UNIVERSITY OF CENTRAL OKLAHOMA

Edmond, Oklahoma

College of Graduate Studies & Research

Rehabilitated Historic Interiors and Sustainability: A Case Study of La Iglesia y

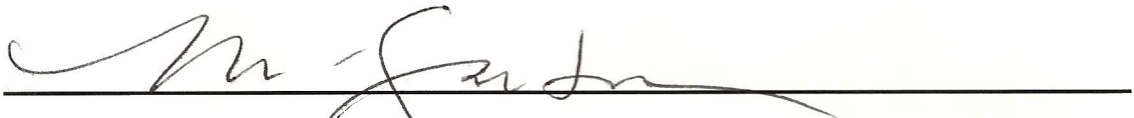Convento Nuestra Señora de Belén in Havana

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Signatures
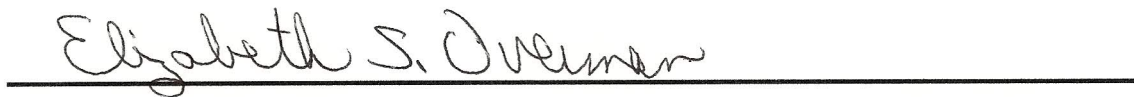
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## Abstract

The concept of social responsibility is continuing to grow as individuals are becoming more accountable for their actions.  It is this idea of social responsibility, which encompasses social, environmental, and economic issues that leads to a sustainable way of thinking. Because the built environment affects people, the planet, and the economy, the incorporation of sustainability within the interior design process is becoming more understood, as well as necessary.  These issues affect everyone on a global scale and that is why an international perspective is provided.  Although new construction utilizes sustainable features, reusing the existing historic building stock should not be ignored.  However, most research only evaluates the use of environmental sustainability in historic preservation.  This study hypothesizes that historic preservation and all forms of sustainability can be achieved.  To test the hypothesis, a building in Havana serves as the case study.   Field research including interviews, site visits, archival research and reviews of the floor plans were used to illustrate how the designers incorporated all forms of sustainability, as related to interior design, to rehabilitate La Iglesia y Convento Nuestra Señora de Belén.  The significant findings conclude both historic preservation and sustainability can be achieved.

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people who worked behind the scenes to make this happen. I would also like to thank the

residents of the Convento de Belen for welcoming me into their community.

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**Definition of Terms**

Adaptive Reuse – The process of repurposing an existing building for a new use (Tyler,

      Ligibel, & Tyler, 2009).

Baroque – A characteristic or style of artistic expression that is marked generally by the

      Use of complex forms, bold ornamentation, and the juxtaposition of contrasting

      elements often conveying a sense of drama, movement, and tension (Merriam-

      Webster Dictionary, 2012).

Barrier-Free – The design of homes, workplaces, and public buildings that allows

      physically challenged individuals to make regular use of such structures (Mosby's

      Medical Dictionary, 2009).

Built Environment - Human-made resources and infrastructure designed to support

      human activity, such as buildings, roads, parks, restaurants, grocery stores and

      other amenities (Merriam-Webster Dictionary, 2012).

Cloister - An area within a monastery or convent (Merriam-Webster Dictionary, 2012).

Communism - A totalitarian system of government in which a single authoritarian party

      controls state-owned means of production (Merriam-Webster Dictionary, 2012).

Cultural Heritage Management – See Historic Preservation

Cultural Identity - The identity of a group or culture (Merriam-Webster Dictionary,

      2012).

Design – The action of creative problem solving by making things better for the user

      (Merriam-Webster Dictionary, 2012).

Design for All – The European term for Universal Design (Bjork, 2009).

Diversity - The inclusion of people of different races or cultures within a group or

      organization (Merriam-Webster Dictionary, 2012).

Egalitarian Society – A society that aims for equal wealth and status for all people

(Merriam-Webster Dictionary, 2012).

Embodied Energy – The total energy required to extract, produce, fabricate, and deliver a material to the job site (Ballast, 2010, p. 4-27).

Environmentally Efficient Materials and Processes – Materials and building operations that perform as well as or better than standard products (Ballast, 2010).

Global Society - The development of an increasingly integrated global economy marked especially by free trade (Merriam-Webster Dictionary, 2012).

Heritage Preservation - The process of identifying, protecting, and enhancing buildings, places, and objects of historical and cultural significance (National Trust for Historic Preservation, 2009).

Inclusive Design – A term used in Great Britain for Universal Design (Bringolf, 2008).

Interior Branding - The process of transforming an office environment into a three-dimensional marketing tool that instantly communicates a company's brand identity, unifies its internal culture, and helps achieve business goals ("Interior Branding", n.d. p.2).

Interior Design - Design solutions for the interior of a building that acknowledge the social context of the project (NCIDQ, 2004).

National Identity - A person's identity and sense of belonging to one state or to one nation, or a feeling one shares with a group of people, regardless of one's citizenship status (Merriam-Webster Dictionary, 2012).

Nationalization – The action of investing control or ownership of in the national government (Merriam-Webster Dictionary, 2012).

Participatory Planning - An urban planning paradigm that emphasizes involving the entire community in the strategic and management processes of urban planning

(Coyula, Angotti, & Uggen; 1996).

Post-Consumer Material – A material or product that has served its intended use and has

been diverted or recovered from waste destined for disposal, having completed its

life as a consumer item (Ballast, 2010, p. 4-27)

Post-Industrial Material – A material that is generated during the manufacturing process

and has been recovered or diverted from solid waste (Ballast, 2010 p 4-27).

Recovered Material- Waste or byproducts that have been recovered or diverted from solid

waste disposal (Ballast, 2010, p. 4-27).

Rehabilitation – The repurposing of a building that allows for the retention and repair of

materials, finishes, features, and spaces that give a property its historical character

(National Trust for Historic Preservation, 2009).

Sick Building Syndrome – The combination of ailments associated with an individual's

place of work or residence (Ballast, 2010).

Social Equity – When all people within a specific society or isolated group have the same

status in a certain respect (Barron & Gauntlett, 2002).

Socialism - Any economic and political theories advocating collective or governmental

ownership and administration of the means of production and distribution of

goods (Merriam-Webster Dictionary, 2012).

Special Period – A period which started in 1991 when Cuba lost all Soviet Union

subsidies (Coyula, Angotti, & Uggen,1996).

Sustainable - The condition of being able to meet the needs of the present without

compromising the needs of future generations (Ballast, 2010).

Sustainable Architecture - It is the art of designing physical objects that comply with the

principles of environment, society and economy (Othman, 2009).

Sustainable Development - Development which meets the needs of current generations

without compromising the ability of future generations to meet their own needs

(Barlund, n.d.).

Triple Bottom Line – Sometimes referred to as "people, planet, and profit" or the three

dimensions of sustainability (Othman, 2009).

Universal Design - The belief that all products, buildings, and interiors should be usable

by everyone regardless of their age, ability, or circumstance (*The Principles of*

*Universal Design*, 1997).

Volatile Organic Compound - Organic chemicals that have a high vapor pressure at

ordinary, room-temperature conditions (Ballast, 2010).

World Heritage Site - A place that is listed by UNESCO as of special cultural or physical

significance (UNESCO, 1996).

**Acronyms**

| | |
|---|---|
| **ADA** | Americans With Disabilities Act |
| **ASID** | American Society of Interior Designers |
| **CPTED** | Crime Prevention through Environmental Design |
| **CSR** | Corporate Social Responsibility |
| **EPA** | Environmental Protection Agency |
| **GDIC** | Group for the Integral Development of the Capital |
| **GDP** | Gross Domestic Product |
| **ICOMOS** | International Council on Monuments and Sites |
| **IDEC** | Interior Design Educator's Council |
| **IFIA/D** | International Federation of Interior Architects/Designers |
| **IIDA** | International Interior Design Association |
| **ISO** | International Organization for Standardization |
| **LEED** | Leadership in Energy and Environmental Design |
| **NCIDQ** | National Counsel for Interior Design Qualification |
| **NGO** | Non-Governmental Organization |
| **NPS** | National Park Service |
| **NTHP** | National Trust For Historic Preservation |
| **OHA** | Office of Humanitarian Affairs |
| **OHC** | Office of the Historian of the City of Havana |
| **SBIC** | Sustainable Building Industry Council |
| **SBS** | Sick Building Syndrome |
| **SR** | Social Responsibility |
| **TBL** | Triple Bottom Line |
| **TTIB** | Talleres para la Transformacion Integral de los Barrios |

**UD** Universal Design

**UNESCO** United Nations Educational Scientific and Cultural Organization

**USGBC** United States Green Building Council

**VOC** Volatile Organic Compound

**WACOSS** Western Australian Council of Social Services

**WCED** World Commission on Environment and Development

## Introduction

As more attention is placed on how the actions of some can negatively affect society, the planet, and overall profits, the concept of social responsibility becomes more popular. It is this idea of social responsibility, which encompasses social, environmental, and economic issues that leads to sustainability. Winton Churchill is quoted as saying, "First we shape our buildings, then they shape us." The built environment greatly affects people's overall physical and mental well-being and is an aspect of our lives which we interact with every day. That is why anyone involved in the architectural and design field should be aware of how their design decisions affect those who use the space.

While the profession of interior design continues to grow, more emphasis is placed on the responsibility designers have in providing spaces that create a positive impact on people, the environment, and the economy. These issues can affect the world on a global scale and designers should look toward other countries to study how they are achieving sustainability. Many times though, only environmental sustainability is addressed in terms of architecture and design and with it the idea that new construction offers the more sustainable choice by utilizing the latest and greatest technologies. However, new construction is not the only option and environmental sustainability should not be the sole focus.

Historic preservation is a strong proponent of all forms of sustainability, providing benefits that include social, environmental, and economic aspects. Rehabilitation, sometimes referred to as adaptive reuse, is one of the historic building treatments that emphasizes the historic character of a building while reusing it for a new purpose and utilizes the skills of the interior designer the most. Again, numerous studies

focus solely on environmental sustainability within historic preservation projects.

Therefore, this study asks the question, "Can historic preservation and all forms of

sustainability be achieved?"  This paper investigates this question in two ways; first, by

providing a definition of each pillar of sustainability from an interior design and historic

preservation perspective, along with the argument of why it is important to include all

forms, thus providing a means of assessment and secondly, by illustrating how the

designers in Havana, Cuba achieved all forms of sustainability in the rehabilitation of La

Iglesia y Convento Nuestra Senora de Belen (Our Lady of Bethlehem Convent and

Church).  The methodologies used to assess this case study involve field research which

included interviews, site visits, archival research and reviews of the floor plans.

**Chapter One: From Social Responsibility to Sustainability**

Social responsibility may be defined as an ethical ideology in the way one conducts his or herself throughout their social interactions (ISO, 26000, 2010). The world is becoming a global society and beginning to realize that our actions not only affect those immediately around us, but can also have consequences all over the world. These consequences relate mostly to the environment, to social equity, and to profitability. This idea of social responsibility is growing and creating buzzwords like "individual social responsibility," "student social responsibility," and "corporate social responsibility." The common theme is that no matter where a person is in their stage of life, the actions one takes must be carefully considered because as a society, individuals must cooperate and respect one another in order to be sustainable. This first chapter attempts to bring a greater understanding to the term "social responsibility" and its connection to the interior design profession, sustainability, and historic preservation.

*Social Responsibility Defined*

Social Responsibility (SR), often referred to as Corporate Social Responsibility (CSR), first emerged in the corporate world. There are multiple global definitions for CSR and what is used in this paper is from the World Business Council for Sustainable Development (WBCSD). Accordingly,

> Corporate Social Responsibility is the continuing commitment by
> businesses to behave ethically and contribute to economic
> development while improving the quality of life of the workforce
> and their families, as well as of the local community and society at
> large (Holme and Watts, 2000, p. 9).

Trends show companies are increasingly shifting away from the profit model to CSR, a more socially responsible model that improves the lives of not only their employees, but also those who use their services or products (Othman, 2009).

Although many times there are no legal obligations for an organization to abide by the theories of social responsibility, the International Organization for Standardization (ISO)[1] created ISO 26000 which provides guidance on the principles of SR and how to incorporate socially responsible behavior into an organization. Unlike most ISO standards, it is not intended to be used as a certification but rather as a guide.  ISO 26000 describes SR as

> the responsibility of an organization for the impact of its decisions
> and activities on society and the environment through transparent
> and ethical behavior that contributes to sustainable
> development…including health and the welfare of society…and is
> integrated throughout the organization (p. 3).

The principles that ISO 26000 developed are divided into seven distinct categories: accountability, transparency, ethical behavior, respect for stakeholder interests, respect for the rule of law, respect for international norms of behavior and respect for human rights. These principles should then be addressed in the seven core subjects of SR: organizational governance, human rights, labor practices, the environment, fair operating practices, consumer issues, and community involvement and development.  The core

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[1] ISO (International Organization for Standardization) is a non-governmental organization and is the world's largest developer and publisher of International Standards. Their goals are to bridge a gap between the private and public sectors, along with finding solutions that benefit both business and society.  There are 162 countries in their network with one member per country.

subjects were chosen because they cover the economic, social, and environmental

impacts that organizations should address[2]. ISO 26000 sets the precedent that

corporations and organizations are not the only ones that should look to the principles as

a guide, and that different types of disciplines such as design should incorporate these

standards into their theoretical philosophies.

Conceptually SR not only benefits the public but also has a significant impact on

the organization. In a 2010 ISO 26000 report, companies benefit in multiple ways when

adapting the SR model. Benefits include:

- encouraging more informed decision making based on an improved understanding
  of the expectations of society, the opportunities associated with social
  responsibility and the risks of not being socially responsible;
- improving the organization's risk management practices;
- enhancing the reputation of the organization and fostering greater public trust;
- supporting an organization's social license to operate;
- generating innovation;
- improving the competitiveness of the organization, including access to finance
  and preferred partner status;
- improving the organization's relationship with its stakeholders, thus exposing the
  organization to new perspectives and contact with a diverse range of stakeholders;
- enhancing employee loyalty, involvement, participation and morale;
- improving the safety and health of both female and male workers;
- impacting positively on an organization's ability to recruit, motivate and retain its
  employees;

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[2] Although not everything in this document can be applied to every type of organization, it does provide a starting point
to achieve SR.

- achieving savings associated with increased productivity and resource efficiency, lower energy and water consumption, decreased waste, and the recovery of valuable by-products;
- improving the reliability and fairness of transactions through responsible political involvement, fair competition and the absence of corruption; and
- preventing or reducing potential conflicts with consumers about products or services (p.20).

SR has expanded beyond the lip service often provided to the public through the broadcasting of philanthropic contributions. It can also generate tangible long-term benefits for various organizations and society as a whole.

*Social Responsibility in the Design Process*

Social responsibility has often been discussed within the corporate business field but the idea is also becoming a rather important philosophy in the field of design. Design in general is the action of creative problem solving to make things better for the user. A designer must be aware that solutions have consequences and the incorporation of SR within the design process prevents negative social, economic, and environmental impact. According to graphic designer David Berman (2009),

> Designers have an essential social responsibility because design is
> at the core of the world's largest challenges…..and solutions.
> Designers create so much of the world we live in, the things we
> consume, and the expectations we seek to fulfill. They shape what
> we see, what we use, and what we waste. Designers have
> enormous power to influence how we engage our world and how
> we envision our future (p 1).

To design something without a sense of responsibility may solve the initial problem, but

it could lead to a multitude of negative outcomes such as overconsumption, the disenfranchisement of a particular group or individuals, or the perpetuation of the act of gentrification within the housing sector (Oas, 2007). To take an apathetic approach to the design process means that the solutions are no longer for the people; they are something that exists without purpose, without research and without a full understanding of the problem. That type of thinking lends credence to the idea that designing is simply an aesthetic act. However, successful design solutions lead to progress which becomes a genuine act that improves the lives of those who use it.

Designs that incorporate the principles of SR eventually result in what the general public refers to as "good design." The term however, is elusive. According to Dieter Rams, industrial designer, good design cannot be measured in finite ways. As a simplistic alternative to the comprehensive and complicated list of the ISO 26000 document, designers may choose to follow a list of principles he created that guide the design process towards social responsibility. Rams believes that good design is innovative, and makes products useful while being aesthetically pleasing. It allows a product to be understandable, yet is unobtrusive, honest, long lasting, thorough, environmentally friendly, and incorporates as little design as possible ("Dieter Rams", n.d. ). A slight contrast comes from Martin Pedersen's (2009) article from *Metropolis Magazine*, where he declares that good design is sustainable, accessible, functional, well-made, emotionally resonant, enduring, socially beneficial, beautiful, ergonomic, and affordable. Another perspective comes from human geography, known as the study of people and space, which affirms that good design must support SR and have good organization of space (Oas, 2007). Definitions and descriptions such as these lead to

conclusions that an aesthetically pleasing design is considered successful by utilizing the

tenants of SR and that those who are involved in the design process need to hold

themselves to this higher standard.

*The Interior Designer's Connection to Social Responsibility (SR)*

Interior design experts specializing in education and qualification, along with

related professional organizations, often declare that interior designers must have

responsibility and accountability for the ethical and social implications of their design

solutions.  The definition of interior design provided by the National Council for Interior

Design Qualification (NCIDQ)[3] asserts that design solutions acknowledge the social

context of the project and must be "functional, enhance the quality of life and culture of

the occupants and are aesthetically pleasing," and that interior designers "protect and

enhance the health, life safety, and welfare of the public" while integrating research and

analysis into the design process (2004, para 1 & 2).  Although health and safety are

tangible concepts that are regulated by building codes, the construct of welfare is

intangible and can best be defined as a benefit to everyone that promotes their overall

well-being.  By definition, interior designers create designs that promote well-being for

the public. In the context of the previous discussion, this is otherwise known as socially

responsible design.

The American Society of Interior Designers (ASID) discusses in *Health and*

*Safety* (2010) that "The issue of public welfare, within the realm of professional interior

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[3] NCIDQ is an organization that administers the NCIDQ examination.  Those who meet the eligibility
standards and pass the examination become NCIDQ Certificate holders, identifying them as competent
interior design professionals.  It also enables designers to call themselves NCIDQ certified interior
designers.

design, includes the responsibility of considering the greater whole" (para 4). The spaces

interior designers create should ultimately allow the users to access their full potential,

whatever that may be and that the design solutions must be functional, accessible, and

aesthetically pleasing (ASID, 2010). The International Interior Design Association's

(IIDA) mission statement on sustainability promotes the use of materials and space plans

that reduce the negative impacts on the natural environment and improve the health and

well-being of all people (IIDA, 2005). The inclusion of 'well-being' is imperative

because it is often an overlooked aspect of social responsibility. IIDA's stance on the

profession is that the goal of the interior designer's plan should be beneficial to everyone

and not just those who use the space. To meet that goal they assert that using socially

responsible materials and construction methods is one way of providing a benefit to

everyone involved in the project (IIDA, 2005). Lastly, the International Federation of

Interior Architects/Designers (IFIA/D) believes that utilizing interior design improves the

overall quality of life and upholds human dignity for all (IFIA/D, n.d.). The federation

also states

> socially responsible design can help alleviate a range of
> problems caused by poverty, illnesses, lack of basic shelter, or
> badly designed physical environments...[they] advocate the
> human dignity of all people through Interior Design by
> changing the perception that design remains the domain of an
> elite segment of the world's population; and encouraging
> professional designers to use their best abilities as creators and
> innovators to solve social and environmental problems (IFIA/D,
> n.d, para 2).

It is evident that responsibility often falls on interior designers to carefully think

about SR and the implications of their projects. This is due in part to the environmental

impact from the construction industry and the fact that the built environment has a

significant effect on human behavior.  Yet there is a disconnect between the public's

perception and the actual work that an interior designer performs. The general impression

is that interior design is just about decorating and making things look nice and not about

the careful consideration of every decision. Interior design professor Diane Smith (2006)

affirms that,

> The media generally portrays what interior designers do as
> modeling the 'high-end' of the market and associated with this
> expensive—or the illusion of expensive—products, finishes, and
> spatial resolutions. In turn, the skills of the interior designer may
> be misconstrued as being associated with trends and styles"
> (p.128).

While the aesthetics of a space is just one of the many attributes of good design, it does

tend to be the most tangible aspect of the design that the public can visually understand.

Interior designers need to reflect on what it means to have professional responsibility and

that the very act of interior design has an impact on how people live and conduct day-to-

day activities (Smith, 2006).  Anderson, Honey, and Dudek (2007,) along with Neives &

Anderson (2010), believe that the primary social value of the interior design profession is

to design physiologically and sociologically supportive interiors that enhance the quality

of life.

For interior designers it is tempting to follow the new take on an old adage that

"form follows finance" instead of 'function' by creating a design to please the developer

who may or may not see the importance of a plan that would benefit society because

economics tend to be a very measurable aspect while social needs are often difficult to define. However, to disregard the need for socially responsible design solutions places the designer in an inactive role. Sometimes interior designers themselves do not recognize the power they have to create environments that improve the quality of life. They believe they are passive bystanders, restricted by the constraints of the project. Yet someone who hires an interior designer depends on that person to make the decisions that are socially and ethically correct. A study conducted by Philips, Siu, Yeh, & Cheng (2005), concluded that interior environments have a greater effect on well-being than exterior environments, proving that interior design is essential to social responsibility. The Interior Design Educators Council (IDEC) warns that if interior designers do not have a formal, accredited education, people will be placed at risk physically, psychologically, socially, and environmentally (IDEC, 2010). But as interior design professor Smith (2006) states, architects are often given credit for the interior design solutions although the firm may employ teams of interior designers. That is why it is imperative to educate the public about the values of social responsibility that interior designers bring to the built environment.

*Connecting Social Responsibility (SR) to Sustainability*

In order to educate the public on SR in design, some architects and interior designers are now adapting the Corporate Social Responsibility model because it fits so closely to the definition of their profession. As designers, they realize they are responsible for creating buildings that affect the environment, the well-being of society, and the prosperity of the economy (Othman, 2005). In Figure 1, Othman (2009) shows how overall responsibility is directly linked to the individual factors of environmental
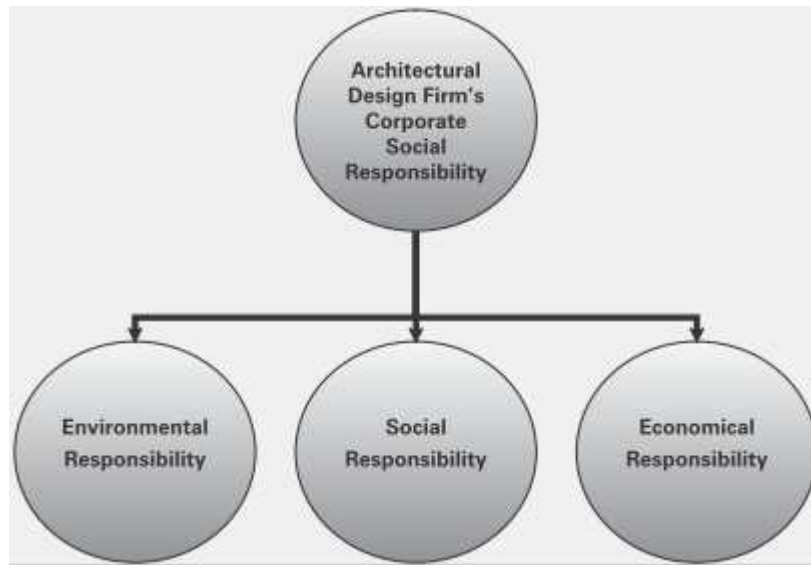
**Figure 1: The CSR of architectural design firms** (Source:  Othman, 2009)

responsibility, social responsibility, and economic sustainability.  Donovan Rypkema,

historic preservation expert, takes the links between social, economic and environmental

responsibility a little bit further by describing the connection of all three and how they

relate to total sustainability.   In a 2005 lecture he asserts,

> For a community to be viable there needs to be a link between
> environmental responsibility and economic responsibility; for a
> community to be livable there needs to be a link between
> environmental responsibility and social responsibility; and for a
> community to be equitable there needs to be a link between
> economic responsibility and social responsibility (Rypkema, 2005,
> pg. 3).

 In essence, it can then be concluded that if designers are incorporating all

forms of social responsibility into their solutions they are ultimately trying

to achieve sustainability, as seen in Figure 2.
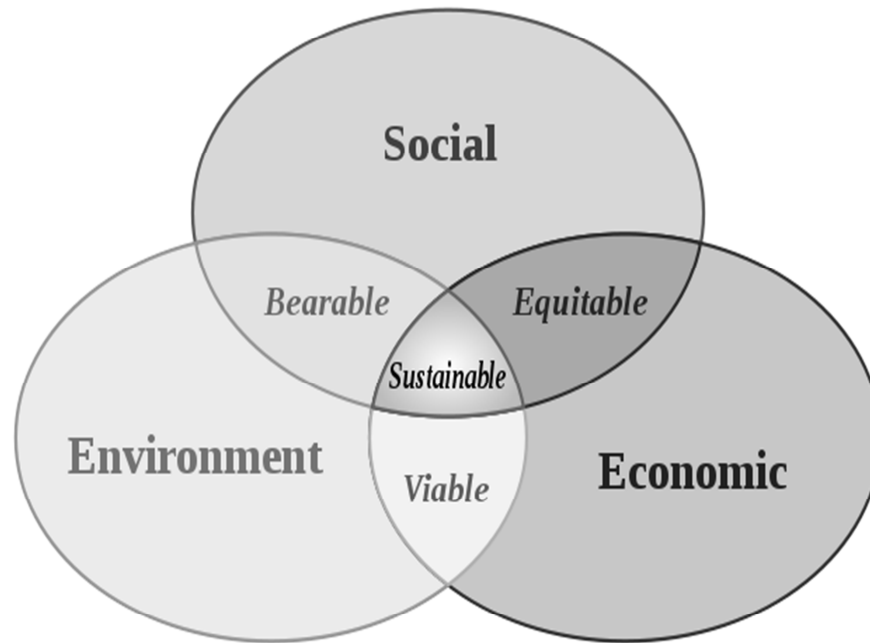


**Figure 2:  Diagram of the dimensions of sustainability within the preservation process** (Source: Rypkema, 2005)

*The Relationship between Historic Preservation and Sustainability*

Sustainability is sometimes a buzzword for the "green" movement which

emphasizes the environmental impact on the earth.  However the term encompasses more

than just that definition.  The World Commission on Environment and Development

(WCED), also known as the Brundtland Commission, published a 1987[4] report that first

defined sustainable development as "development which meets the needs of current

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[4] World Commission on Environment and Development, Our Common Future (Oxford University Press, 1987).

generations without compromising the ability of future generations to meet their own needs" (Barlund, n.d. para. 2). The idea was that support of strong economic and social developments was not possible when they destroy natural resources. The term has long been debated because it is quite vague and broad in its definition. To clarify this, three 'pillars' of sustainability were developed at the European Unions' Copenhagen Summit with the Treaty of Amsterdam of 1997. Dr. Bader, head of the Policy Department of the Ministry of the Environment of Baden-Württemberg, argues that it takes the "three-pillar model of sustainability", (social, economic, and environmental equity) to support sustainability.

All of these components (social, environmental, and economic) are often referred to as the triple bottom line (TBL) or "people, planet, and profit"; or otherwise referred to as the three dimensions of sustainability (Othman, 2009). This phrase-*people, planet, and profit*-was first coined in 1994 by John Elkington, owner of a British consulting group called SustainAbility. It was originally created for large corporations to use as a measure of their financial profits and their social and environmental responsibility (Elkington, 1997). This is closely related to the aforementioned CSR models. Adam Werbach (2009), author of *Strategy for Sustainability: A Business Manifesto,* expands on the TBL and believes that true sustainability has four main components: social, environmental, economic, and cultural[5]. Today, these three main terms (environmental, social and economic) have become common place for anyone trying to determine sustainable development strategies for corporations of any size.

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[5] For the purpose of this research cultural sustainability will be combined with social sustainability.

According to Raesisi, Nezhad, & Hafezifar (2010) sustainable development in the field of architecture is known as "sustainable architecture". John, Croome & Jeronimidis (as cited in Raeisi, et al, 2010) defines a sustainable building as one that includes economic, social, and environmental performance. All three aspects overlap and work together to create a sustainable environment. Figure 3 shows Kua and Lee's (2002) description of the three divisions of sustainable buildings along with the benefits of each.
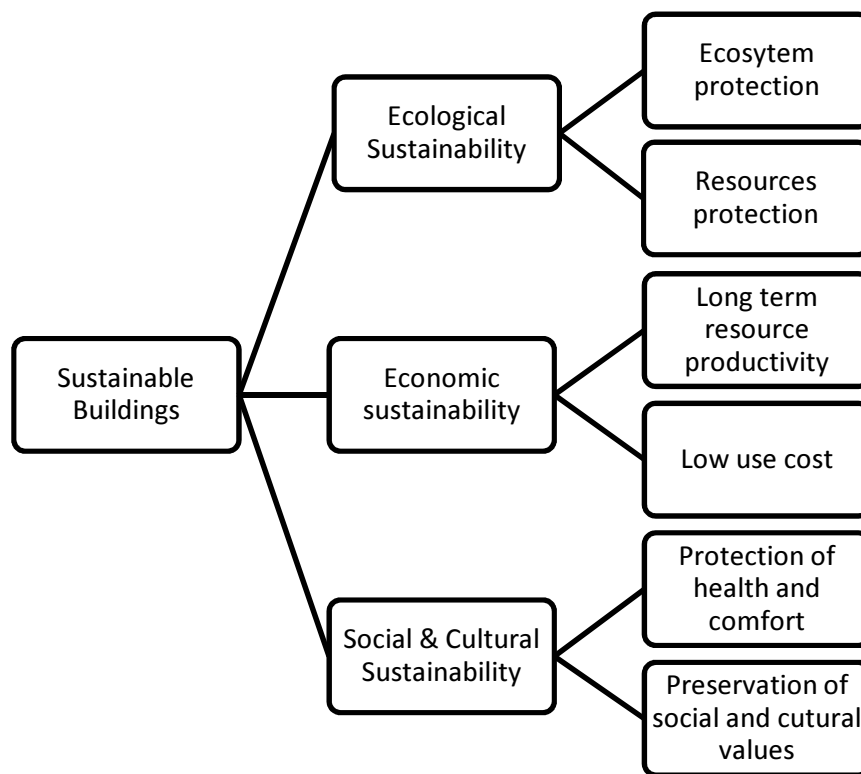


**Figure 3: Three dimensions of sustainable building** (Source: Kua & Lee, 2002)

The environmental and economic goals of sustainable architecture are considered the physical parts of the design process while the social goals relate to the non-physical (Raeisi, et al., 2010). It is important for anyone involved in the architectural field to work together to meet the sustainable needs of the community. Stelmack, Jennings, Tuttle, and Schomer (n.d.), members of ASID and Leadership in Energy and Environmental Design

(LEED), state that interior designers make the choice on a daily basis to take

responsibility for the industry's impact on the health (physical), safety (physical), and

welfare (non-physical) of projects, as well as the TBL (aka sustainability).

In contrast to new construction, one form of sustainable architecture is to

rehabilitate or reuse an existing historic building.  It has been said by many

preservationists that the "greenest building ever…..is the one that is already built" (Tyler,

Ligibel, & Tyler , 2009).  A study by Vehbi and Hoskara (2009) exclaims that the

Declaration of Amsterdam recognizes the protection and enhancement of architectural

heritage as a part of the economic, social, and cultural factors that shape the environment.

Similarly, the interior solutions created by designers for the reuse of a historic building

should achieve a balance between the environmental, economic, and social needs of a

society in a holistic way in order to provide a high quality of life for current a future

generations (Raeisi, et al., 2010).  If these ideas of sustainability are incorporated, urban

designer Matthew Carmona (2003) believes that the built environment can create high

quality, viable space for people, or if ignored, it can create poor quality, alienating

spaces.

Looking at it from an environmental standpoint, historic buildings built prior to

the age of prevalent consumption of fossil fuels often used architectural elements to

increase airflow and utilize natural lighting.  In addition, it takes more embodied energy

to destroy an existing building and build new, not to mention the amount of debris that is

added to the landfills.  When historic buildings are redesigned or rehabilitated it often

adds to the cultural and historic significance of the community.  Kau and Lee (Figure 3)

show that it assists in social and cultural sustainability by preserving social and cultural

values.  This preservation of architecture can also have a profound effect on the local economy.  Many times these revitalized downtowns bring in tourists looking for a cultural experience, which in turn encourages them to spend money in the area through dining, shopping, and heritage attractions (Laurie, 2008). When the ideals of social responsibility are transformed into sustainability, communities can look towards historic preservation as a form of sustainable development.

*Conclusion*

It is a sustainable choice for any organization to adhere to the guidelines of SR in order to benefit the community, the environment, and the economy and socially responsible thinking is inherent in the field of design, especially in interior design. The basic philosophies of many interior design organizations declare that design professionals are sustainable stewards, creating viable spaces that greatly affect the environment, the users, and the bottom-line. Extensive reviews of definitions and descriptions of SR clearly show that it takes all three tenants of sustainability (social, environmental, and economic) to create comprehensive sustainable developments.  One form of sustainable development is the reuse or rehabilitation of the historic building stock.  Before an explanation of the link between historic preservation and sustainability, along with how designers implement sustainable development methods in an existing building, it is necessary to understand the basic philosophies of historic preservation.  To aid in this understanding, Chapter Two will define historic preservation, its history, and how it is perceived today.

**Chapter Two:  Historic Preservation – A Sustainable Choice**

Since interior designers often work within the constraints of an existing building shell they are challenged to create something new inside something that already exists. The interiors will always change with the community, continuously morphing to meet the needs of the current generation, while the exteriors remain relatively unchanged. Jandel (1987) affirms that the interior, rather than the exterior, is often more important in conveying the building's history. With the extensive knowledge about sustainability that interior designers possess, in addition to their experience working at the human scale, it makes sense that they use their expertise to redesign the interiors of historic buildings. The need for sustainable architectural solutions in historic preservation is becoming more prevalent in the design community. Redesigning a historic interior of a building without considering the effects of the symbolic past of the structure or the community's current needs could result in the reproduction of a design that is not socially responsible.  This chapter examines, from a design perspective, the history and philosophies of historic preservation.  It also includes a discussion of the United States' policies on historic preservation.  Although this paper's intentions are to educate American interior designers, it also includes an international perspective because of the world's expanding globalization and the need to look outside of ones' own country for inspiration and knowledge.

*Historic Preservation*

History allows us to know who we are as individuals and as a society.  We learn from our mistakes and understand the paths our forefathers have taken to get us where we are today.  Some history has been long forgotten, and some destroyed, but a powerful

way of accessing our past is to look toward the architecture that remains today. These

historic buildings tell stories about their communities and give us a sense of place in this

world, but have often been destroyed to make room for new construction or have been

lost due to deterioration resulting from abandonment.

The historic preservation movement (also known as 'cultural heritage

management' or 'heritage preservation') began as a reaction to the destruction of these

tangible links to our social culture. This initiative has grown from a few concerned

individuals to now millions of people in cities all across the world. The result has been

the enactment of numerous laws and ordinances and the creation of national and

international organizations for the protection of buildings, districts, and even villages

regarded as historic treasures. Philippot (1976) suggests that 'preservation' across

various cultures is the equivalent of 'conservation' or 'restoration'. This process, as he

points out, is the modern way of maintaining living contact with cultural works of the

past (Philippot, 1976). According to the National Trust for Historic Preservation's

(NTHP) website (2009), historic preservation is defined as

> the process of identifying, protecting, and enhancing buildings,
> places, and objects of historical and cultural significance. This
> process embraces many phases including the survey and evaluation
> of historical, architectural, and cultural resources in an area; the
> development of planning and legal measures to protect these
> resources; the identification of public and private funding sources
> applicable to preservation projects; the design for the restoration,
> rehabilitation, and/or adaptive use of historic structures; and the
> ongoing maintenance of these resources" ("What is historic
> preservation?" para. 1).

The United Nations Educational Scientific and Cultural Organization (UNESCO, 1996)

declares that they interchangeably use the word conservation and preservation but do not

specifically define it. They instead use the Nara Document of Authenticity's[6] comments

on conservation that refers to "all efforts designed to understand cultural heritage, know

its history and meaning, ensure its material safeguard and, as required, its presentation,

restoration and enhancement."[7]  By no means is historic preservation meant to hinder

progress or stand in the way of economic growth but instead bring awareness of buildings

that have important significant historic and cultural value in a community and to protect

that value from eradication. It should also be noted that just because a building is old

does not make it historically significant and there are various criteria that need to be meet

in order to determine its cultural value.  Governmental institutions in the United States

recognize a historic building as being fifty years or older that obtains historical or cultural

importance and architectural value[8].  UNESCO defines buildings or groups of buildings

as having cultural heritage and as significant if their architecture, their homogeneity or

their place in the landscape, are of outstanding universal value from the point of view of

history, art, or science (UNESCO, 1996).  Therefore, not all old and deteriorated

buildings qualify as being historic, nor are they subjected to the specific treatments list

below.

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[6] The Nara Document on Authenticity was drafted by the 45 participants at the Nara Conference on Authenticity in Relation to the World Heritage Convention, held at Nara, Japan, from 1-6 November 1994, at the invitation of the Agency for Cultural Affairs (Government of Japan) and the Nara Prefecture. The Agency organized the Nara Conference in cooperation with UNESCO, ICCROM and ICOMOS (www.international.icomos.org/**nara**doc_eng.htm). This document can be found in Appendix A
[7] For the purposes of this study historic preservation will reference architectural structures only.
[8] More information on the criteria of historic buildings can be found in the U.S. Department of the Interior's National Register Bulletin 15.

*Historic Building Treatments*

Once a building had been designated as a historic property, the best course of treatment for the structure needs to be decided. The directions and rules most implemented on an international level comes from the *Venice Charter for the Conservation and Restoration of Monuments and Sites[9]*. It is a 1964 treaty that provides an international framework for the conservation and restoration of ancient buildings. Articles four through eight refer to conservation ("The Venice Charter", 2011). The Venice Charter states in Article 4 that worthy monuments must be maintained on a permanent basis and that they should be used for some socially useful purpose (Article 5). It does go on to say that this new use must not change the lay-out or decoration of the building and only modifications made from a change in function must be envisaged (Article 5). The charter asserts in Article 6 that no new construction, demolition or modification that would alter the mass and color will be allowed. Article 7 insists that a monument is not to be moved from its original location unless it is deemed necessary for safeguarding and Article 8 applies the same information to sculptures, paintings, and decoration that are integral to the monument.

Articles nine through thirteen discuss the framework of restoration. Article 9 is very specific about the interpretation of the design. It states that restoration is highly specialized and the aesthetics and historical value is based on the authenticity of the monument. Any additional features that extend past originality to conjecture must be distinct from the original structure and bear a contemporary design. It also continues to say that any restoration must be accompanied by an archeological and historical study.

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[9] The Venice Charter was created in 1964 by the Congress of Architects and Specialists of Historic Buildings which eventually lead to the creation of ICOMOS. This document can be found in Appendix B.

When traditional techniques become inadequate in the restoration, Article 10 calls for the

deployment of modern technique if there is scientific data backing it up.  Many times

very ancient buildings have gone through various changes, and Article 11 discusses that

various periods of style that contribute to the architecture of the building must be

respected. In contrast, if something insignificant from a different period reveals

something with great value underneath, it is then acceptable to remove it but this decision

cannot be solely left up to the individual in charge.  If replacement parts are needed they

must be integrated with the original but still be distinguishable from the original so as to

not falsify history (article 12). Lastly, Article 13 talks about additions and that they are

only allowed if they do not detract from the interesting parts of the building or

surroundings.  These articles provide a general framework to the treatment of culturally

significant buildings which also allows local governments to adapt and adjust when

needed.

Before current standards were established, James Fitch (1982), American historic

preservation expert, declared that there were seven order-specific treatments for historic

buildings: preservation, restoration, conservation and consolidation, reconstitution,

adaptive reuse, reconstruction, and replication (p. 46).  Preservation is defined as the

maintenance of the current state of the building, while restoration returns the building to a

previous stage that is determined by the historical organization in charge. If a building

endures a physical intervention to insure structural integrity it is referred to as

conservation/consolidation, and if a building is rebuilt after a disaster it is considered a

reconstitution.  Fitch states that adaptive-reuse is the most economical way an older

building can be saved because the original use is no longer needed and the building is

remodeled to fit new tenants (Fitch, 1982). Another treatment, often considered radical, is reconstruction. This is the construction of a historic building that no longer exists. Lastly and even more extreme than the last is the building of a replica and is referred to as replication. Today, many of those treatments are no longer be recognized as a form of historic preservation[10].

Similarly, the United States' National Park Service (NPS) designated four treatments in specific order to promote responsible preservation practices. They were developed in 1992 and were eventually condensed; this list eliminates some of the treatments discussed by Fitch. The first treatment listed in the *Secretary of the Interior's Standard for the Treatment of Historic Properties*[11] is preservation, which maintains the building in its current state the only procedure that is applied to the structure is regular maintenance needed to protect the structure from additional damage. Rehabilitation, the second treatment, allows for the retention and repair of materials, finishes, features, and spaces that give a property its historical character. According to Tyler, Ligibel, & Tyler (2009), because a new use can be assigned to the building in addition to the retention of its historical elements, it can also be referred to as 'adaptive re-use'. The third treatment known as restoration refers to the return of a building to a particular moment in time while retaining elements that are significant for that period and removing any articles that are not. Reconstruction is the fourth treatment and should be used only when a non-surviving building needs to be recreated.

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[10] They are not recognized because they are no longer historically accurate.

[11] More information regarding the standards and guidelines for each of the treatments can be found at *The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring and Reconstructing Historic Buildings.*

*Rehabilitation as the More Sustainable Choice of Historic Building Treatments*

When preservation was in its infancy there were two opposing and extreme views of possible treatments to older buildings.  Eugene Emmanuel Viollet-le-Duc (1814-1879) made the claim that when restoring a building it is acceptable to rebuild not as it once was but how it should have been.  This might include materials and elements that were not based on historical evidence (Tyler, Ligibel, & Tyler, 2009).  His theory on restoration has largely been discredited by the preservation community.  In his day his greatest opponent was John Ruskin (1819-1900), English critic of art and architecture.  Ruskin's ideas on preservation/conservation were that a building should remain untouched and that beauty remains in the ruins of its architecture. While these may be two valid positions, rehabilitation or adaptive re-use of an existing building is a compromise between these two schools of thought, allowing for the beauty of the character in the building to remain (internally and externally), and finding a new use for the building that is compatible with the living or existing social culture of a community that incorporates modern materials and elements.

Rehabilitation/adaptive reuse is not always readily accepted by historic preservationists and architects.  Wolf Prix, for example, stated that "In poor societies, people have to adapt structures; in affluent societies, they build new structures.  If wealth increases, there is building. If not, there is adaptation, redefinition" (Noever, 1996).  Although this may be typical, it doesn't have to be a rule. Societies are now seeing the benefits of rehabilitation over new construction and it is becoming less stigmatized to poorer societies.  According to Rypkema (2007), rehabilitation of the existing building stock provides support to the five senses.  It augments a sense of place, evolution,

ownership, identity, and community, whether the citizens are rich or poor.  The

conceptual foundations of rehabilitation are changing and becoming more viable as

options for communities who want to embrace sustainability.

An item that made rehabilitation a difficult transition in terms of design,

according to Mehaffy (2010), is that "preservationists believe it's wrong to make the

modifications required to adapt an historic building to new uses, which might thereby

falsify history" (para 8).  He goes on to declare that these preservationists cite Article 5 of

the Venice Charter[12] which states that these modifications must not change the layout or

decoration and Article 9 which says that any extra work that is indispensable must be

distinct from the architectural composition and must bear a contemporary stamp

(Mehaffy, 2010).[13] Since there are many treatment options and ideals associated with

preservation, it does make it difficult to get everyone involved with the process on the

same page.  That is where the concept of rehabilitation and adaptive reuse is more like a

hybrid.  There is importance in retaining historical features but it is also vital for the

overall sustainability of a community to retain history, create their own history by

readapting the building for modern needs, and repurposing the existing resources that

they have available.

*The Social Benefits of Rehabilitation*

When a city embraces the rehabilitation of its built environment it can provide

numerous benefits, such as fostering community and civic pride, developing national

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[12] The international conservation doctrine guides redevelopment and serves as the basis of the US Secretary of the Interior's preservation standards (Mehaffy, 2010).

[13] The 14th Annual US/ICOMOS International Symposium in June 2011 hoped to discuss the reconsideration of the treatments taken from the Venice Charter in terms of rehabilitation/adaptive reuse.

identity, retaining local history, providing job opportunities, revitalizing downtown areas, promoting tourism, and increasing property values (Frey, 2007; Gražulevičiūtė, 2006; Hazen, 2000; Laure, 2008; Peck, 2009, Tyler, Ligibel, & Tyler, 2009). Mario Coyula (1994), a prominent Cuban architect, includes political participation as an additional benefit in his discussion of the historic built environment. Many of these benefits can be promoted through the design of the space, because the architectural features and use of space can increase property values, become a tourist attraction, and revitalize a downtown by creating a new use for the existing building. Due to the popularity and benefits that historic preservation provides, it is important for interior designers to create the most effective design solutions when preserving the past through the rehabilitation of their interiors. According to Jandl (1987), the best rehabilitation is the one that protects the rooms, division of space, as well as the features and finishes that define and shape the overall historic character of the building; all of which is the responsibility of the interior designer.

*Conclusion*

Historic preservation is a very compatible form of sustainability because of the benefits it provides to the environment, economy, and society. Over time historic preservationists have recognized that not all buildings can become living museums and that it is important to find new uses for these buildings. Rehabilitation tends to be the most economically viable treatment in order to save some of these older buildings. Interior designers and architects involved in such projects face difficult political challenges because not everyone agrees how a building should be treated. There are 'rules' set forth by the Venice Charter, by the United States' *Secretary of the Interior*

*Standard's for Rehabilitation*[14], and often times by local governments. Since all of the

historic preservation 'rules' can be interpreted loosely, designers who work on those

projects must be fully educated about historic architecture and sustainability.  They must

also understand the needs of the community or the project may very well be a failure. To

this end each pillar of sustainability and its relationship to rehabilitation will be discussed

further in Chapter Three in order for interior designers to better understand how to

incorporate sustainability into the rehabilitation process.

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[14] Refer to Appendix C for *The Secretary of the Interior's Standards for Rehabilitation*.

**Chapter Three: Historic Rehabilitation and Sustainability**

Numerous studies cite the importance of economic and environmental sustainability, especially in historic preservation (Frey, 2007; Gilderbloom, Hanka, & Ambrosius, 2009; Kau & Lee, 2002; Laure, 2008; Mason, 2005; Rypkema, 1994, 2005, 2007; Vehbi & Hoskara, 2009). Because of this, interior designers have the ability to turn to many different sources to assist them in making economically and environmentally sound decisions. Organizations like LEED, Sustainable Building Industry Council (SBIC) or the U.S. Green Building Council (USGBC) assist in assessing environmental solutions, and interior design organizations' websites, like ASID and IIDA provide ample opportunity to engage in continuing education webinars. The problem lies within the fact that there is little understanding of how social sustainability can be applied to historic rehabilitations (Lombardi & Brandon, 2002). This is why it is the first pillar of sustainability to be discussed.

*Principles of Social Sustainability*

Sustainability is in danger of carrying so many social implications that in order for it to be properly understood it must be redefined whenever it is used (McKenzie, 2004). Similarly, the concept of social sustainability is used in many different fields, each with different meanings, so it is important to define it within the context of historic preservation and architecture (Raeisi, et al., 2010). The term also tends to be a difficult construct to measure because of its non-physical aspect which makes it the least likely to be considered when designing a space. However, it is very important in terms of society's overall well-being.

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                          ┌─────────────┐
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                          └──────┬──────┘
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         │ Conditions  │                  └──────┬──────┘
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                ├────┤   injustice │      └────┤  traditions │
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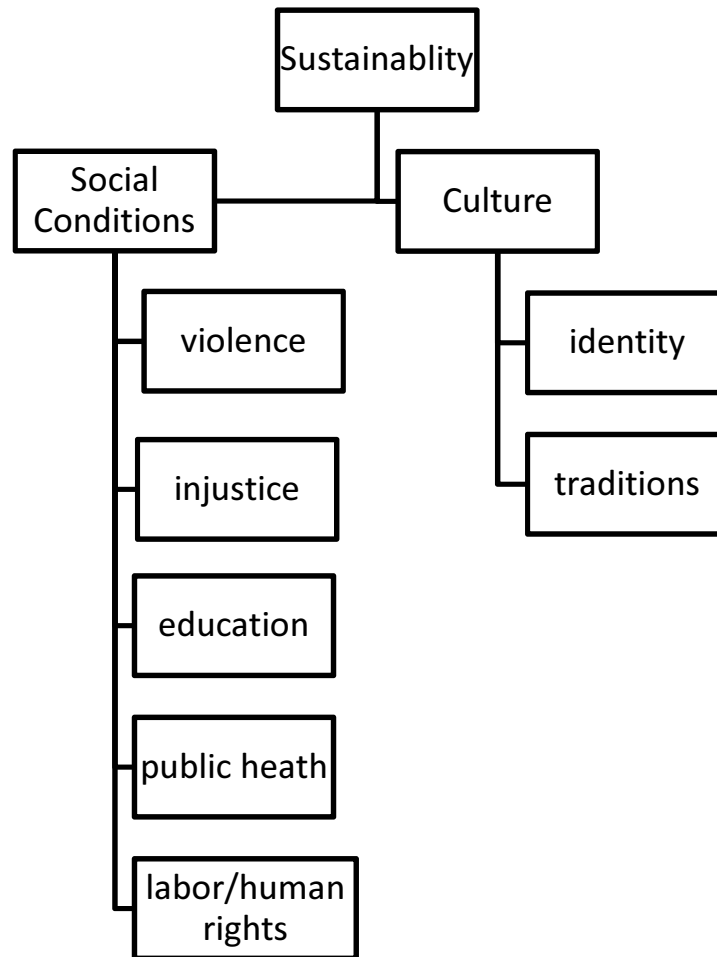
**Figure 4: Social and cultural components of sustainability** (Source: Werbach, 2009)

Multiple perspectives must be first investigated in order to have a true understanding of the term 'social' sustainability. From Werbach's (2009) business perspective, along with environmental and economic aspects, sustainability includes both social and cultural components. He defines social aspects as conditions that affect us all, and cultural aspects as those that aim to protect and value diversity through identity and traditions (Figure 4).

Another perspective is that of the Western Australian Council of Social Services

(WACOSS)[15] which generated a comprehensive definition of social sustainability.

> Social sustainability occurs when the formal and informal processes;
> systems; structures; and relationships actively support the capacity
> of current and future generations to create healthy and livable
> communities.  Socially sustainable communities are equitable,
> diverse, connected, democratic, and provide a good quality of life
> (Barron & Gauntlett, 2002, p. 6).

In Table 1, Barron and Gauntlett determined the principles of social sustainability along

with a list of 36 characteristics that were derived from local, national, and international

indicator projects. Taking cues from WACOSS, the Hawke Research Institute Working

Paper Series No. 27 attempts to define social sustainability for the purposes of creating a

common research agenda for use within large organizations (McKenzie, 2004). After

extensive research, McKenzie concludes that social sustainability "is a life-enhancing

condition within communities, and a process within communities that can achieve that

condition" (McKenzie, 2004, p. 12).  He goes on to state that those 'conditions' are what

each specific fields interested in social sustainability must define on their own to create a

measurable index.

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[15] WACOSS is a Non-Governmental Organization (NGO) that provides social and community services to
disadvantaged individuals.

**Table 1: Characteristics of socially sustainable communities** (Source: Barron & Gauntlett's, 2002).

| Principles: | Characteristics |
| --- | --- |
| **1.Equity-** the community provides equitable opportunities and outcomes for all its members, particularly the poorest members of the community. | • There is equal opportunity for all members.<br>• There is equity for indigenous people.<br>• There is equity in relation to human rights.<br>• There is equity in relation to disadvantaged members. |
| **2.Diversity-**the community promotes and encourages diversity. | • The community is inclusive of diverse groups.<br>• The community values difference. |
| **3.Interconnectedness-** the community provides processes, systems, and structures that promote connectedness within and outside of the community at the formal, informal, and institutional level. | • The quantity of social processes promote connectedness.<br>• The quality of social processes promote connectedness.<br>• The structures governing social processes promote connectedness.<br>• Public and civic institutions promote connectedness.<br>• Community services promote connectedness.<br>• Transport promotes connectedness. |
| **4.Quality of Life-** the community ensures that basic needs are met and fosters a good quality of life for all members at the individual, group, and community level. | • Community members have a sense of belonging.<br>• Community members have a sense of place.<br>• Community members have a sense of self-worth.<br>• Community members have a sense of safety.<br>• Community members have a sense of connection with nature.<br>• Community members have a sense of empowerment and responsibility.<br>• Community members have a sense of self-reliance.<br>• Community members have a good quality of life in relation to education.<br>• Community members have a good quality of life in relation to health.<br>• Community members have a good quality of life in relation to employment.<br>• Community members have a good quality of life in relation to income and standard of living.<br>• Community members have a good quality of life in relation to housing.<br>• Community members have a good quality of life in relation to clean air, soil, and water.<br>• Community members have opportunities for personal and social development. |
| **5.Democracy & Governance-**the community provides democratic processes and open and accountable governance structures. | • Community members have access to information, knowledge and expertice.<br>• Participation processes are open and accountable.<br>• Democratic processes and governance structures are effective.<br>• There is integrity of democratic processes and governance structures.<br>• Democratic processes and governance structures are accountable.<br>• Democratic processes and governance structures incorporate justice and legal rights. |

From an urban planning perspective, Chan and Lee's (2008) study discusses the factors that improve social sustainability in urban renewal projects.  They conclude that socially sustainable projects are those that create harmonious living environments, reduce social inequalities, and improve the quality of life. Figure 5 shows what factors are most important from their review of the literature concerning social sustainability. These factors are:

- *Social Infrastructure*: refers to the idea that the provisions of various amenities are important for a community. These provisions include schools, medical facilities, sports and community centers, open-air gathering spaces, and special provisions that cater to vulnerable groups like the disabled, the elderly, and children.
- *Availability of Job Opportunities*: states that employment provides income and the physical workplace environment allows for social interaction which aids in the overall feeling of well-being.
- *Accessibility*: means that individuals like to live, work, and consume entertainment within a reasonable distance from one another. This also means that regardless of age or physical condition there should be convenient access to certain places.
- *Townscape Design*: the idea that the environment should create a sense of belonging, as well as streetscapes that provides interaction with nature. This idea also expands to the desire to have an appealing visual appearance of the buildings in terms of density, height, mass, and layout.
- *Preservation of Local Characteristic*: is important for a community because it bears witness to the changes over time and it is what is left from the previous generation that helps identify who we are and how we lived.
- *Ability to Fulfill Psychological Needs*: means that the community has a sense of security and actively participates in the design process.

These six factors lead to an understanding of the concept of social sustainability in the

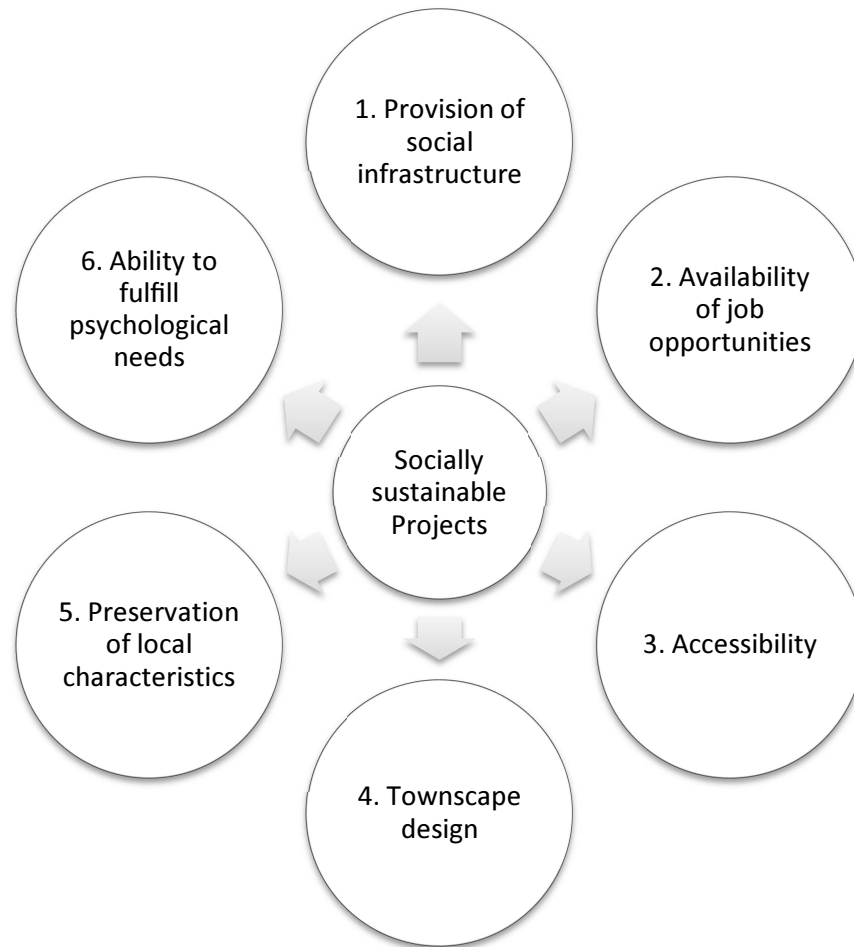field of design, but they are still unclear in reference to historic preservation.



**Figure 5: Factors for social sustainable urban renewal projects** (Source: Chan & Lee, 2008)

**Table 2: Translation of the Human needs to the Design Qualities** (Source: Golkar, 2001, as cited in Raeisi. et al.. 2010)

| Human Needs: | Spatial Qualities in Design |
|---|---|
| Physiological Needs | • Sufficient facilities and equipment<br>• Comfort (temperature, sun, rain, microclimate adaption,…)<br>• Firmness and Balance based on ecology |
| Safety Needs | • Safety of passage<br>• Stewardship and Care<br>• Privacy<br>• Permeability and flexibility |
| Belonging Needs | • Social facilities<br>• Sense of place and Identity<br>• Intelligibility and Visual proportions |
| Esteem Needs | • Place attachment<br>• Personalization and Belonging to groups |
| Self-Actualization Needs | • Creating opportunities for personalized space and to participant in design<br>• Diversity |
| Beauty Needs | • Façade and Sight<br>• Visual richness |

To achieve social sustainability in architectural terms Raeisi, et al. (2010) claim that the

space must have the ability to meet primary human needs.  He uses Maslow's Hierarchy

of Human Needs to define and describe the design qualities of a space, as seen in Table 2.

Physiological needs are the most basic, with aesthetic needs being the highest level.

Lombardi and Brandon (2002) also agree that aesthetics play an important role in

sustainability.

Patrice Frey (2007), director of Sustainability Research for the NTHP, issued a report supporting sustainability in historic preservation projects. She identified five components to social sustainability within historic preservation projects (Frey, 2007).

1. *Cultural Ecosystems:* Preservation maintains cultural resources and diversity.
2. *Wellbeing:* Preservation of place promotes psychological well-being through a sense of place and belonging.
3. *Social Equity:* Preservation promotes social equity by including everyone in the process.
4. *Social Capital:* Preservation encourages social interaction and civic engagement.
5. *Quality of Life:* Historic communities typically are walkable, have green space, and access to other local services.

All of the definitions of social sustainability discussed here are valuable in their own right but it must be determined what social sustainability means to the field of interior design and historic rehabilitation. Until that can be achieved, interior designers will find it difficult to address socially sustainable design solutions inherent in their designs. Many of the criteria listed above are very similar and relate strongly to interior architecture from the historic preservation perspective but do not specifically mention how a designer would achieve the desired result. After a thorough assessment, it has been determined that most of the principles associated with interior design and/or rehabilitation fit somewhere within WACOSS's first, second, and fourth principles and will serve as a guide for implementing socially sustainable design methods to historic rehabilitations. All of the characteristics of the principles are interrelated and overlapping and could be argued that quality of life is affected by diversity and equality and vice versa. A deeper investigation can be seen in Table 3 which breaks down the

social sustainability principles and its association to design characteristics and implementation. The following sections provide a thorough understanding from the perspective of interior design along with references to studies about the negative consequences that can occur if such principles are not implemented.

**Table 3: Social sustainability principles, characteristics, and implementation of rehabilitation**

| Social Sustainability Principles | Design characteristic | Implementation |
|---|---|---|
| **Equity** | The design will provide equal opportunity for all members of a society, especially those most vulnerable- disabled, elderly, and children. | The accessible philosophies of Universal Design. |
| **Diversity** | The design will be inclusive of all diverse groups. | Spaces will be designed with cultural sensitivity and diversity by incorporating the needs of both minority and majority groups. This will be achieved through participatory design practices. |
| **Quality of Life** | The design will support individual and cultural identity and provide a sense of belonging and safety. The design will provide interaction with nature. The design will have a pleasant visual appearance. | The design will retain characteristics pertaining to all the past cultures of that society. The design will provide security and safety throughout the space plan and use of materials. The design will provide outdoor gathering areas. The design will follow the principles and elements of design. |

**Equity**

The design characteristic most compatible with equity is the creation of a space that will provide opportunity for all members of society to use with ease.  One way this is achieved is through the use of the principles of Universal Design (UD).  Inherent in these principles is the belief that all products, buildings, and interiors should be usable by everyone regardless of their age, ability, or circumstance. The Center of Universal Design at North Carolina State University[16] (1997) created seven principles to guide the philosophy of UD[17].  The seven principles are:

1.  *Equitable Use*: The design is useful and marketable to people with diverse abilities.
2.  *Flexibility in Use*: The design accommodates a wide range of individual preferences and abilities.
3.  *Simple and Intuitive Use*: Use of the design is easy to understand, regardless of the user's experience, knowledge, language skills, or current concentration level.
4.  *Perceptible Information*: The design communicates necessary information effectively to the user, regardless of ambient conditions or the user's sensory abilities.
5.  *Tolerance for Error*: The design minimizes hazards and the adverse consequences of accidental or unintended actions.
6.  *Low Physical Effort*: The design can be used efficiently and comfortably and with a minimum of fatigue.

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[16] The Center for Universal Design is a national research, information, and technical assistance center that evaluates, develops, and promotes accessible and universal design in housing, buildings, outdoor and urban environments and related products. The Center's work manifests the belief that all new environments and products, to the greatest extent possible, should be usable by everyone regardless of their age, ability, or circumstance.

[17] For a comprehensive explanation of these principles, refer to Appendix D.

7.  *Size and Space for Approach and Use*: Appropriate size and space is provided

for approach, reach, manipulation, and use regardless of user's body size,

posture, or mobility.

The term UD is more commonly used in the United States.  In Europe, it is referred to as

"Design for All," with "Inclusive Design" utilized in Great Britain (Bjork, 2009;

Bringolf, 2008).  The purpose of UD covers issues such as aging, gender, cultural

differences, and sustainability and allows full social participation by all (Bjork, 2009).  In

Bringolf's study (2008), she warns that UD should not be synonymous with Barrier-

Free[18] design because universal design automatically includes people with disabilities but

it is not exclusive to just that group.  As a further distinction, Joines (2009) concludes that

barrier free design is often regulated by laws while UD is an attainable goal. Not

employing these strategies in the design can have a negative impact on society.  For

example, Bjork (2009) points out that companies who do not incorporate UD strategies in

the built environment ultimately lose existing and potential clients because of the lack of

accessibility. Another downfall in the exclusion of disabled groups, according to the

American's with Disabilities Act (ADA), architectural barriers impose economic and

social costs on American society and undermines the ability to educate, rehabilitate, and

employ individuals with disabilities, as well as preventing society from benefiting from

the skills and talents that those individuals provide (U.S. Department of Justice, 2008).

Originally, historic buildings did not employ UD techniques because they were built

before these concepts were established; so it becomes an important task of the interior

designer to incorporate UD principles along with any barrier-free legislation into the

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[18] Barrier Free or Accessible  design is the design of homes, workplaces, and public buildings that allows physically
challenged individuals to make regular use of such structures (Mosby's Medical Dictionary, 2009).

rehabilitation in order to support an equitable community. If they fail to comply, the

negative consequences listed above could occur.

**Diversity**

To create a new design from an existing historical space that will be inclusive of

diverse groups can be a difficult task.  The best way to achieve this is through the use of

participatory planning. In this day and age of globalization it becomes easy to assume

that we are all alike because of the influences of Western culture.  Argüelles (2002)

asserts that the most important step in conservation is the identification of artistic,

historical, and environmental values of the people.  A study conducted by Hadjiyanni

(2005), concludes that interior designers cannot assume they know the cultural ideas of

another group; in order to understand our differences we first must use social science

methods, such as interviews, to discover these cultural values. Only after this is achieved,

can the design process begin.

A great example of this is in Cuba, where the government tends to provide for its

residents from the top down, and participatory planning is more of a bottom up approach.

To forge a new relationship between the government and the people the *Grupo para el*

*Desarrollo Integral de la Capital* (Group for the Integral Development of the Capital,

GDIC) was developed as an interdisciplinary collaboration of professionals engaged in

neighborhood planning. The group focuses on the physical, social, and economic aspects

of urban development and includes architects, sociologists, economists, and social

workers who actually live in the community (Coyula, Scarpaci, & Segre, 2002, Coyula &

Angotti, 1996; Le Royer, 1997). Currently, the GDIC has created twenty-two

Neighborhood Transformation Workshops, known as *Talleres para la Trasformación Integral de los Barrios* (TTIB) (Hearn, 2004; Kennedy, Rivera, & Tilly, 2003). The group works to promote new approaches to the built environment that are more decentralized, ecologically sound, and economically feasible. The model attempts to meet cultural, social, and economic needs and seeks to affirm the identity and historical continuity of neighborhoods by preserving the built environment and reformulating traditional planning models (Coyula & Angotti, 1996). The workshops allow for individuals in the community to take personal responsibility to insure the survival of the local traditions and customs through neighborhood identity. Spennemann (2006) warns that this bottom-up, community driven approach sometimes favors popular places and ignores places that do not fit into the community mold, so it is important to involve diverse groups in the community participatory planning process, as this can become increasingly difficult in more multicultural neighborhoods.

Besides the GDIC, the Office of the Historian (OHC) holds public meetings in each of Havana's seven districts at which local residents and community leaders identify neighborhood problems and suggest solutions (Hearn, 2004). These participatory planning efforts are beneficial to the community because when the OHC was preparing to provide housing in older, historic buildings in Regala, known for its Santeria practices, they asked the residents to sketch desired floor plans. Architects and planners discovered that almost all of the residents drew a small additional room. When asked what this room was, the people told them that it would be a room used to hold their Santeria altars and religious artifacts (M. Coyula, personal communication, December 2010). Had it not been for these participatory planning meetings the architects and interior designers would

have designed a space that did not truly meet the needs of its community members or promote the unique features of that particular group.

**Quality of Life**

In order to provide a good quality of life for the users of a particular space, the environment must represent the cultural identity of the community, provide security, allow for interaction with nature, and be aesthetically pleasing.  The built environment is a strong proponent in shaping cultural and national identity (Arguelles, 2002; Conti, 2009; Nazarzadeh, & Zarei, 2010; Ragab, 2011; Spennemann, 2006; Yacobi, 2008) all of which result in a strong sense of belonging.  However, through cultural globalization and revitalization of historic neighborhoods there are increasing concerns that a loss of sense of place is occurring (Gražulevičiūtė, 2006). When rehabilitating historic interior spaces it is important for interior designers to assess which features of the building create that cultural identity and what should be added to promote cultural diversity. This is no easy task and requires consideration and research on a case by case basis.

Whose past is preserved is often an underlying question in the rehabilitation process.  In Spennemann's (2006) research he mentions that there are a multitude of past histories associated with a community and we tend to preserve the most comfortable one. Scarpaci's (2000) paper concurs with Spennemann's research and says that the decision about what to preserve is often tied to the influential elites because they often play a larger role the city's decision making processes and preservation fundraising.  Scarpaci refers to an example in Havana where most of the buildings being restored reflect a time during the colonial and republican eras when Cubans were heavily exploited (Scarpaci, 2000).  This is not the desired effect because it places emphasis on restoring and

glorifying the imperial past of that time and does not represent a positive part of Cuban history.

Another cautionary example of this is the case of historic downtown Beirut where there are roughly thirteen layers of history spanning over 5000 years; after a fifteen year civil war between Christians and Muslims, there was a need to rebuild the city.  The goal was to combine western and eastern influences in a culturally sensitive way. When the rehabilitations took place many historic buildings were destroyed to make room for more western-style shopping malls.  The predominate historical style that began appearing throughout the city was that of restored French Colonial architecture used to attract tourists. It has been concluded that the city lost its cultural identity because these colonial facades are just that - facades that make the building appealing to consumers while the interiors were completely reconstructed in generic forms so that they are easily adapted for international commercial clients (Ragab, 2009).

A similar case is that of Viscri, a small German-Saxon community in Romania. Non-governmental organizations (NGOs) sponsored architectural restoration projects in this region.  Because these NGO's are of western heritage they found the German-Saxon culture very old and appealing and ignored a large segment of the population which consisted of poor, original ethnic Romanians that populated the town when the Germans left after World War II and again during the 1990's under the Communist regime. The work there is turning the town into facades that can be only enjoyed by western tourists because the guest rooms of these houses are the only rooms in the house with modern conveniences like indoor plumbing and central heating.  Klimaszewski, Mawr, Bader, Nyce, & Beasley (2009) poses a very important question about this, "If Viscri has had

different ethnic groups living within its environs, why should the Trust [the NGO] privilege one group over another in its portrayal of the village history (p. 100)?" Their research discusses how imperative it is to understand the present situation in order to represent the past and that importance should be placed on understanding the multiplicities of the histories and less on what history is deemed "correct" at that time. Although research is limited on exactly what interior designers should do to retain cultural identity, the studies provided can serve as a starting point in order to learn from past mistakes and make efforts to take all histories into account. When a design can achieve cultural/national identity, it will strengthen the sense of belonging and inevitably improve the quality of life but that cannot be achieved without thorough research and understanding.

When people have a sense of belonging they tend to have a sense of security which leads to overall well-being. This often results in socially sustainable communities (Black, 2004; Byrn, 2010; Erickson, 2010; Marzbali, Abdullah, Razak, & Tilaki, 2011; Nazarzadeh, & Zarei, 2010). Lee, Je, & Byun (2011) determined four indices of well-being resulting from the residential built environment and found that safety and security rated second in priority for individuals living in high rise complexes. They concluded that security meant the protection of residents' privacy and safety from external threats (crime). Crime is becoming an increasing problem in the social well-being of individuals and the design of the built environment can be a leading factor in prevention. This idea is known as Crime Prevention through Environmental Design (CPTED) (Crowe, 2000, Draper & Cadzow, 2004; Jeffery, 1971; Mora, 2008). Crowe (2000) suggests that the design of security features should be incorporated early on in the design phase to avoid

the costs of modifying later. Historic buildings tend to be in more urban areas where security is an issue and although the building already exists, these ideas can be incorporated in the initial rehabilitation design phase. Marzbali, Abdullah, Razak, & Tilaki (2011) suggest the Natural Surveillance concept, that designs a space to be visible and public; this addresses the fact that offenders prefer less observed places, as well as controlling access to the building. This could mean that low traffic hallways are kept to a minimum and the number of entrances/exits is limited. Draper & Cadzow (2004) also suggest clear definition of space between private, public, and semi-public spaces in addition to the previously mentioned idea of surveillance of "see and be seen". Other suggestions include (Byrn, 2010, Erickson, 2010):

- Entrance doors clustered together instead of numerous, dispersed single doors, which are difficult to supervise

- Fish-eye viewers in window-less exterior doors

- Glare free and well lighted areas at window locations

- Interior lighting at main entrance areas with evenly distributed lighting to the exterior

- Clearly directed paths to prevent wandering

- No dead ends where someone might feel trapped

It is also important to take a holistic approach to these design solutions in order to avoid fortress-like environments which lead to more insecurity and a dissatisfaction with the environment (Davey, Wootton, Cooper & Press, 2005).

Another factor in the achievement of social sustainability in rehabilitation projects is the balance of nature within the design. According to Mayer, Frantz, Senecal, &

Dolliver (2009), five potential mediators of nature's benefits exist: recovery from stress and attention fatigue, encouragement to exercise, facilitating social contact, encouraging optimal development in  children, and providing opportunities for personal development and a sense of purpose. There is extensive research that supports that interaction with nature is beneficial (Galindo & Rodriguez, 2000; Kaplan & Kaplan,1989, 2003; Kaplan, 1992, 1993, 2001; Kaplan, 1995; Mayer, Frantz, Senecal, & Dolliver, 2009; Wells, 2000).  Evans' (2003) study concluded that the built environment has a direct effect on a person's mental health and suggests that design elements such as views of nature, fireplaces, fountains, aquariums, animals and paintings of landscapes or other coherent, tranquil scenes can have a restorative effect on a person; access to natural light can reduce fatigue and depression.  He also asserts that individuals living near outdoor areas feel safer because of the uncongested open areas (Evans, 2003).  In a study conducted by Ryan, Weinstein, Bernstein, Brown, Mistretta, & Gagne (2010), vitality was determined as an important indicator of well-being; their subject's vitality was measured with exposure to nature, as well as images of nature. The results concluded that access to nature is by far preferred, but even images of nature can provide vitality.

As stated previously, access to natural light can also influence a person's well-being. Architect Richard Barrett (2009) explains that humans moved from an agrarian society of living in the country where there was an abundance of natural light to a more indoor, urban lifestyle with limited exposure to natural light and our bodies have not been able to adapt well to this new environment.  He urges architects and those involved in the building process to consider the effects of natural light on the well-being of the inhabitants and try to incorporate it into the design whenever possible. Light has always

been an important factor in design and so many older buildings already incorporate it into the design. When this is the case, it is recommended that the interior designer working in these spaces preserve the design features (windows, courtyards, atriums, etc.) that support a connection to nature as much as possible. If the existing building does not have access to nature, Evans' (2003) design elements could easily be incorporated.

Since beauty is considered one of Maslow's hierarchies of human needs that promote well-being, it is important for a space to be aesthetically pleasing, as well as functional. But beauty is often considered subjective. One way that design professionals have overcome this subjectivity is to take an objective approach through the use of the elements and principles of design. Principles of design are considered the abstract concepts that are the governing ideas that determine the success of a design, while the elements are the more concrete, quantifiable parts of the design (Nielson, & Taylor, 2007). This means that one could take an element (i.e. Pattern) and assess it according to each principle (i.e. is the pattern an appropriate scale, does it have balance, etc.).

In order to assess the aesthetic qualities of a design it is best to evaluate the elements of design through applications of the principles of design. Over time the use of the elements and principles reveal the characteristics of what a particular society values, which also leads to a sense of place and belonging. These characteristics, along with certain materials, are what creates the "historical" part of the building reflecting our identity. Designs that use the elements and principles to their maximum capacity are what help a building remain relevant to a community over time.

There is no consistent list of these elements and principles because every design field adjusts them to their current needs, but this section of the study will determine a

working list for the interior design professional.  From a review of the literature

(Binggeli, 2007; Allen, Stimpon, 7 Jones 2009; Nielson, & Taylor, 2007; Pile, 2003;

Zelanski & Fisher, 1996) a comprehensive list of elements and principles has been

determined and can be seen in Table 4.

In summary, in order for a historic rehabilitation project to attain the goal of

social sustainability the interior designer must incorporate equity, diversity, and quality

of life into the design process.  Failing to do so could result in the disenfranchisement of

a particular group, the elimination of a cultural representation of society, anxiety, stress,

and insecurities. Although environmentally and economically sustainable designs are

equally important, it is also important for the interior designer to have a full

understanding of social sustainability and how these principles are incorporated it into

historic rehabilitation project.

*Principles of Environmental Sustainability*

Environmental sustainability, sometimes referred to as "green design", has been

growing in popularity within the last decade as the world is becoming more aware of the

rapid depletion of natural resources.  The construction of buildings, along with their

maintenance, represents a large proportion of society's direct and indirect impact on the

environment and interior designers play a pivotal role in the construction or renovation of

these buildings (Othman, 2002; Stieg, 2006).  This section aims to define environmental

sustainability from an interior design perspective and how it relates to the rehabilitation

of historic preservation projects.

**Table 4 Table 4: Principles and elements of design** (Source: Binggeli, 2007; Jones, & Allen, 2009; Nielson, & Taylor, 2007; Pile, 2003; Zelanski & Fisher, 1996)

| Elements: | Description: |
| --- | --- |
| Point/Line | Series of points create a line; a line can be straight/angular/curved. |
| Shape/Form/Mass | (Shape) 2 dimensional or (form) 3 dimensional. (Mass) actual or optical density of a form or shape. |
| Texture/Pattern/Ornamentation | (Texture) actual or implied feel. (Pattern) arrangement of forms to create an orderly whole. (Ornamentation) visual extras. |
| Value/Color | (Value) relative lightness and darkness. (Color) hue. |
| Light/Opacity/Transparency/ Translucency | (Light) natural or artificial. (Opacity) imperviousness to light. (Transparency) ability to transmit light. (Translucency) ability to transmit some light but block vision. |

| Principles: | Description: |
| --- | --- |
| Size/Scale/Proportion: | (Size) small or large. (Scale) size of an object related to other objects. (Proportion) size of the parts to the whole object. |
| Unity/Variety: | (Unity) sometimes referred to a harmony; combination of elements to create a pleasing whole. (Variety) availability of different elements. |
| Balance: | Equilibrium achieved by the arrangement of the components. |
| Rhythm: | Flow of elements usually achieved through repetition. |
| Emphasis: | Arrangement of elements to create a point of interest. |

In contrast to the complexity of defining social sustainability, environmental sustainability is much simpler in its scope and is widely used and defined in the built environment. According to Misika and Joekes (1997), "environmental sustainability refers to the maintenance of the ecosystem and the natural resource base" (p. 2). Although this definition is vague it does allow every sector to clarify it to their individual needs. In terms of architecture and construction, it is more refined as a part of sustainable development. The EPA states that environmental sustainability is the practice of creating

and using healthier and more resource-efficient models of construction, renovation,

operation, maintenance, and demolition (U.S. Environmental Protection Agency, 2012).

The Sustainable Buildings Industry Council (SBIC) uses a very similar definition but

adds that the process should be done in such a way that promotes energy, water, and

material efficiencies, while providing healthy, productive, and comfortable indoor

environments and long-term benefits to owners, occupants, and society as a whole

(Sustainable Buildings Industry Council, 2012).  Should the construction industry ignore

these principles, the ultimate effect could be harmful to people and the environment.

　　　　The reason the architectural community needs to be so vigilant about this topic is

because the construction of the built environment accounts for one-sixth of the world's

freshwater withdrawals, one-quarter of its wood harvest, and two-fifths of its material and

energy flows (Roodman & Lenssen, 1995).  In addition, roughly half of the energy used

in construction and operation is used to create an artificial indoor climate (through

heating, cooling, ventilation, and lighting) which often leads to sick building syndrome

(SBS) (Roodman & Lessen, 1995).  Also, In the United States, about 40% of carbon

dioxide emissions come from buildings each year (U.S. Environmental Protection

Agency, 2012).  Although this is a small number of statistics, there are many more that

support the idea of incorporating sustainable design practices into building designs[19].

　　　　As stated previously, the responsibility often falls on the interior designer to make

socially responsible choices in the design process to prevent the unwanted ill-effects of a

poorly designed building.  The EPA (2010) lists several components of environmentally

sustainable development that should be considered when constructing a building:

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[19] For more information regarding statistics in the United States, visit
http://www.epa.gov/greenbuilding/pubs/gbstats.pdf

- Energy efficiency and renewable energy
- Water efficiency
- Environmentally preferable materials and specifications
- Waste reduction
- Toxics reduction
- Indoor air quality
- Smart growth and sustainable development

This list is very comprehensive and can be used by all individuals involved in the process.  The EPA website does not define each category but does provide extensive information on programs and tools to help the construction industry make informed decisions.  Unfortunately it doesn't specifically break the complexity of sustainability into the categories that an interior designer would be concerned with or responsible for. To understand sustainability from an interior design perspective, Stelmack, et al. (n.d.) takes a more general approach to the EPA's list and divides them into four broad categories: Energy, Materials, Ecosystems, and Land, Air, and Water.  The downside to their paper is that they do not offer a comprehensive explanation of how they relate to interior design. Another perspective that provides a complete, simple to understand list is from David Ballast (2010) who states that although an architect addresses many of the sustainable design issues there are several things an interior designer can do to minimize the environmental impact. He divides the items that are most controlled by an interior designer into these categories: Materials, Energy Efficiency, and Recycling. Similar to the pillars of sustainability, all three categories often overlap.

**Materials**

One of the most significant ways an interior designer can have an environmental impact is by choosing sustainable materials because they represent a large portion of what makes up a building. This process can be daunting because of all the information and misinformation out there (Stieg, 2006). In addition, sustainability is only one part of the equation and an interior designer needs to also consider appearance, performance, function, and cost. After reviewing several sources (Ballast, 2010; Childs, Argeles, Henderson, Horst, & Malin, 2006; U.S. Environmental Protection Agency, 2012), the evaluation of sustainable materials can be divided into three parts: Material Reduction, Natural Resource Reduction, and Pollutant Reduction. It is also important to note that the list below can serve as a guideline and it may not apply to every situation or product/material.

One of the first ways an interior designer can make sustainable material choices is by reducing the amount of materials used. A way to achieve this is to design flexible, open, multiple use, or future use spaces (Childs, Argeles, Henderson, Horst, & Malin, 2006). Plus, a designer can specify leaving items exposed with putting layer upon layer of materials over it. An example of this is to leave beams, ceiling, and/or concrete subfloor exposed. In addition, sometimes a specified product may have a higher initial cost but will last a long time. Selecting a durable item would need to be replaced less often, thus using less material in the long run. Another method is to reuse salvaged material from an existing building site. Lastly, sustainability through material reduction can be achieved by using a material that has recycled content or has the ability to be recycled. Materials with recycled content uses less energy (discussed in the next section)

and are labeled as containing post-consumer, post-industrial, or recovered materials. Materials that can be recycled can then be disassembled and become recycled content.

A reduction in the amount of natural resources is often concerned with the depletion of the resources and with the embodied energy associated with the product. Embodied energies refer to the total energy required to extract, produce, fabricate, and deliver a material to the job site (Ballast, 2010). Using materials produced and manufactured regionally can reduce the energy in transportation cost and also helps the local economy. Also, materials can be sustainable if they come from renewable sources, meaning that the source can renew itself in a short amount of time. Last of all, the material or product specified should reduce the amount of water and energy consumption that the building uses.

The overall health of the occupants is a very important health and safety concern of the interior designer. Materials within the building contribute to much of the polluted air inside (Childs, Argeles, Henderson, Horst, Malin, 2006). Interior designers can make sustainable choices regarding indoor air quality by specifying materials that have low volatile organic compounds (VOC) content. VOC's can off-gas harmful chemicals into the air causing major health problems to those who breathe them in, and paint is a major contributor. This choice can affect both the occupant and the installer. Besides VOC's, some materials release other toxic substances like chlorofluorocarbons and formaldehydes. Consideration of low toxicity in the materials should be considered before they are specified. In addition, moisture can encourage the growth of biological contaminants like mold to grow. Interior designers should select materials and products

that resist mold growth.  Last but not least, VOC's can come from cleaning products so a material should be chosen that can be easily maintained.

**Energy Efficiency**

Energy efficient products or systems use less energy to perform as well as or better than standard products.  The initial cause of concern for the interior designers is that some of these items can have higher upfront costs, although many times they offer more savings over time.  According to Ballast (2010), there are four parts of building construction that an interior designer may be involved with concerning energy efficiency: Building Commissioning, Mechanical Systems, Electricity Use, and Plumbing.  The designer can create a comprehensive sustainable design but if that plan is not implemented correctly then the energy efficient components become null and void. During the design and initial occupancy of the building the designer can conduct a building commission which verifies that building elements are tested to be compliant with the design intent.  Although most mechanical systems are created by a mechanical engineer, an interior designer can create a plan that conforms to local energy codes, specify a system that does not contain chlorofluorocarbons, and place air registers and returns in a way to maximize heating or cooling temperatures.  The overall energy efficiency of the building can not only help the environment but also save in electricity costs.  Since light fixtures contribute to the overall heat build-up in a building it is important for interior designers to counteract this.  Energy is wasted on both electricity for the lights and the air conditioning needed to counteract the heat caused by the light fixtures.  One way to eliminate this is to design spaces that maximize natural daylight. Usually light fixtures will still be needed but energy efficient bulbs can be used, high

reflectance materials can be specified to maximize the light and daylight sensor and

occupancy sensors can be installed. Also, using solar panels can provide alternative

methods for electricity and using well insulated walls and ceiling can reduce the

heating/cooling needs of the building.  As mention previously, many plumbing issues

have to do with water conservation and the selection of products that reduce the needs for

high amounts of water can be specified.  Additionally, the collection of rainwater can be

designed into the building to reserve this water for toilets and irrigation.

**Recycling**

Although recycling was mentioned in the materials section, there is more than just

specifying materials that contribute to overall recycling.  To make it easier for the

occupants to recycle their waste, interior designers can incorporate a recycling program

into the building's design by providing either bins or recycling rooms.  Additionally, if an

interior designer is part of a renovation it is important to create a plan to either recycle the

unusable parts or donate them.  Although the aforementioned items are very important in

recycling, the largest impact of recycling that can occur is the adaptive

reuse/rehabilitation of a building.  Snoonian and Gould (2001) commented that

> Considering that up to 30 percent of landfill waste in the U.S. is
> composed of construction and demolition debris, adapting existing
> structures or reusing their materials are simple ideas that can make
> significant contributions in environmental stewardship
> (p. 92-94).

According to Rypkema (2007), if a standard size building located in an American

city's "main street" district was demolished it would wipe out the environmental impact

from recycling 1.34 million cans.  According to Jackson (2005), the energy used to

demolish a masonry/concrete building (like most historic buildings) is significantly

higher than a building made of wood or steel construction.  He goes on to state that

reusing the original structure, shell, and half of the interior could equate to 50% of that

buildings embodied energy (Jackson, 2005).  Similarly, according to Rypkema (2005):

> Razing historic buildings results in a triple hit on scarce resources.
> First, we are throwing away thousands of dollars of embodied
> energy. Second, we are replacing it with materials vastly more
> consumptive of energy. What are most historic houses built from?
> Brick, plaster, concrete, and timber are among the least energy
> consumptive of materials. What are major components of new
> buildings? Plastic, steel, vinyl, and aluminum are among the most
> energy consumptive of materials. Third, recurring embodied energy
> savings increase dramatically as a building life stretches over fifty
> years.

Another environmental benefit from rehabilitating a historic building is

the prevention of urban sprawl, which in turn reduces the loss of the natural

habitat, the dependence on cars, and costly infrastructure (Frey, 2007).  Lastly, in

terms of energy efficiency, according to Gilderbloom, Hanka, & Ambrosius

(2009), most houses (and buildings) were designed before the invention of air

conditioning and had to use natural methods to cool them, including using 15 foot

high ceilings, transoms, and operable windows with ventilation shutters.

A measureable way to attain an environmentally friendly status is to use

the USGBC's LEED program[20] or the alternative program called Green Globes by

the Green Building Initiative.  Both award points to a buildings construction,

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[20] See Appendix E for rating system.

verifying that sustainable methods were used in its design and construction and both have a program for existing buildings. In a study conducted by Buddenborg (2006), she demonstrated that one can achieve LEED certification on a rehabilitation project. Similarly, Hyllegard, Ogle, and Dunbar (2003) studied the successfulness of the environmentally sustainable design of REI's flagship store in a historic building. So, although most times new construction is associated with being sustainable, it is possible to achieve "green" benefits in a historic rehabilitation. A summary of the principles of environmentally sustainability can be seen in Table 5.

*Principles of Economic Sustainability*

As a pillar of sustainability, economic issues often overlap many social and environmental principles. Similar to social sustainability, economic sustainability has many definitions and becomes more specific depending on who is defining it. From a general business perspective, economic sustainability entails the actions that affect how people and businesses meet their economic needs (Werbach, 2009). Due to the vague explanation, the objectives of this section are to relate the principles of economic sustainability, interior design, and historic rehabilitation.

Although many decisions regarding a community's economic viability are not left up to the interior designer, but rather the city's leaders, there are several things that a designer can do to assist those economic goals. To better understand how this is achieved it is best to approach the definition from a sustainable

development viewpoint. Othman (2009) determined that there are two factors that

the architectural design community can do to support economic sustainability; (1)

**Table 5: Environmental sustainability principles, characteristics, and implementation**

| Environmentally Sustainable Principles | Characteristics | Implementation |
| --- | --- | --- |
| **Materials** | Material Reduction | Flexibility |
| | | Minimalism |
| | | Durability |
| | | Reusability |
| | | Recycled Content |
| | | Recyclable |
| | Natural Resource Reduction | Local Materials |
| | | Renewable Sources |
| | | Water Conservation |
| | | Energy Conservation |
| | Pollutant Reduction | Low VOC |
| | | Low Toxicity |
| | | Moisture Resistance |
| | | Maintainability |
| **Energy** | Building Commissioning | Testing Components |
| | Mechanical Systems | Energy Code Compliant |
| | | No CFC |
| | | Strategic Planning |
| | Electricity Use | Daylighting |
| | | Efficient Bulbs |
| | | Reflective Materials |
| | | Daylight Sensors |
| | | Occupancy Sensors |
| | | Solar Panels |
| | | Insulation |
| | Plumbing | Efficient Fixtures |
| | | Rainwater Collection |
| **Recycling** | Recycled Materials | Recycle Bins |
| | Building Disposal | Recycle/Donate |
| | Adaptive Reuse | Rehabilitation |

stimulate growth in the construction industry which increases GDP and job

creation and (2) increase a client's profit and investment return. Job creation

through construction needs no clarification because it can clearly be understood

that as a building is designed, workers are hired to build it and materials are

purchased during that process, but how do interior designers increase a client's

profit? The designers at Maquette Interior Design declare that interior branding is

the solution.  They define it as "the process of transforming an office environment

into a three-dimensional marketing tool that instantly communicates a company's

brand identity, unifies its internal culture, and helps achieve business goals"

("Interior Branding", n.d. p.2). Branding allows that business to stand out and

communicate its mission and values to potential new clients, resulting in

additional business. The physical appearance of a space assists in the client's

overall experience.  If that experience is positive then clients will make a

purchase, and continue to make future purchases (Herman Miller, 2007).  An

interior design can accomplish this through the use of effective space planning,

material selection, and thorough research.

Another perspective of increasing profit is Kua and Lee (2002), who state

that the two divisions of economic sustainability are long-term resource

productivity and low-use cost (Figure 3).  Both authors agree that making

environmentally sustainable decisions have a direct correlation to economic

growth.  By choosing more energy efficient products and processes that reduce

operation costs for the client, recycling demolition materials for new materials

reduces construction costs, and by specifying regional materials the local

economy is supported.  Also, Kua and Lee assert that a way to achieve long term

resource productivity is through durability and reusability.  To summarize, the

three principles of economic sustainability that concerns an interior designer are

Interior Branding, Job Creation, and Efficient Materials and Processes.

Several studies have been conducted that provide information supporting the idea

that the rehabilitation of historic buildings supports the local economy (Frey, 2007;

Gilderbloom, Hanka, & Ambrosius, 2009; Kau & Lee, 2002; Laure, 2008; Mason, 2005;

Rypkema, 1994, 2005, 2007; Vehbi & Hoskara, 2009; Wichman, 2007).  However, these

studies examine historic preservation from a general perspective and not from an interior

design viewpoint.  Branding, job creation, and environmentally efficient materials and

processes within historic preservation and rehabilitation need to be examined further.

**Interior Branding**

Interior branding, in terms of historic preservation, can come in the form of

heritage tourism and revitalization.  The NTHP defines heritage tourism as "traveling to

experience the places, artifacts and activities that authentically represent the stories and

people of the past and present. It includes cultural, historic and natural resources"

("Heritage Tourism", n.d).  The key word in that sentence is 'authentically'.  This is

where interior designers and architects play a significant role because it is up to their

research and design solutions to create an authentic rehabilitation. Ultimately they are

creating a brand, and that brand is history.  If the design appears to be inaccurate or

poorly executed, the destination may no longer be desirable and the city may lose out on

revenue. Additionally, the company that is operating the tourist destination will also lose

business. Heritage tourism is very important to the local economy because heritage

visitors stay longer, spend more per day and, therefore, have a significantly greater economic impact per trip (Laurie, 2008; Mason, 2005; Rypkema, 2005). Similarly, Frey, (2007), asserts that the rehabilitation of these historic buildings affects more than just tourism but also finance, real estate, and government. When these cultural sites are rehabilitated it adds to the city wide revitalization of the area because as a building is rehabilitated it improves property values. Once this occurs more investors are attracted to the area and the rehabilitation process continues. Main Street programs[21] in the United States promote community revitalization through a four point process and the design of the area is one of the main points. They clearly understand that the physical appearance is a strong proponent to an economically viable city. The effectiveness of Main Street is significant to the economy because in the 25 years of operation the program has attained $18.3 billion in reinvestment, created 60,500 businesses, rehabilitated 96,283 buildings, and created 244,545 net jobs (Frey, 2005).

**Job Creation**

The design of a rehabilitation project is just a concept until it is built. Ultimately, it is the investor who pays for the work to be completed, but it is the design team that specifies the work to be done. Take, for example, a window; to retain historic accuracy, an interior designer may require that the window be preserved and repaired rather than replaced. That action will require more labor than materials, aiding in the local economy. Traditionally rehabilitation work is more labor intensive (roughly 70% labor, 30% materials) than new construction which requires roughly equal amounts of each, thus creating more jobs (Frey, 2007; Rypkema, 2005). Also, according to Frey (2007), an

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[21] The National Trust for Historic Preservation established the Main Street Program to assist in downtown revitalization by supporting the rehabilitation efforts of historic commercial buildings. Their four point approach includes; organization, promotion, design , and economic restructuring.

investment of $1 million in a rehabilitation project creates on average 9-13 more jobs than the same investment on new construction. In addition, it takes more skilled workers to complete the design intent with regards to historic accuracy because many of the restoration techniques are often done in a traditional manner. These specialized skills can often generate high wage employment which also aids in the economic viability of the community (Frey, 2005).

**Environmentally Efficient Materials and Processes**

This principle is so closely related to environmental sustainability in several ways. There are many instances where a historic building can be updated with more environmentally efficient technologies in order to reduce the operational costs, thus providing the client with savings. As stated before, reusing as much of the building's materials, in addition to specifying long lasting product, both aid in the company's long term investments. (Refer to the section on environmental sustainability for more information.)

*Conclusion*

Sustainable design in the rehabilitation process consists of three categories; social, environmental, and economic sustainability. Although many definitions of each can be found, it needed to be clarified how an interior designer can use all forms of sustainability in a rehabilitation project. Social sustainability is more of an intangible aspect and refers to a design that is equitable, diverse, and provides a good quality of life. The designer can support equality by providing equal opportunity for all users through universal design strategies and can support diversity by including the needs of both minority and majority groups by implementing participatory design practices. Quality of life means that the

spaces will provide cultural identity, a sense of belonging and safety, interaction with nature and pleasant visual appearances.

Environmental sustainability can include many processes, materials, and treatments but the ones most associated with the job of an interior designer are materials, energy consumption, and recycling. In the rehabilitation process, the designer should specify materials or products that will use fewer materials, fewer natural resources, and fewer pollutants.  To increase energy efficiency in the project, the designer can conduct a building commission, aid in the design of the mechanical system to run effectively, and design more energy and water efficient methods.  Lastly, the designer can be environmentally friendly by incorporating recycling programs in the design of the building, specify the proper disposal of construction debris, and of course, retain as much of the building's original fabric as possible.

Although small compared to the other principles, a designer can contribute to economic sustainability is several ways. First, the designer can create a branding strategy that promotes historical accuracy which will aid in heritage tourism benefits.  Designing a space that is historically accurate not only benefits the owner but the entire community, adding to the area's revitalization by increasing property values. Additionally, the work that the interior design specifies allows for more skilled jobs to be created which also inserts money back into the local economy.  Last but not least, a way a designer can provide economic benefits to the owner/investor is by applying the methods of environmental suitability through the use of efficient materials and process.

It takes all three "pillars" to create sustainability and an interior designer plays a significant role in sustainable development.  As one can see, for example, all of the pillars

overlap and the act of using more daylight in a space can aid in both social and

environmental benefits.  The case study in this paper will investigate how the designers

of the Convento de Belen used all forms of sustainability, along with their principles, in

the rehabilitation process.  But first, Chapter Four sets the stage by discussing Havana's

historical styles, explaining Havana's environmental and historic preservation policies,

and attempting to understand why the city needs to preserve their existing building stock.

**Chapter Four:  Historic Preservation and Sustainability in Havana**

Cuba, a country with a population of roughly 11 million people, is an island in the Caribbean Sea that is located 90 miles off the coast of the United States. Within the last few decades this small nation, particularly in the city of Havana, has embraced massive historic preservation efforts in order to sustain the environment, their economy, and their cultural heritage[22].  This is why it makes an ideal location to study how architects and designers used all forms of sustainable methods in the preservation process.  In addition, the difference in politics and the tumultuous relationship between Cuba and the United States is what allows this study to also educate American designers on a contrasting approach to historic preservation. The goals of Chapter Four are three-fold:  (1) to focus on Havana's political and architectural history in order to gain a better understanding of what is being preserved, (2) to explain the organizational structure of the historic preservation process in the city, and (3) to understand why it is important for Cubans to conduct rehabilitation.

*History of Havana's Politics and Architecture*

*Colonial (1512-1898)*

The country is well known for its five centuries of political and architectural history which can be divided into three categories: the Colonial (1512-1898), the Republican (1898-1959), and the Revolutionary (1959-present) (Keifer & Wagner, 1998; Carley, 1997).  In 1492, Columbus declared the island of Cuba as part of the Kingdom of Spain and it remained under Spanish control until 1898.  During this time sugar, tobacco,

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[22] In 2006, Cuba was named the only country in the world that met the guidelines of sustainable development based on the United Nations Development Program's Human Development Index Score along with the ecological footprint (WWF, 2006; WWF, 2010).

and slave trading were the leading contributors to the ever growing economy.  Fortresses

of the 15th and 16th centuries were made from heavy masonry blocks and provided a

defense from pirates and looters in Spain's most prestigious port. Also during this time,

baroque churches became the basis for cultural life and were symbols of Spain's wealth

and power.  The typical baroque façade often included complicated shapes, large curved

forms, and high domes.

Residential design of 17th century early colonial homes had high windows, doors,

and ceilings, which were made from exotic woods, Spanish tiled roofs, indoor courtyards,

and wooden shutters. Most homes of the time were either one or two levels and two level

owners often rented out the street level for retail establishments (Coyula, Segre, &

Scarpaci, 2002).  By the 19th century, the typical layout included a centrally located

courtyard with a fountain, well, and basin.  The first floor had several rooms for

entertaining and a few rooms for the family business, with stables in the back.  The

second floor, often a mezzanine, housed the family's slaves with additional rooms

dedicated to warehouse space and the private living quarters were located on the third

floor which offered protection from any possible looting or invasion. In addition, specific

building codes of the time dictated central plazas with homes and churches situated

around the main square in the municipality of what we today call Old Havana (*Habana*

*Vieja*) which created rows of columns that resulted in beautiful displays of colonnaded

porticos. Then in 1898, the United States won the Spanish-American war and Spain

transferred sovereignty of the island to the U.S. through the Treaty of Paris[23].

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[23] The Treaty of Paris (1989) required Spain to give control of Guam and Puerto Rico to the United States. In addition $20 million was paid for the Philippines.  Also, Spain was required to recognize the American occupation of Cuba by removing all soldiers from the island.

*Republican (1898-1959)*

America occupied Cuba from 1898 to 1902 and eventually allowed Cuba to gain

formal independence and become the Republic of Cuba in 1902.  Through the rules of the

Platt Amendment, the United States was allowed involvement in Cuban affairs and the

relationship between the U.S and Cuba grew.  As American culture became more

influential, Cuba's architecture started to shift away from previous Spanish influences

and leaned more towards American ideals and values. By the beginning of the 20th

century, middle-class Americans became very intrigued with the 'Pearl of the Antilles'

and it became a popular travel destination, opening the communication between Cuba

and America (Edge, Scarpaci, & Woofter, 2006).  With a strong hold on the sugar market

a new middle-class emerged from white collar workers, while businessmen and

merchants became the new upper-class, thus resulting in an increase in housing

construction away from Old Havana.  While the previous colonial urban planning system

relied on narrow, winding streets, the Republican period allowed for the widening of

streets in a more grid-like pattern which provided accessibility for the American

automobile.

Twentieth century architecture in Havana displayed an eclectic range of

construction that was influenced by America and Europe.  Most civic buildings modeled

neoclassical American government architecture and many residences used classical

columns and capitals that were consistent with the colonial porticos. Early 20th century

Art Nouveau styles came from immigrant Catalonian craftsmen which eventually led to

the "eclectic" movement that Cuba is so well known for (Coyula, 2002).  By the 1920's,

the revival of styles, such as Neo Renaissance, Neo Baroque, Neo Gothic, and Neo

Moorish, were the dominating architecture. During the 1930's, Art Deco, Art Nouveau,

and Beaux Arts flourished, while the modern movement and the international style

became popular in the 1940's. By 1956, the United States owned 25% of all bank

deposits, 40% of all sugar production, 50% of all railroads, and 90% of all telephone and

electric companies (Houck, 2000). This disproportionate division in wealth by the United

States left many Cubans disenfranchised and looking for drastic reform.

*Revolutionary (1959-Present)*

In 1959, Fidel Castro and Ernesto "Che" Guevara won back the island from the

Batista government through guerrilla warfare tactics. The revolution was a reaction to

the strong social inequalities in Cuba because of the United States' presence in almost

every facet of business. Within the first year, the revolutionaries' confiscated private

property (with the intent to give back to poor Cuban people and farmers), nationalized the

public utilities, dismantled the mafia, and made prostitution and gambling illegal. In

total, the newly formed government nationalized $25 billion in private property owned by

wealthy Cubans, and by 1960 they nationalized all U.S. and foreign owned property

(Lazo, 1970). In 1961 Castro exclaimed that the revolution was a socialist cause but it

was not until 1965 that he formed the Communist Party (Newman, 2010). The agenda of

this new regime was to create an egalitarian society.

The nationalization of many American companies without compensation resulted

in retaliation from the United States which came in the form of an embargo that was fully

enacted in 1961, and restricted any trade of goods from the United States to Cuba. Then

in 1963, all travel to the island was made illegal. In 1992, the Torricelli Act[24], also

known as The Cuban Democracy Act, was passed which prohibited oversea affiliates of

American companies from trading with Cuba, denied any remittance from Cubans living

in America to family members in Cuba, and moorage was refused in any United States

port to ships that had called in Cuba during the last six months, regardless of that ship's

nationality (Trento, 2000). This policy was once again strengthened by the Helms-

Burton Act[25] of 1996, which penalized foreign companies that did business with Cuba by

preventing them from doing business in the U.S., as well as denying visas to

representatives of foreign companies that invested in the island (Trento, 2000).

Once Fidel Castro came into power after the 1959 revolution many architects fled

the country and the remaining architects produced few to no new structures. What little

construction that did occur was built in the international style of high-rise glass and

concrete structures. These proved to be very unstable after the revolution due to Cuba's

frequent power outages, resulting in the elevators not being able to work properly

(Carley, 1997). Although the embargo was in place, Cuba was still aligned with the

Soviet Union and had access to some construction materials. At the beginning of the

revolution, Fidel Castro made the claim that a developing country would have to sacrifice

housing construction in order to emphasize economic development (Nussenbaum, 2007).

This resulted in the government turning older mansions and palaces into apartments,

schools, government offices, and boarding houses during the early 1960's (Coyula et al.,

2002). Under this new socialist doctrine, housing became a human right and the

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[24] The Torricelli Act was initiated by Robert Torricelli of the United States House of Representatives. The goal behind it was to negatively affect the Cuban economy with the hopes of a total collapse.
[25] It is also known as The Cuban Liberty and Democratic Solidarity Act of 1996. It was sponsored by Jesse Helms, a senator from North Carolina, and Dan Burton from Indiana.

government tried to do its best to provide housing under the circumstances considering the process of deterioration on these historic buildings had begun long before the revolution.

It was not until Cuba lost all Soviet subsidiaries in 1992, after the fall of the Soviet Union, that housing was constructed through three main forms as a response to what is referred to as the "special period". These three forms were: state-sponsored, individual self-help, and collective self-help (Nussbaum, 2007). State-sponsored structures were known for their uniform construction in terms of materials, design, and physical layout, following previous models imported from the Soviet Union.  These buildings were often criticized, stating that "socialist architecture had to be ugly by definition, for beauty was considered an unnecessary luxury incompatible with socialism[26]" (Nussbaum, 2007, p. 5).  The process of individual self-help construction allowed individuals to renovate their own buildings but were characterized by the hazardous structural problems they incurred because people were not experienced in construction methods.  Since the individual self-help was not working, collective self-help groups, known as micro-brigades, started to develop.  The idea behind this was to build housing while collectively pooling the skills and labor of experienced individuals. These micro-brigades abandoned the idea of high rise buildings for more modest four to five story apartment buildings while following a standard design. This worked for a while until Cuba experienced a population boom and the people who made up these micro-brigades could no longer keep up with the continuous demands for housing.  The government started to realize the error of their ways and responded to the housing crisis

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[26] According to Coyula, Angotti, & Uggen (1996) this notion has since been rejected by Cuban architects, believing that quality and beauty are no longer abstract constructs.

by revitalizing the micro-brigades into "social micro-brigades".  These new micro-brigades focused on renovation, rehabilitation, and revitalization, as opposed to new construction (Nussbaum, 2007).  They paid particularly close attention to renovation in historic neighborhoods, like Old Havana, because as Cuba's economy shifted from the exportation of tobacco and sugar to nickel (which could not sustain the country), Cuba eventually saw an increase of revenue though tourism.

*Historic Preservation in Havana, Cuba*

     *Historic Buildings in Old Havana (Habana Vieja)*

The oldest municipality in the capital city of Havana is Old Havana, which was declared a World Heritage Site by UNESCO in 1982 because of its extensive and impressive collection of colonial architecture. Old Havana consists of 74,000 inhabitants in a 243 block radius.  This area includes 4000 buildings, 900 of which possess heritage value and are protected by the Havana Landmarks Commission (Carley, 1997; Coyula, 1994; Hoffman, 2006; Scarpaci, 2000). "Of the 900 historic buildings, 101 date from this century, 460 from last century, 200 from the eighteenth century, and an astonishing 144 date from the seventeenth and sixteenth centuries" (Marshal, 2001, p.150). In contrast to the United States, for buildings to demonstrate cultural heritage value in Cuba, they must have special archeological, prehistoric, literary, educational, artistic, scientific, or general cultural relevance, and does not necessarily have to be a certain age (Hoffman, 2006).

*History of the Evolution of Historic Preservation in Havana*

The Office of the Historian of the City of Havana (OHC)[27], known as *La Oficina del Historiador de la Ciudad de la Habana*, is in charge of the massive undertaking of restoration and rehabilitation projects in the city.  It was first developed in 1925 under the direction of Dr. Emilio Roig de Leuchsenring, but is now currently supervised by Dr. Eusebio Leal Spengler.  When OHC first began, its only concern was with the preservation of the built environment in Havana and had nowhere near the presence it does today.  It was not until 1939 that the *Commission for Monuments, Historic, and Artistic Buildings and Sites of Havana* was formed through the *Historic, Architectural, and Archeological Monuments Bill* (Hoffman, 2006).  Then in 1976 the Heritage Department of the Ministry of Culture was established, and in 1978 the *National and Provincial Landmarks Commission* was formed through Act One and Act Two of the National Assembly, and Havana was added to the list of National Monuments (Coyula, 1994; Hoffman, 2006). In 1982, Old Havana was granted the special status of a World Heritage Site and along with it came the special privilege of necessary regulations to protect it.  According to Hoffman (2006) these regulations include the fact that Cuba's government must "protect, conserve, and restore" the city center, as well as "adopt suitable legal, scientific, technical, administrative, and financial measures to protect the area, to conserve, restore, and rehabilitate old Havana" (p. 241).  In 1993, OHC was given more responsibility to initiate preservation policies after an architect from the National Center for Conservation, Restoration, and Museum Science (CENCRM), *Centro Nacional de Conservación Restauración y Museología,* and a British journalist were

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[27] For the purpose of this study, La Oficina del Historiador de la Ciudad de la Habana will be referred to as "The Office" "The Office of the Historian" or "OHC".

touring around the main plaza known as Plaza Vieja and saw a building collapse right

before their eyes (Peters, 2001; Scarpaci, 2000). It was then that Law Decree 143-93 was

created and allowed the Office of the Historian to precede with high-priority

rehabilitation projects as a result of the embarrassing collapse. To protect the historic city

center OHC implemented a Master Plan for the Integral Revitalization of Old Havana (*El

Plan Maestro para la Revitalización Integral de La Habana Vieja*) which includes

educating the people of Havana on the importance of cultural heritage management.

According to the National Habitat Community (2007), Dr. Leal and other authorities

established five main premises in the belief that human development is an important goal

in the environmental, economic and social rehabilitation of the territory.  The five

premises are as follows:

•To save the national identity using research, promotion and cultural

development.

•To protect heritage by rehabilitating the territory through a continuous Special

Integral Development Plan having legal force as a sum of participative

management and planning instruments that make the implementation of the

process integrally efficient.

•To avoid the displacement of the local population by protecting them from the

impact of the tertiary sector and establishing proper densities and quality of life.

•To give the territory a technical infrastructure and basic services that can

guarantee it is functioning in correspondence with contemporary needs.

•To achieve an integral, self-financed development making investment in heritage

both recoverable and productive (p. 2).

Since the office has a large commitment to preservation efforts it is divided into many 'directions': the Master Plan Direction, Direction for Investments, Cabinet of Archeology, General Direction for Design, Specialized Building Enterprise, and a school where individuals are trained in restoration construction activities (A. del Prado[28], personal communication, January 21, 2011). Figure 6 shows a chart created by Coyula,
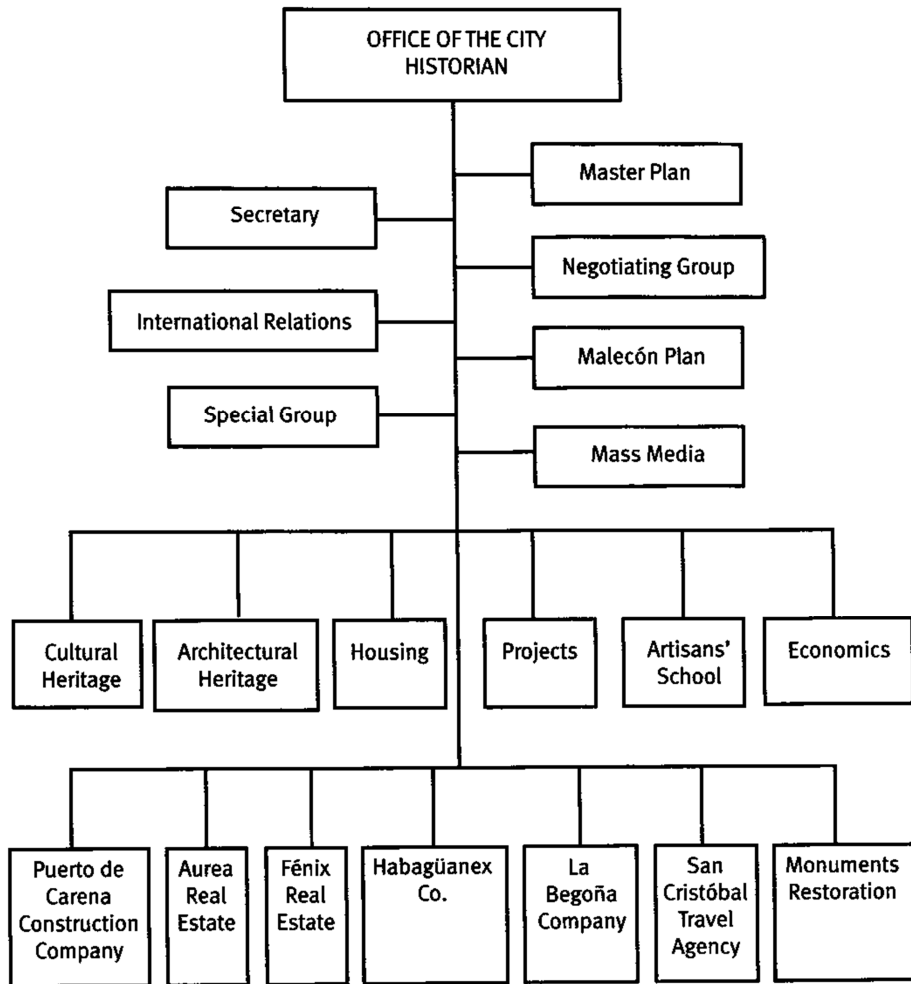
**Figure 6:  Organizational Chart of the Office of the Historian of the City of Havana**
(Source: Coyula, Scarpaci, and Segre, 2002)

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[28] Anibal del Prado is an architect who works in one of the sub divisions of the General Direction for Design.

Scarpaci, and Segre (2002) that is a simplified and modified version of the organizational

chart provided by the Office of the Historian. Overall, the Office employs roughly three

hundred engineers, architects, and interior designers.

OHC is unique in its operations because it has the responsibility of developing all

land use, planning and restoring Old Havana, operating businesses to develop its own

source of funding for restoration and tourist development, and enhancing social service

projects. It is also allowed to enter into contracts to buy and sell freely in the real estate

market (Peters, 2001). Since the office is required to develop its own source of funding

for all restoration efforts, it developed a variety of revenue generating companies (Table

6) for the restoration and rehabilitation of Havana and became a fully sustainable

operation, independent from the central government.

**Table 6: Enterprises created by the Office of the Historian of the City of Havana[29]**
(Source: M. Coyula, personal communication 2011; Peters, 2001)

| Enterprises | Purpose | Year Established |
|---|---|---|
| Habaguanex | Tourism – manages 19 hotels, 80 shops, 38 restaurants and 60 cafeterias and bars. Operates a business unit that manages foreign commercial financing for tourism based businesses. | 1994 |
| Fenix | Real estate company that rents residential and commercial spaces. Also operates a car rental agency and an automotive repair shop. | 1996 |
| Aurea | Real estate company; joint venture operation with Spain | 1996 |
| Puerto de Carena | Construction company | 1997 |
| San Cristobal/ La Begona | Travel agencies | 1995 |
| D'Leone | Joint venture operation; wholesale importer | 1996 |

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[29] For more information on the enterprises listed, visit http://www.habananuestra.cu

In total, these companies employ about 14,000 people (I. Leon[30], personal

communication, December 28, 2010) and generate approximately $80 million annually.

Forty five percent is used for renovating the existing building stock, while 35% is

devoted to social service projects, and 20% goes back to the central government (Luxner,

2004). These social service projects include restored and temporary housing projects, as

well as daycare centers, senior citizen homes, children's rehabilitation homes, and many

other social projects. Because public participation is important, Leal appears on television

to explain what OHC is doing and how the people's participation is critical to success

(Luxner, 2004).  According to Leal, it is important for people all over the world to know

that, "We are restoring Havana not just to see it, but to live in it" (Peters, 2001, p. 10).

As with the United States, these rehabilitation projects are guided by specific building

treatments in order to retain the cultural heritage that makes the city of Havana what it is

today.

### *Historic Building Treatments*

Similar to the National Register of Historic Places in the United States, the

Ministry of Culture maintains the Register of Cultural Assets of the Republic of Cuba.

Once a building is deemed of cultural heritage value by the National Monuments

Commission, there are four protection degrees established from the Law of Heritage

Protection which are determined on a case by case basis (A. del Prado, personal

communication, January 21, 2010).  According to Carley (1997) "high level buildings are

reserved for museums; the second level for hotels, schools, offices, and restaurants; and

the two lowest, which can theoretically tolerate the most intrusion, are designated for

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[30] Isabel Leon is an architect with the Master Plan division of OHC.

housing" (p. 217). In addition, Cuban architect Anibal del Prado states that the Office of

the Historian recognizes the same treatments provided by the *Secretary of the Interior's*

*Standards of the Treatment of Historic Buildings*, but that the process of restoration

differs by way of allowing features from other time periods to remain as long as they

have architectural value (personal communication, January 21, 2011). The rehabilitation

of these buildings is no easy task because of the many difficulties involved, but the Office

of the Historian works diligently to meet the requirements of the Law of Heritage

Protection because rehabilitation is such a necessity for the people of the city.

   *Difficulty of Rehabilitation*

   The preservation efforts in Havana have continuously been presented with many

challenges, such as the U.S. embargo, restricted access to materials, the effects of

weather, and the relocation of citizens. As the city continues to crumble every day it is

very important to rehabilitate as many historic buildings as possible before they are lost

forever. According to Leal, it will take about $1 billion to restore Havana to its former

grandeur. One of the biggest contributors to the dilapidation of Havana's built

environment is the embargo enacted by the United States government (Luxner, 2004).

Over the past few decades the policies of the embargo have changed with each U.S.

administration and now "people to people" travel, as well as humanitarian aid, medical

supplies, agricultural supplies, and some food have been allowed into Cuba from the

United States. However, there are still limitations on the necessary building supplies that

are needed to adequately restore the facades and interiors of these historic buildings, as

well as the number of professional experts in the field of historic preservation that are

allowed to travel there.

Due to the restriction of building materials incurred by the embargo, the Cuban

people have had to find creative, yet often illegal ways to provide housing and repairs for

themselves and their extended families while they wait for their neighborhood to be

restored.  To counteract some of this illegal building construction, the Office of the

Historian of the City of Havana tries to provide for less expensive construction materials

for those who do not want to wait for the restoration and wish to complete the work

themselves.  Typically, a bathroom sink costs about $80 in a state dollar store, but if

purchased through OHC, a resident can buy it for about $6.50 (Philips, 2001).  But it is

important to keep in mind that most people in Havana make the U.S. equivalent of about

$170 a year.  While building codes and permits do exist in Havana, people often take it

upon themselves to construct rooms or mezzanine to provide more living space.  The

*barbacoa* is a loft-like structure built in the colonial fifteen foot high ceilings of Old

Havana and is very similar to what college students do in dorm rooms in the United

States.  Another building technique employed by residents is to create "shacks" on top of

the roofs of multifamily units.  All of these structures add considerable weight to the

buildings which increases its chances for a collapse.

Other challenges include the need for temporary housing and keeping in pace with

the drastic effects from the environment.  When the Office of the Historian is restoring a

structure for residential use the problem lies in what to do with the occupants while the

building is being restored.  In order to work on twenty units of housing, they need thirty

units of temporary housing.  To meet building code requirements once a building is

rehabilitated, it is impossible to move all of the original inhabitants back in, so if

residents want to stay in the temporary housing, they just become owners of that home.

In addition, another challenge for the restoration efforts is the constant collapse of

buildings due to the humidity, salt, and hurricanes that take their toll on the architectural

landscape.  It is estimated that 500 buildings collapse each year in Havana and it has even

been said that a building partially or fully collapses every three days (Sanchez, 2009).  In

December 2000, the city was flooded from storms; four buildings completely collapsed

and 19 partially collapsed (Peters, 2001).  In 2008, it was reported that after Hurricane

Ike 140,000 homes were damaged or destroyed (Sanchez, 2008).  To deal with the

crumbling decay, the city often removes the rubble and builds a community park to

restore beauty in an architectural ruin, but it is becoming increasingly difficult to keep the

preservation efforts in pace with the collapsing buildings.  According to Sanchez (2009),

Orestes del Castillo, a retired architect and restoration expert with the Office of the

Historian, states that "Many buildings will be totally lost in 10 years" (para 4). This is a

powerful statement especially when there is such a need to use almost every building in

Havana.

> *The Need for Rehabilitation*

Although the Office of the Historian is constantly presented with many setbacks

they continue with their preservation efforts, in no small part because the community is in

such desperate need for buildings to house social services and an ever growing desire for

a stronger economy.  Preserving the existing building stock goes further than simply

restoring a building for history's sake.  In Cuba there are four main factors that contribute

to the need for rehabilitation.  First, there is an extreme housing shortage, second, there is

an ever growing aging population, third, there is a tourism market that continues to

accelerate, and fourth, there is a need to conserve resources. In Cuba housing is

considered a right, and after the revolution the private housing market was abolished

making the government the only entity allowed to sell real estate (Kapur & Smith, 2002;

Nussbaum, 2007).  However, that does not prevent Cubans from property ownership and

it is estimated that 85% of people own their home (Kapur & Smith, 2002). In addition, a

law was established that eliminated the legality of evicting the residents from an inability

to pay (Nussbaum, 2007). In order to provide affordable housing, rent does not exceed

10% of a family's income, and over time all of these policies created overcrowding in

Havana. Out of 11 million people in Cuba, 2.2 million live in Havana and since the

revolution in 1959 much of the building stock has fallen into ruins making it difficult to

house that number of people.  To make matters worse, a resident in Havana states that

although the census says there are two million people, he feels there are more like four

million "palestinos"[31] in the city due to people living there illegally (Colom, 2005) and

Rohter (1997) says that although there are no precise figures, the press estimates about

one in five people living in Havana are illegal[32].  In a 2001 survey, housing was identified

as the most pressing social issue because there is a deficit of about 400,000 homes with

45% of homes and apartments not meeting minimal standards (Acosta, 2004; Boadle,

2007).  According to Cuban architect, Mario Coyula, and urban planner, Jill Hamburg

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[31] This term is Cuban slang meaning Palestinian, referencing that these illegals have no "homeland" and that the squatter conditions in which they live are reminiscent of the Gaza Strip (Rohter,1997).
[32] The term "illegal" in this context means an individual from the provinces of Cuba who did not get authorization to move to Havana.  Once the Special Period occurred, many individuals left the countryside to find work in the city creating huge problems in overcrowding and crime.  In 1997, the government began fining and evicting these residents, and now Cubans who want to live in the city must first obtain permission.

(2003), the average household size is 3.5 persons in these densely populated areas with the average floor space per person being about 107 square feet (p.17).  Most of this substandard, overcrowded housing is located in Old Havana, Central Havana, and Atares, and "80% of housing in these inner-city areas are over eighty years old" while the rest is between forty and sixty years old (Corzo, 2005, p.168; Coyula, 2006).

The challenge the Office of the Historian faces is providing housing in an already inadequate and old housing stock while accommodating the needs of the growing aging segment of the population.  According to Miguel Coyula (2006), Cuban architect for the Grupo para el Desarrollo Integral de la  Capital (Group for the Comprehensive Development of the Capital GDIC), states that "by 2025, one in four Cubans will be older than 60 and by 2050, the number of the 'third age people'[33] will equal 40% of the population" (pg. 3).  Coyula goes on to state that current homes for the elderly are insufficiently meeting their objective and subjective needs and "in order for the city to have a gradually aging population, it must adapt to the new needs of this group, rather than simply seeing it as a group with increasing limitations and special disabilities" (Coyula, 2006, pg. 5).

Although there is a growing need to adapt historic buildings into suitable housing for all populations, there is also a need to preserve these structures to support an expanding and lucrative tourism market. According to hospitality expert Charles Suddaby (1997), Cuba is a desirable place for tourists because it offers a variety of traditional island adventures and historical/cultural attractions.  In addition, the island is substantial in size, close to the U.S., relatively crime free, and has an educated workforce.  Because

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[33] A term generally used by Cubans to reference senior citizens.

Cuba is desirable, it is speculated that when the United States removes its travel

restrictions completely, the island could expect over one million additional visitors each

year (Dorshner &Wyss, 2009). To maintain a supply for the demand, Cuba needs

to double the number of hotel rooms available in the near future and upgrade existing

ones (Keiffer, 1997). As Lee Cott, professor of urban planning at Harvard University,

points out, "as tourism and foreign business continues to grow, the rush is on to build

new hotels throughout the city as quickly as possible" (2002, para. 1). This could result in

the demolition of older historic buildings to make way for new 'mega' hotels and

architect/city planner Jeffery Horowitz, from Urbanist International, fears that once

Western companies gain access to the Cuban market there will be an onslaught on the

island's architectural heritage (Kralev, 2003). To counteract this, Mario Coyula states

that he would prefer to

> attract many small investors than a few large ones and find ways of
> reusing some of the city's old mansions as small-scale hotels. That
> way, we can manage both the benefits and the risks of tourism more
> effectively, and spread the benefits and costs more thinly across
> many neighborhoods" (LeRoyer, 1997).

Historic preservation allows for the appreciation of local and national history while

creating a market of heritage tourism where visitors want to experience history first hand,

so it makes sense for Cuba to invest in the rehabilitation of their historic buildings.

Lastly, because building materials are difficult to come by and energy costs are

very expensive due to the U.S. embargo (more so after the "special period"), the Office of

the Historian, as well as Cuba as a whole, has had to turn to more environmentally

sustainable methods, like the reuse of the existing building stock to survive. According

to Yaffee (2010) the "GDP plummeted 35% by 1993 and there were critical scarcities of

hydrocarbon energy resources, fertilizers, food imports, medicines, cement, equipment

and resources in every sector" (para 11).  In addition, Houck (2000) reports that Cuba lost

about 80% of goods imported to the island.  This action really pushed Cuba to find

sustainable solutions.  Then in 1997 the Cuban government enacted Law 81, *The Law of

the Environment.* This law embraces "air, water, waste, noise, toxic substances, historic

preservation, biological diversity, national parks, forests, wildlife refuges, coastal zone

management, education, research and technology, environmental impact assessment and

planning, inspection, enforcement, and penalty regimes" (Houck, 2000 p.24; Whittle &

Santos, 2006).  In 2006, Cuba enacted the Energy Revolution which focused on

conservation.  In this plan, people were able to switch from incandescent light bulbs to

compact fluorescent ones, free of charge. Within six months, almost 100% of the

incandescent bulbs were eliminated (Stone, 2009).

*C*onclusion

         The island of Cuba has a rich architectural history with 500 years of varying

styles that embraces Spanish, European, and American influences. In addition, it also has

a very complicated political history, especially with the United States.  Recognized as a

World Heritage site, Old Havana, a municipality of the city of Havana, retains many

architectural masterpieces and the Office of the Historian of the City of Havana has a

strong network of government officials that aim at preserving their cultural heritage.  The

guidelines for the treatment of these culturally significant buildings are very similar to the

United States even though their methods of generating revenue and reasons behind

preservation are very different.  Although there have been many challenges to the

preservation process in Havana, such as the U.S. embargo, restricted access to materials, weather, and the relocation of residents, it has been a necessary process in order to sustain society. The population in Havana continues to expand, as well as to age, so in order to provide a better quality of life, The Office of the Historian has turned to preservation as a socially sustainable option. Additionally, with the fall of the Soviet Union and no real export to speak of, preservation has provided Cuba with an economic advantage through heritage tourism and promotes environmental benefits through conservation. The extraordinary efforts by the Cuban government to preserve the architectural landscape, along with its commitment to sustainability make it an ideal location to study how designers use sustainability methods in the rehabilitation process. The Iglesia y Convento Nuestra Señora de Belén (Church and Convent of Our Lady of Bethlehem) case study, described in further detail in the following chapter, demonstrates how sustainability was achieved.

**Chapter Five: A Case Study: La Iglesia y Convento Nuestra Senora de Belen**

La Iglesia y Convento Nuesta Señora de Belen (The Church and Convent of Our Lady of Bethlehem)[34] is considered a "hallmark of sensitive sustainable urban development and rehabilitation" and has earned international acclaim ("Convento y Iglesia", n.d., para 5). This convent is an ideal model for this study because it is a historic rehabilitation in a UNESCO World Heritage site and is located in a city that prides itself on sustainable development and historic preservation. This historic building is located in Old Havana, in the Belen neighborhood between Luz and Acosta, with its main entrance and plaza on Compostela (Figure 7). The building is the largest religious complex in the city and measure roughly 130,000 square feet. The neighborhood of Belen is less of a draw for tourists visiting Old Havana but is slowly being restored. The
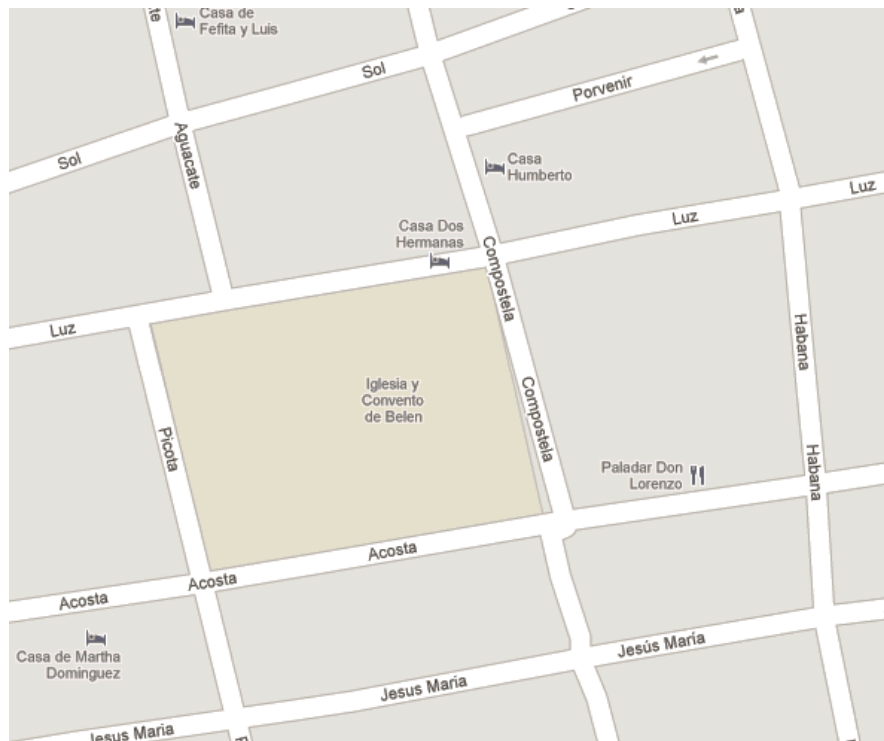


**Figure 7: Map of the Convento de Belen, 2012**  (Source: Google Maps)

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[34] For the purpose of this study, the convent will be referred to as the Convento de Belen or the convent.

current goal of OHC, in addition to the restoration of the convent, is to restore the plaza

and surrounding buildings to the quality of other popular tourist plazas like Plaza Vieja

and Plaza de Catedral.[35]

*The History of the Convento de Belen*

In order to understand the current function and restoration plan of the convent it is

important to learn about the history of its original purpose along with the architectural

characteristics which make it historic.  The convent went through many periods of use

and reconstruction and is an excellent example of the different time periods that display

typical religious baroque, neoclassical, and eclectic construction that Havana is so well

known for.  In the early 1700's, Bishop Diego Evelino Hurtado de Compostela, from

Santiago de Compostela in Spain, built a summer home, orchard, and convalescent

hospital in Havana for sailors and soldiers who were discharged from the main San Juan

de Dios hospital. With a generous donation of land to the Bethlehem Catholic Order from

the Bishop, along with a monetary donation from Baron Juan Francisco Carville,

construction of the convent began in 1712.

By 1720, the church, the main cloister, and the hospital were completed.  The

convent was influenced by Spanish colonial architecture which included interior

courtyards, tile roofs, and dark stained local wood. Large masonry blocks were the

foundation of the structure due to its abundance during the 18th century.  In addition,

because of the Catholic origin of the church, the layout represented a cross which was a

typical design element of churches during that time.  The floor plan of the church and

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[35] Old Square and Cathedral Square.
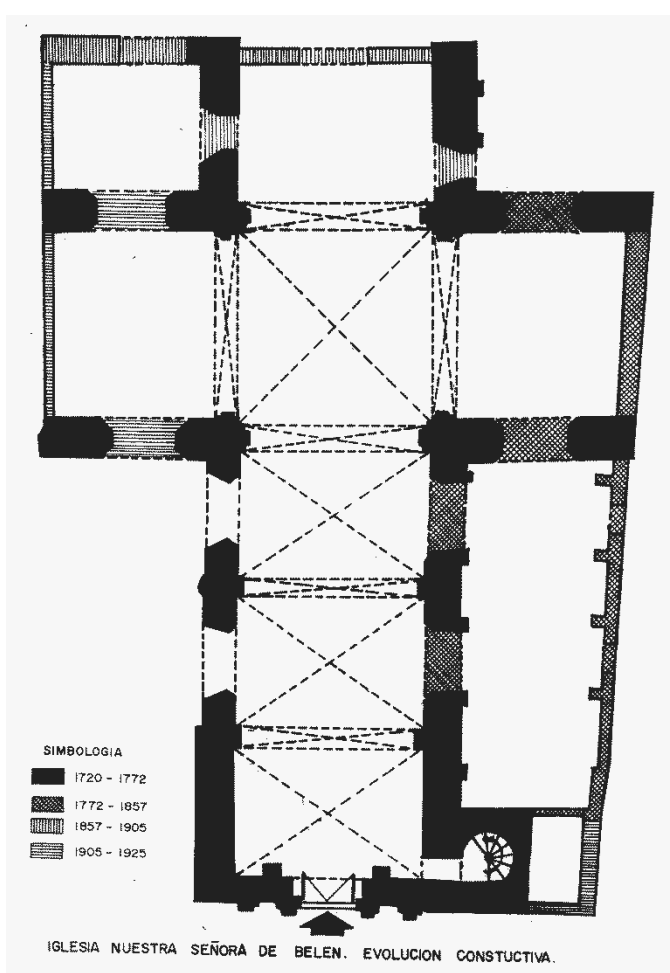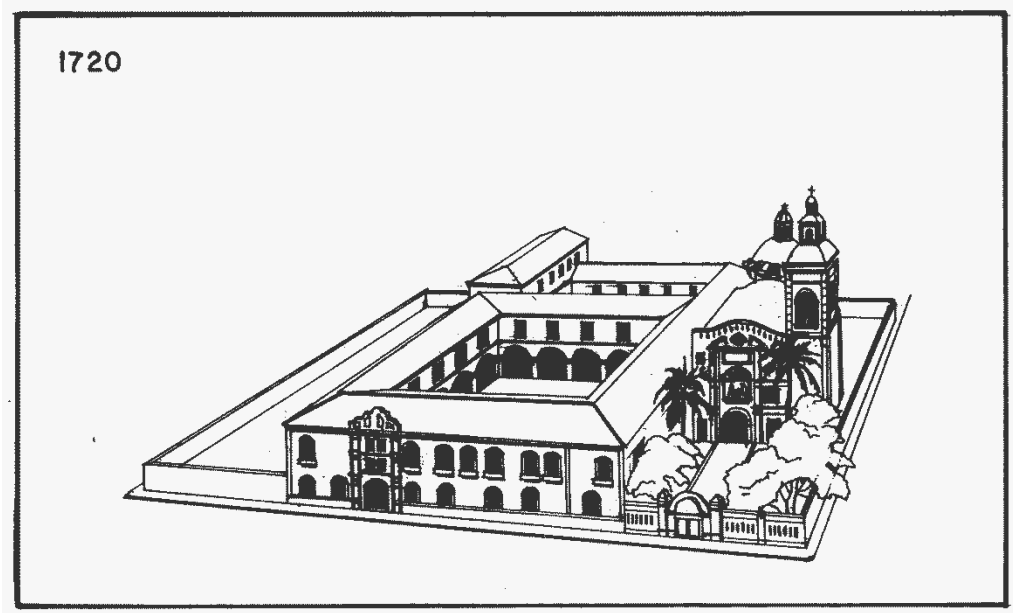
**Figure 8: Convento de Belen, 1720's** (Source: OHC Archives)

drawing of what the convent looked like in 1720 can be seen in Figure 8.  Operated by

the Catholic order, the religious lifestyles of the Belenitas[36] were simple, which could be

seen in their sculpture and stone work on the church. The church façade (Figure 9)

displays the typical baroque architectural elements of the time by showcasing various

scroll designs and is the only church in Havana with a bas relief.  This relief depicts the

"Bethlehem" scene from the bible with angel sculptures at the top announcing the birth of

Jesus. Above the relief is St. Francis de Assisi carrying the cross.  A similar cupola was

repeated over the main entrance to the convent but no longer exists due to the various

periods of construction.  Another typical Spanish baroque feature is the decorative nail



**Figure 9: Facade of the church, with door and façade detail, 2011** (Photo Credit: Author)

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[36] A name given to the nuns and friars of the convent

head on the church and main entrance doors.  This method also assisted in the joint

construction for the large pieces of wood used.

By the late 18<sup>th</sup> century, the Belenitas acquired most of the block and constructed

an arch (the Arch of Belen) over Acosta Street, designed by Pedro de Medina in the

1770's, to assist with the transfer of sick and heavily contagious individuals from their

neighborhood homes to the hospital within the convent.  An additional two courtyards

were also constructed on the Acosta side of the convent. The façade of the convent on

Compostela Street, in Figure 10, shows the original construction with the main entrance

in the middle and the addition that was completed in the late 18<sup>th</sup> century which slightly

projects forward.  It is also important to note that the 12 windows on the first and second

floors and to the left and right of the entrance represent the 12 Franciscan monks of the

Catholic Order that built the convent and church.
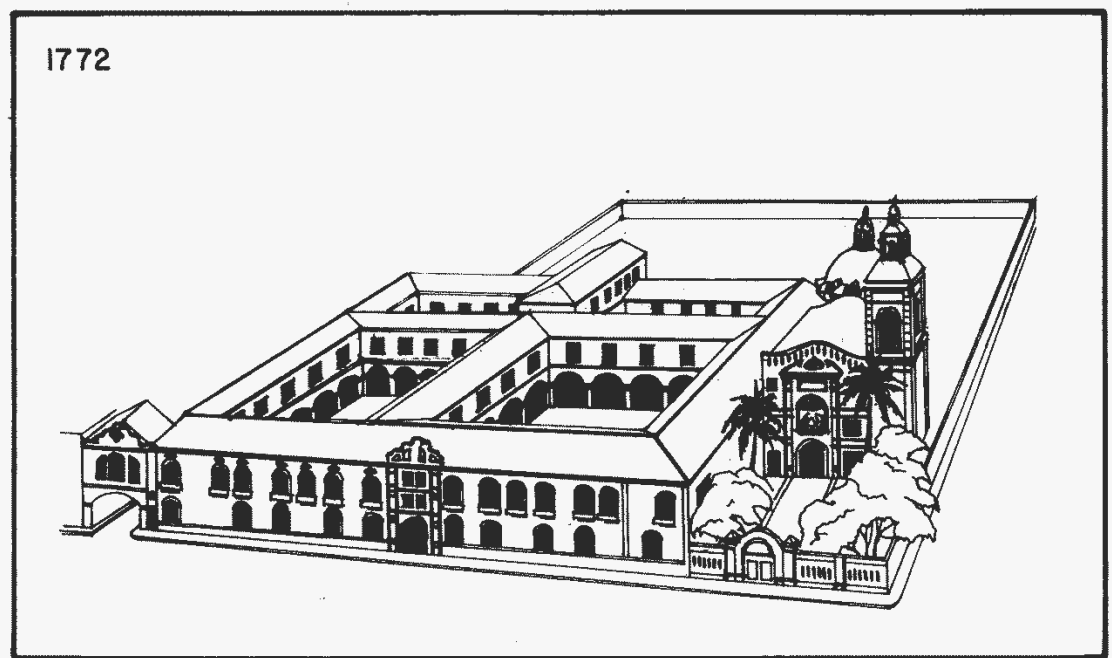


**Figure 30: Convento de Belen, 1772** (Source: OHC Archives)

During the 1840's and 1850's part of the convent was given to Spanish troops and

was used to house the generals; but then in 1854 the convent was given to the Jesuits to

create a college.  Queen Isabella II offered the convent as compensation for their

expulsion from Spain.  The chosen name of the college was the Colegio de Belen and

they specialized in weather forecasting and scientific studies.  Continuing on with their

religious mission, they accepted students who could not afford to pay.  A majority of

what the current building looks like today is due to the many renovations and additions

that the college commissioned.

In 1896 a third floor was built over the left side of the façade, along with a bell

tower. Then in the early 1900's they expanded the college and completed the 3$^{rd}$ floor to

cover all sides of the convent.  Figure 11 shows the additions and a very general floor

**Second Floor**

(Early 20$^{th}$ Century):

1. Church

2. Main Cloister

3. Hospital Cloister
or Old Cloister

4. Courtyards

5. Gallery

6. Outdoor Gallery

7. Corridor

8. Dormitories

9. Arch of Belen
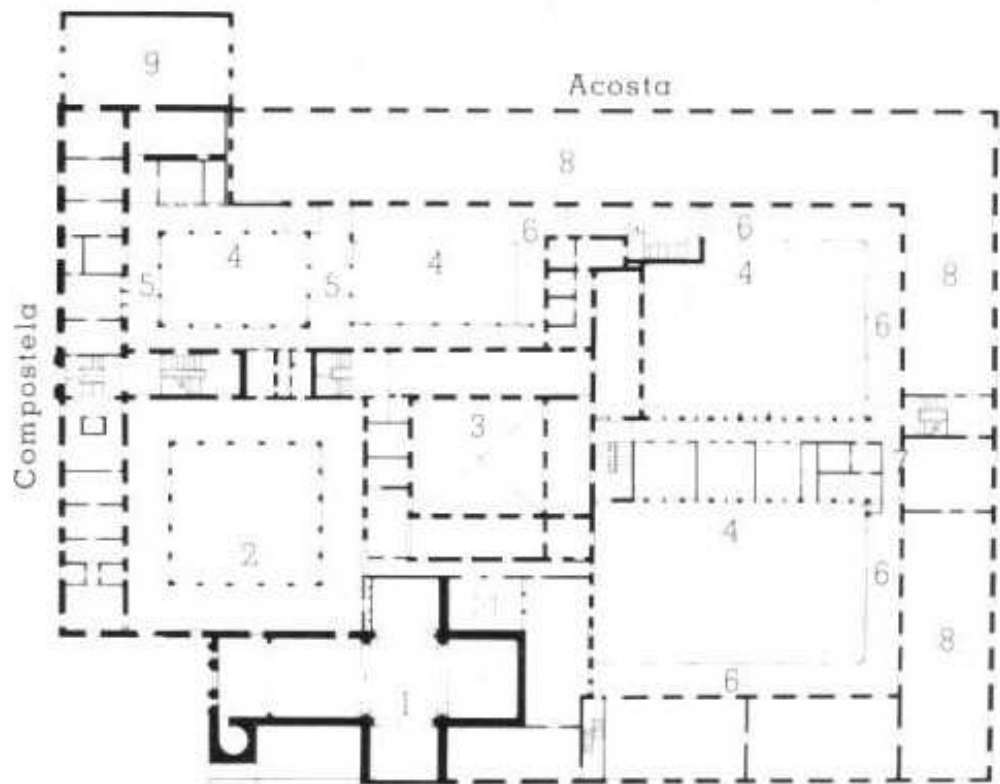


**Figure 11: Convento de Belen floor plan, 1998** (Source: Martin & Rodriguez)

**Figure 12 Convento de Belen additions on Compostela Street, 1896, 1915** (Photo credit: OHC Archives)

plan. While stone was the premier building material of the 18<sup>th</sup> century and was mostly used for the base of the convent, these additions were made from brick which became popular in the 19<sup>th</sup> century. In addition, the facades during this time were covered with sand and lime. Examples of these additions can be seen in Figure 12. Additional 19<sup>th</sup> century characteristics that can be seen in the convent is the use of iron grates on the windows, Italian marble staircases, and windows with operable horizontal slats for ventilation.

Then, in 1925, the Jesuits moved to another building and the Minister of Government was housed inside the convent until the revolution when it was dissolved and the Ministry of Homeland Security was formed. The building was used for government purposes until the Academy of Science occupied the building in the 1960's. During the 1970's and 1980's many of the spaces became dilapidated and the Academy of Science restored some of them for their own uses[37], but then a tragic fire occurred in 1992 which affected most of the church and some of the cloisters. Abandoned and dilapidated, members of the community rallied together to restore this building, and in 1994 the Office of the Historian of the City of Havana took charge of the rehabilitation efforts.

*The Rehabilitation Plan*

The rehabilitation of the convent is a cooperative effort between the Office of the Historian of the City of Havana (OHC), the Office of Humanitarian Affairs (OHA), and the Catholic Order of the Sisters of Charity. It is the first of its kind to create a

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[37] The Academy of Science only occupies the back half of the convent today, which can be seen in Figure 11. The area they take up is around the courtyards listed as #4 on the right hand of the floor plan in the figure.

comprehensive integrated neighborhood project that improves the lives of the local community. The OHA, led by Director Nelson Aguila, was formed under the direction of the OHC and they located their headquarters within the Convento de Belen in 1997. The goal of OHA was developed as a community taskforce to try and solve the different requests made by people from all over the country no matter their race, gender, and social condition. In addition, any sick, elderly, or disabled individuals are assisted by the office and social and cultural activities are developed for the younger segment of the population.

The Office of Humanitarian Affairs is broken into four departments: assistance department, day care center, boarding home, and pharmacy. The assistance department handles the request from the community with priority to the sick, elderly, and disabled. The day care center operates disability treatments, recreation activities, cultural activities, physiotherapy, and holistic medicine all within the convent. There are roughly 500 adults and 60 children who use these services daily (*The Humanitarian Affairs Office*, n.d). The boarding home provides housing for the elderly who were living in poor conditions and the pharmacy distributes necessary medications to the community. Together, the departments provide the following services within the convent (*Convento y Iglesia,* n.d):

- Housing for the elderly
- Health clinic and pharmacy
- Shelter from natural catastrophe
- Mass and religious ceremonies
- Optical services and glasses
- Computer and internet training
- Physical therapy & physiotherapy
- Occupational training
- Cultural activities
- Meals for the needy
- Community outreach
- Cognitive rehabilitation
- Day care facilities
- Single parent support
- Substance abuse counseling

Although the rehabilitation is an ongoing process, future amenities will include an astronomy and meteorology museum and a hostel for senior citizens traveling from the providences for care.

The restoration and rehabilitation of the convent began in the late 1990's and was an enormous task due to the abandonment of the building. According to Anibal del Prado, many of the walls and ceilings were collapsed, plants were growing from the moisture in the walls, the floors needed to be replaced, and almost everything had to be reinforced (personal communication, September 9, 2011). The first step of the process was to do an analysis of the building and neighborhood to understand its historical significance, map its basic floor plan, and create a plan for the buildings use. Like its original use, the convent has been designed to meets the needs of the most vulnerable population. The rehabilitation project first started with the church, the second phase involved rehabilitating the two cloisters[38] next to the church, and the last phase, which is still in process, is to continue to work on the remaining courtyards next to Acosta Street, along with the arch (A. Prado, personal communication, September 9, 2011). Reproductions of the floor plans may be found in Appendix F.

Starting on the ground floor on Compostela Street, individuals using the community center services can enter through the church's atrium entrance where most of the activities take place around the Main Cloister on the ground and first floor[39]. Surrounding the Old Cloister are several elderly boarding rooms. Both the residents and

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[38] The larger cloister of the two is referred to as the Main Cloister (number 2 in Figure 11), and the smaller one behind that is called the Old Cloister (number 3 in Figure 11).
[39] References to floors/levels remain consistent with the plans from OHC. In contrast to how levels are commonly referred to in the United States, the first floor is what Americans would normally call the second floor.

visitors have access to dining and kitchen facilities near the back of the Old Cloister.  Off

the left cross of the church is the Office of Humanitarian Affairs main office. Although

still in process, the plan will be to have a shelter located around the two courtyards with

access from Acosta Street.  Similarly to the ground floor, the first floor houses the

children's nursery which is situated around the Main Cloister and additional elderly

boarding rooms with living quarters for the nuns are around the Old Cloister.  When

completed, the hostel will be above the largest courtyard which will have access from the

main entrance on Compostela Street.  On the second floor, there are additional nun's

rooms and more hostel rooms that will be built.  Lastly, the astronomy and meteorology

museum will occupy the entire bell tower.  The remainder of this chapter illustrates the

techniques the design team of the historic La Iglesis y Convento Nuestra Senora de Belen

incorporated to achieve sustainability, from an interior design perspective, in the

rehabilitation process. The research methodologies used to assess these sustainable

features were conducted through field research which included interviews, site visits,

archival research and reviews of the floor plans.

*Social Sustainability*

        To complement the Office of Humanitarian Affairs, the architects and designers

from the Office of the Historian created spaces that would assist in the social goals that

OHA was trying to achieve. Using the information from Table 3 in the literature review,

the attributes of equity, diversity, and quality of life were used to assess the design

decisions relating to social sustainability.  The first attribute, equity, contributes to the

equal opportunity for all members of a society, especially those most vulnerable like the

disabled, elderly, and children and is achieved through the principles of Universal Design

**Figure 13: Front entrance of the convent, 2011** (Photo Credit: Author)

(UD).  To include UD principles, including barrier-free elements, the design team

implemented many features throughout the building.  Starting at the front entrance of the

design, a non-permanent ramp assists occupants into the building.  Currently the main

entrance has two steps that lead into the building and it is required to step over the

threshold to get inside (see Figure 13).  This ramp's placement is very important because

often times the solution is to provide a secondary exit for the disabled but this eliminated

segregation and allows for full access.  To solve the issue of the threshold, the door can

be fully opened to provide a smooth transition.  Once inside, way finding is addressed by

being simple and easy to read, and adds a modern touch to the space. A combination of

braille, pictures, and words are used to convey the layout of the convent (Figure 14).

**Figure 14: Signage in the convent, 2011** (Photo Credit: Author)

This makes it easy for children, adults, and individuals with disabilities to find where

they need to go. In addition, in the children's daycare center the furniture was selected to

accommodate the size of a child. To retain historic accuracy and provide for accessibility

throughout the space, the original doors (which are mostly double doors) provide more

space for wheelchair/walker access. Additionally, the original lever door handles provide

for ease of use by all types of individuals and the naturally wide hallways that can

accommodate wheelchair users were preserved. These features can be found in Figure

15. When the rehabilitation of the building resulted in unleveled floor heights, the design

team created gradual ramps to make the transition accessible. Similarly, the outdoor

courtyards around the church were recently redesigned to make them more accessible by

**Figure 15: Restored doors, 2011** (Photo Credit: Author)

providing handrails and ramps instead of the variations in grade that were previously

there.  Other accessible features within the convent include larger public and private

residence bathroom stalls and wall mounted sinks to provide wheelchair accessibility.

For individuals who may have dexterity issues, lever faucets were installed on all the

bathroom sinks. The showers in the residence's rooms are large enough to accommodate

a wheelchair and the nun's quarters include accessible showers with bench seats.

Similarly, to make the transition between floors easier to navigate for all types of

abilities, two elevators were installed in the convent. Due to limited funding coming from

the state and through various donations, many UD elements have to be completed in

phases, and although the design team recognizes the importance of being universal, the

building needs to be used.  When funding does become available the important additional

features are installed at that time (N. Varona[40], personal communication, September 9,

2011).  Future UD plans include the addition of handrails around the perimeter of the

elderly day care center above the dado.  This feature will accommodate individuals who

need assistance walking long distances but who are not in a wheelchair or do not use a

walker.  Also, tactile strips will be adhered to the floor at direction changes to assist those

with limited visibility.

Next, diversity is incorporated in the design of a space by including the needs of

both minority and majority groups with attention paid to cultural sensitivity.  In order to

gain this information, members of the Office of the Historian of the City and the Office

of Humanitarian Affairs used participatory design practices while retaining flexibility in

the design.  The needs of the people are consistently changing and if the architecture does

not support the new goals then the building's design is no longer useful.   It became

important to the both the OHC and the OHA to investigate the current needs of the

members of the community who use the center, no matter their background, so staff of

the OHA conduct community surveys several times a year to find out what is needed or

missing in terms of services and then works together with the OHC to continue the

rehabilitation as needed.  If individuals do not want to wait for a survey, OHA has an

"open-door" policy where the people can make suggestions or complaints (N. Aguila,

personal communication September 14, 2011).  In addition, the furnishings and designs

of the living spaces are minimal in order to accommodate a wide variety of people,

cultures, and tastes.  Also, special attention by the interior designers was paid to the

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[40] Niurka Varona was the original lead architect when the project began.

living spaces of the nuns because according to their religious and cultural beliefs the

spaces should be simple.  The design utilizes a minimal amount of space and contains no

mirrors to conform to their convictions.  One of the most significant ways the design

team provides for all diverse groups is through the use of flexible design.  The perimeter

of the Main Cloister on the ground floor is where most of the community center activities

occur and instead of creating sectioned-off rooms for the activities the designer chose to

keep the space open.  This decision allows for the constant changing needs of the

community and allows for a diverse group of people to partake in the activities.  Another

example of flexibility occurred after major hurricanes swept the country.  Many residents

within the local community turned to the convent as a shelter although it was not a

designated location.  Seeing the need to accommodate the diverse population, the design

staff changed their original program of creating a boutique hotel around the courtyards to

creating a designated natural disaster shelter. Similarly, the children's daycare center was

created to meet the needs of the staff who volunteered (A. Prado, personal

communication, September 13, 2011).  Figures 16, 17, and 18 show the flexibility of the

design by creating enough space for a variety of activities around the main cloister.

Lastly, the designers of the Convento de Belen enhanced the quality of life of the

community in many ways.  Incorporating cultural identity was an important aspect in the

design of the building because it gives people a sense of place. Historically the convent

has always served the needs of the community so it appeared logical to the OHC and the

OHA to rehabilitate the building to be used again for community services.  The convent

has a strong sense of history in the community and by reusing the building that tradition

continues.

Before any actual construction began, the architects and designers conducted a

historical analysis of the building and investigated the history of the previous



**Figure 16: Main Cloister- small social gathering, 2010** (Photo Credit: OHC Archives)



**Figure 17: Main Cloister- large formal gathering, 2010** (Photo Credit: OHC Archives)

**Figure 18: Main Cloister -large social gathering, 2010** (Photo Credit: OHC Archives)

occupants. The design team understood that every previous use and every addition has historical value which in turn aids in the creation of cultural identity. To support this idea they restored many of the building's elements regardless of the time period in order to insure the retention of the full cultural identity associated with the building. Niurka Varona explains that the main principle of their design rational was to keep whatever they recovered because each moment in history is important and they did not want to destroy or eliminate what they found if they were trying to achieve a restoration to one particular time (N. Varona, personal communication, September 9, 2011). To illustrate this point, the main entrance stairs were originally wood and were replaced with stone during the occupation of the college, however, the design team kept the current stairs even though they have photos of what the original stairs look like (Figure 20). Additionally, the main entrance doors to the church have evidence of the fire that occurred in 1992, and because that too was an important moment in history, the doors will not be restored but will retain the fire damage as a reminder of that period. Also, to retain historic accuracy, all of the original placement of doors and windows were unchanged. The challenge, as conveyed by a member of the OHA, is making a new design from an old building that meets the needs of a 21$^{st}$ century community (R. Ribalta, September 15, 2011). According to Anibal del Prado, restoration ends when hypothesis begins (personal communication, September 13, 2011). So what the design team set out to accomplish was to create a space that respects the past cultural identity, while creating a new identity of the time. When they were faced with having to create something new, they designed it with respect for the traditional style. Examples of these can be seen in the selection of new light
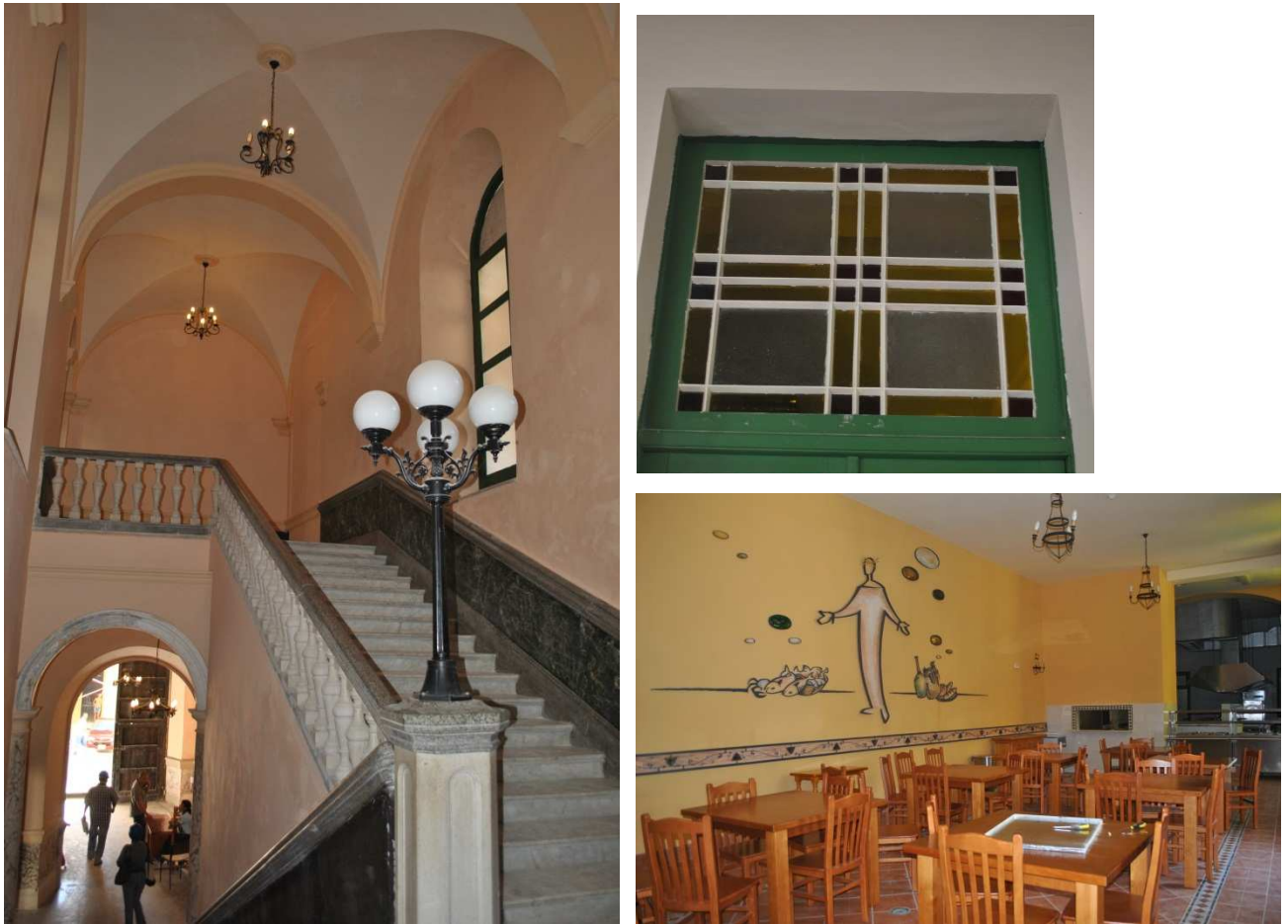
**Figure 19: Redesign of features in the convent, 2011** (Photo Credit: Author)

fixtures, the décor in the dining hall, and in the stained glass (most of the original stained glass did not survive over time) as seen in Figure 19.

Another aspect that relates to the quality of life that the designers incorporated was security.  This was very important to them because of the type of individuals who used and lived in the space. Originally the convent had many exterior doors but the design team created a specific entry point for the shelter, for the hostel, for the elderly homes, community center, church, and museum, and limited access for service personal. A front check-in desk was specified for the main convent entrance on Compostela Street, with another one at the church entrance.  The division of public and private space was

also considered. A majority of the privately used rooms, such as the bedrooms, are placed on the first floor. Although there are living spaces on the ground floor, they were designed in such a way to eliminate disturbances from public traffic. Another feature in the elderly rooms that aids in a sense of security is a call/panic button for when the individual needs assistance. Also, each floor that has elderly bedrooms also has the nun's quarter nearby because the nuns will care for the residents. Retaining the inherent racetrack floor plan allowed the designers to provide a space that limits dead-end hallways and provides easy way finding. Since the designers retained the original window placement, ample light enters the space making visibility easy to achieve.

Since the purpose of the building's use leads to increased vitality in its users, the designers wanted to assist that notion throughout the design of the building by providing plenty of access to nature. As stated previously, they retained all the windows in the space, as well as the courtyards which provide abundant daylight. Although most rooms are situated around either a cloister or a courtyard, those that are not typically have windows placed slightly higher from the ground (to provide privacy from the hallway) and still benefit from the natural light from the courtyard. In addition, fountains and benches were placed in the courtyards and cloister to allows users of the space to enjoy the outdoors and to reflect. Examples of the ample daylight and natural views can be seen in Figure 20.

The last aspect of design that incorporates quality of life is aesthetic beauty and is illustrated through the use of the principles and elements of design. Throughout the space the color scheme of green, yellow, and red is repeated in the paint, the stained glass, and even the signage. Rectilinear lines, shapes, and forms of the windows, doors,

**Figure 20: Main Cloister and Old Cloister, 2011** (Photo Credit: Author)

slats, and overall layout create a rhythmic flow around the space. The floor tile was laid

on a diagonal to help divide the space but to also create visual interest.  The smooth

stained glass along with the ventilation slats also adds to the texture of the design, which

again creates visual interest.  Natural light that pours in through the courtyards and

cloisters create emphasis on the outdoor spaces. Also this type of layout creates balance

in the space plan by revolving around a central object like the courtyard.  In addition, the

extreme scale of each space's ceiling height adds to the splendor and grandeur of the

convent which makes it an iconic structure in the colonial city.

*Environmental Sustainability*

Due to the difficulty of acquiring materials because of the embargo, the economic

state of the country, as well as the country being an island which requires most things to

be imported, the designers at OHC tried to incorporate sustainable principles wherever

possible.  Using the information from Table 5 in the literature review, materials, energy,

and recycling were used to assess the design decisions relating to environmental

sustainability.  The first characteristic relating to the environmentally sustainable

principle of materials is the way that material reduction was incorporated.  The materials

specified in the rehabilitation may either include flexibility, minimalism, durability,

reusability, recycled content or have the potential to be recycled.   In order to minimize

the need for excessive material usage the design team decided to retain the open spaces

for multipurpose spaces so it was not only a socially sustainable choice but

environmental as well (as seen previously in Figures 16, 17, and 18).  Although minimal

treatments are applied to the walls and the beams are exposed in the ceilings (Figure 17)

requiring very little additional material, due to the nature of rehabilitation project the

construction crews often needs to put up drywall to seal off sections that are under

construction.  As seen in Figure 19, the top of the stairs actually continues to the second

floor but is sealed off.  This material is later removed once that section of work is

completed so it does create an adverse effect by increasing material usage.  In terms of

durability, although ceramic tile has a greater environmental impact it can last a long

time, reducing the need for replacement making it a more sustainable choice (Childs, Argeles, Henderson, Horst, Malin, 2006). All throughout the convent tile is used on the floors and for wall protection, placed usually about four feet above the finished floor (Figure 16). Similarly, since many of the furnishings were chosen because of their durability, they have the potential to be reused later. Lacking the ability to fund, as well as obtain various materials, prevented the design team from being able to specify products that have a high recycled content but they did use several products that have the potential to be recycled. Often times the construction workers would grind down the brick and stone debris and turn it into plaster that they would then use for the walls (A. Prado, personal communication, September 12, 2011). Also, the tile and metal (used for wall support) can eventually be recycled when the time comes. In terms of furnishings, many of the chairs and tables are made from solid wood which also can be recycled later (Ballast, 2010).

The next characteristic relating to materials is to specify products and finishes that reduce the use of natural resources. This can be accomplished through the selection of local materials, renewable sources, and water and energy conservation methods However, this category is where the rehabilitation performed the weakest. Being an island, Cuba does not provide for a lot of opportunity to use local materials. Additionally, funding comes from a historic preservation fund and donations so the design team was less discerning when it came to selecting materials from a renewable source. This was also another factor in the lack of specification of low-flow toilets and high efficiency faucets and fixtures. However, since the Energy Revolution initiative in 2006, compact

florescent light fixtures and energy efficient appliances were used throughout the

building.

The last characteristic that relates to material selection is the concept of reducing

pollutants.  Pollutants can come from VOC's, toxic substances, biological contaminants,

and chemicals used in maintaining certain finishes.  Very few products, such as

wallpaper, carpet, and fabrics, produce VOC's or release toxic substances are used in the

spaces.  When they are, the open-air nature of the space allows for quicker dissipation.

According to Anibal del Prado (2011), very little paint is used on the walls because more

natural products like limestone based plaster absorb the humidity in the air, cooling the



**Figure 21: Communal space in living quarters, 2011** (Photo Credit: Author)

space and preventing moisture accumulation.  Moisture can create mold growth and it is a

huge concern in the extremely humid climate, so reducing biological contaminates was

very important to the design team.  A layer of concrete blocks is used as the base of the

wall which absorb much of the moisture as well.  All the furnishings are solid wood, or

are covered with either leather or vinyl and all the flooring is ceramic tile (Figure 21).

Additionally the ceramic tile on the floors and walls can easily be cleaned with soap and

water, which reduces the need for toxic chemicals in the cleaning process.

The next principle of environmental sustainability involves the energy efficiency

of the building systems. Since the Convent de Belen is still under renovation and very

few mechanical and electrical systems are used, conducting a building commission is not

necessary at this point. Due to the nature of the climate, no heating elements are used

and individual electric air conditioning units are only used in specific rooms. Adhering

with the historic nature of the building, daylighting was maximized to reduce the need for

electricity to light spaces and the historical cooling techniques, like high ceilings and

louvered shutters, were retained to cool the spaces. When daylight could not be utilized,

as stated previously, fluorescent bulbs were used in light fixtures and soft, light colored

finishes were used throughout the spaces to maximize the reflectance of daylight when it

was being used. Lacking in the design is the use of daylight and occupancy sensor

switches and solar panels (although solar panels are used throughout the countryside).

The last characteristic of the principle of energy efficiency is the way plumbing is

specified. Again, the aspect of water efficiency was not heavily considered so neither

efficient fixtures or rainwater collection were designed.

The area where the rehabilitation performed the strongest is through the

environmental principle of recycling. Although no large scale recycling bins can be seen

inside the convent compared to many "green" buildings in the United States, recycling of

everyday objects does occur. Also, because materials are so hard to come by, what

construction debris that could be recycled is recycled or donated. The most significant

impact from this category is the idea of adaptive-reuse.  Because this is a rehabilitation

project, so much of the building shell, interior, and components were salvaged and

reused, reducing large amounts of embodied energy usage.

*Economic Sustainability*

Economics plays an important role in the rehabilitation of the Convento de Belen.

The three main factors that were used to assess the economic sustainability of this project

were Interior Branding, Job Creation, and Environmentally Efficient Materials and

Processes.  Interior branding takes place in the form of heritage tourism and

revitalization.  Before any preservation began on the Convento de Belen, the design team

painstakingly went through old records to research the historic properties of the building.

This thorough analysis allowed them to proceed with an accurate rehabilitation that adds

to the tourism market that Havana's economy relies on.  Although the function of the

building serves a more humanitarian need, investors and designers agreed to also make it

a tourist destination.  The building is an excellent example of $18^{th}$ and $19^{th}$ century

Spanish architecture and attracts visitors from all over the world to see the beautifully

rehabilitated spaces.  No statistical numbers are recorded regarding how many foreign

visitors the convent receives per year, but according to Nelson Aguila (personal

communication, September 14, 2011) the visitors rank in the thousands and include

groups from architecture, health, and social services tours.  Also, the historic observatory

is now in the process of becoming a museum to celebrate the scientific research that was

conducted during the college years which will add another feature to this tourist

destination.  With any rehabilitation, surprises and unforeseen things often cannot be

predicted. In the case of the convent, during an excavation to repair the floors in the

church, workers uncovered the burial grounds of old church benefactors. Designers

changed course mid-construction and are now planning to finish the floor with a see-

through material so that visitors can see the archaeological artifacts (Figure 22).



**Figure 22: Church excavation, 2011** (Photo Credit: Author)



**Figure 23: Buildings on Compostela Street, 2011** (Photo Credit: Author)

As mentioned previously, a small plaza, or square, is on Compostela Street. In the early 18<sup>th</sup> century the city planning was dictated by placing most buildings around a central square. The more famous ones, like Plaza Vieja, draw large crowds of tourists every year. To attract more visitors to the Belen neighborhood the OHC decided to rehabilitate more buildings around the square to create a total neighborhood revitalization (Figure 23). Once this starting occurring, more members of the community began to take pride in the area and actively participate in the revitalization process.

No statistics could be given to estimate the number of jobs this rehabilitation has provided. When asked, Anibal del Prado (personal communication September 14, 2011) stated that the rehabilitation work has been going on for roughly 15 years and will probably continue another 15 years. During that time countless construction workers, architects, designers, and engineers have contributed to this rehabilitation. Additionally, to provide an accurate rehabilitation, many of the construction workers are highly trained at a school called the *Gaspar Melchor de Jovellanos*. It is at this school where students are taught traditional restoration techniques involving wall paints, archeology, carpentry, glasswork, iron work and stone, plaster, and masonry work. The school graduates 70-100 per year and about 70% of the total number of graduates still work with OHC. Figure 24 shows one of the window restorations in progress.

When it comes to environmentally efficient materials and processes, the information is similar to the environmental sustainability principles. Using as many original materials as possible made this an economically sustainable project because the cost of shipping new materials to Cuba can be very costly. Similarly, the price of oil is quite expensive and using fluorescent light fixtures reduces the electricity bill and helps

reduce the need for foreign oil.  The same can be said for utilizing the natural light

inherent in the building.  It is not only a socially sustainable design feature, but reduces

the need for electricity and saves in energy cost. Since many historic architectural

features did not rely on fossil fuels, the designers retained those features (like the high

ceilings and louvered shutters) not only for aesthetics but for the energy savings they

provided.   Efficiency in the long run comes from the idea of using the building although

the rehabilitation is not complete. It will take years to finish and is such a large space that

a majority of the finished spaces would go to waste if they were sitting around waiting for

completion.  As the building is being used and the needs of the center changes (like

needing a shelter instead of a hotel) the design team does not have to waste time and

money on something that will not work down the road.  They are able to make revisions

and keep up with the occupants needs throughout the process.

*Conclusion*

Built in the early 1700's, the Convento de Belen is an excellent example of

religious baroque, neoclassical, and eclecticism.  Throughout time the building served as

a convent and hospital, a college, and government offices only to be abandoned and

dilapidated by the late 1980's.  Taken over by OHC in 1994 after a tragic fire, the design

team has slowly been rehabilitating this building section by section. In cooperation with

OHA, the building is now a cultural icon in a UNESCO World Heritage site and serves as

community center.

The design team of the Convento de Belen incorporated many features of the

principles of social, environmental, and economic sustainability while adhering to the

guidelines of historic preservation. Due to the overlapping nature of the principles often times one design solution worked for two or more principles. For this reason, all forms of sustainability were assessed to illustrate how the design team incorporated them into the project. The strengths of the design came in the way of creating solutions that provided socially sustainable benefits. The community center serves a very diverse group of individuals that range from children to the elderly and includes all types of cultures and abilities which required the design team to thoroughly consider the needs of the occupants in order to provide equity, diversity, and a good quality of life. Additionally, the design solutions provided many benefits in terms of environmental sustainability. The rehabilitation inherently supports the environment because reusing much of the existing structure created the need for less embodied energy to be consumed. However, due to the current situation that Cuba faces, the design performed the weakest with the ability to specify materials with recycled content and providing products that reduces the impact on natural resources. Possibly in the future when the economy strengthens in Cuba and the design team is not so reliant on donations, this situation can improve.

By incorporating environmental factors, such as reusing as much as possible and reducing the amount of energy consumed, ultimately provides economic benefits to the investors by providing low cost operations. Since the city of Havana relies on tourism, the designers carefully restored and repaired features that retained the historical accuracy of the building. Additionally, the rehabilitation has been an ongoing operation and will continue to do so for several more years. As the design team continues to specify the need for skilled workers, the projects has and will continue to employ many individuals for years to come.

**Conclusion**

Social responsibility is comprised of three main tenets; social, environmental, and economic responsibility.  It is these three tenets that create the three pillars of sustainability.  As a professional standard, interior designers must take into consideration the quality of life of the occupant and the environmental and economic impact of their design solutions.  Simply put, their design solutions must be sustainable. In our global economy, the expansion of consumerism with consideration of the three pillars can be considered sustainable development.

In terms of the built environment, architecture is a form of development and is called sustainable architecture.  However, the term "sustainability" in the design field is often associated with only environmental issues and new construction is assumed to be the best way to achieve it.  This is not always the case.  Many historic preservationists advocate the use of an existing building in order to be sustainable because it can provide a multitude of benefits associated with social, environmental, and economic issues.  The argument against preservation is the thought that it hinders progress by limiting what can be changed.  Nationally and internationally there are standards for the treatment of historic buildings and the theory of rehabilitation/adaptive reuse allows for the most intervention by retaining the historic character while creating a new use. Although there might be some limitations, they are in place to protect the historic and cultural significance of the building and should not be viewed at as a hindrance.  Since it is the interiors that continue to change over time, meeting the most current needs of the community, rehabilitation and sustainability, from an interior design perspective, is examined in this paper.

Although there are several assessment tools to determine the environmental impact of architecture (new or existing), there is no assessment tool created for interior designers that discusses all forms of sustainability within a rehabilitation project. From the review of literature, this study provides a framework which interior designers can work from. Starting with social sustainability, equity, diversity and quality of life all need to be incorporated into the overall design plan. By doing so, the space becomes accessible for all types of abilities and cultures, while aiding in the overall well-being of the occupants.

When planning for environmental sustainability, a designer must create a solution that considers the materials, the energy efficiency, and the recycling aspect of the design. It is also important to note that there are many ways to create a space that is environmentally friendly that does not require expensive products. Simply reducing the amount of materials in a space can achieve this. Additionally, with the considerable amount of waste the construction industry creates, reusing as much of the building as possible lessens our environmental impact.

Economic sustainability from an interior design perspective is quite limited but does have a significant impact. The decisions that designers make affect the success of the interior branding, the extent of job creation, and operating costs associated with the selection of environmentally efficient materials and processes. A historic building is a representation of a certain time period and an accurate restoration plan draws in more tourists wanting a historic experience. At the same time, this increase of business revitalizes the area in which this building resides. Both the building's investor and community benefit economically. Similarly, an accurate rehabilitation requires skilled

workers, thus creating more local jobs.  Economic sustainability is also closely tied with

environmentally sustainability because as choices are made to reduce energy and water

consumption, and high efficiency building systems are incorporated, overall operational

costs are lowered.

As the world becomes more globalized, it is important for interior designers to

examine how other countries are achieving a balance between historic preservation and

sustainability.  Havana, Cuba is an ideal location to study this balance because of their

extensive historic building stock and their dedication to all forms of sustainability.  The

case study of La Iglesia y Convento Nuestra Senora de Belen effectively illustrates that

all forms of sustainability can be incorporated into a historic rehabilitation.  Although the

design team of the Convento de Belen was not able to incorporate every aspect of every

principle of sustainability, their design included a significant amount.

The limitations of this study mostly come from the international component.  The

relationship between Cuba and the United States makes travel to the island difficult and

each site visit was conducted within a two week period.  Additionally, many of the

interviews and interactions required a translator and information could have been

misinterpreted in translation. Also, the embargo makes this project very unique, and had a

direct effect on the designer's decisions by limiting access to various products and

materials.  Another limitation is that the rehabilitation process is not complete, and the

analysis covered only the finished sections of the convent and the future intentions.

To strengthen the idea that historic preservation and sustainability can be

achieved, interest in historic preservation needs to expand past history buffs and

preservationists.  Anyone involved in a community's development should be exposed to this issue, including city and community leaders, urban planners, architects, interior designers, and business owners. As the concept of sustainability continues to grow to mean more than just environmental considerations, more assessment of how historic preservation and sustainability are combined can occur.

Future studies could include the creation of either a national or international assessment tool of all forms of sustainability in existing buildings specifying interior solutions.  Since nothing like this has been studied before, assessing buildings in other countries, as well as in economically struggling small towns across America, could help make the case that historic preservation and sustainability can be achieved and ultimately provide numerous benefits for the users of the space, as well as the community.

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**Appendix A**

**The Nara Document of Authenticity**

**Preamble**

1. We, the experts assembled in Nara (Japan), wish to acknowledge the generous spirit And intellectual courage of the Japanese authorities in providing a timely forum in which we could challenge conventional thinking in the conservation field, and debate ways and means of broadening our horizons to bring greater respect for cultural and heritage diversity to conservation practice.

2. We also wish to acknowledge the value of the framework for discussion provided by the World Heritage Committee's desire to apply the test of authenticity in ways which accord full respect to the social and cultural values of all societies, in examining the outstanding universal value of cultural properties proposed for the World Heritage List.

3. The Nara Document on Authenticity is conceived in the spirit of the Charter of Venice, 1963, and builds on it and extends it in response to the expanding scope of cultural heritage concerns and interests in our contemporary world.

4. In a world that is increasingly subject to the forces of globalization and homogenization, and in a world in which the search for cultural identity is sometimes pursued through aggressive nationalism and the suppression of the cultures of minorities, the essential contribution made by the consideration of authenticity in conservation practice is to clarify and illuminate the collective memory of humanity.

**Cultural Diversity and Heritage Diversity**

5. The diversity of cultures and heritage in our world is an irreplaceable source of spiritual and intellectual richness for all humankind. The protection and enhancement of

cultural and heritage diversity in our world should be actively promoted as an essential aspect of human development.

6. Cultural heritage diversity exists in time and space, and demands respect for other cultures and all aspects of their belief systems. In cases where cultural values appear to be in conflict, respect for cultural diversity demands acknowledgment of the legitimacy of the cultural values of all parties.

7. All cultures and societies are rooted in the particular forms and means of tangible and intangible expression which constitute their heritage, and these should be respected.

8. It is important to underline a fundamental principle of UNESCO, to the effect that the cultural heritage of each is the cultural heritage of all. Responsibility for cultural heritage and the management of it belongs, in the first place, to the cultural community that has generated it, and subsequently to that which cares for it. However, in addition to these responsibilities, adherence to the international charters and conventions developed for conservation of cultural heritage also obliges consideration of the principles and responsibilities flowing from them. Balancing their own requirements with those of other cultural communities is, for each community, highly desirable, provided achieving this balance does not undermine their fundamental cultural values.

**Values and authenticity**

9. Conservation of cultural heritage in all its forms and historical periods is rooted in the values attributed to the heritage. Our ability to understand these values depends, in part, on the degree to which information sources about these values may be understood as credible or truthful. Knowledge and understanding of these sources of information, in relation to original and subsequent characteristics of the cultural heritage, and their meaning, is a requisite basis for assessing all aspects of authenticity.

10. Authenticity, considered in this way and affirmed in the Charter of Venice, appears as the essential qualifying factor concerning values. The understanding of authenticity plays

a fundamental role in all scientific studies of the cultural heritage, in conservation and restoration planning, as well as within the inscription procedures used for the World Heritage Convention and other cultural heritage inventories.

11. All judgements about values attributed to cultural properties as well as the credibility of related information sources may differ from culture to culture, and even within the same culture. It is thus not possible to base judgements of values and authenticity within fixed criteria. On the contrary, the respect due to all cultures requires that heritage properties must considered and judged within the cultural contexts to which they belong.

12. Therefore, it is of the highest importance and urgency that, within each culture, recognition be accorded to the specific nature of its heritage values and the credibility and truthfulness of related information sources.

13. Depending on the nature of the cultural heritage, its cultural context, and its evolution through time, authenticity judgements may be linked to the worth of a great variety of sources of information. Aspects of the sources may include form and design, materials and substance, use and function, traditions and techniques, location and setting, and spirit and feeling, and other internal and external factors. The use of these sources permits elaboration of the specific artistic, historic, social, and scientific dimensions of the cultural heritage being examined.

**Definitions**

CONSERVATION: all operations designed to understand a property, know its history and meaning, ensure its material safeguard, and, if required, its restoration and enhancement.

INFORMATION SOURCES: all physical, written, oral, and figurative sources which make it possible to know the nature, specificities, meaning, and history of the cultural heritage. The Nara Document on Authenticity was drafted by the 35 participants at the Nara Conference on Authenticity in Relation to the World Heritage Convention, held at Nara, Japan, from 1-6 November 1993, at the invitation of the Agency for Cultural

Affairs (Government of Japan) and the Nara Prefecture. The Agency organized the Nara Conference in cooperation with UNESCO, ICCROM and ICOMOS.

This final version of the Nara Document has been edited by the general rapporteurs of the Nara Conference, Mr. Raymond Lemaire and Mr. Herb Stovel.

**Appendix B**

The Venice Charter 1964

The International Charter for the Conservation and Restoration of Monuments and Sites

2nd International Congress of Architects and Technicians of Historic Monuments, Venice 1964

Imbued with a message from the past, the historic monuments of generations of people remain to the present day as living witnesses of their age-old traditions. People are becoming more and more conscious of the unity of human values and regard ancient monuments as a common heritage. The common responsibility to safeguard them for future generations is recognized. It is our duty to hand them on in the full richness of their authenticity.

It is essential that the principles guiding the preservation and restoration of ancient buildings should be agreed and be laid down on an international basis, with each country being responsible for applying the plan within the framework of its own culture and traditions.

By defining these basic principles for the first time, the Athens Charter of 1931 contributed towards the development of an extensive international movement which has assumed concrete form in national documents, in the work of ICOM and UNESCO and in the establishment by the latter of the International Centre for the Study of the Preservation and the Restoration of Cultural Property. Increasing awareness and critical study have been brought to bear on problems which have continually become more complex and varied; now the time has come to examine the Charter afresh in order to make a thorough study of the principles involved and to enlarge its scope in a new document.

Accordingly, the 2nd International Congress of Architects and Technicians of Historic Monuments, which met in Venice from May 25th to 31st 1964, approved the following text:

Definitions

Article 1. The concept of an historic monument embraces not only the single architectural work but also the urban or rural setting in which is found the evidence of a particular civilization, a significant development or an historic event. This applies not only to great works of art but also to more modest works of the past which have acquired cultural significance with the passing of time.

Article 2. The conservation and restoration of monuments must have recourse to all the sciences and techniques which can contribute to the study and safeguarding of the architectural heritage.

Aim

ARTICLE 3. The intention in conserving and restoring monuments is to safeguard them no less as works of art than as historical evidence.

Conservation

Article 4. It is essential to the conservation of monuments that they be maintained on a permanent basis.

Article 5. The conservation of monuments is always facilitated by making use of them for some socially useful purpose. Such use is therefore desirable but it must not change the lay-out or decoration of the building. It is within these limits only that modifications demanded by a change of function should be envisaged and may be permitted.

Article 6. The conservation of a monument implies preserving a setting which is not out of scale. Wherever the traditional setting exists, it must be kept. No new construction,

demolition or modification which would alter the relations of mass and color must be allowed.

Article 7. A monument is inseparable from the history to which it bears witness and from the setting in which it occurs. The moving of all or part of a monument cannot be allowed except where the safeguarding of that monument demands it or where it is justified by national or international interest of paramount importance.

Article 8. Items of sculpture, painting or decoration which form an integral part of a monument may only be removed from it if this is the sole means of ensuring their preservation.

Restoration

Article 9. The process of restoration is a highly specialized operation. Its aim is to preserve and reveal the aesthetic and historic value of the monument and is based on respect for original material and authentic documents. It must stop at the point where conjecture begins, and in this case moreover any extra work which is indispensable must be distinct from the architectural composition and must bear a contemporary stamp. The restoration in any case must be preceded and followed by an archaeological and historical study of the monument.

Article 10. Where traditional techniques prove inadequate, the consolidation of a monument can be achieved by the use of any modem technique for conservation and construction, the efficacy of which has been shown by scientific data and proved by experience.

Article 11. The valid contributions of all periods to the building of a monument must be respected, since unity of style is not the aim of a restoration. When a building includes the superimposed work of different periods, the revealing of the underlying state can only be justified in exceptional circumstances and when what is removed is of little interest and the material which is brought to light is of great historical, archaeological or aesthetic value, and its state of preservation good enough to justify the action. Evaluation of the

importance of the elements involved and the decision as to what may be destroyed cannot rest solely on the individual in charge of the work.

Article 12. Replacements of missing parts must integrate harmoniously with the whole, but at the same time must be distinguishable from the original so that restoration does not falsify the artistic or historic evidence.

Article 13.  Additions cannot be allowed except in so far as they do not detract from the interesting parts of the building, its traditional setting, the balance of its composition and its relation with its surroundings.

Article 14. The sites of monuments must be the object of special care in order to safeguard their integrity and ensure that they are cleared and presented in a seemly manner. The work of conservation and restoration carried out in such places should be inspired by the principles set forth in the foregoing articles.

Excavations

Article 15. Excavations should be carried out in accordance with scientific standards and the recommendation defining international principles to be applied in the case of archaeological excavation adopted by UNESCO in 1956.

Ruins must be maintained and measures necessary for the permanent conservation and protection of architectural features and of objects discovered must be taken. Furthermore, every means must be taken to facilitate the understanding of the monument and to reveal it without ever distorting its meaning.

All reconstruction work should however be ruled out "a priori".   Only anastylosis, that is to say, the reassembling of existing but dismembered parts can be permitted. The material used for integration should always be recognizable and its use should be the least that will ensure the conservation of a monument and the reinstatement of its form.

Publication

Article 16. In all works of preservation, restoration or excavation, there should always be precise documentation in the form of analytical and critical reports, illustrated with drawings and photographs. Every stage of the work of clearing, consolidation, rearrangement and integration, as well as technical and formal features identified during the course of the work, should be included. This record should be placed in the archives of a public institution and made available to research workers. It is recommended that the report should be published.

**Appendix C**

The Secretary of the Interior's Standards for Rehabilitation (36 CFR Part 67)

1. A property shall be used for its historic purpose or be placed in a new use that requires minimal change to the defining characteristics of the building and its site and environment.

2. The historic character of a property shall be retained and preserved. The removal of historic materials or alteration of features and spaces that characterize a property shall be avoided.

3. Each property shall be recognized as a physical record of its time, place, and use. Changes that create a false sense of historical development, such as adding conjectural features or architectural elements from other buildings, shall not be undertaken.

4. Most properties change over time; those changes that have acquired historic significance in their own right shall be retained and preserved.

5. Distinctive features, finishes, and construction techniques or examples of craftsmanship that characterize a historic property shall be preserved.

6. Deteriorated historic features shall be repaired rather than replaced. Where the severity of deterioration requires replacement of a distinctive feature, the new feature shall match the old in design, color, texture, and other visual qualities and, where possible, materials. Replacement of missing features shall be substantiated by documentary, physical, or pictorial evidence.

7. Chemical or physical treatments, such as sandblasting, that cause damage to historic materials shall not be used. The surface cleaning of structures, if appropriate, shall be undertaken using the gentlest means possible.

8. Significant archeological resources affected by a project shall be protected and preserved. If such resources must be disturbed, mitigation measures shall be undertaken.

9. New additions, exterior alterations, or related new construction shall not destroy historic materials that characterize the property. The new work shall be differentiated from the old and shall be compatible with the massing, size, scale, and architectural features to protect the historic integrity of the property and its environment.

10. New additions and adjacent or related new construction shall be undertaken in such a manner that if removed in the future, the essential form and integrity of the historic property and its environment would be unimpaired.

**Appendix D**

**THE PRINCIPLES OF UNIVERSAL DESIGN**

*Version 2.0 - 4/1/97*

Compiled by advocates of universal design, listed in alphabetical order:

Bettye Rose Connell, Mike Jones, Ron Mace, Jim Mueller, Abir Mullick, Elaine Ostroff, Jon Sanford, Ed Steinfeld, Molly Story, and Gregg Vanderheiden

Major funding provided by: The National Institute on Disability and Rehabilitation Research, U.S. Department of Education

**UNIVERSAL DESIGN:**

**The design of products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design.**

The authors, a working group of architects, product designers, engineers and environmental design researchers, collaborated to establish the following Principles of Universal Design to guide a wide range of design disciplines including environments, products, and communications. These seven principles may be applied to evaluate existing designs, guide the design process and educate both designers and consumers about the characteristics of more usable products and environments.

The Principles of Universal Design are presented here, in the following format: name of the principle, intended to be a concise and easily remembered statement of the key concept embodied in the principle; definition of the principle, a brief description of the principle's primary directive for design; and guidelines, a list of the key elements that should be present in a design which adheres to the principle. (Note: all guidelines may not be relevant to all designs.)

**PRINCIPLE ONE: Equitable Use**

The design is useful and marketable to people with diverse abilities.

**Guidelines:**

**1a.** Provide the same means of use for all users: identical whenever possible; equivalent when not.

**1b.** Avoid segregating or stigmatizing any users.

**1c.** Provisions for privacy, security, and safety should be equally available to all users.

**1d.** Make the design appealing to all users.

**PRINCIPLE TWO: Flexibility in Use**

The design accommodates a wide range of individual preferences and abilities.

**Guidelines:**

**2a.** Provide choice in methods of use.

**2b.** Accommodate right- or left-handed access and use.

**2c.** Facilitate the user's accuracy and precision.

**2d.** Provide adaptability to the user's pace.

**PRINCIPLE THREE: Simple and Intuitive Use**

Use of the design is easy to understand, regardless of the user's experience, knowledge, language skills, or current concentration level.

**Guidelines:**

**3a.** Eliminate unnecessary complexity.

**3b.** Be consistent with user expectations and intuition.

**3c.** Accommodate a wide range of literacy and language skills.

**3d.** Arrange information consistent with its importance.

**3e.** Provide effective prompting and feedback during and after task completion.

**PRINCIPLE FOUR: Perceptible Information**

The design communicates necessary information effectively to the user, regardless of

ambient conditions or the user's sensory abilities.

**Guidelines:**

> **4a.** Use different modes (pictorial, verbal, tactile) for redundant presentation of essential information.
>
> **4b.** Provide adequate contrast between essential information and its surroundings.
>
> **4c.** Maximize "legibility" of essential information.
>
> **4d.** Differentiate elements in ways that can be described (i.e., make it easy to give instructions or directions).
>
> **4e.** Provide compatibility with a variety of techniques or devices used by people with sensory limitations.

**PRINCIPLE FIVE: Tolerance for Error**

The design minimizes hazards and the adverse consequences of accidental or unintended actions.

**Guidelines:**

> **5a.** Arrange elements to minimize hazards and errors: most used elements, most accessible; hazardous elements eliminated, isolated, or shielded.
>
> **5b.** Provide warnings of hazards and errors.
>
> **5c.** Provide fail safe features.
>
> **5d.** Discourage unconscious action in tasks that require vigilance.

**PRINCIPLE SIX: Low Physical Effort**

The design can be used efficiently and comfortably and with a minimum of fatigue.

**Guidelines:**

> **6a.** Allow user to maintain a neutral body position.
>
> **6b.** Use reasonable operating forces.
>
> **6c.** Minimize repetitive actions.
>
> **6d.** Minimize sustained physical effort.

**PRINCIPLE SEVEN: Size and Space for Approach and Use**

Appropriate size and space is provided for approach, reach, manipulation, and use

regardless of user's body size, posture, or mobility.

**Guidelines:**

> **7a.** Provide a clear line of sight to important elements for any seated or standing user.
>
> **7b.** Make reach to all components comfortable for any seated or standing user.
>
> **7c.** Accommodate variations in hand and grip size.
>
> **7d.** Provide adequate space for the use of assistive devices or personal assistance.

Please note that the Principles of Universal Design address only universally usable design, while the practice of design involves more than consideration for usability. Designers must also incorporate other considerations such as economic, engineering, cultural, gender, and environmental concerns in their design processes. These Principles offer designers guidance to better integrate features that meet the needs of as many users as possible.

**Appendix E**

LEED for Existing Buildings

# LEED 2009 for Existing Buildings: Operations & Maintenance
## Project Checklist

Project Name

Date

### Sustainable Sites — Possible Points: 26

Y ? N

| | | | | | |
|---|---|---|---|---|---|
| | | | Credit 1 | LEED Certified Design and Construction | 4 |
| | | | Credit 2 | Building Exterior and Hardscape Management Plan | 1 |
| | | | Credit 3 | Integrated Pest Mgmt, Erosion Control, and Landscape Mgmt Plan | 1 |
| | | | Credit 4 | Alternative Commuting Transportation | 3 to 15 |
| | | | Credit 5 | Site Development—Protect or Restore Open Habitat | 1 |
| | | | Credit 6 | Stormwater Quantity Control | 1 |
| | | | Credit 7.1 | Heat Island Reduction—Non-Roof | 1 |
| | | | Credit 7.2 | Heat Island Reduction—Roof | 1 |
| | | | Credit 8 | Light Pollution Reduction | 1 |

### Water Efficiency — Possible Points: 14

| | | | | | |
|---|---|---|---|---|---|
| Y | | | Prereq 1 | Minimum Indoor Plumbing Fixture and Fitting Efficiency | |
| | | | Credit 1 | Water Performance Measurement | 1 to 2 |
| | | | Credit 2 | Additional Indoor Plumbing Fixture and Fitting Efficiency | 1 to 5 |
| | | | Credit 3 | Water Efficient Landscaping | 1 to 5 |
| | | | Credit 4 | Cooling Tower Water Management | 1 to 2 |

### Energy and Atmosphere — Possible Points: 35

| | | | | | |
|---|---|---|---|---|---|
| Y | | | Prereq 1 | Energy Efficiency Best Management Practices | |
| Y | | | Prereq 2 | Minimum Energy Efficiency Performance | |
| Y | | | Prereq 3 | Fundamental Refrigerant Management | |
| | | | Credit 1 | Optimize Energy Efficiency Performance | 1 to 18 |
| | | | Credit 2.1 | Existing Building Commissioning—Investigation and Analysis | 2 |
| | | | Credit 2.2 | Existing Building Commissioning—Implementation | 2 |
| | | | Credit 2.3 | Existing Building Commissioning—Ongoing Commissioning | 2 |
| | | | Credit 3.1 | Performance Measurement—Building Automation System | 1 |
| | | | Credit 3.2 | Performance Measurement—System-Level Metering | 1 to 2 |
| | | | Credit 4 | On-site and Off-site Renewable Energy | 1 to 6 |
| | | | Credit 5 | Enhanced Refrigerant Management | 1 |
| | | | Credit 6 | Emissions Reduction Reporting | 1 |

### Materials and Resources — Possible Points: 10

| | | | | | |
|---|---|---|---|---|---|
| Y | | | Prereq 1 | Sustainable Purchasing Policy | |
| Y | | | Prereq 2 | Solid Waste Management Policy | |
| | | | Credit 1 | Sustainable Purchasing—Ongoing Consumables | 1 |
| | | | Credit 2.1 | Sustainable Purchasing—Electric-Powered Equipment | 1 |
| | | | Credit 2.2 | Sustainable Purchasing—Furniture | 1 |
| | | | Credit 3 | Sustainable Purchasing—Facility Alterations and Additions | 1 |
| | | | Credit 4 | Sustainable Purchasing—Reduced Mercury in Lamps | 1 |
| | | | Credit 5 | Sustainable Purchasing—Food | 1 |

### Materials and Resources, Continued

Y ? N

| | | | | | |
|---|---|---|---|---|---|
| | | | Credit 6 | Solid Waste Management—Waste Stream Audit | 1 |
| | | | Credit 7 | Solid Waste Management—Ongoing Consumables | 1 |
| | | | Credit 8 | Solid Waste Management—Durable Goods | 1 |
| | | | Credit 9 | Solid Waste Management—Facility Alterations and Additions | 1 |

### Indoor Environmental Quality — Possible Points: 15

| | | | | | |
|---|---|---|---|---|---|
| Y | | | Prereq 1 | Minimum IAQ Performance | |
| Y | | | Prereq 2 | Environmental Tobacco Smoke (ETS) Control | |
| Y | | | Prereq 3 | Green Cleaning Policy | |
| | | | Credit 1.1 | IAQ Best Mgmt Practices—IAQ Management Program | 1 |
| | | | Credit 1.2 | IAQ Best Mgmt Practices—Outdoor Air | 1 |
| | | | Credit 1.3 | IAQ Best Mgmt Practices—Increased Ventilation | 1 |
| | | | Credit 1.4 | IAQ Best Mgmt Practices—Reduce Particulates in Air Distribution | 1 |
| | | | Credit 1.5 | IAQ Mgmt Plan—IAQ Mgmt for Facility Alterations and Additions | 1 |
| | | | Credit 2.1 | Occupant Comfort—Occupant Survey | 1 |
| | | | Credit 2.2 | Controllability of Systems—Lighting | 1 |
| | | | Credit 2.3 | Occupant Comfort—Thermal Comfort Monitoring | 1 |
| | | | Credit 2.4 | Daylight and Views | 1 |
| | | | Credit 3.1 | Green Cleaning—High Performance Cleaning Program | 1 |
| | | | Credit 3.2 | Green Cleaning—Custodial Effectiveness Assessment | 1 |
| | | | Credit 3.3 | Green Cleaning—Sustainable Cleaning Products, Materials Purchases | 1 |
| | | | Credit 3.4 | Green Cleaning—Sustainable Cleaning Equipment | 1 |
| | | | Credit 3.5 | Green Cleaning—Indoor Chemical and Pollutant Source Control | 1 |
| | | | Credit 3.6 | Green Cleaning—Indoor Integrated Pest Management | 1 |

### Innovation in Operations — Possible Points: 6

| | | | | | |
|---|---|---|---|---|---|
| | | | Credit 1.1 | Innovation in Operations: Specific Title | 1 |
| | | | Credit 1.2 | Innovation in Operations: Specific Title | 1 |
| | | | Credit 1.3 | Innovation in Operations: Specific Title | 1 |
| | | | Credit 1.4 | Innovation in Operations: Specific Title | 1 |
| | | | Credit 2 | LEED Accredited Professional | 1 |
| | | | Credit 3 | Documenting Sustainable Building Cost Impacts | 1 |

### Regional Priority Credits — Possible Points: 4

| | | | | | |
|---|---|---|---|---|---|
| | | | Credit 1.1 | Regional Priority: Specific Credit | 1 |
| | | | Credit 1.2 | Regional Priority: Specific Credit | 1 |
| | | | Credit 1.3 | Regional Priority: Specific Credit | 1 |
| | | | Credit 1.4 | Regional Priority: Specific Credit | 1 |

### Total — Possible Points: 110

Certified 40 to 49 points    Silver 50 to 59 points    Gold 60 to 79 points    Platinum 80 to 110 points

**Appendix F**

Convento de Belen Floor Plans

PICOTA

ACOSTA

LUZ

SCHOOL

OFFICES

TRANSFORMERS
CHAMBER

EMERGENCY
POWER PLANT

TECHNOLOGICAL
ZONE

SERVICE
ACCESS
TO
SHELTER
&
HOSTAL

SHELTER

ELDERLY HOME
OLD CLOISTER

SERVICE
ACCESS TO
ELDERLY
HOME
(DAY CARE &
RESIDENCE)

CHURCH

ENTRANCE
TO SHELTER

ELDERLY HOME
(DAY CARE CENTER),
MAIN CLOISTER

ATRIUM

EXIT FOR
DECEASED

MUSEUM

ACCESS TO HOSTAL

COMPOSTELA

ACCESS TO:
ELDERLY HOME, CHURCH &
OBSERVATORY MUSEUM

N

**CONVENTO "NUESTRA SEÑORA DE BELEN"**
**GENERAL PLAN. GROUND FLOOR**
SCALE: NTS
DATE: 8 SEPTEMBER 2011

SCHOOL

OFFICES

NUN'S HOUSE

ELDERLY HOME
RESIDENCE
OLD CLOISTER

NURSERY

CHURCH

HOSTAL

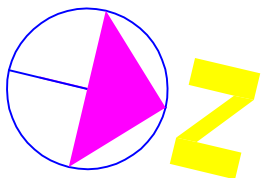MUSEUM
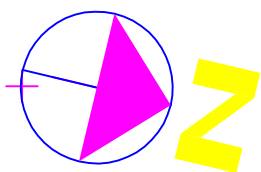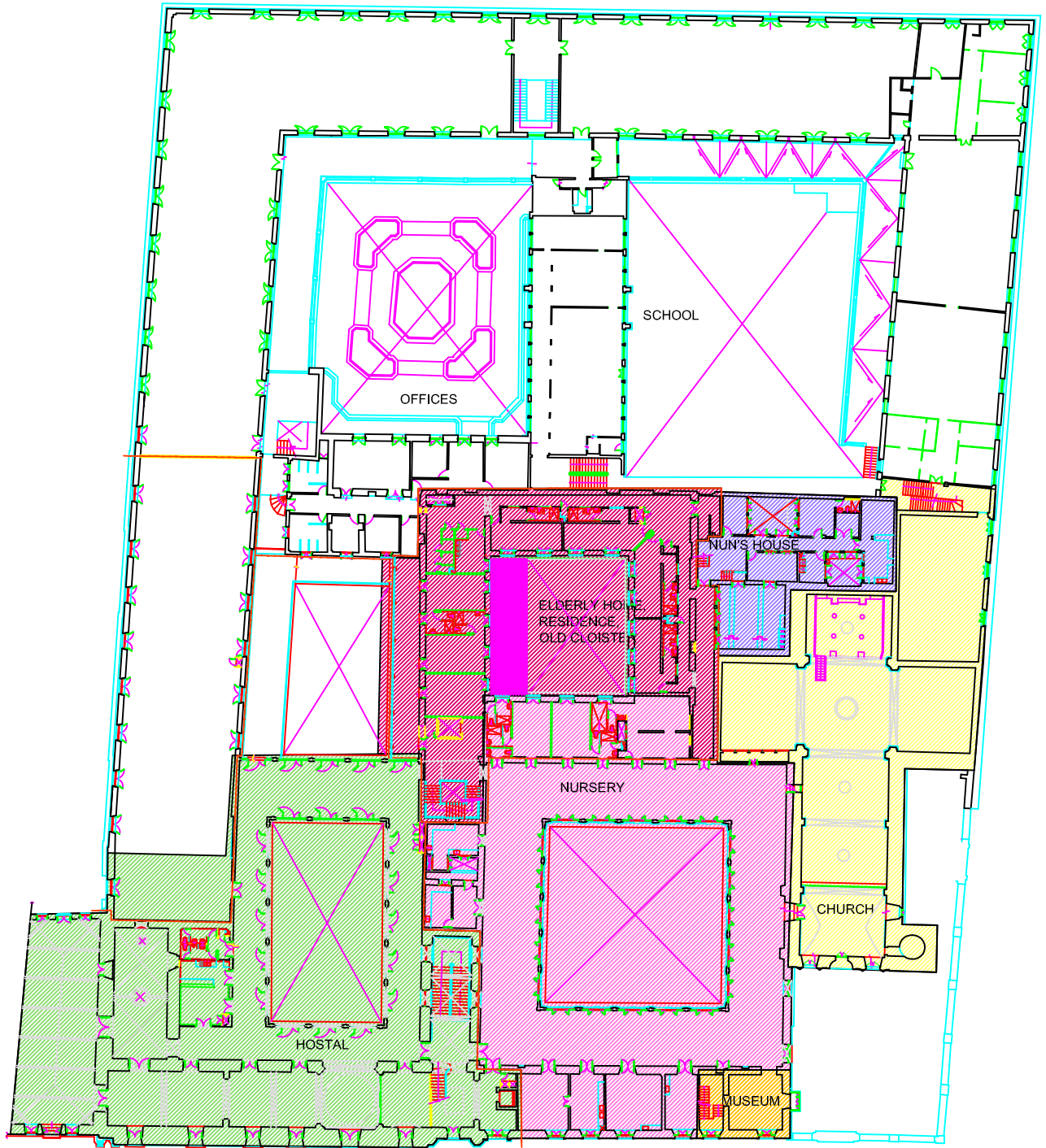
# CONVENTO "NUESTRA SEÑORA DE BELEN"
# GENERAL PLAN. FIRST FLOOR
SCALE: NTS
DATE: 8 SEPTEMBER 2011

SCHOOL

OFFICES

NUN'S HOUSE

ELDERLY HOME
RESIDENCE,
OLD CLOISTER

HOSTAL

MUSEUM
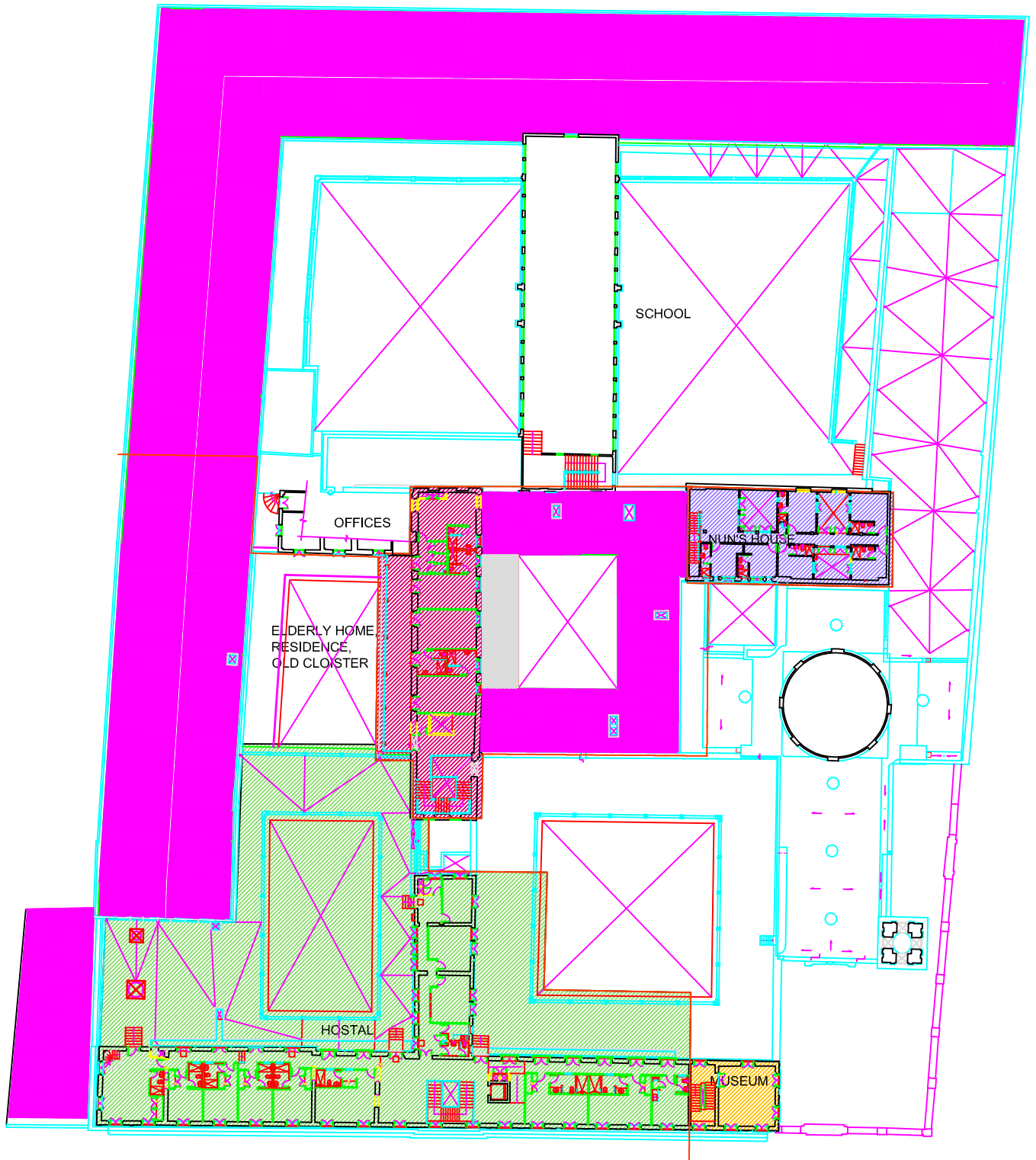
**CONVENTO "NUESTRA SEÑORA DE BELEN"**
**GENERAL PLAN. SECOND FLOOR**
SCALE: NTS
DATE: 8 SEPTEMBER 2011

Z

HOSTAL

MUSEUM

Z
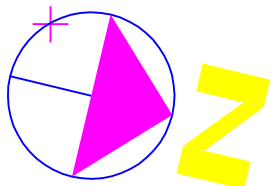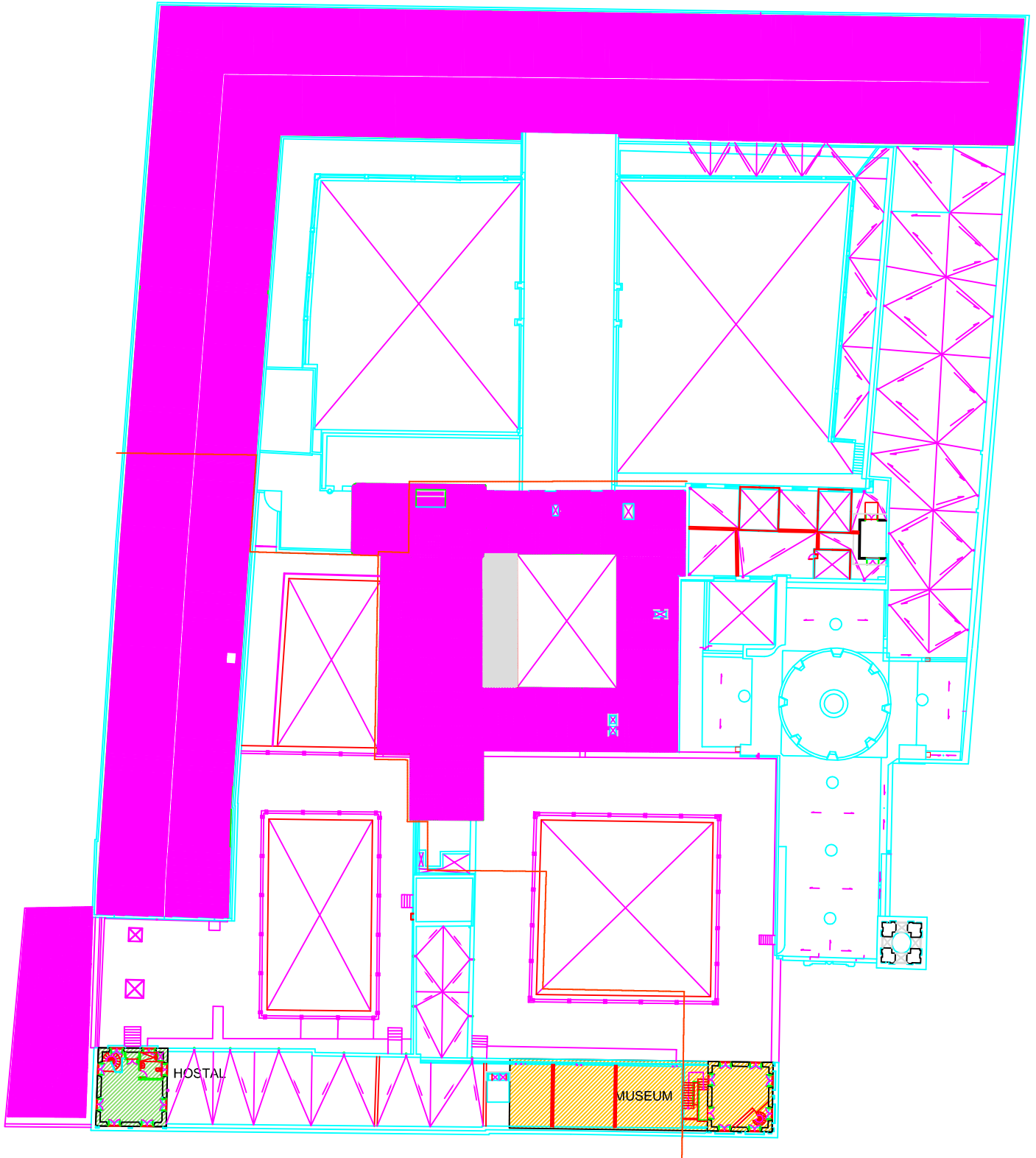
# CONVENTO "NUESTRA SEÑORA DE BELEN"
# GENERAL PLAN. ROOF
SCALE: NTS
DATE: 8 SEPTEMBER 2011