collection of Recyclables	Y	0
Credit 1.1	Building Reuse, Maintain 75% of Existing Shell	N	0
Credit 1.2	Building Reuse, Maintain 100% of Existing Shell	N	0
Credit 1.3	Building Reuse, Maintain 100% Shell & 50% Non-Shell	N	0
Credit 2.1	Construction Waste Management, Divert 50%	Y	1
Credit 2.2	Construction Waste Management, Divert 75%	Y	1
Credit 3.1	Resource Reuse, Specify 5%	N	0
Credit 3.2	Resource Reuse, Specify 10%	N	0
Credit 4.1	Recycled Content, Specify 25%	Y	1
Credit 4.2	Recycled Content, Specify 50%	Y	1
Credit 5.1	Local/Regional Materials, 20% Manufactured Locally	Y	1
Credit 5.2	Local/Regional Materials, of 20% Above, 50% Harvested Locally	Y	1
Credit 6	Rapidly Renewable Materials	N	0
Credit 7	Certified Wood	Y	1
Indoor Environmental Quality			
Credit		Y or N	points
Prereq 1	Minimum IAQ Performance	Y	0
Prereq 2	Environmental Tobacco Smoke (ETS) Control	Y	0
Credit 1	Carbon Dioxide (CO_2) Monitoring	N	0
Credit 2	Increase Ventilation Effectiveness	N	0
Credit 3.1	Construction IAQ Management Plan, During Construction	Y	1
Credit 3.2	Construction IAQ Management Plan, Before Occupancy	N	0
Credit 4.1	Low-Emitting Materials, Adhesives & Sealants	Y	1
Credit 4.2	Low-Emitting Materials, Paints	Y	1
Credit 4.3	Low-Emitting Materials, Carpet	Y	1
Credit 4.4	Low-Emitting Materials, Composite Wood	N	0
Credit 5	Indoor Chemical & Pollutant Source Control	Y	1
Credit 6.1	Controllability of Systems, Perimeter	N	0
Credit 6.2	Controllability of Systems, Non-Perimeter	N	0
Credit 7.1	Thermal Comfort, Comply with ASHRAE 55-1992	Y	1
Credit 7.2	Thermal Comfort, Permanent Monitoring System	N	0
Credit 8.1	Daylight & Views, Daylight 75% of Spaces	Y	1
Credit 8.2	Daylight & Views, Views for 90% of Spaces	N	0
Innovation & Design Process			
Credit		Y or N	points
Credit 1.1	Innovation in Design: Green Cleaning	Y	1
Credit 1.2	Innovation in Design: Education	Y	1
Credit 1.3	Innovation in Design: Green Construction Oractices	Y	1
Credit 1.4	Innovation in Design: Environmental Management System	Y	1
Credit 2	LEED™ Accredited Professional	Y	1

April 11, 2007 LEED 2.1 Submission

SCORESHEET APPENDIX

PAGOSA SPRINGS HOTEL AND RESORT
Pagosa Springs, Colorado

SCORESHEET APPENDIX

THE PALAZZO CASINO HOTEL AND RESORT
Las Vegas, Nevada

ERNST & YOUNG

The Palazzo Hotel Resort: Las Vegas

LEED-NC Progress Matrix

LEED-NC

LEED-NC Version 2.2 Progress Matrix
Palazzo - Sands

Yes	?	No				
10	0	4			**Sustainable Sites**	14 Points
Y			SS	Prereq 1	**Construction Activity Pollution Prevention**	Required
1			SS	Credit 1	**Site Selection**	1
1			SS	Credit 2	**Development Density & Community Connectivity**	1
1			SS	Credit 3	**Brownfield Redevelopment**	1
1			SS	Credit 4.1	**Alternative Transportation**, Public Transportation Access	1
1			SS	Credit 4.2	**Alternative Transportation**, Bicycle Storage & Changing Rooms	1
1			SS	Credit 4.3	**Alternative Transportation**, Low-Emitting and Fuel-Efficient Vehicles	1
1			SS	Credit 4.4	**Alternative Transportation**, Parking Capacity (Carpools/vanpools)	1
1			SS	Credit 5.2	**Site Development**, Maximize Open Space	1
1			SS	Credit 7.1	**Heat Island Effect**, Non-Roof	1
1			SS	Credit 7.2	**Heat Island Effect**, Roof	1

Yes	?	No				
4	0	1			**Water Efficiency**	5 Points
1			WE	Credit 1.1	**Water Efficient Landscaping**, Reduce by 50%	1
1			WE	Credit 1.2	**Water Efficient Landscaping**, No Potable Use or No Irrigation	1
1			WE	Credit 3.1	**Water Use Reduction**, 20% Reduction	1
1			WE	Credit 3.2	**Water Use Reduction**, 30% Reduction	1

Yes	?	No				
3	0	14			**Energy & Atmosphere**	17 Points
Y			EA	Prereq 1	**Fundamental Commissioning of the Building Energy Systems**	Required
Y			EA	Prereq 2	**Minimum Energy Performance**	Required
Y			EA	Prereq 3	**Fundamental Refrigerant Management**	Required
1		9	EA	Credit 1	**Optimize Energy Performance**	1 to 10
1			EA	Credit 3	**Enhanced Commissioning**	1
1			EA	Credit 4	**Enhanced Refrigerant Management**	1

Yes	?	No				
4	0	9			**Materials & Resources**	13 Points
Y			MR	Prereq 1	**Storage & Collection of Recyclables**	Required
1			MR	Credit 2.1	**Construction Waste Management**, Divert 50% from Disposal	1
1			MR	Credit 4.1	**Recycled Content**, 10% (post-consumer + ½ pre-consumer)	1
1			MR	Credit 4.2	**Recycled Content**, 20% (post-consumer + ½ pre-consumer)	1
1			MR	Credit 5.1	**Regional Materials**, 10% Extracted, Processed & Manufactured Regionally	1

9	0	6			**Indoor Environmental Quality**	16 Points
Y			EQ	Prereq 1	**Minimum IAQ Performance**	Required
Y			EQ	Prereq 2	**Environmental Tobacco Smoke (ETS) Control**	Required
1			EQ	Credit 1	**Outdoor Air Delivery Monitoring**	1
1			EQ	Credit 2	**Increased Ventilation**	1
1			EQ	Credit 4.1	**Low-Emitting Materials**, Adhesives & Sealants	1
1			EQ	Credit 4.2	**Low-Emitting Materials**, Paints & Coatings	1
1			EQ	Credit 4.3	**Low-Emitting Materials**, Carpet Systems	1
1			EQ	Credit 6.1	**Controllability of Systems**, Lighting	1
1			EQ	Credit 6.2	**Controllability of Systems**, Thermal Comfort	1
1			EQ	Credit 7.1	**Thermal Comfort**, Design	1
1			EQ	Credit 7.2	**Thermal Comfort**, Verification	1

Yes	?	No				
6	0	0			**Innovation & Design Process**	6 Points
1			ID	Credit 1.1	**Innovation in Design**: Open Spaces	1
1			ID	Credit 1.2	**Innovation in Design**: Exemplary performance - Development Density	1
1			ID	Credit 1.3	**Innovation in Design**: Education	1
1			ID	Credit 1.4	**Innovation in Design**: Water use reduction, increased cycles of concentration in cooling tower	1
1			ID	Credit 2	**LEED® Accredited Professional**	1

SCORESHEET APPENDIX

PROXIMITY HOTEL AND CONFERENCE CENTER
Greenboro, North Carolina

U.S. GREEN BUILDING COUNCIL — LEED PLATINUM — USGBC

LEED-NC

NEW CONSTRUCTION

PURPOSE — The Leadership in Energy and Environmental Design (LEED) Rating System was designed by the US Green Building Council to encourage and facilitate the development of more sustainable buildings.

LEED CREDITS — The environmental categories are subdivided into the established LEED credits, which are based on desired performance goals within each category. An assessment of whether the credit is earned or denied is made and a narrative describes the basis for the assessment.

CREDITS ACHIEVED 55 — The applicant has provided the mandatory documentation which supports the achievements of the credit requirements, achieving the associated points. Currently the project has scored the adjacent points in this category.

RATING — **Platinum**

OFFICIAL SCORES — Official LEED v2.2-2008 Score: Certified: 26-32 Silver Rating: 33-38 Gold Rating: 39-51 Platinum Rating: 52+

CREDITS EARNED 12 — SUSTAINABLE SITES — POSSIBLE POINTS 14

CONSTRUCTION ACTIVITY POLLUTION PREVENTION — PREREQUISITE
The project has followed local erosion and sedimentation control standards and codes, which are more stringent than the NPDES program requirements.

1 — SITE SELECTION
The hotel site does not meet any of the prohibited criteria.

1 — DEVELOPMENT DENSITY; COMMUNITY CONNECTIVITY
The project has been renovated or constructed on a previously developed site within 1/2 mile of a residential zone or neighborhood with an average density of 10 units per acre net and within 1/2 mile of at least 10 Basic Services.

1 — ALTERNATIVE TRANSPORTATION: PUBLIC TRANSPORTATION ACCESS
The project is located within 1/4 mile of one or more stops for two or more public or campus bus lines usable by building occupants.

1 — ALTERNATIVE TRANSPORTATION: BICYCLE STORAGE; CHANGING ROOMS
Secure bicycle racks/storage has been provided for at least 5% of all peak building users within 200 yards of a building entrance and shower/changing facilities have been provided within 200 yards of the building entrance for at least 0.5% of Full-Time Equivalent occupants.

1 — ALTERNATIVE TRANSPORTATION: LOW-EMITTING; FUEL EFFICIENT VEHICLES
Preferred parking has been provided for low-emitting and fuel-efficient vehicles for 5% of the total vehicle parking capacity of the site.

1 — ALTERNATIVE TRANSPORTATION: PARKING CAPACITY
The parking capacity has been sized to meet, but not exceed, the minimum local zoning requirements, and that preferred parking has been provided for 5% of the total provided parking spaces.

1 — SITE DEVELOPMENT: PROTECT OR RESTORE HABITAT
A minimum of 50% of the site area that does not fall within the building footprint has been restored with native planting.

1 — SITE DEVELOPMENT: MAXIMIZE OPEN SPACE CREDIT
Local zoning requirements do not require open space, so an area of open space has been allocated which is equal to or greater than 20% of the total site area.

1 — STORMWATER MANAGEMENT: QUANTITY CONTROL
Existing Imperviousness less than or equal to 50%. A stormwater management plan or stream channel protection strategy has been implemented that protects receiving stream channels from excessive erosion.

1 — STORMWATER MANAGEMENT: QUALITY CONTROL

1 — HEAT ISLAND EFFECT: ROOF CREDIT
Reflective roofing materials have been used for at least 75% of the project's roof surface.

1 — LIGHT POLLUTION REDUCTION
The maximum candela value from interior fixtures does not intersect transparent or translucent exterior building surfaces OR automatic lighting controls turn off non-essential lighting during non-business hours and the Lighting Power Density is within the LEED Allowable threshold and the percentage of site lamp lumens above 90 degrees from nadir is no greater than 2%.

CREDITS EARNED 4 — WATER EFFICIENCY — POSSIBLE POINTS 5

2 — WATER EFFICIENT LANDSCAPING
The landscaping and irrigation systems have been designed to reduce irrigation water consumption from a calculated baseline and the irrigation water used on site is supplied by a non-potable source.

2 — WATER USE REDUCTION
Water use has been reduced by 33.5% through the use of low-flow fixtures.

CREDITS EARNED 16 — ENERGY; ATMOSPHERE — POSSIBLE POINTS 17

FUNDAMENTAL COMMISIONING — PREREQUISITE

MINIMUM ENERGY PERFORMANCE — PREREQUISITE

FUNDAMENTAL REFRIGERANT MANAGEMENT — PREREQUISITE
The project's HVAC & Refrigeration systems do not contain CFC-based refrigerants.

9 — OPTIMIZE ENERGY PERFORMANCE
The energy modeling output indicate a 39.2% savings between the design case and the budget case based on ASHRAE 90.1-2004.

3 — ON-SITE RENEWABLE ENERGY
Calculations indicate that 8.49% of the building's regulated energy cost is provided by on-site renewable energy.

1 — ENHANCED COMMISSIONING

1 — ENHANCED REFRIGERANT MANAGEMENT
The base building HVAC & Refrigeration equipment does not exceed the LEED Ozone Depletion and Global Warming maximum threshold formula.

1 — MEASUREMENT; VERIFICATION
The project has developed and implemented a measurement and verification plan consistentwith Option (D) of the IPMVP.

1 — GREEN POWER
35% of the Electricity is from renewable sources.

CREDITS EARNED 6 — MATERIALS; RESOURCES — POSSIBLE POINTS 13

STORAGE; COLLECTION OF RECYCLABLES — PREREQUISITE
Appropriate facilities for recycling have been provided.

2 — CONSTRUCTION WASTE MANAGEMENT
The project diverted 1,535 tons (86.9%) of on-site generated construction waste from landfill.

2 — RECYCLED CONTENT
22.4% of the total building materials content, by value, have been manufactured using recycled materials.

2 — REGIONAL MATERIALS
45.9% of the total building materials value is comprised of building materials and/or products that have been extracted, processed and manufactured within 500 miles of the project site.

CREDITS EARNED 12 — INDOOR ENVIRONMENTAL QUALITY — POSSIBLE POINTS 15

MINIMUM INDOOR AIR QUALITY PERFORMANCE — PREREQUISITE
The requirements of ASHRAE 62.1-2004 have been met.

ENVIRONMENTAL TOBACCO SMOKE (ETS) CONTROL — PREREQUISITE
No smoking is allowed in the building and designated exterior smoking areas are located at least 25 feet away from entries, outdoor air intakes and operable windows.

1 — OUTDOOR AIR DELIVERY MONITORING
A CO2 monitoring system has been installed.

1 — INCREASED VENTILATION
Outdoor air ventilation rates have been increased to all occupied spaces by at least 30% above the minimum rates required by ASHRAE Standard 62.1-2004.

1 — CONSTRUCTION INDOOR AIR QUALITY MANAGEMENT PLAN: DURING CONSTRUCTION
The project developed and implemented a construction IAQ management plan that followed the referenced SMACNA Guidelines. A copy of the project's IAQ Management Plan and photos highlighting the implemented IAQ measures have been provided.

1 — LOW-EMITTING MATERIALS: ADHESIVES; SEALANTS
All adhesive and sealant products comply with the VOC (Volital Organic Compounds) limits.

1 — LOW-EMITTING MATERIALS: PAINTS; COATINGS
All indoor paints, stains, and clear finishes comply with the VOC (Volital Organic Compounds) limits of the referenced Green Seal and SCAQMD standards.

1 — LOW-EMITTING MATERIALS: CARPET SYSTEMS
Installed carpet systems comply with the VOC (Volital Organic Compounds) limits of the CRI Green Label Plus Testing Program.

1 — CONTROLLABILITY OF SYSTEMS: LIGHTING
Sufficient lighting controls have been provided for all shared multi-occupant spaces and that at least 50% of the individual workstations have been provided with lighting controls.

1 — CONTROLLABILITY OF SYSTEMS: THERMAL COMFORT
Individual comfort controls have been provided.

1 — THERMAL COMFORT: DESIGN
The project has been designed to maintain indoor comfort within the ranges established by ASHRAE 55-2004.

1 — THERMAL COMFORT: VERIFICATION
A post-occupancy survey will be conducted to determine occupant thermal comfort satisfaction.

1 — DAYLIGHTING; VIEWS: DAYLIGHT 75% OF SPACES

1 — DAYLIGHTING; VIEWS: VIEWS FOR 90% OF SPACES
97.15% of critical visual task areas have direct access to views of the outdoors.

CREDITS EARNED 5 — INNOVATION; DESIGN PROCESS — POSSIBLE POINTS 5

1 — INNOVATION IN DESIGN
Achieving views for 97.15% of critical visual task areas.

1 — INNOVATION IN DESIGN
Green Building Education efforts.
1. Poster board narratives
2. A series of "Sustainable Practices Symposiums" available to the public
   (a) Outreach to the education community
   (b) Providing speakers (in the first year, over 70 speaking engagements were fulfilled by team speakers)
   (c) Sustainable Practices tours (over 9,000 in the first year)
3. NC A&T State University collaboration program with their Center of Energy Research and Technology

1 — INNOVATION IN DESIGN CREDIT
Restoration of 700 linear feet of stream to the NC Department of Water quality standards.

1 — INNOVATION IN DESIGN
Over 40% of the building materials sourced locally.

1 — LEED ACCREDITED PROFESSIONAL
A LEED AP has been a participant on the project development team.

SCORESHEET APPENDIX

SANDPEARL RESORT
Clearwater Beach, Florida

LEED-NC

LEED-NC Version 2.2 Registered Project Checklist

Sandpearl
Clearwater Beach, FL

Current as of 8/21/07

Yes	?	No	Levels: Certified 26-32 pts Silver 33-38 pts Gold 39-51 pts Platinum 52-69 pts			
27	5	29	**Project Totals (pre-certification estimates)**			
6	2	6	**Sustainable Sites**		14 Pts	Credit Intent
Y			Prereq 1	**Construction Activity Pollution Prevention**	Required	[illegible]
1			Credit 1	**Site Selection**	1	[illegible]
	1		Credit 2	**Development Density & Community Connectivity**	1	[illegible]
		1	Credit 3	**Brownfield Redevelopment**	1	[illegible]
1			Credit 4.1	**Alternative Transportation**, Public Transportation Access	1	[illegible]
1			Credit 4.2	**Alternative Transportation**, Bicycle Storage & Changing Rooms	1	[illegible]
1			Credit 4.3	**Alternative Transportation**, Low-Emitting and Fuel-Efficient Vehicles	1	[illegible]
	1		Credit 4.4	**Alternative Transportation**, Parking Capacity	1	[illegible]
		1	Credit 5.1	**Site Development**, Protect or Restore Habitat	1	[illegible]
		1	Credit 5.2	**Site Development**, Maximize Open Space	1	[illegible]
		1	Credit 6.1	**Stormwater Design**, Quantity Control	1	[illegible]
1			Credit 6.2	**Stormwater Design**, Quality Control	1	[illegible]
1			Credit 7.1	**Heat Island Effect**, Non-Roof	1	[illegible]
		1	Credit 7.2	**Heat Island Effect**, Roof	1	[illegible]
		1	Credit 8	**Light Pollution Reduction**	1	[illegible]
Yes	?	No	Levels: Certified 26-32 pts Silver 33-38 pts Gold 39-51 pts Platinum 52-69 pts			
2	1	2	**Water Efficiency**		5 Pts	Credit Intent
1			Credit 1.1	**Water Efficient Landscaping**, Reduce by 50%	1	[illegible]
	1		Credit 1.2	**Water Efficient Landscaping**, No Potable Use or No Irrigation	1	[illegible]
		1	Credit 2	**Innovative Wastewater Technologies**	1	[illegible]
1			Credit 3.1	**Water Use Reduction**, 20% Reduction	1	[illegible]
		1	Credit 3.2	**Water Use Reduction**, 30% Reduction	1	[illegible]
8		9	**Energy & Atmosphere**		17 Pts	Credit Intent
Y			Prereq 1	**Fundamental Commissioning of the Building Energy Systems**	Required	[illegible]
Y			Prereq 2	**Minimum Energy Performance**	Required	[illegible]
Y			Prereq 3	**Fundamental Refrigerant Management**	Required	[illegible]
6		4	Credit 1	**Optimize Energy Performance**	1 to 10	[illegible]
		3	Credit 2	**On-Site Renewable Energy**	1 to 3	[illegible]
1			Credit 3	**Enhanced Commissioning**	1	[illegible]
1			Credit 4	**Enhanced Refrigerant Management**	1	[illegible]
		1	Credit 5	**Measurement & Verification**	1	[illegible]
		1	Credit 6	**Green Power**	1	[illegible]
4		7	**Materials & Resources**		13 Pts	Credit Intent
Y			Prereq 1	**Storage & Collection of Recyclables**	Required	[illegible]
		1	Credit 1.1	**Building Reuse**, Maintain 75% of Existing Walls, Floors & Roof	1	[illegible]
		1	Credit 1.2	**Building Reuse**, Maintain 95% of Existing Walls, Floors & Roof	1	[illegible]
		1	Credit 1.3	**Building Reuse**, Maintain 50% of Interior Non-Structural Elements	1	[illegible]
1			Credit 2.1	**Construction Waste Management**, Divert 50% from Disposal	1	[illegible]
Yes	?	No	Levels: Certified 26-32 pts Silver 33-38 pts Gold 39-51 pts Platinum 52-69 pts			
			Credit 2.2	**Construction Waste Management**, Divert 75% from Disposal	1	[illegible]
		1	Credit 3.1	**Materials Reuse**, 5%	1	[illegible]
		1	Credit 3.2	**Materials Reuse**, 10%	1	[illegible]
1			Credit 4.1	**Recycled Content**, 10% (post-consumer + ½ pre-consumer)	1	[illegible]
			Credit 4.2	**Recycled Content**, 20% (post-consumer + ½ pre-consumer)	1	[illegible]
1			Credit 5.1	**Regional Materials**, 10% Extracted, Processed & Manufactured	1	[illegible]
1			Credit 5.2	**Regional Materials**, 20% Extracted, Processed & Manufactured	1	[illegible]
		1	Credit 6	**Rapidly Renewable Materials**	1	[illegible]
		1	Credit 7	**Certified Wood**	1	[illegible]
4		5	**Indoor Environmental Quality**		15 Pts	Credit Intent
Y			Prereq 1	**Minimum IAQ Performance**	Required	[illegible]
Y			Prereq 2	**Environmental Tobacco Smoke** (ETS) **Control**	Required	[illegible]
			Credit 1	**Outdoor Air Delivery Monitoring**	1	[illegible]
			Credit 2	**Increased Ventilation**	1	[illegible]
1			Credit 3.1	**Construction IAQ Management Plan**, During Construction	1	[illegible]
		1	Credit 3.2	**Construction IAQ Management Plan**, Before Occupancy	1	[illegible]
1			Credit 4.1	**Low-Emitting Materials**, Adhesives & Sealants	1	[illegible]
1			Credit 4.2	**Low-Emitting Materials**, Paints & Coatings	1	[illegible]
		1	Credit 4.3	**Low-Emitting Materials**, Carpet Systems	1	[illegible]
		1	Credit 4.4	**Low-Emitting Materials**, Composite Wood & Agrifiber Products	1	[illegible]
		1	Credit 5	**Indoor Chemical & Pollutant Source Control**	1	[illegible]
			Credit 6.1	**Controllability of Systems**, Lighting	1	[illegible]
Yes	?	No	Levels: Certified 26-32 pts Silver 33-38 pts Gold 39-51 pts Platinum 52-69 pts			
			Credit 6.2	**Controllability of Systems**, Thermal Comfort	1	[illegible]
1			Credit 7.1	**Thermal Comfort**, Design	1	[illegible]
			Credit 7.2	**Thermal Comfort**, Verification	1	[illegible]
		1	Credit 8.1	**Daylight & Views**, Daylight 75% of Spaces	1	[illegible]
			Credit 8.2	**Daylight & Views**, Views for 90% of Spaces	1	[illegible]
3	2		**Innovation & Design Process**		5 Pts	Credit Intent
1			Credit 1.1	**Innovation in Design**: Exemplary Performance: Regional Materials	1	[illegible]
1			Credit 1.2	**Innovation in Design**: Exemplary Performance: Heat Island Effect, Non-	1	
	1		Credit 1.3	**Innovation in Design**: Green Building Education	1	
	1		Credit 1.4	**Innovation in Design**: Reduced Process Water	1	
1			Credit 2	**LEED® Accredited Professional**	1	[illegible]
27	5	29	**Project Totals (pre-certification estimates)**		69 Pts	
			Certified 26-32 points Silver 33-38 points Gold 39-51 points Platinum 52-69 points			

SEAGATE HOTEL
Delray Beach, Florida

TLC Engineering for Architecture

LEED® Checklist Worksheet

June 12, 2006

		Points Available	Yes	Maybe	No
	Sustainable Sites	14	8	0	6
Prereq 1	**Erosion & Sedimentation Control**	Req'd			
Credit 1	**Site Selection**	1	1		
Credit 2	**Urban Redevelopment**	1			1
Credit 3	**Brownfield Redevelopment**	1			1
Credit 4.1	**Alternative Transportation**, Public Transportation Access	1	1		
Credit 4.2	**Alternative Transportation**, Bicycle Storage & Changing Rooms	1	1		
Credit 4.3	**Alternative Transportation**, Low Emitting and Fuel Efficient Vehicles	1	1		
Credit 4.4	**Alternative Transportation**, Parking Capacity	1			
Credit 5.1	**Reduced Site Disturbance**, Protect or Restore Open Space	1			
Credit 5.2	**Reduced Site Disturbance**, Development Footprint	1			
Credit 6.1	**Stormwater Management**, Rate or Quantity	1	1		
Credit 6.2	**Stormwater Management**, Treatment	1	1		
Credit 7.1	**Landscape & Exterior Design to Reduce Heat Islands**, Non-Roof	1	1		
Credit 7.2	**Landscape & Exterior Design to Reduce Heat Islands**, Roof	1	1		
Credit 8	**Light Pollution Reduction**	1			
	Water Efficiency	5	3	0	2
Credit 1.1	**Water Efficient Landscaping**, Reduce by 50%	1	1		
Credit 1.2	**Water Efficient Landscaping**, No Potable Use or No Irrigation	1			
Credit 2	**Innovative Wastewater Technologies**	1			
Credit 3.1	**Water Use Reduction**, 20% Reduction	1	1		
Credit 3.2	**Water Use Reduction**, 30% Reduction	1	1		
	Energy & Atmosphere	17	4	0	13
Prereq 1	**Fundamental Building Systems Commissioning**	Req			
Prereq 2	**Minimum Energy Performance**	Req			
Prereq 3	**CFC Reduction in HVAC&R Equipment**	Req'd			
Credit 1.1 through 1.5	**Optimize Energy Performance**	10	2		
Credit 2.1	**Renewable Energy**, 5%	1			
Credit 2.2	**Renewable Energy**, 10%	1			
Credit 2.3	**Renewable Energy**, 20%	1			
Credit 3	**Additional Commissioning**	1	1		
Credit 4	**Ozone Depletion**	1	1		
Credit 5	**Measurement & Verification**	1			
Credit 6	**Green Power**	1			
	Materials & Resources	13	2	0	11
Prereq 1	**Storage & Collection of Recyclables**	Req'd			
Credit 1.1	**Building Reuse**, Maintain 75% of Existing Shell	1			
Credit 1.2	**Building Reuse**, Maintain 100% of Shell	1			
Credit 1.3	**Building Reuse**, Maintain 100% Shell & 50% Non-Shell	1			
Credit 2.1	**Construction Waste Management**, Divert 50%	1	1		
Credit 2.2	**Construction Waste Management**, Divert 75%	1	1		
Credit 3.1	**Resource Reuse**, Specify 5%	1			
Credit 3.2	**Resource Reuse**, Specify 10%	1			
Credit 4.1	**Recycled Content**, Specify 10%	1			
Credit 4.2	**Recycled Content**, Specify 50%	1			
Credit 5.1	**Local/Regional Materials**, 10% Manufactured Regionally	1			
Credit 5.2	**Local/Regional Materials**, 20% Above, 20% Harvested Locally	1			
Credit 6	**Rapidly Renewable Materials**	1			
Credit 7	**Certified Wood**	1			
	Indoor Environmental Quality	15	9	0	6
Prereq 1	**Minimum IAQ Performance**	Req'd			
Prereq 2	**Environmental Tobacco Smoke (ETS) Control**	Req'd			
Credit 1	**Carbon Dioxide (CO_2) Monitoring**	1			
Credit 2	**Increase Ventilation Effectiveness**	1			
Credit 3.1	**Construction IAQ Management Plan**, During Construction	1	1		
Credit 3.2	**Construction IAQ Management Plan**, Before Occupancy	1			
Credit 4.1	**Low-Emitting Materials**, Adhesives & Sealants	1			
Credit 4.2	**Low-Emitting Materials**, Paints and Coatings	1	1		
Credit 4.3	**Low-Emitting Materials**, Carpet	1	1		
Credit 4.4	**Low-Emitting Materials**, Composite Wood	1			
Credit 5	**Indoor Chemical & Pollutant Source Control**	1			
Credit 6.1	**Controllability of Systems**, Perimeter	1	1		
Credit 6.2	**Controllability of Systems**, Non-Perimeter	1	1		
Credit 7.1	**Thermal Comfort**, Compliance with ASHRAE 55-2004	1	1		
Credit 7.2	**Thermal Comfort**, Permanent Monitoring System	1	1		
Credit 8.1	**Daylight & Views**, Daylight 75% of Spaces	1	1		
Credit 8.2	**Daylight & Views**, Views for 90% of Spaces	1	1		
	Innovation & Design Process	5	1	0	4
Credit 1.1	**Innovation in Design:**	1			
Credit 1.2	**Innovation in Design:**	1			
Credit 1.3	**Innovation in Design:**	1			
Credit 1.4	**Innovation in Design:**	1			
Credit 2	**LEED® Accredited Professional**	1	1		
	Certified 26-32 points **Silver** 33-38 points **Gold** 39-51 points **Platinum** 52-69 points		27		42

SCORESHEET APPENDIX

THE NINES HOTEL
Portland, Oregon

LEED Scorecard
The Nines, Portland Oregon
July 6, 2009

BRIGHTWORKS

Yes	No	
36	33	**Total Project Score**

Certified 26 to 32 points · Silver 33 to 38 points · Gold 39 to 51 points · Platinum 52 or more points

Y	N			
7	7			**Sustainable Sites**
Y		C	Prereq 1	**Erosion & Sedimentation Control**
1		D	Credit 1	**Site Selection**
1		D	Credit 2	**Development Density**
1		D	Credit 3	**Brownfield Redevelopment**
1		D	Credit 4.1	**Alternative Transportation**, Public Transportation Access
1		D	Credit 4.2	**Alternative Transportation**, Bicycle Storage & Changing Rooms
	1	D	Credit 4.3	**Alternative Transportation**, Hybrid Flexcars for employees
1		D	Credit 4.4	**Alternative Transportation**, No New Parking
	1	C	Credit 5.1	**Reduced Site Disturbance**, Protect or Restore Open Space
	1	D	Credit 5.2	**Reduced Site Disturbance**, Development Footprint
	1	D	Credit 6.1	**Stormwater Management**, Rate and Quantity
	1	D	Credit 6.2	**Stormwater Management**, Treatment
	1	C	Credit 7.1	**Reduce Heat Islands**, Non-Roof
1		D	Credit 7.2	**Reduce Heat Islands**, Roof
	1	D	Credit 8	**Light Pollution Reduction**

Y	N			
3	2			**Water Efficiency**
1		D	Credit 1.1	**Water Efficient Landscaping**, Reduce by 50%
1		D	Credit 1.2	**Water Efficient Landscaping**, No Potable Use or No Irrigation
	1	D	Credit 2	**Innovative Wastewater Technologies**
1		D	Credit 3.1	**Water Use Reduction**, 20% Reduction
	1	D	Credit 3.2	**Water Use Reduction**, 30% Reduction

Y	N			
8	9			**Energy & Atmosphere**
Y		C	Prereq 1	**Fundamental Building Systems Commissioning**
Y		D	Prereq 2	**Minimum Energy Performance**
Y		D	Prereq 3	**CFC Reduction in HVAC&R Equipment**
2		D	Credit 1.1	**Optimize Energy Performance**, 20% New / 10% Existing
2		D	Credit 1.2	**Optimize Energy Performance**, 30% New / 20% Existing
1	1	D	Credit 1.3	**Optimize Energy Performance**, 40% New / 30% Existing
	2	D	Credit 1.4	**Optimize Energy Performance**, 50% New / 40% Existing
	2	D	Credit 1.5	**Optimize Energy Performance**, 60% New / 50% Existing
	1	D	Credit 2.1	**Renewable Energy**, 5%
	1	D	Credit 2.2	**Renewable Energy**, 10%
	1	D	Credit 2.3	**Renewable Energy**, 20%
1		C	Credit 3	**Additional Commissioning**
1		D	Credit 4	**Ozone Depletion**
	1	C	Credit 5	**Measurement & Verification**
1		C	Credit 6	**50% Green Power**

Y	N			
6	7			**Materials & Resources**
Y		D	Prereq 1	**Storage & Collection of Recyclables**
1		D	Credit 1.1	**Building Reuse**, Maintain 75% of Existing Shell
	1	D	Credit 1.2	**Building Reuse**, Maintain 100% of Existing Shell
	1	D	Credit 1.3	**Building Reuse**, Maintain 100% Shell & 50% Non-Shell
1		C	Credit 2.1	**Construction Waste Management**, Divert 50%
1		C	Credit 2.2	**Construction Waste Management**, Divert 75%
	1	D	Credit 3.1	**Resource Reuse**, Specify 5%
	1	D	Credit 3.2	**Resource Reuse**, Specify 10%
1		C	Credit 4.1	**Recycled Content**, 5% (POST-CONSUMER + 1/2 POST-INDUSTRIAL)
1		C	Credit 4.2	**Recycled Content**, 10% (POST-CONSUMER + 1/2 POST-INDUSTRIAL)
1		C	Credit 5.1	**Regional Materials**, 20% Manufactured Locally
	1	C	Credit 5.2	**Regional Materials**, of 20% Above, 50% Harvested Locally
	1	C	Credit 6	**Rapidly Renewable Materials**
	1	C	Credit 7	**Certified Wood**

Y	N			
7	8			**Indoor Environmental Quality**
Y		D	Prereq 1	**Minimum IAQ Performance**
Y		D	Prereq 2	**Environmental Tobacco Smoke (ETS) Control**
	1	D	Credit 1	**Carbon Dioxide (CO_2) Monitoring**
	1	D	Credit 2	**Increase Ventilation Effectiveness**
	1	C	Credit 3.1	**Construction IAQ Management Plan**, During Construction
	1	C	Credit 3.2	**Construction IAQ Management Plan**, Before Occupancy
1		C	Credit 4.1	**Low-Emitting Materials**, Adhesives & Sealants
1		C	Credit 4.2	**Low-Emitting Materials**, Paints
1		C	Credit 4.3	**Low-Emitting Materials**, Carpet
	1	C	Credit 4.4	**Low-Emitting Materials**, Composite Wood
1		D	Credit 5	**Indoor Chemical & Pollutant Source Control**
1		D	Credit 6.1	**Controllability of Systems**, Lighting
1		D	Credit 6.2	**Controllability of Systems**, Thermal Comfort
1		D	Credit 7.1	**Thermal Comfort**, Comply with ASHRAE 55-1992
	1	D	Credit 7.2	**Thermal Comfort**, Permanent Monitoring System
	1	D	Credit 8.1	**Daylight & Views**, Daylight 75% of Spaces
	1	D	Credit 8.2	**Daylight & Views**, Views for 90% of Spaces

Y	N			
5	0			**Innovation in Design Process**
1		C	Credit 1.1	**Green Housekeeping**
1		C	Credit 1.2	**Exceed MRc4**
1		C	Credit 1.3	**100% Green Power**
1		D	Credit 1.4	**Exceed SSc4.1**
1		D	Credit 2	**LEED™ Accredited Professional**

SCORESHEET APPENDIX

UNITY VILLAGE HOTEL AND CONFERENCE CENTER
Kansas City, Missouri

		Credits and Prerequisites				Team Notes
Sustainable Sites		**Possible**	**Pending**	**Documented**	**Responsible**	
Prerequisite 1	Erosion & Sedimentation Control	0	No	Yes	Brad Sonner	Credit Documented
Credit 1	Site Selection	1	0	1	John Ware	Credit Documented
Credit 2	Urban Redevelopment	1	0	0	#N/A	Not Pursuing Credit
Credit 3	Brownfield Redevelopment	1	0	0	#N/A	Not Pursuing Credit
Credit 4.1	Alternative Transportation, Public Transportation Access	1	0	0	#N/A	Not Pursuing Credit
Credit 4.2	Alternative Transportation, Bicycle Storage & Changing Rooms	1	0	1	John Ware	Credit Documented
Credit 4.3	Alternative Transportation, Alternative Fuel Refueling Stations	1	0	1	Bruce Schall	Credit Documented
Credit 4.4	Alternative Transportation, Parking Capacity	1	0	1	John Ware	Credit Documented
Credit 5.1	Reduced Site Disturbance, Protect or Restore Open Space	1	0	1	John Ware	Credit Documented
Credit 5.2	Reduced Site Disturbance, Development Footprint	1	0	1	John Ware	Credit Documented
Credit 6.1	Stormwater Management, Rate and Quantity	1	0	1	Brad Sonner	Credit Documented
Credit 6.2	Stormwater Management, Treatment	1	0	1	Robert Whitman	Credit Documented
Credit 7.1	Landscape & Ext Design to Reduce Heat Islands, Non-Roof	1	0	1	John Ware	Credit Documented
Credit 7.2	Landscape & Ext Design to Reduce Heat Islands, Roof	1	0	0	#N/A	Not Pursuing Credit
Credit 8	Light Pollution Reduction	1	0	1	Dominick Rucereto	Credit Documented
	Sustainable Sites Totals	14	0	10		
Water Efficiency		**Possible**	**Pending**	**Documented**	**Responsible**	**Team Notes**
Credit 1.1	Water Efficient Landscaping, Reduce by 50%	1	0	1	Robert Whitman	Credit Documented
Credit 1.2	Water Efficient Landscaping, No Potable Use or No Irrigation	1	0	1	Robert Whitman	Credit Documented
Credit 2	Innovative Wastewater Technologies	1	0	1	Dominick Rucereto	Credit Documented
Credit 3.1	Water Use Reduction, 20% Reduction	1	0	1	Dominick Rucereto	Credit Documented
Credit 3.2	Water Use Reduction, 30% Reduction	1	0	1	Dominick Rucereto	Credit Documented
	Water Efficiency Totals	5	0	5		
Energy & Atmosphere		**Possible**	**Pending**	**Documented**	**Responsible**	**Team Notes**
Prerequsite 1	Fundamental Building Systems Commissioning	0	No	Yes	Dominick Rucereto	Credit Documented
Prerequisite 2	Minimum Energy Performance	0	No	Yes	Dominick Rucereto	Credit Documented
Prerequisite 3	CFC Reduction in HVAC&R Equipment	0	No	Yes	Dominick Rucereto	Credit Documented
Credit 1.1-1.10	Optimize Energy Performance	10	0	6	Dominick Rucereto	Credit Documented
Credit 2.1	Renewable Energy, 5%	1	0	0	#N/A	Not Pursuing Credit
Credit 2.2	Renewable Energy, 10%	1	0	0	#N/A	Not Pursuing Credit
Credit 2.3	Renewable Energy, 20%	1	0	0	#N/A	Not Pursuing Credit
Credit 3	Additional Commissioning	1	0	0	#N/A	Not Pursuing Credit
Credit 4	Ozone Depletion	1	0	0	#N/A	Not Pursuing Credit
Credit 5	Measurement & Verification	1	0	0	#N/A	Not Pursuing Credit
Credit 6	Green Power	1	0	0	#N/A	Held in reserve: $15,600
	Energy & Atmosphere Totals	17	0	6		
Materials & Resources		**Possible**	**Pending**	**Documented**	**Responsible**	**Team Notes**
Prerequisite 1	Storage & Collection of Recyclables	0	No	Yes	John Ware	Credit Documented
Credit 1.1	Building Reuse, Maintain 75% of Existing Shell	1	0	0	#N/A	Not Pursuing Credit
Credit 1.2	Building Reuse, Maintain 100% of Existing Shell	1	0	0	#N/A	Not Pursuing Credit
Credit 1.3	Building Reuse, Maintain 100% Shell & 50% Non-Shell	1	0	0	#N/A	Not Pursuing Credit
Credit 2.1	Construction Waste Management, Divert 50%	1	0	1	Nathan Benjamin	Credit Documented
Credit 2.2	Construction Waste Management, Divert 75%	1	0	0	Nathan Benjamin	Not Pursuing Credit
Credit 3.1	Resource Reuse, Specify 5%	1	0	0	#N/A	Not Pursuing Credit
Credit 3.2	Resource Reuse, Specify 10%	1	0	0	#N/A	Not Pursuing Credit
Credit 4.1	Recycled Content, Specify 5% PC or 10% PC+PI	1	1	0	Nathan Benjamin	Documented in separate Excel file
Credit 4.2	Recycled Content, Specify 10% PC or 20% PC+PI	1	1	0	Nathan Benjamin	Documented in separate Excel file
Credit 5.1	Local/Regional Materials, 20% Manufactured Locally	1	0	0	Nathan Benjamin	Documented in separate Excel file
Credit 5.2	Local/Regional Materials, of 20% Above, 50% Harvested Locally	1	0	0	Nathan Benjamin	Not Pursuing Credit
Credit 6	Rapidly Renewable Materials	1	0	0	#N/A	Not Pursuing Credit
Credit 7	Certified Wood	1	0	0	Nathan Benjamin	Not Pursuing Credit
	Materials & Resources Totals	13	2	1		
Indoor Environmental Quality		**Possible**	**Pending**	**Documented**	**Responsible**	**Team Notes**
Prerequisite 1	Minimum IAQ Performance	0	No	Yes	Dominick Rucereto	Credit Documented
Prerequisite 2	Environmental Tobacco Smoke (ETS) Control	0	No	Yes	Bruce Schall	Credit Documented
Credit 1	Carbon Dioxide (CO2) Monitoring	1	0	1	Katrina Gerber	Credit Documented
Credit 2	Increase Ventilation Effectiveness	1	0	0	Dominick Rucereto	Not Pursuing Credit
Credit 3.1	Construction IAQ Management Plan, During Construction	1	0	1	Nathan Benjamin	Credit Documented
Credit 3.2	Construction IAQ Management Plan, Before Occupancy	1	0	1	Nathan Benjamin	Credit Documented
Credit 4.1	Low-Emitting Materials, Adhesives & Sealants	1	0	1	John Ware	Credit Documented
Credit 4.2	Low-Emitting Materials, Paints	1	0	1	John Ware	Credit Documented
Credit 4.3	Low-Emitting Materials, Carpet	1	0	1	John Ware	Credit Documented
Credit 4.4	Low-Emitting Materials, Composite Wood	1	0	0	John Ware	Not Pursuing Credit
Credit 5	Indoor Chemical & Pollutant Source Control	1	0	1	Dominick Rucereto	Credit Documented
Credit 6.1	Controllability of Systems, Perimeter	1	0	1	John Ware	Credit Documented
Credit 6.2	Controllability of Systems, Non-Perimeter	1	1	0	John Ware	Not Pursuing Credit
Credit 7.1	Thermal Comfort, Comply with ASHRAE 55-1992	1	0	0	#N/A	Not Pursuing Credit
Credit 7.2	Thermal Comfort, Permanent Monitoring System	1	0	0	#N/A	Not Pursuing Credit
Credit 8.1	Daylight & Views, Daylight 75% of Spaces	1	1	0	John Ware	Not Pursuing Credit
Credit 8.2	Daylight & Views, Views for 90% of Spaces	1	0	1	John Ware	Credit Documented
	Indoor Environmental Quality Totals	15	2	9		
Innovation & Design Process		**Possible**	**Pending**	**Documented**	**Responsible**	**Team Notes**
Credit 1.1	Innovation in Design	1	0	1	John Ware	Educational Program
Credit 1.2	Innovation in Design	1	0	1	John Ware	Green Cleaning
Credit 1.3	Innovation in Design	1	0	1	John Ware	Water Efficiency
Credit 1.4	Innovation in Design	1	0	1	John Ware	Recycled Content
Credit 2	LEED™ Accredited Professional	1	0	1	John Ware	John Ware
	Innovation & Design Process Totals	5	0	5		
TOTAL		**69**	**4**	**36**		
Potential LEED Rating				**Silver**		
Certified: (26 to 32 points) Silver: (33 to 38 points) Gold: (39 to 51 points) Platinum: (> 52 points)						

SCORESHEET APPENDIX

WESTIN RIVERFRONT RESORT AND SPA
Avon, Colorado

LEED - NC v2.1

ARCHITECTURAL ENERGY CORPORATION
Integrated Engineered Solutions

Westin Riverfront Resort & Spa
Project # 06-180
Date: June 26, 2009
Level Achieved Silver

Y	M	N	Sustainable Sites		Notes:	D/C
Y			Prerequisite 1	Erosion and Sedimentation Control		C
		X	Credit 1	Site Selection		
		X	Credit 2	Development Density		
		X	Credit 3	Brownfield Redevelopment		
X			Credit 4.1	Alternative Transportation, Locate Near Public Transportation		D
X			Credit 4.2	Alternative Transportation, Bicycle Storage & Changing Rooms		D
X			Credit 4.3	Alternative Transportation, Alternative Fuel Refueling Stations		D
X			Credit 4.4	Alternative Transportation, Minimum or No New Parking		D
X			Credit 5.1	Reduced Site Disturbance, Protect or Restore Open Space		C
X			Credit 5.2	Reduced Site Disturbance, Reduce Footprint & Increase Open Space		D
		X	Credit 6.1	Stormwater Management, No Net Increase or 25% Decrease		
		X	Credit 6.2	Stormwater Management, Treatment Systems		
X			Credit 7.1	Landscape & Exterior Design to Reduce Heat Islands, Site Surfaces		C
		X	Credit 7.2	Landscape & Exterior Design to Reduce Heat Islands, Roof Surfaces		
X			Credit 8	Light Pollution Reduction		D
8	0	6	14 Possible			

Y	M	N	Water Efficiency		Notes:	D/C
X			Credit 1.1	Water Efficient Landscaping, Reduce by 50%		D
		X	Credit 1.2	Water Efficient Landscaping, Reduce Additional 50% or No Irrigation		
		X	Credit 2	Innovative Wastewater Technologies		
		X	Credit 3.1	Water Use Reduction, 20% Reduction		
		X	Credit 3.2	Water Use Reduction, Additional 10% Reduction		
1	0	4	5 Possible			

Y	M	N	Energy and Atmosphere		Notes:	D/C
Y			Prerequisite 1	Fundamental Building Systems Commissioning		C
Y			Prerequisite 2	Minimum Energy Performance		D
Y			Prerequisite 3	CFC Reduction in HVAC&R Equipment		D
X			Credit 1.1	Optimize Energy Performance, 12.5% new, 2.5% existing		D
		X	Credit 1.2	Optimize Energy Performance, 17.51% new, 7.51% existing		
		X	Credit 1.3	Optimize Energy Performance, 22.51% New 12.51% Existing		
		X	Credit 1.4	Optimize Energy Performance, 27.51% New 17.51% Existing		
		X	Credit 1.5	Optimize Energy Performance, 32.51% New 22.51% Existing		
		X	Credit 1.6	Optimize Energy Performance, 37.51% New 27.51% Existing		
		X	Credit 1.7	Optimize Energy Performance, 42.51% New 32.51% Existing		
		X	Credit 1.8	Optimize Energy Performance, 47.51% New 37.51% Existing		
		X	Credit 1.9	Optimize Energy Performance, 52.51% New 42.51% Existing		
		X	Credit 1.10	Optimize Energy Performance, 57.51% New 47.51% Existing		
		X	Credit 2.1	Renewable Energy, 2.5%-7.5% Contribution		
		X	Credit 2.2	Renewable Energy, 7.51%-15.5% Contribution		
		X	Credit 2.3	Renewable Energy, 15.51% Contribution		
X			Credit 3	Additional Commissioning		C
X			Credit 4	Ozone Depletion		D
X			Credit 5	Measurement & Verification		C
X			Credit 6	Green Power		
6	0	12	17 Possible			

Y	M	N	Materials and Resources		Notes:	D/C
Y			Prerequisite 1	Storage & Collection of Recyclables		D
		X	Credit 1.1	Building Reuse, Maintain 75% of Existing Shell		
		X	Credit 1.2	Building Reuse, Maintain Additional 25% of Shell		
		X	Credit 1.3	Building Reuse, Maintain 100% Shell & 50% Non-Shell		
		X	Credit 2.1	Construction Waste Management, Salvage or Recycle 50%		
		X	Credit 2.2	Construction Waste Management, Salvage Additional 25%		
		X	Credit 3.1	Resource Reuse, Specify 5% Reuse		
		X	Credit 3.2	Resource Reuse, Specify 10% Reuse		
X			Credit 4.1	Recycled Content, Specify 5% Recycled Content (PC + 1/2 PI)		C
X			Credit 4.2	Recycled Content, Specify 10% Recycled Content (PC + 1/2 PI)		C
X			Credit 5.1	Local/Regional Materials, 20% Manufactured Locally		C
X			Credit 5.2	Local/Regional Materials, of 20% Above 50% Harvested Locally		C
		X	Credit 6	Rapidly Renewable Materials		
		X	Credit 7	Certified Wood		
4	0	9	13 Possible			

Y	M	N	Indoor Environmental Quality		Notes:	D/C
Y			Prerequisite 1	Minimum IAQ Performance		D
Y			Prerequisite 2	Environmental Tobacco Smoke (ETS) Control		D
X			Credit 1	Carbon Dioxide (CO_2) Monitoring		D
		X	Credit 2	Increase Ventilation Effectiveness		
		X	Credit 3.1	Construction IAQ Management Plan, During Construction		
		X	Credit 3.2	Construction IAQ Management Plan, Prior to Occupancy		
X			Credit 4.1	Low-Emitting Materials, Adhesives		C
X			Credit 4.2	Low-Emitting Materials, Paints		C
X			Credit 4.3	Low-Emitting Materials, Carpet		C
		X	Credit 4.4	Low-Emitting Materials, Composite Wood		C
		X	Credit 5	Indoor Chemical and Pollutant Source Control		
X			Credit 6.1	Controllability of Systems, Operable Window		D
X			Credit 6.2	Controllability of Systems, Individual Controls		D
X			Credit 7.1	Thermal Comfort, Comply with ASHRAE 55-2004		D
X			Credit 7.2	Thermal Comfort, Permanent Monitoring System		D
X			Credit 8.1	Daylight and Views, Diffuse Sunlight to 75% of Space		D
X			Credit 8.2	Daylight and Views, Direct Line of Site to 90% of Space		D
10	0	6	15 Possible			

Y	M	N	Innovation & Design Process		Notes:	D/C
X			Credit 1.1	Innovation in Design, SSc7.1 Exemplary Performance		C
X			Credit 1.2	Innovation in Design, Green Housekeeping		C
X			Credit 1.3	Innovation in Design, Education & Outreach		C
X			Credit 1.4	Innovation in Design, MRc4 Exemplary Performance		C
X			Credit 2	LEED™ Accredited Professional		D
6	0	0	5 Possible			

Points	Level
0 - 25	Insufficient
26 - 32	Certified
33 - 38	Silver
39 - 51	Gold
52 - 69	Platinum

Project Points	Maybe
33	0
Silver	

Project Notes: