TEMPLE

PROGRAMMING DOCUMENTS

Sam East     IDES 442     Fall 2014
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PRELIMINARY RESEARCH

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INTRODUCTION

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Temple Building
500 E. Grand River Avenue
Lansing, MI 48912

Fig. 1.1 – Exterior of the Temple Building from the northeast corner of E. Grand River Avenue and N. Cedar Street.

Project Intent: Continue revitalization efforts of the Old Town Lansing Historic District by transforming the Temple Building into Multi-Functional Gallery Space with a trendy Restaurant/Brewery and which will increase the walkability of the area surrounding the project site.
Title: “Walkable Route Perceptions and Physical Features: Converging Evidence for En Route Walking Experiences”
Author(s): Barbara B. Brown, Carol M. Werner, Jonathan W. Amburgey, and Caitlin Szalay
Publication: Environment and Behavior
Date: 2007
Volume: 39
Issue: 1
Pages: 34 – 61

Major Issues:
“Walkable Route Perceptions and Physical Features: Converging Evidence for En Route Walking Experiences” is an article featuring research and analysis from a study conducted by the Social Sciences department of the University of Utah. This research covered three walking routes in neighborhoods of Downtown Salt Lake City. The study determined areas of high walkability lacked environmental incivilities, and had adequate traffic safety, pleasant aesthetics, and diverse destinations. Areas of low walkability lacked social scenes and amenities.

Design Considerations:
- Walking provides many personal and social benefits, however the research shows that negative environmental such as high traffic, panhandlers, and trash can discourage walking.
- Safety, attractiveness, and additional people walking on the route may have the greatest impact on how pedestrians evaluate a route.
- By providing additional amenities along the route there is an opportunity to increase walkability of an area.
- Design solutions for the site can include a Road Diet Program to lower the number a traffic lanes, introducing landscaping strips, widening sidewalks, adding bicycle lanes, and widening footpaths to encourage more pedestrian traffic.
Major Issues:
“Micro-Brewed Beer and the Patrons of Mid-Priced, Casual Restaurants” is an article featuring a study examining and comparing the preferences for micro-brews among potential customers at casual restaurants in the Southeast, Pacific Northwest, and Midwest United States. This research showed that the micro-brewed beer industry has grown in the Midwest in recent decades, with casual, mid-priced restaurants beginning to serve micro-brewed beers. Restaurant operators with a strong understanding of customer beer preferences were better equipped to capitalize on the growing popularity of micro-brewed beers by meeting customer needs and expectations. The research also concluded that preference for micro-brews was higher among women with higher than average socioeconomic and education status.

Design Considerations:
- Consider providing micro-brewed beer to more affluent customer groups since this group preferred this type of beer.
- Provide bar and serving space for different types of beers in the restaurant environment based on the preferences of relevant customer groups.
- Design restaurants with flexible serving capabilities so product offerings can be changed as customer interest in various beverages evolves.
- Consider providing space for brewing beer on-site, at restaurants to meet customer preferences for locally-brewed beers.
Title: “Measuring Expectations: Forecast vs. Ideal Expectations. Does It Really Matter?”
Author(s): Bronwyn Higgs, Michael Jay Polonsky, and Mary Hollick
Publication: Journal of Retailing and Consumer Services
Date: 2005
Volume: 12
Issue: 1
Pages: 49 – 64

Major Issues:
“Measuring Expectations: Forecast vs. Ideal Expectations. Does It Really Matter?” is an article featuring a study examining the relationship between expectations and satisfaction with an art exhibit at an art gallery in Australia. The research concluded that visitors’ mental categories for evaluating the museum experience changed during their visit. For example, among visitors who had not yet seen the exhibit, tickets and lines were an important concern. However, visitors who had just seen the exhibit were not concerned with such issues. Visitors who hadn't seen the exhibit yet considered interpretive materials as a separate entity from the art exhibit itself, while those who had seen the exhibit considered interpretive materials an integral part of the art exhibit. Regular visitors to the museum had more detailed, realistic expectations of the visit. First-time visitors had a wider-ranging, less informed set of expectations. Overall, museums may be understood using five categories: the building and facilities, the collection and exhibit, interpretive signs and materials, services, and programs.

Design Considerations:
- Be aware that museum visitors’ expectations may change through the course of a visit.
- Pay attention to the design of interpretive signage as visitors may regard such displays as an integral part of an exhibition.
- Be aware that prior to visiting an exhibition new visitors may be concerned with convenience issues.
- Consider design features that make lining up and purchasing tickets more pleasant, easy, and comfortable.
- Consider services and amenities that might contribute to the visitors overall experience.
Major Issues:
“Indoor Illumination by Solar Light Collectors” is an article featuring the results of an experiment conducted on a prototype for a unique solar-powered lighting system called, The Sunflower. The experiment introduced The Sunflower lighting system which was designed to use solar power to illuminate interior spaces and tested its effectiveness in a museum installation. The Sunflower employs three main components: collectors which allow for storing solar energy, sun tracking device that aligns the collectors with the sun, and fiber bundles that are connected to the collectors and used to distribute light. The Sunflower prototype in this study demonstrated the individual components that makes solar collectors effective. They found that the ability of solar collectors to store solar power energy until it is needed is beneficial for museums, as they are typically used several daytime hours or the entire day. Overall the solar powered LED lighting created adequate light distribution while the polymeric fibers in The Sunflowers helped create uniformity in the lighting scheme.

Design Considerations:
- Consider using Sunflower-type lighting, as described in this study, for museum exhibit lighting.
- The solar powered lighting option lowered energy usage and costs.
- The Sunflower solar lighting system had lower maintenance requirements when compared to other non-solar lighting systems in a museum setting.
- Consider installation of The Sunflower system as it offers versatility with lighting schemes.
EXISTING STATE

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Site Condition
Building Condition
Climate Analysis
Floorplan Analysis
Future Facility Proposal
Building History

The Temple Building in Old Town Lansing was originally intended to be the First Methodist Episcopal Church. The history of this building dates back to 1840s. The church site saw many locations over the next few decades until finally landing on the corner of Franklin Street (now Grand River Avenue) and Cedar Street in 1870. The original building was made of wood and was home to the First Methodist congregation until 1904 when it became apparent that the growth of the city was rapid enough to warrant a larger facility. In 1905 a new, more impressive stone church was completed, featuring an impressive tower and beautiful stained glass windows. Once again the congregation’s need had outgrown the building and on March 27, 1917 the first cornerstone of the third and final building was laid, the church was dedicated on April 7, 1918. The new building featured amenities that included heating and cooling, intercoms, drinking fountains and indoor plumbing, electric fixtures, a print shop, eleven Sunday school classrooms, and an auditorium. The building, designed by Lansing based architect Lee Black and was constructed using construction materials that were purchased entirely in Lansing. The Temple Building functioned as a church until the 1990s. The building was eventually opened as a nightclub in 2001, known as the Temple Club, which operated until October 2006. The building was once again sold and remained vacant for sometime. The space now occupied by new tenants, the Lansing Makers Network.
Adjacent Environment

The buildings adjacent to the Temple Building location have undergone some “face-lifting” to their facades in an effort to revitalize the Old Town Lansing community. The Temple Building is situated just on the edge of where the current revitalization efforts have reached (Fig. 2.4). The street and sidewalks are in need of some repair. The building sits on a corner lot with the adjacent corners being occupied by varying businesses including Pruess Pet Supply (Fig. 2.7), Speedway gas station (Fig. 2.8) and a small, local insurance company. The building directly behind the Temple Building, the Old Town Medical Arts building, has had some renovations to the exterior. It is currently occupied by various tenants. Next door to the Temple building, facing Grand River Avenue, is the Old Town Diner. Across the street, also facing Grand River Avenue, are many small, locally owned business. Not far from the project site is the heart of Old Town Lansing. Situated right on the Grand River, this is the oldest part of Lansing with many of the area’s original buildings still intact (Fig. 2.6). This area has undergone extensive revitalization in recent years and has become very walkable with many restaurants, boutiques, antique shops and art galleries (Fig. 2.5). Thanks to the combined effort of the Mainstreet Program started by the Old Town Commercial Association and the Cool Cities Initiative started by Governor Jennifer Granholm in 2006, The Old Town Historic District is becoming a better place to live, work, work and shop.

http://www.iloveoldtown.org/our-story
Traffic
The Temple Building sits on the corner of a major intersection, Grand River Avenue and N. Cedar Street (Fig. 2.9 and 2.10). The traffic is both east and west bound on Grand River Avenue and is only southbound on N. Cedar Street. Peak traffic hours are generally mid-day to later afternoon on weekdays and evenings on weekends.

Pedestrian Traffic
The local business adjacent to the Temple Building bring some pedestrian traffic, however the majority of the foot traffic is localized one block west of the site, closer to the heart of Old Town Lansing. There is opportunity to increase pedestrian traffic with the revitalization of the entire corner that the Temple Building sits on.

Parking Space
The Temple building sits on a corner where no street parking is available directly in front of the building. Some street parking is available approx. 100 feet from the building entrance on Grand River Avenue. There is also limited on-site parking that is in need of refurbishing in order to make it more usable (Fig. 2.11). There is also a small parking lot located across the street that could possibly be refurbished to accommodate more parking for this site.

Landscape
The Temple Building is located in an urban setting. There is little to no existing landscaping in the adjacent areas.

Signage
There is adequate signage for the buildings adjacent to the Temple Buildings. The Temple Building itself has one large sign located at the corner near the front entrance that sits on a laid brick platform Fig. 2.12). There are also banners on the light posts indicating that the building is still located within the walkable area of Old Town Lansing.
Year of Completion
The completion of the current state of the Temple Building was in 1938.

Exterior
The condition of the exterior of the Temple Building appears to be good. The building is made of brick that has a weathered appearance giving it unique texture. There is white painted wood trim. The front façade features a temple front with various window types placed symmetrically (Fig. 2.13). The majority of the windows are stained glass and feature and arched shape. At the top of the building just below the roof there are small round portal windows. Some windows are missing and would need to be replaced. There are two sets of double wood doors that act as the main entrances to the building. Along the sides there are a few other doors that may act as secondary entrances. There is no visible ADA access at this time and the only door that sits at ground level is along the east side of the building, all other doors have stepped entrances. The front façade also features a portico with four symmetrically placed ionic columns. The roof line features white dentil molding with large cornices that are painted to match the trim.

Interior
The Temple building interior is in poor condition. There has been little upkeep to the building in recent years. The building does however seem to be structurally sound. The walls, though peeling and damaged in many places, do not appear to have major cracks that would indicate structural instability. The floors and ceilings are in similar condition to the walls, structurally sound but in need of massive cosmetic repair (Fig. 2.14). The space over all is very poorly lit, despite the many windows. There is a need for more natural light in addition to artificial light throughout the entire space. Over all the interior has unique character and can be functional in many different ways.
Layout
The layout of the Temple Building is very unique. The flow of the space is very chopping with many smaller spaces extremely compartmentalized. There is however on very large open space on the second floor that features a balcony that looks down to the second floor, creating a very tall ceiling height.

Space Size
The spaces overall thought the Temple Building are large for a building of this time. One unique feature is that the ceiling height changes drastically from space to space. All spaces will be addressed in future design proposal.

Structure
The Temple building overall appears to be structurally sound. The building is constructed of brick and the exterior brick appears to be in good condition. The interior of the building features very dated building techniques, such as lath and plaster, which are less efficient for heating and cooling the space. The architectural elements of the space such as stairs, archways, and etc. appear to be sound (Fig. 2.15).

Heating and Cooling
The Temple Building does have existing heating ducts (Fig. 2.16). There are updated thermostats throughout the space indicating that there is a functioning HVAC system.

Plumbing
There are functioning restrooms and all levels of the Temple Building with the exception of the attic space. The restrooms are equipped with sewage drains and water intake pipes with both hot and cold functionality. This indicates the existence of a functioning water heater. There are also two existing bar tops with water supply and drainage on the second floor and mezzanine level.
Indoor Lighting
The Temple Building features many gothic style fixtures through the space (Fig. 2.17). Some are wall mounted fixtures in passageways and larger hanging fixtures in spaces with larger ceiling heights.

Materials
The interior space features a large variety of materials in varying conditions. In many places there is no finish material and plywood or lath and plaster are exposed (Fig. 2.19). There is an eclectic mix of tiles on each level for the restrooms and in the entrance foyer (Fig. 2.18). Many of the larger spaces have unfinished concrete slabs and peeling paint. There are remnants of carpet in some door openings and hallways.

Walls and Floors
The walls and floors appear to be structural intact, however they are in need of extensive cosmetic repair. The floors appear to be a mix of wood and concrete which is very stable, though some area may need patching. The walls are mostly constructed of lath and plaster and will need to be updated to gypsum board in order to accommodate more efficient insulation (Fig. 2.20).

Windows and Doors
The majority of the windows are large arched stained glass windows that date back to the early 1900s. Most are in fairly decent condition but there are some broken windows that may need to be replaced. The doors that remain appear to be in good condition and all function, though they may still need to be replaced to accommodate ADA sized door opening in some areas.

Ceiling
Like the walls the ceilings are made of lath and plaster and should be replaced by gypsum board to allow for better insulation to be added (Fig. 2.21).
The hottest day of 2013 was July 18, with a high temperature of 94°F. For reference, on that day the average high temperature is 82°F and the high temperature exceeds 90°F only one day in ten. The warmest month of 2013 was July with an average daily high temperature of 81°F. The longest warm spell was from August 17 to September 2, constituting 17 consecutive days with warmer than average high temperatures. The month of May had the largest fraction of warmer than average days with 71% days with higher than average high temperatures. The coldest day of 2013 was January 22, with a low temperature of -4°F. For reference, on that day the average low temperature is 15°F and the low temperature drops below -1°F only one day in ten. The coldest month of 2013 was February with an average daily low temperature of 18°F. The longest freezing spell was from December 6 to December 19, constituting 14 consecutive days with temperatures strictly below freezing.

The day with the largest quantity of precipitation was June 28. That day saw 3.120" of liquid precipitation. The longest dry spell was from March 1 to March 10, constituting 10 consecutive days with no measured precipitation. The month with the largest fraction of dry days was August, with 74% of days reporting no measured precipitation at all.

The first reported snow fall in 2013 was on November 11; the last was on April 24. The month of 2013 with the largest number of those reports was December, with a total of 195 reports. The day with the largest number of those reports was January 31, with a total of 23 reports.
Lansing has dramatic changes in temperatures throughout the year. The warmest months are July and August and the coldest months are January and February. In order to maintain comfortable temperatures within the space, adequate insulation will need to be used to prevent heat loss or transfer. The design includes plans to maintain the historic integrity of the property and as a result much of the focus on insulating the space will take place on the building’s interior. Precipitation will also be a major concern. Gutters and drainage systems will need to be improved in order to increase on site drainage efficiency. Overall durable, long lasting materials will need to be used to resist the dramatic weather changes in the area.
FLOORPLAN ANALYSIS

First Floor Plan

**Total Square Footage:** 5400 SF

Scale: NTS

Second Floor Plan

**Total Square Footage:** 5480 SF

Scale: NTS
FLOORPLAN ANALYSIS

Third Floor Plan
Total Square Footage: 3000 SF
Scale: NTS

Attic Floor Plan
Total Square Footage: 5000 SF
Scale: NTS
Future Facility Use
The Temple Building has served many functions through out its life time indicating its ability to easily adapt. The future facility proposal for this space will be a mixed use space featuring hospitality functions as well as gallery space for local artists. The concept is to create an unique restaurant environment that also works as a place for local artists to display and sell their work. The primary tenant of the space with me a brewery with a restaurant that features craft beer from a local brew master. The brewery will offer tours and have the ability to be rented out for special functions. The space will also allow for storage and display of work from local artists in need of a venue for distribution to the public. The furnishing in the space will offer flexibility to accommodate the space’s many functions.

Building and Location Features
The temple Building offers many unique architectural features that will act as inspiration for the future design of the space. Special attention will be paid to maintain the historic integrity of the building and the area’s history. The location of the building offers the perfect setting for a facility of this type. The local area is in need of an additional restaurant to accommodate the fast growing Old Town Historic District and the gallery will fit perfectly with the existing theme of the existing local businesses.

Fig. 2.22

Fig. 2.22 – Interior of Stone Brewery and Restaurant in Escondido, CA. Design will take inspiration from rustic furnishings and large scale windows offering viewing of brewing room.

Fig. 2.23

Fig. 2.23 – Simplistic gallery design allowing art to be the focal point in the space
FUTURE STATE CONCEPT

CONTENTS

Mega Concept
Mission Statement
Design Issues + Goals
Potential Users + Spaces
Concept 1 – Sacred Geometry
The design for the Temple Building will reflect various characteristics of sacred geometry. Sacred geometry is often used as a religious, philosophical, or spiritual term concerning the fundamental laws that create geometrical patterns found in nature and their symbolic meanings. The temple building, like many other buildings inspired by classical antiquity, were built using proportions derived from this concept of sacred geometry. The design of the space will be inspired by elements found in sacred geometry.

Ref. 3.1

Concept 2 – Cube
The design for the Temple Building will be inspired by one of the simplest geometric forms found in nature, a cube. A cube is a polyhedron, a solid three dimensional object with flat faces, straight edges, and sharp corners. With a geometric net that forms eleven unique patterns, the cube offers simple inspiration for architectural elements, decorative details, and space planning. The future design of the space will reflect the geometric patterns formed by an un-folded cube.

Ref. 3.2

Fig. 3.1 – This image is a visual representation of the proportions and ratios found in sacred geometry. In this pattern are some examples of shapes that will be incorporated into the re-design of the Temple Building.

Fig. 3.2 – These images depict the 11 geometrical nets of a cube. These patterns will be incorporated in the re-design of the Temple Building.
Temple will serve as a multi-functional Brewery/Restaurant offering a unique gallery space hosting work from local artists. Temple will be a COMMUNITY FOCUSED destination featuring local food, local brews, and local arts. By sourcing home-grown goods there is an opportunity to capitalize on the community’s assets and harness the potential to provide a space that promotes people’s health, happiness, and well-being. The CULTURAL PLACEMAKING approach to the design of Temple is intended to create a cornerstone for expanding the walkability of the area and strengthen the connection of people in the community and the places they share. The overall design will include ENVIRONMENTALLY CONCIOUS design elements while still allowing for HISTORIC PRESERVATION of the existing site. The interior spaces will feature a FLEXIBLE LAYOUT and functional furniture that will accommodate varying hospitality functions. Overall Temple will contribute to the continued REVITALIZATION efforts of the Old Town Historic District in Lansing.
Design Issue 1: Community Focused
Temple will feature a theme of Michigan-made and inspired, hand-crafted food, brews, and arts.

Performance Requirement 1
- The overall design will facilitate a partnership and create a connection with local artists and galleries.

Performance Requirement 2
- The concept for the restaurant will include plans to source local, hand-crafted foods and brews.

Performance Requirement 3
- The design will introduce the ability for on-site food and beer production.

Design Issue 2: Cultural Placemaking
Temple will strengthen the connection between people and the places they share by creating a cultural destination for the area’s residents and visitors.

Performance Requirement 1
- The design will capitalize on the local community’s assets and potential.

Performance Requirement 2
- The design will utilize tools that include community input when revitalizing the space and surrounding site.

Performance Requirement 3
- The design will create a balance between the built, social, and ecological qualities of the space.
Design Issue 3: Environmentally Conscious

The design of Temple will include sustainable practices and materials.

- **Performance Requirement 1**
  - The design will incorporate energy efficient lighting options with user operated controls.

- **Performance Requirement 2**
  - The design will include materials with recycled content and incorporate organized bins for recycling various materials.

- **Performance Requirement 3**
  - The design optimize energy performance and reduce water usage for the building.

Design Issue 4: Historic Preservation

The design of Temple will maintain and enhance the historic integrity of the existing building and surrounding site.

- **Performance Requirement 1**
  - The design will incorporate a plan to preserve all exterior facades and interior architectural details.

- **Performance Requirement 2**
  - The stained-glass windows will be repaired or replaced to pay homage to the buildings history.

- **Performance Requirement 3**
  - The design will maintain the historic value while making the space accessible.
Design Issue 5: Flexible Layout
The design of Temple’s interior spaces will offer multi-functional elements that will allow for flexible use of the facility.

Performance Requirement 1
- The design will include movable architectural partitions for gallery/event spaces.

Performance Requirement 2
- The design will utilize flexible furniture pieces to allow for multi-functional use.

Performance Requirement 3
- The design will include adequate storage facilities for various storage needs.

Design Issue 6: Revitalization
The re-design of the Temple Building will facilitate inspiration for continued revitalization efforts in Lansing’s Old Town Historic District.

Performance Requirement 1
- The design will include plans for a Street Diet Program to improve walkability of surrounding area.

Performance Requirement 2
- The design will allow for rehabilitation and improvement to the buildings façade.

Performance Requirement 3
- The design will improve landscaping for the site and the surrounding areas.
POTENTISL USERS + SPACES

Visitors
- Gallery Guests
- Restaurant Guests
- Special Event Guests

Gallery Employees
- Receptionists
- Volunteer Docents
- Administrative Support Staff
- Curative Staff

Restaurant/Brewery Employees
- Hostess
- Servers + Bartenders
- Kitchen Staff
- Management Staff

Maintenance Employees
- Cleaning Staff
- Maintenance Staff
- Additional Support Staff

Gallery Spaces
- Reception Area
- Gallery/Exhibit Areas
- Bathrooms
- Administrative Offices
- Maintenance Rooms
- Storage Areas

Restaurant Spaces
- Hostess + Waiting Areas
- Dining Room
- Bar Areas
- Lounge/Bar Seating
- Kitchen
- Management Office
- Employee Break Areas
- Bathrooms
- Brewing Room

Maintenance Spaces
- Gallery Storage
- Restaurant Storage
- Maintenance Storage
- Additional Support Areas
CODE ANALYSIS

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International Building Code
Americans with Disabilities Act
LEED Certification
Occupancy Classification

303.1 Assembly Group A.
Assembly Group A occupancy includes, among others, the use of a building or structure, or a portion thereof, for the gathering of persons for purposes such as civic, social or religious functions; recreation, food or drink consumption; or awaiting transportation.

- A-2 Assembly uses intended for food and/or drink consumption including, but not limited to: restaurants, taverns and bars.
- A-3 Assembly intended for worship, recreation or amusement and other assembly uses not classified elsewhere in Group A including, but not limited to: Art Galleries, Community Halls, or Exhibition Halls.

311.1 Storage Group S.
Storage Group S occupancy includes, among others, the use of a building or structure, or a portion thereof, for storage that is not classified as a hazardous occupancy.

- S-2 Low-hazard storage, includes, among others, buildings used for the storage of noncombustible materials such as products on wood pallets or in paper cartons with or without single thickness divisions; or in paper wrappings. Such products are permitted to have a negligible amount of plastic trim, such as knobs, handles or film wraping.

Occupancy Load

- A-2 Assembly without fixed seats – Unconcentrated
  First Floor: 5400 SF / 15 net = 360 Occupants
  Mezzanine: 3000 SF / 15 net = 200 Occupants
- A-3 Assembly without fixed seats – Standing Space
  Second Floor: 5480 SF / 5 net = 1000 Occupants
- S-2 Low Hazard Storage
  Second Floor: 5400 SF / 300 gross = 18 Occupants

### IBC ANALYSIS: OCCUPANCY

<table>
<thead>
<tr>
<th>Function of Space</th>
<th>Floor Area in SQ. FT. Per Occupant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assembly without fixed seats</td>
<td></td>
</tr>
<tr>
<td>Standing space</td>
<td>5 net</td>
</tr>
<tr>
<td>Unconcentrated (tables and chairs)</td>
<td>15 net</td>
</tr>
<tr>
<td>Accessory storage areas, mechanical equipment room</td>
<td>300 gross</td>
</tr>
</tbody>
</table>
1004.1 Design occupant load.
In determining means of egress requirements, the number of occupants for whom means of egress facilities shall be provided shall be determined in accordance with this section. Where occupants from accessory areas egress through a primary space, the calculated occupant load for the primary space shall include the total occupant load of the primary space plus the number of occupants egressing through it from the accessory area.

1004.1.1 Areas without fixed seating.
The number of occupants shall be computed at the rate of one occupant per unit of area as prescribed in Table 1004.1.1. For areas without fixed seating, the occupant load shall not be less than that number determined by dividing the floor area under consideration by the occupant per unit of area factor assigned to the occupancy as set forth in Table 1004.1.1. Where an intended use is not listed in Table 1004.1.1, the building official shall establish a use based on a listed use that most nearly resembles the intended use. Exception: Where approved by the building official, the actual number of occupants for whom each occupied space, floor or building is designed, although less than those determined by calculation, shall be permitted to be used in the determination of the design occupant load.

1004.2 Increased occupant load.
The occupant load permitted in any building, or portion thereof, is permitted to be increased from that number established for the occupancies in Table 1004.1.1, provided that all other requirements of the code are also met based on such modified number and the occupant load does not exceed one occupant per 7 square feet (0.65 m²) of occupiable floor space. Where required by the building official, an approved aisle, seating or fixed equipment diagram substantiating any increase in occupant load shall be submitted. Where required by the building official, such diagram shall be posted.

1004.3 Posting of occupant load.
Every room or space that is an assembly occupancy shall have the occupant load of the room or space posted in a conspicuous place, near the main exit or exit access doorway from the room or space. Posted signs shall be of an approved legible permanent design and shall be maintained by the owner or authorized agent.

1004.9 Multiple occupancies.
Where a building contains two or more occupancies, the means of egress requirements shall apply to each portion of the building based on the occupancy of that space. Where two or more occupancies utilize portions of the same means of egress system, those egress components shall meet the more stringent requirements of all occupancies that are served.
Means of Egress

1019.1 Minimum number of exits.
All rooms and spaces within each story shall be provided with and have access to the minimum number of approved independent exits.

Occupancy Load 1-500 (occupants per story) = 2 (minimum exits per story).
Occupant Load 500-1000 (occupants per story) = 3 (minimum exits per story).
1003.1 Applicability.
The general requirements specified in Sections 1003 through 1013 shall apply to all three elements of the means of egress system, in addition to those specific requirements for the exit access, the exit and the exit discharge detailed elsewhere in this chapter.

1003.2 Ceiling height.
The means of egress shall have a ceiling height of not less than 7 feet 6 inches (2286 mm). Exceptions: 1. Sloped ceilings in accordance with Section 1208.2. 2. Ceilings of dwelling units and sleeping units within residential occupancies in accordance with Section 1208.2. 3. Allowable projections in accordance with Section 1003.3. 4. Stair headroom in accordance with Section 1009.2. 5. Door height in accordance with Section 1008.1.1. 1003.3 Protruding objects.

1003.3.1 Headroom.
Protruding objects are permitted to extend below the minimum ceiling height required by Section 1003.2 provided a minimum headroom of 80 inches (2032 mm) shall be provided for any walking surface, including walks, corridors, aisles and passageways. Not more than 50 percent of the ceiling area of a means of egress shall be reduced in height by protruding objects. Exception: Door closers and stops shall not reduce headroom to less than 78 inches (1981 mm). A barrier shall be provided where the vertical clearance is less than 80 inches (2032 mm) high. The leading edge of such a barrier shall be located 27 inches (686 mm) maximum above the floor.

1003.3.2 Free-standing objects.
A free-standing object mounted on a post or pylon shall not overhang that post or pylon more than 4 inches (102 mm) where the lowest point of the leading edge is more than 27 inches (686 mm) and less than 80 inches (2032 mm) above the walking surface. Where a sign or other obstruction is mounted between posts or pylons and the clear distance between the posts or pylons is greater than 12 inches (305 mm), the lowest edge of such sign or obstruction shall be 27 inches (685 mm) maximum or 80 inches (2030 mm) minimum above the finished floor or ground. Exception: This requirement shall not apply to sloping portions of handrails serving stairs and ramps.

1003.3.3 Horizontal projections.
Structural elements, fixtures or furnishings shall not project horizontally from either side more than 4 inches (102 mm) over any walking surface between the heights of 27 inches (686 mm) and 80 inches (2032 mm) above the walking surface. Exception: Handrails serving stairs and ramps are permitted to protrude 4.5 inches (114 mm) from the wall.
1003.3.4 Clear width.
Protruding objects shall not reduce the minimum clear width of accessible routes as required in Section 1104.

1003.4 Floor surface.
Walking surfaces of the means of egress shall have a slip-resistant surface and be securely attached.

1003.5 Elevation change.
Where changes in elevation of less than 12 inches (305 mm) exist in the means of egress, sloped surfaces shall be used. Where the slope is greater than one unit vertical in 20 units horizontal (5-percent slope), ramps complying with Section 1010 shall be used. Where the difference in elevation is 6 inches (152 mm) or less, the ramp shall be equipped with either handrails or floor finish materials that contrast with adjacent floor finish materials. Exceptions: 1. A single step with a maximum riser height of 7 inches (178 mm) is permitted for buildings with occupancies in Groups F, H, R-2 and R-3 and Groups S and U at exterior doors not required to be accessible by Chapter 11. 2. A stair with a single riser or with two risers and a tread is permitted at locations not required to be accessible by Chapter 11, provided that the risers and treads comply with Section 1009.3, the minimum depth of the tread is 13 inches (330 mm) and at least one handrail complying with Section 1012 is provided within 30 inches (762 mm) of the centerline of the normal path of egress travel on the stair. 3. A step is permitted in aisles serving seating that has a difference in elevation less than 12 inches (305 mm) at locations not required to be accessible by Chapter 11, provided that the risers and treads comply with Section 1025.11 and the aisle is provided with a handrail complying with Section 1025.13. Any change in elevation in a corridor serving non-ambulatory persons in a Group I-2 occupancy shall be by means of a ramp or sloped walkway.

1003.6 Means of egress continuity.
The path of egress travel along a means of egress shall not be interrupted by any building element other than a means of egress component as specified in this chapter. Obstructions shall not be placed in the required width of a means of egress except projections permitted by this chapter. The required capacity of a means of egress system shall not be diminished along the path of egress travel.

1003.7 Elevators, escalators and moving walks.
Elevators, escalators and moving walks shall not be used as a component of a required means of egress from any other part of the building. Exception: Elevators used as an accessible means of egress in accordance with Section 1007.4.
1004.4 Exiting from multiple levels.
Where exits serve more than one floor, only the occupant load of each floor considered individually shall be used in computing the required capacity of the exits at that floor, provided that the exit capacity shall not decrease in the direction of egress travel.

1004.5 Egress convergence.
Where means of egress from floors above and below converge at an intermediate level, the capacity of the means of egress from the point of convergence shall not be less than the sum of the two floors.

1007.1 Accessible means of egress required.
Accessible means of egress shall comply with this section. Accessible spaces shall be provided with not less than one accessible means of egress. Where more than one means of egress is required by Section 1015.1 or 1019.1 from any accessible space, each accessible portion of the space shall be served by not less than two accessible means of egress. Exceptions: 1. Accessible means of egress are not required in alterations to existing buildings. 2. One accessible means of egress is required from an accessible mezzanine level in accordance with Section 1007.3, 1007.4 or 1007.5. 3. In assembly spaces with sloped floors, one accessible means of egress is required from a space where the common path of travel of the accessible route for access to the wheelchair spaces meets the requirements in Section 1025.8.

1007.2 Continuity and components.
Each required accessible means of egress shall be continuous to a public way and shall consist of one or more of the following components: 1. Accessible routes complying with Section 1104. 2. Stairways within vertical exit enclosures complying with Sections 1007.3 and 1020. 3. Exterior exit stairways complying with Sections 1007.3 and 1023. 4. Elevators complying with Section 1007.4. 5. Platform lifts complying with Section 1007.5. 6. Horizontal exits complying with Section 1021. 7. Ramps complying with Section 1010. 8. Areas of refuge complying with Section 1007.6. Exceptions: 1. Where the exit discharge is not accessible, an exterior area for assisted rescue must be provided in accordance with Section 1007.8. 2. Where the exit stairway is open to the exterior, the accessible means of egress shall include either an area of refuge in accordance with Section 1007.6 or an exterior area for assisted rescue in accordance with Section 1007.8.
1007.2.1 Elevators required.
In buildings where a required accessible floor is four or more stories above or below a level of exit discharge, at least one required accessible means of egress shall be an elevator complying with Section 1007.4. Exceptions: 1. In buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1 or 903.3.1.2, the elevator shall not be required on floors provided with a horizontal exit and located at or above the level of exit discharge. 2. In buildings equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1 or 903.3.1.2, the elevator shall not be required on floors provided with a ramp conforming to the provisions of Section 1010.

1007.3 Exit stairways.
In order to be considered part of an accessible means of egress, an exit stairway shall have a clear width of 48 inches (1219 mm) minimum between handrails and shall either incorporate an area of refuge within an enlarged floor-level landing or shall be accessed from either an area of refuge complying with Section 1007.6 or a horizontal exit. Exceptions: 1. Unenclosed exit stairways as permitted by Section 1020.1 are permitted to be considered part of an accessible means of egress. 2. The area of refuge is not required at unenclosed exit stairways as permitted by Section 1020.1 in buildings or facilities that are equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1. 3. The clear width of 48 inches (1219 mm) between handrails is not required at exit stairways in buildings or facilities equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1 or 903.3.1.2. 4. The clear width of 48 inches (1219 mm) between handrails is not required for exit stairways accessed from a horizontal exit. 5. Areas of refuge are not required for exit stairways serving open parking garages.

1007.4 Elevators.
In order to be considered part of an accessible means of egress, an elevator shall comply with the emergency operation and signaling device requirements of Section 2.27 of ASME A17.1. Standby power shall be provided in accordance with Sections 2702 and 3003. The elevator shall be accessed from either an area of refuge complying with Section 1007.6 or a horizontal exit. Exception: Elevators are not required to be accessed from an area of refuge or horizontal exit in open parking garages.
803.1 General. Interior wall and ceiling finishes shall be classified in accordance with ASTM E 84. Such interior finish materials shall be grouped in the following classes in accordance with their flame spread and smoke-developed indexes. Class A: Flame spread 0-25; smoke-developed 0-450. Class B: Flame spread 26-75; smoke-developed 0-450. Class C: Flame spread 76-200; smoke-developed 0-450. Exception: Materials, other than textiles, tested in accordance with Section 803.2.

803.6 Textiles. Where used as interior wall or ceiling finish materials, textiles, including materials having woven or nonwoven, napped, tufted, looped or similar surface and carpet and similar textile materials, shall comply with the requirements of Section 803.6.1, 803.6.2 or 803.6.3.

804.4 Interior floor finish requirements. In all occupancies, interior floor finish and floor covering materials in exit enclosures, exit passageways, corridors and rooms or spaces not separated from corridors by full-height partitions extending from the floor to the underside of the ceiling shall withstand a minimum critical radiant flux as specified in Section 804.4.1.

805.1.2 Wood finish flooring. Wood finish flooring is permitted to be attached directly to the embedded or fire blocked wood sleepers and shall be permitted where cemented directly to the top surface of approved fire-resistance-rated floor construction or directly to a wood subfloor attached to sleepers as provided for in Section 805.1.1.

805.1.1 Subfloor construction. Floor sleepers, bucks and nailing blocks shall not be constructed of combustible materials, unless the space between the fire-resistance-rated floor construction and the flooring is either solidly filled with approved noncombustible materials or fire blocked in accordance with Section 717, and provided that such open spaces shall not extend under or through permanent partitions or walls.

806.1 General requirements. In occupancies in Groups A, E, I and R-1 and dormitories in Group R-2, curtains, draperies, hangings and other decorative materials suspended from walls or ceilings shall meet the flame propagation performance criteria of NFPA 701 in accordance with Section 806.2 or be noncombustible.
Space Allowance and Reach Ranges

4.2.1* Wheelchair Passage Width. The minimum clear width for single wheelchair passage shall be 32 in (815 mm) at a point and 36 in (915 mm) continuously.

4.2.2 Width for Wheelchair Passing. The minimum width for two wheelchairs to pass is 60 in (1525 mm).

4.2.3* Wheelchair Turning Space. The space required for a wheelchair to make a 180-degree turn is a clear space of 60 in (1525 mm) diameter or a T-shaped space.

4.2.4.1 Size and Approach. The minimum clear floor or ground space required to accommodate a single, stationary wheelchair and occupant is 30 in by 48 in (760 mm by 1220 mm). The minimum clear floor or ground space for wheelchairs may be positioned for forward or parallel approach to an object. Clear floor or ground space for wheelchairs may be part of the knee space required under some objects.

4.2.4.2 Relationship of Maneuvering Clearance to Wheelchair Spaces. One full unobstructed side of the clear floor or ground space for a wheelchair shall adjoin or overlap an accessible route or adjoin another wheelchair clear floor space. If a clear floor space is located in an alcove or otherwise confined on all or part of three sides, additional maneuvering clearances shall be provided as shown in Fig. 4(d) and (e).

4.2.5* Forward Reach. If the clear floor space only allows forward approach to an object, the maximum high forward reach allowed shall be 48 in (1220 mm). The minimum low forward reach is 15 in (380 mm). If the high forward reach is over an obstruction, reach and clearances shall be as shown in Fig. 5(b).

4.2.6* Side Reach. If the clear floor space allows parallel approach by a person in a wheelchair, the maximum high side reach allowed shall be 54 in (1370 mm) and the low side reach shall be no less than 9 in (230 mm) above the floor. If the side reach is over an obstruction, the reach and clearances shall be as shown in Fig 6(c).

Accessible Route

4.3.2 Location.
(1) At least one accessible route within the boundary of the site shall be provided from public transportation stops, accessible parking, and accessible passenger loading zones, and public streets or sidewalks to the accessible building entrance they serve. The accessible route shall, to the maximum extent feasible, coincide with the route for the general public.
(2) At least one accessible route shall connect accessible buildings, facilities, elements, and spaces that are on the same site.
Accessible Route Cont.
(3) At least one accessible route shall connect accessible building or facility entrances with all accessible spaces and elements and with all accessible dwelling units within the building or facility.

4.3.3 Width. The minimum clear width of an accessible route shall be 36 in (915 mm) except at doors. If a person in a wheelchair must make a turn around an obstruction, the minimum clear width of the accessible route shall be as shown in Fig. 7(a) and (b).

4.3.4 Passing Space. If an accessible route has less than 60 in (1525 mm) clear width, then passing spaces at least 60 in by 60 in (1525 mm by 1525 mm) shall be located at reasonable intervals not to exceed 200 ft (61 m). A T-intersection of two corridors or walks is an acceptable passing place.

Ground and Floor Surfaces
4.5.2 Changes in Level. Changes in level up to 1/4 in (6 mm) may be vertical and without edge treatment. Changes in level between 1/4 in and 1/2 in (6 mm and 13 mm) shall be beveled with a slope no greater than 1:2. Changes in level greater than 1/2 in (13 mm) shall be accomplished by means of a ramp that complies with 4.7 or 4.8

4.5.3* Carpet. If carpet or carpet tile is used on a ground or floor surface, then it shall be securely attached; have a firm cushion, pad, or backing, or no cushion or pad; and have a level loop, textured loop, level cut pile, or level cut/uncut pile texture. The maximum pile thickness shall be 1/2 in (13 mm). Exposed edges of carpet shall be fastened to floor surfaces and have trim along the entire length of the exposed edge. Carpet edge trim shall comply with 4.5.2.

Windows and Doors
4.12.1* General. (Reserved).
4.12.2* Window Hardware. (Reserved).
4.13.2 Revolving Doors and Turnstiles. Revolving doors or turnstiles shall not be the only means of passage at an accessible entrance or along an accessible route. An accessible gate or door shall be provided adjacent to the turnstile or revolving door and shall be so designed as to facilitate the same use pattern.

4.13.3 Gates. Gates, including ticket gates, shall meet all applicable specifications of 4.13.

4.13.4 Double-Leaf Doorways. If doorways have two independently operated door leaves, then at least one leaf shall meet the specifications in 4.13.5 and 4.13.6. That leaf shall be an active leaf.
Windows and Doors Cont.

4.13.5 Clear Width. Doorways shall have a minimum clear opening of 32 in (815 mm) with the door open 90 degrees, measured between the face of the door and the opposite stop. Openings more than 24 in (610 mm) in depth shall comply with 4.2.1 and 4.3.3.

EXCEPTION: Doors not requiring full user passage, such as shallow closets, may have the clear opening reduced to 20 in (510 mm) minimum.

Entrances

4.14.1 Minimum Number. Entrances required to be accessible by 4.1 shall be part of an accessible route complying with 4.3. Such entrances shall be connected by an accessible route to public transportation stops, to accessible parking and passenger loading zones, and to public streets or sidewalks if available. They shall also be connected by an accessible route to all accessible spaces or elements within the building or facility.

4.14.2 Service Entrances. A service entrance shall not be the sole accessible entrance unless it is the only entrance to a building or facility (for example, in a factory or garage).

Water Closets

4.16.2 Clear Floor Space. Clear floor space for water closets not in stalls shall comply with Fig. 28. Clear floor space may be arranged to allow either a left-handed or right-handed approach.

4.16.4* Grab Bars. Grab bars for water closets not located in stalls shall comply with 4.26. The grab bar behind the water closet shall be 36 in (915 mm) minimum.

4.16.5* Flush Controls. Flush controls shall be hand operated or automatic and shall comply with 4.27.4. Controls for flush valves shall be mounted on the wide side of toilet areas no more than 44 in (1120 mm) above the floor.

4.16.6 Dispensers. Toilet paper dispensers shall be installed within reach, as shown in Fig. 29(b). Dispensers that control delivery, or that do not permit continuous paper flow, shall not be used.

Lavatories and Mirrors

4.19.2 Height and Clearances. Lavatories shall be mounted with the rim or counter surface no higher than 34 in (865 mm) above the finish floor. Provide a clearance of at least 29 in (735 mm) above the finish floor to the bottom of the apron. Knee and toe clearance shall comply with Fig. 31.

4.19.3 Clear Floor Space. A clear floor space 30 in by 48 in (760 mm by 1220 mm) complying with 4.2.4 shall be provided in front of a lavatory to allow forward approach. Such clear floor space shall adjoin or overlap an accessible route and shall extend a maximum of 19 in (485 mm) underneath the lavatory.
Lavatories and Mirrors Cont.

4.19.5 **Faucets.** Faucets shall comply with 4.27.4. Lever-operated, push-type, and electronically controlled mechanisms are examples of acceptable designs. If self-closing valves are used the faucet shall remain open for at least 10 seconds.

4.19.6** Mirrors.** Mirrors shall be mounted with the bottom edge of the reflecting surface no higher than 40 in (1015 mm) above the finish floor.

**Toilet Rooms**

4.22.2 **Doors.** All doors to accessible toilet rooms shall comply with 4.13. Doors shall not swing into the clear floor space required for any fixture.

4.22.3** Clear Floor Space.** The accessible fixtures and controls required in 4.22.4, 4.22.5, 4.22.6, and 4.22.7 shall be on an accessible route. An unobstructed turning space complying with 4.2.3 shall be provided within an accessible toilet room. The clear floor space at fixtures and controls, the accessible route, and the turning space may overlap.

4.22.4 **Water Closets.** If toilet stalls are provided, then at least one shall be a standard toilet stall complying with 4.17; where 6 or more stalls are provided, in addition to the stall complying with 4.17.3, at least one stall 36 in (915 mm) wide with an outward swinging, self-closing door and parallel grab bars complying with Fig. 30(d) and 4.26 shall be provided. Water closets in such stalls shall comply with 4.16. If water closets are not in stalls, then at least one shall comply with 4.16.

4.22.5 **Urinals.** If urinals are provided, then at least one shall comply with 4.18.

4.24.2 **Height.** Sinks shall be mounted with the counter or rim no higher than 34 in (865 mm) above the finish floor.

4.24.3 **Knee Clearance.** Knee clearance that is at least 27 in (685 mm) high, 30 in (760 mm) wide, and 19 in (485 mm) deep shall be provided underneath sinks.

4.24.4 **Depth.** Each sink shall be a maximum of 6-1/2 in (165 mm) deep.

4.26.2** Size and Spacing of Grab Bars and Handrails.** The diameter or width of the gripping surfaces of a handrail or grab bar shall be 1-1/4 in to 1-1/2 in (32 mm to 38 mm), or the shape shall provide an equivalent gripping surface. If handrails or grab bars are mounted adjacent to a wall, the space between the wall and the grab bar shall be 1-1/2 in (38 mm). Handrails may be located in a recess if the recess is a maximum of 3 in (75 mm) deep and extends at least 18 in (455 mm) above the top of the rail.

4.32.4** Height of Tables or Counters.** The tops of accessible tables and counters shall be from 28 in to 34 in (710 mm to 865 mm) above the finish floor or ground.
Objective
To obtain credits in the 60-79 range in order achieve LEED Gold for Commercial Interiors. The projected total points are based on the LEED v3 2009 Commercial Interiors project checklist. To reach this goal the project will focus on water reduction, energy performance, regionally sourced materials, high indoor environmental quality, having a LEED AP working on the project, and utilizing regional priority.

LEED Credit Overview
- Sustainable Sites – 21 points
- Water Efficiency – 6 points
- Energy and Atmosphere – 24 points
- Materials and Resources – 8 points
- Indoor Environmental Quality – 13 points
- Innovation in Design – 1 point
- Regional Priority – 4 points

Total Projected Credits: 77 Points
LEED Credit Analysis

Sustainable Sites (SS)
- Credit 1 Site Selection (5 points)
- Credit 2 Development Density and Community Connectivity (6 points)
- Credit 3.1 Alternative Transportation—Public Transportation Access (6 points)
- Credit 3.2 Alternative Transportation—Bicycle Storage and Changing Rooms (2 points)
- Credit 3.3 Alternative Transportation—Parking Availability (2 points)

Water Efficiency (WE)
- Prerequisite 1 Water Use Reduction
- Credit 1 Water Use Reduction (6 points)

Energy and Atmosphere (EA)
- Prerequisite 1 Fundamental Commissioning of Building Energy Systems
- Prerequisite 2 Minimum Energy Performance
- Prerequisite 3 Fundamental Refrigerant Management
- Credit 1.1 Optimize Energy Performance—Lighting Power (3 points)
- Credit 1.2 Optimize Energy Performance—Lighting Controls (3 points)
- Credit 1.3 Optimize Energy Performance—HVAC (5 points)
- Credit 1.4 Optimize Energy Performance—Equipment and Appliances (1 point)
- Credit 2 Enhanced Commissioning (5 points)
- Credit 3 Measurement and Verification (2 points)
- Credit 4 Green Power (5 points)

Materials and Resources (MR)
- Prerequisite 1 Storage and Collection of Recyclables
- Credit 1.1 Tenant Space—Long-Term Commitment (0 points)
- Credit 1.2 Building Reuse—Maintain Interior Nonstructural Components (1 point)
- Credit 2 Construction Waste Management (1 point)
- Credit 3.1 Materials Reuse (1 point)
- Credit 3.2 Materials Reuse—Furniture and Furnishings (1 point)
- Credit 4 Recycled Content (1 point)
- Credit 5 Regional Materials (1 point)
- Credit 6 Rapidly Renewable Materials (1 point)
- Credit 7 Certified Wood (1 point)
LEED Credit Analysis

Indoor Environmental Quality (IEQ)
- Prerequisite 1 Minimum Indoor Air Quality Performance
- Prerequisite 2 Environmental Tobacco Smoke (ETS) Control
- Credit 1 Outdoor Air Delivery Monitoring (1 point)
- Credit 2 Increased Ventilation (1 point)
- Credit 3.1 Construction Indoor Air Quality Management Plan—During Construction (1 point)
- Credit 3.2 Construction Indoor Air Quality Management Plan—Before Occupancy (1 point)
- Credit 4.1 Low-Emitting Materials—Adhesives and Sealants (1 point)
- Credit 4.2 Low-Emitting Materials—Paints and Coatings (1 point)
- Credit 4.3 Low-Emitting Materials—Flooring Systems (1 point)
- Credit 4.4 Low-Emitting Materials—Composite Wood and Agrifiber Products (1 point)
- Credit 4.5 Low-Emitting Materials—Systems Furniture and Seating (1 point)
- Credit 5 Indoor Chemical and Pollutant Source Control (0 points)
- Credit 6.1 Controllability of Systems—Lighting (1 point)
- Credit 6.2 Controllability of Systems—Thermal Comfort (1 point)
- Credit 7.1 Thermal Comfort—Design (1 point)
- Credit 7.2 Thermal Comfort—Verification (1 point)
- Credit 8.1 Daylight and Views—Daylight (0 points)
- Credit 8.2 Daylight and Views—Views for Seated Spaces (0 points)

Innovation in Design (ID)
- Credit 1 Innovation in Design (0 points)
- Credit 2 LEED® Accredited Professional (1 point)

Regional Priority (RP)
- Credit 1 Regional Priority (4 points)
# LEED 2009 for Commercial Interiors

## Project Checklist

### Sustainable Sites

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### Innovation and Design Process

| x Credit 1.1 | Innovation in Design: Specific Title | 1 |
| x Credit 1.2 | Innovation in Design: Specific Title | 1 |
| x Credit 1.3 | Innovation in Design: Specific Title | 1 |
| x Credit 1.4 | Innovation in Design: Specific Title | 1 |
| x Credit 1.5 | Innovation in Design: Specific Title | 1 |
| x Credit 2 | LEED Accredited Professional | 1 |

### Regional Priority Credits

| x Credit 1.1 | Regional Priority: Specific Credit | 1 |
| x Credit 1.2 | Regional Priority: Specific Credit | 1 |
| x Credit 1.3 | Regional Priority: Specific Credit | 1 |
| x Credit 1.4 | Regional Priority: Specific Credit | 1 |

### Total

Certified 40 to 49 points, Silver 50 to 59 points, Gold 60 to 79 points, Platinum 80 to 110
SPACE PLANNING

CONTENTS

Bubble Diagrams
Space Program
Block Diagrams
Legend

- Public
- Semi-Private
- Private
- Moderate Adjacency
- Immediate Adjacency

Second Floor

Option 1

- Kitchen
- Main Stairs
- Reception
- Stairs
- Restrooms
- Brewing Room
- Elevator
- Stor.

Option 2

- Gallery Office
- Main Stairs
- Reception
- Stairs
- Restrooms
- Special Exhibits
- Gallery Space
- Special Exhibits
- Elevator
- Stor.
Space Program: Option 1

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Interior Net Square Footage: 4150.0
Walls + Circulation: 1245.0
Gross Total Square Footage: 5395.0

First Floor: 2400.0
Walls + Circulation: 600.0
Gross Total Square Footage: 3000.0

Second Floor: 4380.0
Walls + Circulation: 1095.0
Gross Total Square Footage: 5475.0

Third Floor: 2400.0
Walls + Circulation: 600.0
Gross Total Square Footage: 3000.0

Attic Floor: 3750.0
Walls + Circulation: 1237.5
Gross Total Square Footage: 4987.5

Total: 13870.0
### Space Program: Option 2

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</table>

- **First Floor Interior Net Square Footage**: 4320.0
- **First Floor Walls + Circulation**: 1080.0
- **First Floor Gross Total Square Footage**: 5400.0

| Second Floor | Bar                        | 1                 | 900                 |                     | 900.0                       |
|             | Lounge Seating            | 1                 | 500                 |                     | 500.0                       |
|             | Bar Seating               | 1                 | 550                 |                     | 550.0                       |
|             | Restrooms                 | 2                 | 150                 |                     | 300.0                       |
|             | Elevator                  | 1                 | 150                 |                     | 150.0                       |

- **Second Floor Interior Net Square Footage**: 4210.0
- **Second Floor Walls + Circulation**: 1263.0
- **Second Floor Gross Total Square Footage**: 5473.0

| Third Floor  | Bar                        | 1                 | 150                 |                     | 150.0                       |
|             | Mechanical Room           | 1                 | 400                 |                     | 400.0                       |
|             | Storage                   | 1                 | 3200                |                     | 3200.0                      |

- **Third Floor Interior Net Square Footage**: 2400.0
- **Third Floor Walls + Circulation**: 600.0
- **Third Floor Gross Total Square Footage**: 3000.0

| Attic Floor | Elevator                  | 1                 | 150                 |                     | 150.0                       |
|            | Mechanical Room           | 1                 | 400                 |                     | 400.0                       |
|            | Storage                   | 1                 | 3200                |                     | 3200.0                      |

- **Attic Floor Interior Net Square Footage**: 3750.0
- **Attic Floor Walls + Circulation**: 1237.5
- **Attic Floor Gross Total Square Footage**: 4987.5
- **Total Gross Total Square Footage**: 13873.0
First Floor
The second bubble diagram option for the first floor provides the most appropriate space planning solutions for developing block diagrams for the restaurant and brewing space. The ceiling heights are lower on this level then on the second level providing a more intimate setting for dining options. There is also adequate space on this level to accommodate spaces for service and administrative functions. This level is also useful for providing an option for an accessible entrance due to the rear of the building sitting at ground level with no steps to hinder access. Due to this feature the most appropriate location for the elevator shaft begins on this level where the maintenance room is currently. Another factor that contributes to this level being the optimal location for the restaurant space is the existence of a second set of restrooms with adjacent open space that will work perfectly as employee restrooms and lounge.

Second Floor
The second bubble diagram for the second floor provides the most appropriate space planning solutions for developing block diagrams for the gallery space. The number one factor that contributes to this space being ideal is the ceiling height created by the open third floor balcony. The ceilings on the second floor are twice as high as anywhere else in the entire building offering the perfect setting for the gallery space. This level also features space to accommodate administrative offices for the gallery. The elevator shaft can continue seamlessly to this level to allow for accessibility to the gallery space.

Third Floor
The third floor features a balcony that looks down into the open space of the second floor. This is the ideal setting for a bar/lounge that can be useful when accommodating hospitality functions for the gallery. This gives the needed separation of food/beverage service from the gallery space while still allowing users to view the exhibits from a bird’s eye perspective. Currently there is an additional open space on the second floor that has a ceiling height level to the ceilings on the third floor. This area offers the ability to continue the balcony level beyond the restrooms on the third floor to meet the elevator location from the previous levels.

Fourth Floor
This floor currently operates as an unfinished attic space. The ceiling height in the attic space is high enough to accommodate storage functionality. The other three floors of the building are lacking adequate storage space and this fourth floor attic offers the perfect solution to this design issue.

Ref. 4.3
DESIGN PROPOSAL

CONTENTS

Inspiration
Color Scheme
INSPIRATION

ART GALLERY

Fig. 6.1 – Display with geometric patterns creating visual interest
Fig. 6.2 – Exhibit display fixtures with minimalist aesthetic that can be moved easily
Fig. 6.3 – Geometric ceiling system with modular walls
Fig. 6.4 – Sliding rail panel system suspended from the ceiling offering a unique display for work
Fig. 6.5 – Art museum in Grand Rapids, MI with modular walls
Fig. 6.6 – Rustic finishes with unique surface materials
Fig. 6.7 – Large windows with viewing of brewing room, indoor landscaping
Fig. 6.8 – Exposed brick with unique bar seating
Fig. 6.9 – Blending of textures and furniture reminiscent of building’s history with modern flair
Fig. 6.10 – Patterns with flooring materials
Fig. 6.11 – Bar back with one of a kind tap styles
The color scheme is inspired by the natural elements commonly found in the areas surrounding the Temple Building. Dandelions are a common flowering plant generally considered to be an undesirable weed, however, this simple flower, when backlit by the setting sun, creates beautifully soft, muted shades of yellow, orange, and red. This color scheme inspiration reflects a similar feeling to that of the Temple Building, which is somewhat undesirable in its existing state but when shown in the correct light reveals a unique colorful space. The colors in this scheme are ideal for creating an environment that inspires enthusiasm, fascination, happiness, creativity, determination, and stimulation. The neutral grays will give the space a sense of stability and offer the perfect balance of colors.
SYNTHESIS + CONCLUSION

CONTENTS

Concept + Goals
Programming Evaluation
Design Considerations
Project Timeline
Temple will be a multifunctional space that offers local artists a place to display their work and network with their peers. Inspired by the characteristics of sacred geometry and the cube, the layout if the gallery space will feature simple geometric patterns in the arrangement of modular walls. Modular fixtures and furnishings will allow for greater flexibility in the space’s level of accommodation for varying hospitality functions. The restaurant/brewery will also feature many flexible elements, inspiration from the same shape and offer hand-crafted local foods and brews. By sourcing home-grown goods there is an opportunity to capitalize on the community’s assets and harness the potential to provide a space that promotes people’s health, happiness, and well-being. There will be enhancements to the site that will accommodate accessibility requirements and will pay special attention to not interfere with preserving the historic integrity of this Lansing landmark.

Temple will be a future destination for locals and visitors of the Old Town Lansing Historic District. Overall the intent is for to Temple serve as the cornerstone for expansion of the area’s walkability.
Narrative + Evaluation

An initial analysis of the site and building conditions of the Temple Building was performed, with full documentation and photographs. Research was done on the climate in the area, potential users, and potential activities in order to accurately assess the needs for the space. Additional research was conducted on possible design issues, which was helpful in creating a mission and developing goals. Once the functions for each space were identified, analysis of the International Building Code and Americans with Disabilities Act requirements was conducted in order to generate space planning diagrams and produce floorplans. Further sketching and ideation allowed for the development in the initial stages of a cohesive design concept and schematic.

Additional Considerations

The current design concept meets the project goals and performance requirements, however these concepts can be further broken down to allow for more details solutions. With more time spent on programming, additional design issues can be address. Additional site visits would also be helpful for the design development stages of the project.
PROJECT TIMELINE

January
- Revisit Project Site
- Review + Revise Programming
- Select Materials + Furnishings

February
- Develop Floor Plans
- Select Lighting Schemes
- Detailed Specifications

March
- Construction Documents
- Section + Elevation Drawings
- Perspective Drawings

April
- Finalize Renderings
- Presentation Preparation
- Final Presentation
REFERENCES

Fig. 1.1 – Image Credits go to Sam East
Fig. 2.1 – Image Credits go to Sam East
Fig. 2.2 – https://www.google.com/maps
Fig. 2.3 – https://www.google.com/maps
Fig. 2.4-Fig. 1.21 – Image Credits go to Sam East
Fig. 2.22 – www.vengefulvegetarians.wordpress.com
Fig. 2.23 – www.icp.org
Fig. 3.1 – www.esotericonline.net/profiles/blogs/sacred-geometry-and-spiritual-development
Fig. 3.2 – http://en.wikipedia.org/wiki/Cube
Fig. 6.1 – www.archimosphere.com/project.php?year=2013&num=5
Fig. 6.2 – www.domusweb.it/en/art/2012/10/02/ghosts-in-the-machine.html
Fig. 6.3 – www.artscaleNDAR.yale.edu/day/2013-09-22?event=CAL-2c9cb3cc-3df9694d-013e-322b9e8b-000047aabcdedwork%40yale.edu_20130922T173000Z
Fig. 6.4 – www.archinspire.org/interior-renovation-art-collections-house-focused-designs
Fig. 6.5 – www.gnevillebrooks.com/2011/10/18/movable-wall
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Fig. 6.7 – www.stonebrewing.com
Fig. 6.8 – www.discover0.com/black-interior-design-ideas-inspirations
Fig. 6.9 – www.trendhunter.com/trends/new-york-style-loft
Fig. 6.10 – www.hardwoodfloorsmag.com
Fig. 6.11 – www.garageproject.co.nz
Ref.1.1 – http://search.proquest.com.proxy2.cl.msu.edu/docview/290614413/967D9718B2D345C3PQ/1?accountid=12598
Ref. 1.2 – http://search.proquest.com.proxy2.cl.msu.edu/docview/18857850/CBCD1689D444440APQ/1?accountid=12598
Ref. 1.3 – http://rs.informedesign.org/Rs_detail.aspx?rsId=2805
Ref. 1.4 – http://www.informedesign.org/Rs_detail/rsId/2687
Ref. 2.1 – https://d2l.msu.edu/d2l/le/content/127779/viewContent/1564645/View
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Ref. 3.2 – http://en.wikipedia.org/wiki/Cube
Ref. 4.1 – https://d2l.msu.edu/d2l/le/content/127779/viewContent/1516854/View?ou=127779
Ref. 4.2 – http://www.ada.gov/2010ADAstandards_index.htm
Ref. 4.3 – www.usgbc.org/resources/leed-commercial-interiors-redline-v2009-current-version
Market Research Survey

The intent of this survey is to collect information and gain a better understanding of user’s needs for the potential development of a gallery space featuring a brewery/restaurant located in the Old Town Lansing Historic District. All information provided will remain confidential and will not be shared with third party individuals or groups.

**Demographics**
Please answer the following questions.

Gender:
Age:
City of Residency:
Occupation:
Number of People in Your Household:
Annual Household Income:
Highest Level of Education:

**User Preferences**
Please answer the following questions.

What is most important to you when visiting an area? (Check all that apply)

- ___ Convenient Parking
- ___ Pedestrian-friendly Sidewalks
- ___ Nearby Public Transportation
- ___ Available of Amenities

What type of restaurant do you prefer? (Check all that apply)

- ___ Fast Food
- ___ Delivery
- ___ Deli
- ___ Buffet
- ___ Sports Bar
- ___ Casual Dining
- ___ Fine Dining

What is your current favorite restaurant?

____________________________________

What typically do you look for when choosing a restaurant? (Check all that apply)

- ___ Location
- ___ Food/Beverage Type
 USER SURVEY

### Atmosphere
### Entertainment
### Price

How frequently do you dine out?
___ 1 – 2 Times per Week
___ 3 – 5 Times per Week
___ I Dine Out for Every Meal
___ I do not Dine Out

When dining-out, how many people are usually in your party?
___ 1 – 2
___ 3 – 4
___ 5 – 6
___ 7+

Which of these activities do you associate with Old Town Lansing? (Check all that apply)
___ Dining
___ Shopping
___ Arts/Entertainment
___ Leisure Activities
___ Nightlife
___ Business

**Design Preferences**
Please answer the following questions.

Which restaurant setting is more appealing to you?

[Images of three different restaurant settings]

___ Traditional
___ Contemporary
___ Modern

What type of seating do you prefer?
Which color palette do you find more appealing?

- Red
- Blue
- Green
- Neutral

Image References

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www.decoist.com
www.imtex.org
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www.princegeorgehotel.com
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www.australiandesignreview.com
Walkable Route Perceptions and Physical Features: Converging Evidence for En Route Walking Experiences
Barbara B. Brown, Carol M. Werner, Jonathan W. Amburgey and Caitlin Szalay

Environment and Behavior 2007 39: 34
DOI: 10.1177/0013916506295569

The online version of this article can be found at:
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>> Version of Record - Nov 29, 2006
What is This?
Walkable Route Perceptions and Physical Features

Converging Evidence for En Route Walking Experiences

Barbara B. Brown
Carol M. Werner
Jonathan W. Amburgey
Caitlin Szalay
University of Utah

Guided walks near a light rail stop in downtown Salt Lake City, Utah, were examined using a 2 (gender) × 3 (route walkability: low-, mixed-, or high-walkability features) design. Trained raters confirmed that more walkable segments had more traffic, environmental, and social safety; pleasing aesthetics; natural features; pedestrian amenities; and land use diversity (using the Irvine-Minnesota physical environment audit) and a superior social milieu rating. According to tape-recorded open-ended descriptions, university student participants experienced walkable route segments as noticeably safer, with a more positive social environment, fewer social and physical incivilities, and more attractive natural and built environment features. According to closed-ended scales, walkable route segments had more pleasant social and/or environmental atmosphere and better traffic safety. Few gender differences were found. Results highlight the importance of understanding subjective experiences of walkability and suggest that these experiences should be an additional focus of urban design.

Keywords: environmental aesthetics; incivilities; urban environment; walking

Understanding how walking routes encourage or discourage pedestrians has become an important priority for researchers, planners and developers, health and governmental officials, and a variety of citizen advocacy groups. Walking confers multiple personal and societal benefits; however, many people walk too little to realize these benefits. Past research on physical fitness often emphasized creating motivational or social factors to support
adherence to formal exercise programs, such as exercise classes. More recent research focused on lifestyle activities, such as walking, and noted how deficits in the environment make walking unpleasant, inconvenient, or scary. If these environmental deficits could be corrected, regular brisk walks could enable millions of people to meet the Center for Disease Control goal of accumulating 30 mins of moderate activity on most days of the week (Simpson et al., 2003). The benefits of walking are also appreciated by a growing coalition of other actors: City officials want to encourage people to walk to make downtowns safe and popular destinations for residents, workers, and shoppers; social equity advocates want to make walking possible and pleasant for elders, women, children, transit riders, poor people, and people with disabilities; environmentalists want alternatives to more parking, roads, car emissions, and automobile dependency; and New Urbanists want to design diverse, pedestrian-friendly places that support resource efficiency and a sense of community.

By focusing on the multiple forces that create pleasant or unpleasant walks, rather than focusing exclusively on flaws of sedentary individuals, research on walking can be informed by a transactional approach (Altman & Rogoff, 1987; Werner, Brown, & Altman, 2002). A transactional approach assumes that behavior is multiply determined, with physical, psychological, social, and cultural aspects playing a role. For example, walking can be supported by recent federal funding for pedestrian paths, local zoning requirements for sidewalks and street trees, and growing societal interests in health and energy efficiency. However, a long legacy of cultural values and environmental infrastructure supports car use and ownership, so that drivers’ needs overrule pedestrians’ needs. By understanding how these countervailing forces come together to influence walking, we can develop

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a better understanding of how to encourage walking. In the current study, we focus on how particular small-scale street segments are designed and perceived to support or discourage walking.

Walking is a healthy but infrequently used way to get around. Less than one half of U.S. adults achieve healthy levels of physical activity (Centers for Disease Control and Prevention, 2003). Nevertheless, walking is one of the most popular forms of physical activity (Eyler, Brownson, Bacak, & Housemann, 2003) and can be done regularly (Perri et al., 2002). Even short 10-min bouts of brisk walking provide health benefits when they total 30-mins a day (Andersen et al., 1999). Walking 15 extra minutes a day would burn 100 calories and prevent the typical adult yearly gain of 1 to 2 pounds that can lead to obesity (Hill, Wyatt, Reed, & Peters, 2003). A U.S. public health goal for adults is to increase the number of short (less than a mile) trips that are walked from 17% in 1995 to 25% in 2010 (U.S. Department of Health and Human Services, 2000); fully 27% of the 90% of trips made by car are short and might be accomplished by walking (U.S. Department of Transportation, 2001). If places were designed to allow convenient, pleasant, safe, and useful walks, more people might opt to walk.

To understand how people are attracted to or repelled by certain walks, research has taken two major approaches, reviewed below. One approach is to identify environmental correlates of walking in general; another is to compare walking in settings sampled to have contrasting walkability configurations.

**Environmental Correlates of Walking**

A growing number of studies asked residents their perceptions of neighborhood environmental features and correlated those perceptions with residents’ reports of walking. These studies involve fairly large samples, selected from a variety of neighborhoods, and provide intriguing (albeit correlational) evidence that environmental features encourage or support walking. Findings often indicate that residents report more walking when they perceive accessible or high-quality sidewalks or paths (Addy et al., 2004; Ball, Bauman, Leslie, & Owen, 2001; Brownson et al., 2000; Chad et al., 2005; De Bourdeaudhuij, Sallis, & Saelens, 2003; Duncan & Mummery, 2005; Giles-Corti & Donovan, 2002; King et al., 2003; Troped, Saunders, Pate, Reininger, & Addy, 2003). Walking is more likely when the area provides good access to desired destinations (Booth, Owen, Bauman, Clavisi, & Leslie, 2000; Humpel, Owen, Leslie, et al., 2004). Desirable destinations that inspire walking include shopping areas or malls (Addy et al.,
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2004; De Bourdeaudhuij et al., 2003; Duncan & Mummery, 2005; Foster, Hillsdon, & Thorogood, 2004; King et al., 2003; van Lenthe, Brug, & Mackenbach, 2005), recreation facilities (Chad et al., 2005), parks and/or open space (Foster et al., 2004; Giles-Corti & Donovan, 2002; King et al., 2003; Li, Fisher, & Brownson, 2005; Timperio, Crawford, Telford, & Salmon, 2004), or public transportation stops (Besser & Dannenberg, 2005; De Bourdeaudhuij et al., 2003). In addition, walking is associated with pleasant pathways, such as those with appealing scenery (Ball et al., 2001; Brownson, Baker, Housemann, Brennan, & Bacak, 2001; Giles-Corti & Donovan, 2002; Humpe, Owen, Leslie, et al., 2004; Troped et al., 2003).

Safety fears have frequently emerged as barriers to walking (Booth et al., 2000; Foster et al., 2004; Li et al., 2005; Sharpe, Granner, Hutto, & Ainsworth, 2004; Wilson, Kirtland, Ainsworth, & Addy, 2004). Recent reviews (Loukaitou-Sideris, 2006; Loukaitou-Sideris, Liggett, & Iseki, 2002) addressed how environmental and social cues may trigger fear of crime. Fear cues include social incivilities, such as disreputable-looking individuals or street confrontations; the absence of people; physical (or nonhuman) incivilities such as unattended dogs, vacant lots, litter, and graffiti; and limited visual surveillance of an area, as well as potential hiding places and blocked escapes. Safety concerns also extend to traffic safety, with less walking reported in areas of greater traffic or traffic noise (Carver et al., 2005; van Lenthe et al., 2005). These results underscore how a range of environmental and social conditions are offered by participants as reasons for walking or not walking.

Correlational studies of environmental perceptions are useful but limited because they do not focus on particular objectively rated environmental features and because research participants select themselves into walking environments. Thus, the methodology cannot explain puzzling findings, such as when more walking is being reported in the presence of barriers to walking, including such as heavy traffic (Brownson et al., 2001; Troped et al., 2003) and hills (Brownson et al., 2001; Chad et al., 2005). Similarly, the studies do not explain why men and women report different associations between walking and perceived environmental features such as access to walking paths and destinations, pleasant scenery, traffic, and perceived safety (Humpel, Marshall, Leslie, Bauman, & Owen, 2004; Humpel, Owen, Iuerson, Leslie, & Bauman, 2004; Suminski, Poston, Petosa, Stevens, & Katzenmoyer, 2005). Such results may be due to differential exposure to environments, differential perceptions of the same environments, or complex interactions between participant characteristics and environmental exposures and perceptions. More definitive results regarding the roles of objective and perceived aspects of the
environment require data on the actual environment and participants’ perceptions of the exact same environment.

### Walkable and Nonwalkable Places

A second line of research focuses more on actual physical environments and typically samples areas hypothesized to represent good and poor walkability. This research is published in a variety of disciplinary outlets, including transportation, planning, and health journals. The research involves a wide variety of sample sizes from small contrasts of two particular subdivisions to larger scale studies of areas characterized by Geographic Information Systems (GIS) assessments of walkability. This strategy provides more information about ecologically valid configurations of environmental features and is consistent with the transactional assumption that multiple aspects of the environment support, encourage, and shape behavior. For example, compared with lower-density suburban designs, more walking has been reported in neighborhoods designed with New Urbanist features: small residential lot sizes, gridded narrow streets, and relatively dense mixtures of houses and apartments, (Brown & Cropper, 2001; Handy, 1996; Saelens, Sallis, Black, & Chen, 2003). Generally, reviews show that a combination of density, diverse land uses and destinations, and pedestrian-friendly designs such as good street or sidewalk connectivity enhance walking (Cervero & Kockelman, 1997; Li, Fisher, Brownson, & Bosworth, 2005; Saelens, Sallis, & Frank, 2003). Walking is less likely in sprawling areas without these design supports (Ewing, Schmid, Killingsworth, Zlot, & Raudenbush, 2003; Frank, Andresen, & Schmid, 2004). These studies provide additional information on the physical environment, although often at a large scale, such as for street grid networks. These studies’ findings are also still subject to the possibility that participants select into particular types of neighborhoods.

### The Current Experiment

The environmental correlates studies and walkable place studies show that environments perceived to be walkable and environments designed to combine many walkable features support more walking. However, both lines of research often rely on participants’ recalls of large areas, such as neighborhoods, and over a number of days, such as the last week or month. Thus these studies cannot answer the question of whether participants exposed to the
same walking environment would perceive the environment in the same way. In the current study, we combined exposures to the same walking environment with subjective and objective ratings of the environment.

The task of studying walkability is eased by recent efforts to construct audit tools to measure the environmental features believed to support walkability. Day and Boarnet (Boarnet, Day, Alfonzo, Forsyth, & Oakes, 2006; Day, Boarnet, Alfonzo, & Forsyth, 2006) have developed a fairly comprehensive audit to assess environments for their potential to support walking and other physical activities. The Irvine-Minnesota audit measures accessibility, pleasurability, and perceived safety from traffic and crime.

Walkability audits provide a rigorous tool to apply to topics of long-standing interest to environment and behavior researchers. In 1959, Kevin Lynch had participants walk about five blocks while describing what they noticed (Lynch, 1980). His participants confirmed the importance of very small-scale environmental features, such as sidewalks. Moreover, participants noticed small-scale qualities of the sidewalks, such as their width and upkeep. Other small-scale details of the environment, which are often not assessed in the recent environmental correlates and walkable place studies, were also important. The design of striking and pleasing buildings, the focal point of a bookstall on a sidewalk, and commercial or street signs along the way were also salient features of good walks. Relatively few studies have subsequently addressed whether these immediate “microfeatures” of the physical environment for walking might yield more positive walking experiences. A transactional approach assumes that the physical environment and psychological experiences are integral parts of a pedestrian event. Past research does show that walking in green rather than urban settings relates to more positive moods and lower blood pressure (Hartig, Evans, Jamner, Davis, & Garling, 2003). Another study shows that pedestrians rate pathways according to immediate environmental cues such as “weather, sound, water, light and edge of space” (Naderi & Raman, 2005). The current study extends the assessment of pedestrian experience by having volunteers describe their experiences on downtown walking routes selected to vary in walkability features, according to the Irvine-Minnesota audit tool.

We address several research questions. When environments are rated as more walkable via objective environmental audits by trained and reliable auditors, will participants experience those walks more positively, according to open-ended and closed-ended assessments? Conversely, when environments are characterized by low walkability, according to objective audits, will participants experience those walks more negatively? When environments have mixed walkability features, will participants experience them with as
mixed positive and negative places? We then examine what salient and potentially modifiable features supported or detracted from walkability.

Method

Participants

Participants for the current two studies of slightly different walks were University of Utah male and female undergraduates, recruited during the 2004-2005 academic year from social science classes for class credit or extra credit. Study 1 included 7 male and 19 female participants (mean age = 23.96 years, range = 19 to 39 years, SD = 5.29), and Study 2 included 18 males and 29 females (mean age = 24.17 years, range = 18 to 51 years, SD = 7.45).

Design, Procedures, Settings, and Routes

Experimental design and procedures. A 2 (gender) x 3 (walkability of route) between- and within-participants design allowed us to examine how students experienced a contiguous route with distinct segments selected to include low-, mixed-, and high-walkability design features. As explained below, slightly different routes were chosen in Study 1 and Study 2. In both studies, each participant met an experimenter-guide at a campus light rail station, signed the informed consent form, and completed a demographic questionnaire while taking the 20-min ride to the common starting point in downtown Salt Lake City, UT. The guide explained that the study took about 2 hrs and was about “how people experience different aspects of their environments.” For the outbound one half of each walking route, participants were asked to describe “your experiences during the walk...what is most salient to you as you walk. Feel free to mention anything that you like/dislike, enjoy/don’t enjoy.” Comments were tape-recorded, with the guide nearby to define the beginnings of walk segments 1, 2, and 3 and to provide directions, but otherwise maintaining neutrality during the walk. For the return trip, the route was retraced, and at the end of each segment, the participant was asked to rate the just-traversed section on an 18-item questionnaire. The route was also rated by trained raters using an environmental audit.

Environmental setting. The route chosen was typical for areas undergoing downtown redevelopment, especially around rail transit stops. The high-walkable segment included a new outdoor mixed-use mall, with apartments
and condos over the shops, as shown in Figure 1. Mall attractions included restaurants, movies, and shops. Pedestrian amenities were plentiful and included narrow roads, benches, a fountain, and posted maps and signs. The mixed-walkable segment was on the noncommercial (back) side of the mall, with the new 2- to 3-story rental apartments on one side of the street and a large rail yard, empty lots, and seemingly abandoned buildings on the other side (see Figure 1). The low-walkable segment included a homeless shelter dominating one block, a power substation, empty warehouse, and vacant lots (see Figure 1). Although some studies focus on differences between walking for pleasure and walking for instrumental reasons, such as shopping or to get to transit, the walkable area in the current study combines both—it is known to be a leisure destination where people enjoy features such as a fountain and plaza but also has stores where individuals can shop.

**Route differences across studies.** During Study 1 we found that at certain times of the day, a somewhat rowdy group of individuals was waiting outside the shelter and our participants were sometimes panhandled or verbally abused. To prevent any further problems, we altered the low-walkable route slightly and considered all participants from that point on to be in Study 2 (the high- and mixed-walkable segments of the route remained the same). Specifically, we slightly shortened the low-walkable route to allow pedestrians to see into the block with the homeless shelter but to avoid walking directly in front of the shelter. The objective ratings of physical features for the two low-walkable routes were the same because the views, presence of the homeless shelter, and existing physical structures did not change. However, the objective ratings of social milieu by the trained raters were more positive for the shorter, low-walkable route used in Study 2. Participant experiences of the low-walkable area were also different across the two studies. Whereas participants in Studies 1 and 2 referred to homeless individuals, only in Study 1 did participants remark on how aggressive the homeless individuals had been around the homeless shelter. We also instructed research assistants to provide more prompting for en route comments from participants, given that some participants had been reticent in Study 1. Although differences across the studies were slight, they require separate analysis of Study 1 and Study 2.

**Measures and Reliability Tests**

**Environmental audit of routes.** To confirm that segments differed in walkability and to characterize those differences, four trained raters used a
Figure 1
Examples of High-, Mixed-, and Low-Walkability Segments
prepublication version of the Irvine-Minnesota Inventory, an audit of environmental features supportive of walking and other physical activities (Boarnet et al., 2006; Day et al., 2006). The rating system identifies four classes of environmental walkability features, most of them dichotomous items, which were averaged. Traffic safety \((n = 38\) items) includes crosswalks, safety features around crosswalks (such as visibility flags for pedestrians to carry, striping to highlight the crosswalk), bicycle lanes, and so on. Crime safety \((n = 11\) includes the absence of environmental incivilities such as litter, weeds, vacant lots, broken windows, and so on. Pedestrian accessibility involves ease of access to desired destinations. Pedestrian accessibility features include four specific composites: density—building height \((i.e., \text{number of stories in buildings along the street}, n = 1\) ), diverse land uses \((i.e., \text{number of land use categories}, n = 58\) ), pedestrian amenities \((\text{non-safety features for comfort such as benches or restrooms}, n = 6\) ), and pedestrian access \((i.e., steepness, broken sidewalks, or barriers to access, n = 28\) ). The fourth general category—pleasurability—includes two specific composites: natural features \((\text{parks, trees, flowers, etc.}, n = 25\) ), and pleasant aesthetics, such as festive urban design elements \((\text{awnings, fountains, artwork}, n = 28\) ).

Based on preliminary site visits, we supplemented the Irvine-Minnesota audit with two new sets of items: (a) two items indicating whether pedestrians were buffered from automobile traffic \((\text{parking strip, street islands})\) which were combined with the Irvine-Minnesota traffic safety composite \((\text{resulting } n = 40\text{ total items})\) and (b) social milieu, items describing the social feeling of the area \((\text{friendly, exciting, dull, etc.})\); the frequency of people on the segment \((\text{none, one, some, many})\) who looked reputable, neutral, or disreputable; as well as whether there were adults, teens, and children present \((\text{yes/no}, n = 23\) ). Although social features of a place might vary over time, subsequent interrater reliabilities demonstrated sufficient consistency to retain these ratings. We felt that impressions made by the social milieu were sufficiently strong that it was important to include these, even though this required developing new measures.

Four trained observers used the Irvine-Minnesota audit and the social milieu audit to rate all three walk segments, with the third author serving as the standard for reliability tests. During daylight hours, three raters assessed the area at the same time and without conferring; because of schedule conflicts, the fourth rater assessed the area at a different time. Instructions for the audit recommend using percentage agreement instead of Cohen’s kappa for interrater reliabilities to avoid underestimating agreement for measures with
low base rates and small samples (Boarnet et al., 2006); as a conservative assessment of reliability, we used both tests. For our segments, there were at most 220 judgments (but fewer when elements were absent, such as no park to rate for attractiveness), and 175 of these required dichotomous judgments. Across the three walk segments and different rater pairs, percentage agreement for all 203 judgments ranged from 92% to 100% (r’s ranged from .84 to 1.00). For the subset of 175 dichotomous judgments, Cohen’s kappa ranged from .83 to 1.0 and percentage agreement ranged from 92% to 100%. The social milieu ratings are included in these numbers. Separate examination indicated that the three raters who were in the area at the same time agreed 98% of the time (agreement for ratings at a different time was 81%, which we believe indicated the fluidity of the social environment); r’s(21) ranged from .99 to 1.0. Thus, for all three segments, interrater agreement was quite high.

**Participants’ open-ended comments.** The open-ended recordings of participants’ experiences during the walk were transcribed and coded for themes related to walkability (because of equipment malfunction, Study 1 n = 21; Study 2 n = 39). Participants’ comments were first divided by the fourth author into meaningful codable segments. After extensive discussions and refinement of category definitions based on difficult and ambiguous comments, a trained coder categorized all comments for substantive content and valence of affective tone—positive, neutral, or negative evaluations of the feature. Negative comments were subtracted from positive to compute a single index for each category for each study. Seven categories resulted, with definitions and examples in Table 1. An eighth category, general atmosphere, contained statements so general that it was not clear whether they referred to attractiveness, amenities, social milieu, or environmental safety; these are summarized along with other mean statements per category by segment in the appendix. A second independent coder rated a random sample of 52% of the participants’ transcripts. For the 21 reliability estimates on the difference scores (7 categories × 3 walk segments), the median correlation coefficient was .90 (range = .67 to .97).

**Closed-ended questionnaires.** The 18-item questionnaire for each route segment addressed traffic concerns and other pleasant or unpleasant features of the walk; these were rated on 5-point Likert-type scales (strongly agree to strongly disagree), with seven items reversed to reduce response biases. After dropping two items, principal components analyses (PCA) indicated a simple
Table 1
Coding System Category Definitions and Positive (+) and Negative (−) Examples for Participant En Route Comments

<table>
<thead>
<tr>
<th>Category</th>
<th>Positive (+)</th>
<th>Negative (−)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traffic safety</td>
<td>“I do like the fact that the sidewalks are separated from the street itself. It gives you kind of a boundary and a little bit of protection from the streets”</td>
<td>“There are a lot of cars; hopefully I don’t get run over.”</td>
</tr>
<tr>
<td>Physical environmental safety</td>
<td>“It’s a well-lit walkway . . . I can see that it would be a well-lit walkway if it were night, which is good . . . it makes me feel like it would be safe to come here at night.”</td>
<td>“Passing some kind of a parking lot that says ‘park at your own risk.’ That’s comforting.”</td>
</tr>
<tr>
<td></td>
<td>“But what I didn’t like is . . . there was a lot of litter on the ground which made it kind of uncomfortable and kind of apprehensive walking, especially if I was by myself.”</td>
<td></td>
</tr>
<tr>
<td>Social milieu</td>
<td>“There are kids here jumping around, playing, which is fun. I’d like to see more kids . . . come here and have a good time;”</td>
<td>“A lot of homeless people which kind of makes it scary.”</td>
</tr>
<tr>
<td>Aesthetics, natural features</td>
<td>“This is really nice because there are trees, the trees kind of have like flower gardens around and everything. It makes it seem very inviting;”</td>
<td>“[This area] is not very attractive, it’s ugly;”</td>
</tr>
<tr>
<td></td>
<td>“[The one thing that I did not like about it was the big train whistle in the background. I felt that detracted from the area.”</td>
<td></td>
</tr>
<tr>
<td>Pedestrian amenities</td>
<td>“It just looks inviting because there are benches to sit on;”</td>
<td>“There is no where to sit;”</td>
</tr>
<tr>
<td></td>
<td>“Good map for the whole entire [shopping area]”;</td>
<td>“Probably what I didn’t like about it is I didn’t see too many signs—wayfinding signs, so that you can locate where you are in the area, and if you are looking for a specific place . . . I didn’t see too many of those;”</td>
</tr>
<tr>
<td>Pedestrian access</td>
<td>“The footpaths are wide, so that’s good.”</td>
<td>“The sidewalks is paved well so it doesn’t make it at all bad to walk on.”</td>
</tr>
</tbody>
</table>
two-factor structure for all three segments (using varimax rotations) that was similar in both studies. The two factors are Traffic Safety and Pleasant Atmosphere. Sample traffic safety items include: “I felt safe from traffic walking in this area,” “drivers yielded to pedestrians,” “there is too much traffic along this segment of the route,” and “traffic moves too fast along this segment.” Examples of pleasant atmosphere items include: “the walk was unpleasant,” “this area is well maintained,” “there were attractive views,” “the area was vibrant,” and “I would come back to this area again.” As appropriate, items were reversed for analyses so that high scores always indicate a positive or safe atmosphere. Coefficient alphas for these scales were acceptable, ranging from .74 to .93 (see Table 2).

Results

Walk Segments: Environmental and/or Social Audit

According to the audit, the most walkable segment had superior traffic and environmental safety, a pleasant social milieu, more positive aesthetics, more natural features, more pedestrian amenities, and a greater diversity of destinations. Table 3 shows the mean subscale scores for the Irvine-Minnesota environmental audit and our additional subscale relating to social milieu. Subscales are summed scores with different possible ranges of scores, depending on the number of items and response metric (dichotomous or 3-point ratings). As needed, ratings were reversed so that all scores
indicate more walkability and safety. Ratings shown are of the route used in Study 2, which provides a conservative test of the differences, given that the social milieu for the nonwalkable Study 1 segment was clearly more negative.

In the analysis of these objective ratings, the overall multivariate test was significant, Wilks's lambda criterion multivariate, $F(14, 6) = 64.04, p < .001$, partial $\eta^2 = .99$. All but two of the subscales (Density and Pedestrian Access) yielded significant main effects, with $p < .05$. The patterns were similar for all of the significant effects, with the least walkable segment rated significantly less walkable than the most walkable segment. For the subscales Traffic Safety, Social Milieu, and Land Use Diversity, the mixed segment was intermediate (i.e., significantly different from the other two segments); pedestrian amenities only occurred in the mixed and walkable segments, and differed significantly, $t(6) = 16.97, p < .001$. For the most part (i.e., for seven of nine composites), we were successful in demonstrating construct validity for our selection of three walk segments that differed significantly in their environmental supports for walkability and that should create different experiences for our participants.

Table 2
Questionnaire Closed-Ended Judgments of Pleasant Atmosphere and Traffic Safety by Guided Walk Participants: Coefficient Alpha Reliability Tests and Means by Route Segment

<table>
<thead>
<tr>
<th>Route Walkability</th>
<th>Low</th>
<th>Mixed</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pleasant Atmosphere</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alpha Study 1</td>
<td>.80</td>
<td>.91</td>
<td>.93</td>
</tr>
<tr>
<td>Study 2</td>
<td>.85</td>
<td>.90</td>
<td>.92</td>
</tr>
<tr>
<td>Mean Study 1</td>
<td>2.26a</td>
<td>3.48b</td>
<td>4.53c</td>
</tr>
<tr>
<td>Study 2</td>
<td>3.17a</td>
<td>3.02a</td>
<td>4.12b</td>
</tr>
<tr>
<td>Traffic Safety</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alpha Study 1</td>
<td>.80</td>
<td>.84</td>
<td>.74</td>
</tr>
<tr>
<td>Study 2</td>
<td>.78</td>
<td>.75</td>
<td>.77</td>
</tr>
<tr>
<td>Mean Study 1</td>
<td>3.50a</td>
<td>4.03b</td>
<td>3.98a</td>
</tr>
<tr>
<td>Study 2</td>
<td>3.45a</td>
<td>3.84b</td>
<td>3.95b</td>
</tr>
</tbody>
</table>

Note: Ratings use 5-point scales, where 5 is most positive. Within rows, means with different subscripts differ at $p < .05$ by a priori $t$ tests.
Participant Experiences

No significant main or interactive effects emerged for the order in which segments were walked (high, mixed, then low walkable or low, mixed, then high walkable), so we collapsed across that factor. We tested for main and interactive effects for participant sex but collapsed results because only one significant effect emerged, as noted below. Because Studies 1 and 2 yielded similar results, they are discussed together. Although open-ended responses were recorded first to avoid alerting participants to our specific questions, we discuss the results of the closed-ended questionnaires first, followed by open-ended comments.

Closed-ended judgments. As shown in Table 2, results supported the hypotheses that participants would perceive the walkable segment to be more pleasant and to have greater traffic safety. The low- and high-walkable segments were clearly different, with the low-walkable segment means ranging from 2.26 to 3.50 and the high-walkable segment means ranging from 3.95 to 4.53. The mixed-walkable segment was perceived as more mixed, resembling the low-walkable segment once, the high-walkable segment twice, and

Table 3
Means for the Environmental and/or Social Audit by Four Trained Raters

<table>
<thead>
<tr>
<th></th>
<th>Low</th>
<th>Mixed</th>
<th>High</th>
<th>F (2,9)</th>
<th>Partial η²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traffic safety</td>
<td>.61ab</td>
<td>.68b</td>
<td>.74c</td>
<td>19.02**</td>
<td>.81</td>
</tr>
<tr>
<td>Environmental safety</td>
<td>.89a</td>
<td>.82a</td>
<td>1.23b</td>
<td>119.57**</td>
<td>.96</td>
</tr>
<tr>
<td>Social milieu</td>
<td>1.08a</td>
<td>2.46b</td>
<td>5.10c</td>
<td>192.61**</td>
<td>.98</td>
</tr>
<tr>
<td>Aesthetics</td>
<td>.45a</td>
<td>.40a</td>
<td>.75b</td>
<td>27.38**</td>
<td>.86</td>
</tr>
<tr>
<td>Natural features</td>
<td>.37a</td>
<td>.49b</td>
<td>.50b</td>
<td>11.92**</td>
<td>.73</td>
</tr>
<tr>
<td>Pedestrian amenities</td>
<td>.00</td>
<td>.29a</td>
<td>1.29b</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Pedestrian access</td>
<td>1.00</td>
<td>1.06</td>
<td>1.00</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Diverse land use</td>
<td>.43a</td>
<td>.38b</td>
<td>.53c</td>
<td>54.92**</td>
<td>.92</td>
</tr>
<tr>
<td>Density-building height</td>
<td>2.50</td>
<td>1.75</td>
<td>2.00</td>
<td>.33</td>
<td>.07</td>
</tr>
</tbody>
</table>

Note: Higher scores indicate more walkability. Zero variance cells for Access and Amenities preclude F tests. Amenities mixed vs. high t(6) = 16.97, p < .01. Within rows different subscripts indicate where means differ, with Tukey’s post hoc tests at p < .01 level, except “Traffic Safety” where p < .05. N = 4.

*p < .05. **p < .01.
significantly different from and in between the low- and high-walkable segments once. All tests use Huynh–Feldt adjustments for lack of sphericity and two-tailed protected $t$ tests for comparisons between means.

Participants judged Traffic Safety to increase with walkability, Study 1, $F(1.61, 38.62) = 6.84, MSE = .320, p < .005, \eta^2 = .222$; Study 2, $F(1.84, 82.88) = 12.61, MSE = .271, p < .000, \eta^2 = .219$; Sex main effect, $F(1, 45) = 5.74, MSE = .790, p < .02, \eta^2 = .110$. The sex main effect in Study 2 occurred because male participants were more positive than females (3.93 vs. 3.56) regarding Traffic Safety. In both studies, participants judged the Pleasant Atmosphere scores to increase with increases in walkability of the segment; Study 1, $F(1.84, 44.19) = 82.92, p < .000, \eta^2 = .776, MSE = .348$; Study 2, $F(1.81, 81.58) = 30.06, p < .000, \eta^2 = .400, MSE = .580$.

**Open-ended comments.** Although most of the themes derived from the content analysis of open-ended comments paralleled those in the environmental audit, there were some differences. Because of low frequencies in the natural features category during winter, we combined environmental aesthetics and natural features into a single category of “attractiveness.” Density did not emerge as a category, perhaps because building height was typically uniform at 2 to 3 stories (and only four participants mentioned building height).

As shown in Table 4, participants reported more net positive comments (i.e., positive minus negative comments) on the high-walkable segments. Bonferroni adjusted critical values of $F$ for the seven measures were used (Maxwell & Delaney, 2004). In Study 1, participants commented more positively on environmental safety, attractiveness, and social milieu in the high-walkable segments. In Study 2, participants commented more positively on those three categories plus pedestrian amenities. For example, in the high-walkable segments, participants commented on artistry and attractiveness of the shops and store windows (attractiveness). They liked wading pools, benches and shade (pedestrian amenities), the pleasure of watching people enjoying themselves (social milieu), and cleanliness and upkeep (physical environmental safety).

**Positive, neutral, and negative comments.** To this point, we emphasized comparisons among the three walk segments, using a net score (positive comments minus negative comments) for the open-ended comments. To illustrate how salient various features were, the appendix provides, for each walk segment, the original mean number per person of positive, neutral, and negative comments. Neutral comments were simply descriptive and did not
### Table 4
Open-Ended Remarks: Net Positivity About Each Segment of the Walk

<table>
<thead>
<tr>
<th>Study 1</th>
<th>Study 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walkability of Segment</td>
<td>Walkability of Segment</td>
</tr>
<tr>
<td>Low</td>
<td>Mixed</td>
</tr>
<tr>
<td>Traffic safety</td>
<td>$-.19$</td>
</tr>
<tr>
<td>Environmental safety</td>
<td>$-1.24_a$</td>
</tr>
<tr>
<td>Attractiveness</td>
<td>$-.10_a$</td>
</tr>
<tr>
<td>Social environment</td>
<td>$-1.19_a$</td>
</tr>
<tr>
<td>Pedestrian amenities</td>
<td>$.05$</td>
</tr>
<tr>
<td>Pedestrian access</td>
<td>$-.24$</td>
</tr>
<tr>
<td>Land use</td>
<td>$.05$</td>
</tr>
</tbody>
</table>

Note: Scores are number of positive comments minus number of negative comments. All $F$ values represent the main effect for segment except for Study 1, social milieu, which shows the linear trend, $F(1, 19) = 8.15$. With alpha set at .05, Bonferroni adjustments for the seven variables yield a critical value for Study 1 of $F_{crit} = 8.09$, and for Study 2, $F_{crit} = 7.68$ (Maxwell & Delaney, 2004). Within each row and separately for each study, means with different subscripts differ at $p < .05$ by two-tailed a priori $t$ tests. Huny-Feldt adjusted degrees of freedom: Study 1, environmental safety (1.51, 28.73); amenities (1.67, 33.30); access (1.70, 32.21); Study 2, environmental safety (1.86, 68.77), amenities (1.39, 51.23); land use (1.82, 67.38). In Study 1, for pedestrian amenities and land use, segment is the only factor, and error degrees of freedom are 40; sex could not be included as a factor because males did not use the category in at least one segment.

*p < .05 with Bonferroni adjustment.
convey identifiable positive or negative affect. The appendix includes separate means for comments in Studies 1 and 2 (left and right halves of the table, respectively) by evaluative tone of the comments (see Negative, Neutral, and Positive columns) and segment walkability (see low-, mixed-, and high-walkability in top, middle, and bottom rows, respectively). For example, examination of the far right column shows that the category attractiveness was mentioned positively 2.92 times per person in the low-walkable segment, 3.62 times in the mixed-walkable segment, and 5.62 times in the high-walkable segment.

In addition to allowing the interested reader to peruse the original scores, this table is useful for exploring what aspects about these environments were most salient, and to consider whether future objective audit tools should expand to include new categories. For simplicity and because of the larger sample, this discussion considers only scores for Study 2.

Participants commented most frequently on the relative attractiveness of built and natural environmental features, with an approximate average of 5 mentions (negative + neutral + positive) in the low-walkable and more than 7 each in the mixed- and high-walkable segments. In the high-walkable segment, more than 5 of the 7 remarks were positive and fewer than 1 was negative. In contrast, in the low-walkable segment, a mean of 2.9 of the five remarks were positive whereas 1.7 were negative. Thus for these frequently noticed features, positive comments dominated in the high-walkable segment whereas positive and negative comments were more evenly distributed in the low-walkable segment.

Many comments concern crime safety, whether safety was inferred from the absence or presence of environmental incivilities (environmental safety), or from the kinds of people present and their activities (social milieu). These comments far exceeded traffic safety in frequency and—presumably—in salience. Crime safety comments were frequently negative in the low- and mixed-walkable segments and almost uniformly positive in the high-walkable segment. Note that other types of features noticed along the walks evoked more neutral comments. For example, participants frequently pointed out particular buildings (land uses) but without clear affective evaluation (‘‘there is a street vendor’’ or ‘‘lots of clothing stores’’). Perhaps with prompting, participants might have been able to clarify that neutral comments were really negative or positive; however, no prompting was needed for eliciting affect about environmental safety.

Note also that many comments about social milieu were neutral because they could not be labeled as negative or positive; however, their total
number underscores the salience of people in the urban scene. Pedestrian amenities also distinguish the segments, but in a different way from that uncovered by the environmental audit. The audit demonstrated that more amenities were present on the high-walkable than mixed-walkable segments (1.29 vs. .29; no amenities were observed by auditors on the low-walkable segment). However, the appendix shows how the amenities were especially salient in the high-walkable segment, evoking numerous positive comments (2.72). Providing pedestrian amenities appears to be a relatively low-cost way to enhance the perception of walkability.

**Discussion**

The current study revealed that a downtown area can vary substantially in walkability across a few adjacent blocks and that pedestrians are quite sensitive to these different levels of walkability. Trained raters, using the Irvine-Minnesota environmental audit tool and our own social audit tool, found that segments chosen to vary on walkability indeed differed significantly on most (i.e., 7 of 9) physical and social features. The lack of difference on building height and pedestrian access is not surprising, as the area is small and has fairly consistent building heights and pedestrian infrastructure. However, substantial differences were due to the types of facilities, their architectural and decorative styles, and the social scene they attracted. The objective ratings showed that the more walkable segment had multiple safety indicators in terms of less traffic, fewer environmental incivilities, and a more pleasant social milieu. In addition, the provision of more pleasing built environment aesthetics, natural features, and pedestrian amenities created an environment that pedestrians could enjoy.

Participants’ ratings also distinguished between walkable and less walkable segments. Spontaneous comments were made before they saw the rating scales and therefore should reflect the social and environmental information most salient to them. In fact, naïve participants reported noticing most of the features that walkability advocates have identified. The more walkable segments garnered more positive mentions of the social milieu, environmental safety cues, attractive built and natural features, and (in Study 2) pedestrian amenities. Consistent with the trained observer audit ratings, pedestrian access comments did not differ substantially (and there were few comments about density). Furthermore, the questionnaire ratings confirmed that participants judged the more walkable segments to
be more pleasant, including perceptions that it was attractive, vibrant, interesting, and well-maintained. Thus, there was substantial agreement that environments designed with walkability features were noticeably more pleasant and walkable, based on open-ended comments and the more directed closed-ended judgments.

Note that the results of this microlevel in-depth examination of walkability can be contrasted with typical results from macro-scale correlational studies. Many of the larger scale correlational studies measure walkability by focusing exclusively on density and pedestrian accessibility (e.g., sidewalk network completeness, intersection density, average block size) because those are the only walkability indicators that are available from existing Census or GIS databases. Such databases may provide good measures of density and land use diversity; however, pedestrian-friendly design also plays an important role in walkability (Cervero & Kockelman, 1997). Significant differences arose in the current study even across blocks that would have been rated equally walkable via larger scale density and sidewalk access measures. Understanding these microlevel design features that support walking has been deemed the “newest frontier in travel research” (Ewing & Cervero, 2001, p. 102). Future research is needed to establish generalizability using more varied participants and places.

The open-ended comments give a sense of the differences between macro GIS measures and micro en route measures. The environmental characteristics that evoked the most clearly evaluative comments involved those related to safety from crime. The high-walkable segment had almost uniformly positive comments whereas the mixed- and low-walkable segments evoked comments that were clearly negative a majority of the time. Given how basic a feeling of safety is for pedestrians, future research is needed to determine if safety is always perceived in such an extreme and uniform fashion. Although correlational studies have noted several sex differences in perceived walkability, the current study yielded only one sex difference, with males more satisfied with traffic safety. Sex differences may emerge in correlational studies because males and females may visit different places in the neighborhood or they may notice different aspects of the same environment, or both. The more experimental methodology in the current study allowed us to have males and females experience the same environment, and the results suggest similar perceptions. Several studies found that females perceive more crime problems on walks than males; however, the current study did not. Our participants were accompanied by a research assistant, in daytime conditions in Salt
Lake City, a city not known for crime. Although participants in Study 1 had some unpleasant encounters with homeless individuals, the conditions did not evoke any gender differences in ratings of crime safety. Gender differences have been found in other research on walkability and fear of crime. A recent review suggests that older women, non-White women, or lower income women may be more fearful; similarly, certain places, such as parking garages and transit stops, may evoke greater fear (Loukaitou-Sideris, 2006). Females may be especially sensitive to fear cues when they are alone (Warr, 1990) and are less likely to walk alone or at night (Clifton & Livi, 2005). Several participants—male and female—explicitly said they would not be in the mixed- or low-walkable segments alone or at night.

Participant comments also suggested a new role for the social milieu. Past research on social factors in walking has related to social support for exercise, social modeling of exercise, or having company for exercise (Addy et al., 2004; Ball et al., 2001; Booth et al., 2000; Chad et al., 2005; De Bourdeaudhuij, Teixeira, Cardon, & Deforche, 2005). Although these features may be important for planned bouts of exercise, in the current study the presence of people played a different role. Our pedestrians enjoyed people watching on segments they considered to be good walks. Many commented on how much they enjoyed seeing other people enjoying themselves, or how they often visited certain features in part because they knew others would be drawn there as well (e.g., a symbol of The Salt Lake City 2002 Olympics, a fountain where children played). In contrast, our participants were made uncomfortable by or disliked seeing panhandlers, transients, and people sleeping on the sidewalk. Although many expressed fear of these people, many others expressed empathy and described feeling guilty they had so much whereas these people had so little. Some people thought it was good for middle-class people to be exposed to the urban poor, and others thought it was too uncomfortable and unsafe. Thus, in addition to physical features, the social climate of an area emerged as one of the most important features people noticed and commented on. It is possible that social milieu may not be as salient in more familiar areas near home. However, in this public setting with many varied users, social milieu is a key evaluative factor and had little to do with social models of exercise or partners for exercise. Consistent with our transactional approach, which seeks to identify multiple positive supports for behavior, the entertainment value of the social scene should not be overlooked as a positive support for walking.

Future users of environmental audit instruments may want to supplement them with social audits as well. The Irvine-Minnesota scale was not
intended to measure social factors, and its developers note that the field’s efforts at social audits have so far proved only modest in reliability (Boarnet et al., 2006). Although the instrument used in the current study was a simple one, it was useful and reliable (as long as the raters were in the area at approximately the same time and could observe similar social scenes). Future research is needed to clarify whether social audits are feasible in other situations that might require extensive time sampling to adequately characterize rapidly changing social scenes.

Given downtown economic-development interests in getting people to frequent downtown areas, it may be useful to appreciate the holistic experience of downtown trips. It is not just a particular store but also the social and environmental sights along the way that can foster a pleasant downtown experience. In our own research we have found that good light rail transit can create more interest and excitement in visiting downtown (Brown, Werner, & Kim, 2003). Whyte’s (1980) analysis of good plaza designs suggests that downtown uses are enhanced by good seating, urban design features, and the ability to choose pleasing parts of the setting to visit. In urban areas, good designs for sitting may also be good designs for walking. Thus, it is important to focus on the range of social and environmental qualities that support walking. The key to walking in urban areas may be the ability to achieve multiple goals, such as running errands, enjoying scenery and social milieu, avoiding the hassle and cost of driving, and enjoying the health benefits of walking.

These results are especially important to keep in mind for downtown redevelopment and transit-oriented development areas. One way in which downtowns compete with suburbs is by offering diverse and varied destinations well connected by sidewalks and transit. However, many transit-oriented developments are better described as transit adjacent instead of transit oriented. Indeed all of the walks included in the current study were within a half-mile of a rail transit stop. Although some segments of the walk were quite pleasant, others were not. These pedestrian-unfriendly areas could serve as priority targets for pedestrian improvements. However, this seemingly simple recommendation can also prove to be controversial. For example, although the homeless shelter itself received positive comments for its appearance and maintenance, the larger area around the homeless shelter was distinctly pedestrian unfriendly. Urban areas are known for diverse land uses, including homeless shelters. These results should not be used as an argument for removing homeless shelters but rather used as grounds for improving the physical conditions surrounding those areas to
benefit homeless clients and other downtown pedestrians. In fact, there were 14 comments that participants thought it strange \((n = 8)\) or guilt inducing \((n = 6)\) to site a new shopping area right next to the low-income service area. Given that most urban areas have both, downtown advocates have additional reasons to promote good quality services for homeless individuals. The encounters with homeless individuals that disturbed our participants might not have happened if homeless individuals had places to go at all times, instead of having to wait for the shelter to open for the evening.

Recalling the diverse audiences interested in walkable places—health researchers, social equity proponents, downtown advocates, and environmentalists—all can benefit from knowing how to create downtown walkability. Health researchers can benefit from a focus on urban walkability, given that the world is rapidly urbanizing. In addition, the current study suggests more attention is merited for the role of urban design in walking. Several large-scale health studies associated walking with density and diverse destinations; the current study highlights the importance of small-scale social and environmental features to support walking. Social equity proponents may find that walking studies can provide additional support for economic development and housing initiatives. In the current study, although the homeless shelter was unpopular with our participants, the high-walkable area included a number of affordable housing apartments above the stores. Thus, mixed-income areas can be attractive and functional, serving individuals of all economic backgrounds. Downtown advocates might be able to promote health and safety by publicizing the presence and availability of safe walking paths and their health consequences. Good directories at major transit stops and other central locations might allow pedestrians to take advantage of more destinations and promote local businesses and services at the same time. Directories could even be supplemented with pedestrian mileage signs to allow pedestrians to gauge distances and perhaps be more aware of the benefits of healthy downtown walks. Finally, environmentalists might be interested to see whether downtown walks can substitute for car trips, thereby reducing air pollution levels. We believe that research aimed at urban design that incorporates the benefits of walkable environments might help catalyze a coalition of diverse interests around improving downtown environments and other urban areas. All of these interest groups may focus on particular positive aspects of walkability; consistent with a transactional approach, we believe walking is fostered when all of these positive aspects of walkability can be combined into meaningful pedestrian-friendly settings.
# Appendix

## Mean Number of Comments per Participant by Walkability Segment and Affective Tone

<table>
<thead>
<tr>
<th></th>
<th>Study 1 (N = 21)</th>
<th>Study 2 (N = 39)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Negative</td>
<td>Neutral</td>
</tr>
<tr>
<td>Low-walkability segment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Traffic safety</td>
<td>.29</td>
<td>.43</td>
</tr>
<tr>
<td>Environmental safety</td>
<td>1.29</td>
<td>.10</td>
</tr>
<tr>
<td>Social milieu</td>
<td>1.43</td>
<td>.33</td>
</tr>
<tr>
<td>Attractiveness</td>
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<td>.76</td>
</tr>
<tr>
<td>Pedestrian amenities</td>
<td>.00</td>
<td>.00</td>
</tr>
<tr>
<td>Pedestrian access</td>
<td>.29</td>
<td>.05</td>
</tr>
<tr>
<td>Land use</td>
<td>.00</td>
<td>.29</td>
</tr>
<tr>
<td>General atmosphere</td>
<td>.24</td>
<td>.05</td>
</tr>
<tr>
<td>Mixed-walkability segment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Traffic safety</td>
<td>.29</td>
<td>.29</td>
</tr>
<tr>
<td>Environmental safety</td>
<td>.76</td>
<td>.24</td>
</tr>
<tr>
<td>Social milieu</td>
<td>.33</td>
<td>.57</td>
</tr>
<tr>
<td>Attractiveness</td>
<td>1.43</td>
<td>.91</td>
</tr>
<tr>
<td>Pedestrian amenities</td>
<td>.05</td>
<td>.05</td>
</tr>
<tr>
<td>Pedestrian access</td>
<td>.10</td>
<td>.00</td>
</tr>
<tr>
<td>Land use</td>
<td>.10</td>
<td>.38</td>
</tr>
<tr>
<td>General atmosphere</td>
<td>.38</td>
<td>.14</td>
</tr>
<tr>
<td>High-walkability segment</td>
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<td></td>
</tr>
<tr>
<td>Traffic safety</td>
<td>.52</td>
<td>.48</td>
</tr>
<tr>
<td>Environmental safety</td>
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<td>.00</td>
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<tr>
<td>Social milieu</td>
<td>.48</td>
<td>.57</td>
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<tr>
<td>Attractiveness</td>
<td>.62</td>
<td>1.10</td>
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<tr>
<td>Pedestrian amenities</td>
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<td>.24</td>
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<tr>
<td>Land use</td>
<td>.05</td>
<td>.14</td>
</tr>
<tr>
<td>General atmosphere</td>
<td>.05</td>
<td>.00</td>
</tr>
</tbody>
</table>

Note: Data are the mean number of comments per person in this category and affective tone. “Sum” provides a rough gauge of how frequently each category was used per person (i.e., what people noticed); it is the sum across affective tone.

## References


Giles-Corti, B., & Donovan, R. J. (2002). Socioeconomic status differences in recreational physical activity levels and real and perceived access to a supportive physical environment. *Preventive Medicine, 35*(6), 601-611.


**Barbara B. Brown** is an environmental psychology professor in the Family and Consumer Studies Department at the University of Utah. Her research examines processes connecting physical environments to human behavior in areas related to human well-being (e.g., walkability, crime reduction, transit use, and place attachment).

**Carol M. Werner** is a professor in the Psychology Department at the University of Utah. Her research emphasizes the importance of supportive social and physical environments for effecting behavior change (e.g., recycling, transit use, reducing use of toxic products).

**Jonathan W. Amburgey** is pursuing a doctoral degree in the psychology graduate program at the University of Utah. His research interests include attitudes, persuasion processes, human-environment interactions, and behavior change.

**Caitlin Szalay** is an undergraduate psychology major at Berea College, who plans on pursuing a doctoral degree in social or community psychology. Her research interests include human environment interactions, preventive interventions, and values.
Micro-Brew Beer Preferences when Dining Out

**Author's Title:** Micro-Brewed Beer and the Patrons of Mid-Priced, Casual Restaurants  
**Author(s) Name:** Carl P. Borchgrevink and Alex M. Susskind  
**Year of Publication:** 1998  
**Search Related Keywords:** Aesthetics, Guest/Shopper, Identity and Status, Preference/Attitude, Programming, Restaurant/Cafe, Some College, Space Planning

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**Design Issue**

This study examined and compared preferences for micro-brewed beers among potential customers of mid-priced, casual restaurants in the Southeast, Pacific Northwest, and Midwest United States.

- The micro-brewed beer industry has grown in recent decades, with casual, mid-priced restaurants beginning to serve micro-brewed beers.
- Though customers may drink less when consuming micro-brewed beer (Moen, 1997), they are willing to pay higher prices for this type of beverage.
- Restaurant operators with a strong understanding of customer beer preferences may be able to capitalize on the growing popularity of micro-brewed beers by meeting customer needs and expectations.

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**Design Criteria**

**Author Identified:**

- Be aware of regional differences in customer beer preferences and examine each market specifically to best meet customer needs since the level of customer preference differs by region.
- Consider providing micro-brewed beer to more affluent customer groups since this group preferred this type of beer.
- Provide bar and serving space for different types of beers (i.e., national brand, imported, or micro-brewed beer) in the restaurant environment based on the preferences of relevant customer groups.

**Informal Design Identified:**

- Design restaurants with flexible serving capabilities so product offerings can be changed as customer interest in various beverages evolves.
- Consider providing space for brewing beer at restaurants to meet customer preferences for locally-brewed beers.
Key Concepts

- Most subjects dined at a mid-priced, casual theme restaurant once or more per week, and more than half ordered beer. Subjects who dined out once or more per week were more likely to order micro-brewed beer.
- About half of all subjects expected micro-brews to be offered and available in mid-priced restaurants. The majority of subjects exhibited no preference for a national-brand beer.
- Customers in the Northwest had the highest preference for micro- and locally-brewed beers, and preferred national brands the least.
- Those who preferred national-brand beers were less likely to expect a selection of micro-brewed beers, and were also less likely to order a micro-brew.
- Preference for micro-brews was higher among women and those with higher than average socioeconomic and education status.

Research Method

- Subjects (338) were 21 to 25 year-old undergraduate and graduate college students (48% male) from three universities in the Southeast, Pacific Northwest, and Midwest.
- Demographic information, preferences, and expectations regarding restaurant service in mid-priced, casual restaurants were measured using a questionnaire.
- Questions used to evaluate subjects' preferences addressed 1) ordering a recommended food or beverage, 2) the type of beverage preferred (distilled beverage, wine, or beer), 3) general consumption of alcoholic beverages, 4) expectations for a selection of micro- and locally-brewed beer, 5) the likelihood of ordering a micro-brewed beer, and 6) subjects' preference for national-brand beer.
- Correlations, chi-square, t-tests, and descriptive statistics were used to evaluate data.

Limitations

- Subjects surveyed generally had some college education, creating a homogenous sample.
Commentary

Though the study indicated preferences for micro-brewed beer, it did not determine if offering micro-brews at a restaurant would lead customers to select that establishment. Due to the sample, the results may not be generalizable to other age or demographic groups. The authors made recommendations for future research, calling for an investigation of the characteristics and preferences of additional customer groups.

Adapted From

Author(s): Carl P. Borchgrevink, Ph.D., CFBE, assistant professor, The School of Hospitality Business, Michigan State University, East Lansing and Alex M. Susskind, Ph.D., CFES, assistant professor, Department of Hospitality Administration, Florida State University, Tallahassee
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Issue: 2/3
Pages: 115-129
Expectations and Satisfaction with Art Museums

Author's Title: Measuring Expectations: Forecast vs. Ideal Expectations. Does It Really Matter?
Author(s) Name: Bronwyn Higgs, Michael Jay Polonsky, and Mary Hollick
Year of Publication: 2005
Search Related Keywords: 2D & 3D Design, Cognition/Perception, Development and Learning, Museum/Gallery/Zoo/Historic Site, Orientation, Wayfinding, and Spatial Movement

Design Issue

This study examined the relationship between expectations and satisfaction with an art exhibit at an Australian gallery.

- Directors at centers for the arts have increasingly focused on marketing as leisure options increase, public funding for the arts drops, and museums rely more on entrance fees.

Design Criteria

Author Identified:

- Be aware that museum visitors’ expectations may change through the course of a visit.
- Pay attention to the design of interpretive signage as visitors may regard such displays as an integral part of an exhibition.
- Be aware that prior to visiting an exhibition new visitors may be concerned with convenience issues (e.g., lines, tickets).

InformeDesign Identified:

- Consider design features that make lining up and purchasing tickets more pleasant, easy, and comfortable.

Key Concepts
As they relate to the service economy, expectations are people’s assumptions about what will happen (Boulding et al., 1993; Spreng et al., 1996) and are pertinent to evaluating service experiences because they offer a reference point for satisfaction judgments (Oliver, 1996). The higher one’s expectations, the harder it is to satisfy them (Oliver, 1996).

Visitors’ mental categories for evaluating the museum experience changed during their visit. For example, among visitors who had not yet seen the exhibit, tickets and lines were an important concern. However, visitors who had just seen the exhibit were not concerned with such issues. Visitors who hadn’t seen the exhibit yet considered interpretive materials as a separate entity from the art exhibit itself, while those who had seen the exhibit considered interpretive materials an integral part of the art exhibit.

Regular visitors to the museum had more detailed, realistic expectations of the visit. First-time visitors had a wider-ranging, less informed set of expectations.

In general, museums may be understood using five categories: the building and facilities, the collection and exhibit, interpretive signs and materials, services (i.e., cafeterias), and programs (Kotler & Kotler, 1998).

Research Method

Surveys were distributed at a major art exhibition every day of the week and at major viewing times. A total of 446 visitors who had not previously been to the exhibit completed surveys.

Surveys were collected verbally from some subjects before viewing the exhibition (195); other subjects (251) completed the survey independently after they viewed the exhibition.

The survey instrument ARTSQUAL was based on SERVQUAL (Parasuraman, Zeithaml, & Barry, 1985) with new and revised items to address issues specific to arts museums. The survey was tailored to each sample group (i.e., those that had not yet or had already visited the exhibit). The survey gathered data on subjects’ expectations of arts galleries, demographic and background information, and on satisfaction and service quality.

Descriptive statistics, z-tests, paired t-tests, factor analysis, correlation analysis, and reliability tests were used to analyze the data.

Limitations

Of the four types of expectations identified in the literature, only two types of expectations (ideal and forecast) were studied.

Different data collection methods (e.g., interview-based and independent surveys) may have impacted the findings.

Subjects’ prior experience with other museums was not investigated.
This study was specific to art museums and the results may not be generalizable to other service types.

Commentary

Reviews of literature on expectations in satisfaction and service quality research and on the museum experience as a service were included.

Adapted From

Author(s): Bronwyn Higgs, School of Hospitality, Tourism, and Marketing, Victoria University, Melbourne City, Australia; Michael Jay Polonsky, School of Hospitality, Tourism, and Marketing, Victoria University; Mary Hollick, School of Tourism, University of Ballarat, Australia
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Solar Light Collectors Within a Museum Setting

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**Design Issue**

This experiment introduced a lighting system (The Sunflower) designed to use solar power to illuminate interior spaces and tested its effectiveness in a museum installation.

- The ability of solar collectors to store solar power energy until it is needed is beneficial for museums, as they are typically used several daytime hours (or the entire day). The Sunflower prototype in this study demonstrates the individual components that make them effective.

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**Design Criteria**

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**Author Identified:**

- Consider using Sunflower-type lighting, as described in this study, for museum exhibit lighting.

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**Key Concepts**

- The Sunflower employs three main components: collectors (for storing solar energy), sun tracking device (to align the collectors with the sun), and fiber bundles (connected to the collectors and used to distribute light). The specific qualities that make each component effective are described below:
  - The collector type used had an aspherical lens (Catadioptric Concentrator Monoblock; CCM) in polymethylmethacrylate, chosen for its compactness (14.9 mm wide). Each
solar collector had an optical fiber bundle with seven terminations (optical fibers with core diameter of 1.5 mm; representing lighting points). Fiber bundles were selected over individual fibers because of the higher level of illumination and uniform distribution of light.

- In order to maximize sunlight exposure, a two-part sun tracking device helped point the solar collectors in the direction of the sun. The first tracking system provided daily readjusting towards the sun and the second system refined positioning. The system tracked with an angular precision of 0.1° and adapted to all weather and environmental conditions.
- The polymeric fiber was selected (over the glass fiber) for the prototype. Though glass fibers allowed for the closest correct color, polymeric fibers were selected for their ease of installation and durability. Filters were used to adjust the fiber color.

- Sunlight collection efficiency was an average of 98% for plastic lenses coated with an anti-reflection treatment and 91% for those without the treatment. The collection efficiency of anti-reflection coated lenses was affected primarily by moisture build-up and thermal changes (night and day). Without cleaning the solar collection efficiency of the lens decreased (97% to 93% in three weeks) then fluctuated (between 91% and 76%). Lenses that were cleaned decreased from 97% to 95% in efficiency over a ten week period. Ultra-violet radiation did not significantly impact the performance of lenses coated with the anti-reflection treatment.
- A museum in Florence, Italy successfully implemented a lighting scheme that incorporated the Sunflower with polymeric fibers and LED lighting. The LED lighting created adequate light distribution while the polymeric fibers in the Sunflowers helped create uniformity in the lighting scheme.

Research Method

- The Sunflower lighting system was designed to track the sun’s position to collect solar power. Its main elements (i.e., solar collectors, optical fibers, mechanical and electronic tracking systems) were selected or developed through individual experiments. Collection efficiency assessments and optical properties of different types of collectors were compared (Ciamberlini et al., 2003). A sun tracking technique was developed by experimentation and testing. Sunlight collection efficiency and focal distance of different types of plastic lenses (20) were measured to determine how the lenses should be produced and how reproducible they were. Plastic lenses were coated with an anti-reflection treatment and measurements of efficiency and focal distance were repeated.
- Image spot dimension and light distribution within the fibers was measured.
- The endurance of the plastic lens anti-reflection treatment was tested. Collection efficiency was monitored over a ten-week period of atmosphere exposure, measured before and after cleaning the lens each week. Degradation of color on the lens due to ultra-violet radiation exposure was also tested with continuous exposure to a UV lamp for many weeks. Fiber samples (2) were compared for optical performances by measuring sunlight and investigating fiber end illumination. Bundles of plastic and glass fiber samples were tested at noontime (illuminance of sun 950 lx to 1020 lx) and repeated on different days in different sun conditions. The specific needs of museum object illumination were considered for illuminance levels (mean illuminance
of 100 lx), light color (yellow-orange), and uniformity of light distribution. Photometric and colorimetric measurements were used to determine appropriate filters for plastic fiber and LED light.

- After The Sunflower prototype was completed it was installed in a museum in Florence, Italy inside large showcases (5 m or 2 m wide x 3 m high). Each sunflower system included solar collectors (8) coupled with fiber bundles (8), each with fiber terminations (7). Lighting configurations (2; plastic fibers or LED) were experimented within the showcases to determine the best application.

Limitations

- The author did not identify any limitations.

Commentary

Tables and graphs of results; and photographs of “The Sunflowers” and museum showcases with and without the Sunflowers were included. Future research using more detailed analysis (e.g., temperature, moisture, cloud cover, wind speed) to determine the level of deterioration of the lens was recommended.

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